High School eLearning:
An investigation into the desirable and workable features of an Internet eLearning resource to sustain high school learning communities

by

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Abstract

eLearning is rapidly spreading into the high school learning environment. This research attempts to find desirable and workable features of an eLearning resource that would sustain high school learning communities. The basis of the instrumental case study was the Cambridge International Examination course offered by an eLearning institution over a period of two and a half years. Data was gathered by means of various questionnaires, focus groups, interviews and quantitative analysis of computer log files of activity. Content analysis was performed by comparing research data with information (such as various eLearning models) obtained from the literature review. Similarities and differences were found in the way eLearning is used by high school learners and teachers versus university students and lecturers. Desirable and workable features were identified and the reasons for these explored. A number of suggestions are made that would contribute to sustaining eLearning for high school learners.

Keywords

ELearning, online learning, web learning, virtual school, high school, K-12, MOODLE, open source, Learner management system, content management system, eLearning, web learning, Internet, Internet learning

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1. CHAPTER 1 INTRODUCTION, BACKGROUND AND RESEARCH PROBLEM.

1.1. Introduction

Brief overview of the study

This study investigates desirable and workable strategies in an eLearning resource for learners at a high school level. A resource with features of this kind is usually only used by students in a university context.

The delimiters in this research are as follows. The sample selected for research consisted of high school learners between the ages of thirteen and eighteen, who, at the time of the research, were all in South African grades 8 to 12 (what used to be called, in South Africa, standards 6 to 10). All of them were at the time studying various subjects through the medium of internationally recognised Cambridge courses for which they had enrolled.

The pedagogical model that I have implemented in the case study is based on mediated instruction. While the learning materials are designed for independent learning, they are from time to time supplemented with direct face-to-face tutoring. eLearning at a high school level in South Africa is the exception rather than the rule and a very small percentage of all high school learners pursue their studies through this medium. My purpose is to investigate the extent to which and the manner in which the learning resource affects and determines the dynamics of interaction (1) between the eLearning resource itself and the students, (2) between the students and other students using the resource, and (3) between the teachers and the students.

While this study is mainly interpretivist-interactionist in design, it also incorporates elements of a pragmatic-functionalist model. The study situates this specific case in its context and provides suggestions as to how the resource may be improved. Interpretation will be used in the analysis of the data.

Although I have based this study on an interpretivist-interactionist theoretical framework, I have incorporated a pragmatic-functionalist bias by attempting to understand this specific case in its context. Chapter 5 offers suggestions about how the resource might be improved. The case study itself focuses on particular elements in the eLearning resource and in the high school eLearning community. It also describes the way in which learners used the resource in practice while engaging with their courses on a daily basis.

My data collection methods utilised questionnaires, interviews and focus groups as well as analysis and synthesis of texts.

The verification methods that I used included member checking, peer review and the crystallization process (triangulation).

1.2. Background

1.2.1. eLearning has seen a remarkable growth.

eLearning is being used more and more widely in tertiary education as universities increasingly resort to online courses as a method of tuition.

While eLearning is well established in tertiary education, it is also being increasingly utilized by high schools throughout the world and in the United

States in particular. This kind of learning has been made viable by the increasing sophistication and affordability of new technology such as the personal computer and by reliable broadband connectivity that makes prolonged Internet use in classroom, home, and libraries both logistically practicable and economically feasible (NCES, 2002).

The United States, however, is not alone in implementing eLearning at high school level. In Europe and Australia, for example, more and more parents and educators are becoming interested in eLearning as a means of educating school-age children. Significant attention is being given in these countries to the potential of eLearning as an alternative to conventional schooling. Under the heading "Adapt school curricula to enable new ways of learning and information and communication technologies", more than 2000 projects were launched in Europe in 2002 in the education and training sector as part of a long-term campaign to provide the knowledge and skills that Europe needs to remain competitive in a digital age (Commission of the European Communities, 2002).

Research into eLearning in secondary schools has, for various reasons, not yet come into its own in South Africa even though the South African government is promoting major initiatives to establish the necessary technological infrastructure in South Africa that will support eLearning for all levels of education (Online, 2006, Thuthong Educational Portal SA, 2006). A database search for research into eLearning undertaken in South Africa (see the section "Current and past research in South Africa in the Literature review" for full details) reveals that nearly all eLearning research at this stage focuses on e-activity at university level.

Since eLearning is already being used in secondary schools (Paloff, 2001), the following question becomes pertinent: "Can it be assumed that the same

principles that apply to tertiary post-school learning also apply to school-aged learners?" This question is assumed in the research question that guides this research.

Writing in acknowledgement of more research specifically in this field, Cavanaugh (Cavanaugh, 2004b) states that only a negligible amount of information about school-going learners and their experiences with online learning is available in the United States. In her view it is important to know whether the eLearning strategies that are applied in higher education will also work for high school learners. She also asks whether eLearning at the high school level can be informed by a hybrid of eLearning theory that draws on research into tertiary-level eLearning and research into secondary-level eLearning. Cavanaugh answers this question affirmatively even though she is of the opinion that high school or secondary school distance education is fundamentally different from the kind of eLearning that is suited to university students.

1.2.2. Setting of this study

This study is set in South Africa, a country of dramatic changes and stark contrasts that has nevertheless emerged as a visible presence in the world of eLearning. While serious shortages, appalling conditions and a lack of even basic amenities exist in many schools, the government continues to spend large amounts of money on getting schools equipped and connected. While some learners eagerly try to gain admission to public schools, others are moving out of overcrowded schools. Africa is a continent with a deep digital divide between those who possess and those who are without various forms of digital technology. Efforts to close this digital divide are being made by institutions such as the World Bank (World_Links-World_Bank, 2004) and Gauteng Online

(Online, 2006). Digital technologies are regarded as a vital accessory in many developing countries such as South Africa, and the ability to communicate instantly by means of a technological device such as an Internet-linked computer or the cellular phone is highly valueeWhatd as a status symbol by upwardly mobile people in South Africa and other developing countries (Dryden, 1999).

1.3. Problem identification

As has been noted above, eLearning products and research tend to focus very largely on post-school learners. What kind of eLearning resources would best cater specifically for the needs of high school learners, is as yet unknown.

My research builds on the foundation of two meta-studies that preceded it. The first is that of Bernard (Bernard, 2004) , who evaluated empirical literature produced between 1985 and 2002, that focused on comparisons between classroom instruction and distance education instruction. The second meta-study is by Cavanaugh (Cavanaugh, 2004b), who dealt more specifically with the same field that this research covers, namely the education of school-going children by means of distance education. She evaluated studies on the effects of distance education on student educational outcomes between 1999 and 2004.

The problem addressed in this research is to what extent the different elements of an eLearning strategy may work towards sustaining a learning community for high school learners. What, in other words, are the desirable and workable elements of an eLearning resource that will sustain high school learning communities?

1.4. Purpose and objectives of study

Reeves (Reeves, 2006) outlines the difference between research goals and methods, which, he says, researchers often fail to distinguish. He describes six major types of research goals that are commonly pursued by educational technology researchers. These goals are theoretical, predictive, interpretivist, postmodern, design-developmental, and action-evaluative.

The type of research goal for this study

In terms of Reeves's taxonomy, this research has both interpretivist and development goals since it sets out to try to understand how eLearning for high school learners works by interpreting selected aspects of learner performance and teacher instruction. This research also aims to contribute to existing theory about the use of eLearning specifically for high school learners and to suggest guidelines for future development.

Purpose and objective

The specific purpose and objectives of this study are to identify and evaluate desirable and workable strategies in an eLearning resource and in an eLearning community for high school learners in terms of the following four broad elements that are investigated in this study:

- pedagogical issues
- learning community issues
- communicative, collaborative and social issues
- technological and instructional design issues

1.5. Relevance of and need for the research

The two most important reasons why this research is relevant and needed are as follows:

- A recent significant meta-study in the United States by (Cavanaugh, 2004b) concludes that further research in the field of high school eLearning is necessary. This research is designed to make one such contribution in this field.
- The same study concludes that high school eLearning will grow in importance because educational authorities will use it as a means to compensate for educational deficits. This study suggests specific ways in which eLearning can be made desirable and workable. This makes it both relevant and necessary.

I shall now briefly review the input of various authors who have contributed to study and research in the field of high school eLearning regarding the relevance of such research.

While elementary and secondary students have been taught by means of electronic distance learning systems since the 1930s, the development of online distance learning schools is a relatively new phenomenon in 2006 (the time of writing). Cavanaugh also believes that online virtual schools may be ideally suited to and may successfully meet the needs of those who want more schooling choices and who desire to be educated in workplace-related skills in the circumstances of the 21st century. The growth in the numbers of students who are learning online throughout the world and the importance of online learning as an increasingly utilized solution to educational challenges has drastically increased the need for researchers to make a close study of the factors that affect student learning in virtual schooling environments.

Cavanaugh (Cavanaugh, 2004b) states: “It is no longer enough to ask whether distance education is effective; we now need to understand why it is effective or

not." This research tries to establish the extent to which certain elements in eLearning may be effective in a high school context.

Two other meta-analysts, Bernard and Abrami (Bernard, 2004), comment on Cavanaugh's work by saying that the field in which she works, namely eLearning in schools, is a field that is less developed than other branches of eLearning. This confirms the general consensus that high school eLearning is a field of study that needs to be extended and explored.

Several official bodies in Europe (Commission of the European Communities, 2002) have provided substantial funding to commission research into all aspects of virtual high schooling. This also confirms the importance and relevance of research in this area of eLearning studies.

Vrasidas (Vrasidas, 2003) notes that there is a strong need for more research and for evaluation studies that will contribute towards increasing the effectiveness of high school eLearning and that will increase our knowledge of relevant distance education theory and best practice.

Rapid changes and refinements in technology and in educational formats over the past decade have resulted in only a small body of research that is relevant to present conditions and that can serve to guide instructors, planners and developers (Cavanaugh, 2004b). Cavanaugh continues to say that this deficiency may tempt us to apply or adapt findings from studies of ordinary school classroom learning or adult distance learning (which are themselves in short supply) to school eLearning. But she adds that eLearning at school level is intrinsically unique and that a great deal more research is needed if eLearning school environments are to function optimally.

Jochens (Jochens, 2004) says that research into the way in which pedagogics and the technical and organisational spheres of eLearning interact with one another is needed. He also regrets the fact that new technologies are simply imposed onto eLearning contexts with an accompanying assumption that old theories are still applicable in such circumstances without any kind of modification or original critique. It is possible that new instructional methods may be required. This research suggests some relevant and needed answers to these dilemmas.

1.6. Research question

1.6.1. Main research question.

To what extent and why are certain features of an eLearning resource workable and desirable for sustaining a high school learning community?

The research set out to answer the following question:

1.6.2. Supporting questions.

In order to answer the main research question, the following sub questions were devised:

1. To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?

2. Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?

3. In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?

4. How do certain technological aspects and instructional design issues affect a high school elearning resource?

The following table describes the research context and the subsidiary questions of the research.

Research context	Research subsidiary questions
The context for this instrumental case study is the online eLearning Cambridge course for which learners enrolled in the two years 2004 and 2005 inclusive at a distance education institution in Pretoria, South Africa, with the view to obtaining an external Cambridge IGCSE qualification. A number or learners were "international" students (which means they were not resident in South Africa). A modified version of the open-source eLearning application, Moodle, was implemented.	To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?
	Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?
	In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?
	How do certain technological aspects and instructional design issues affect a high school eLearning resource?

Table 1 : Research context and subsidiary questions

The table describes the research context and the subsidiary questions of the research

The research is conceptually represented in the following figure.

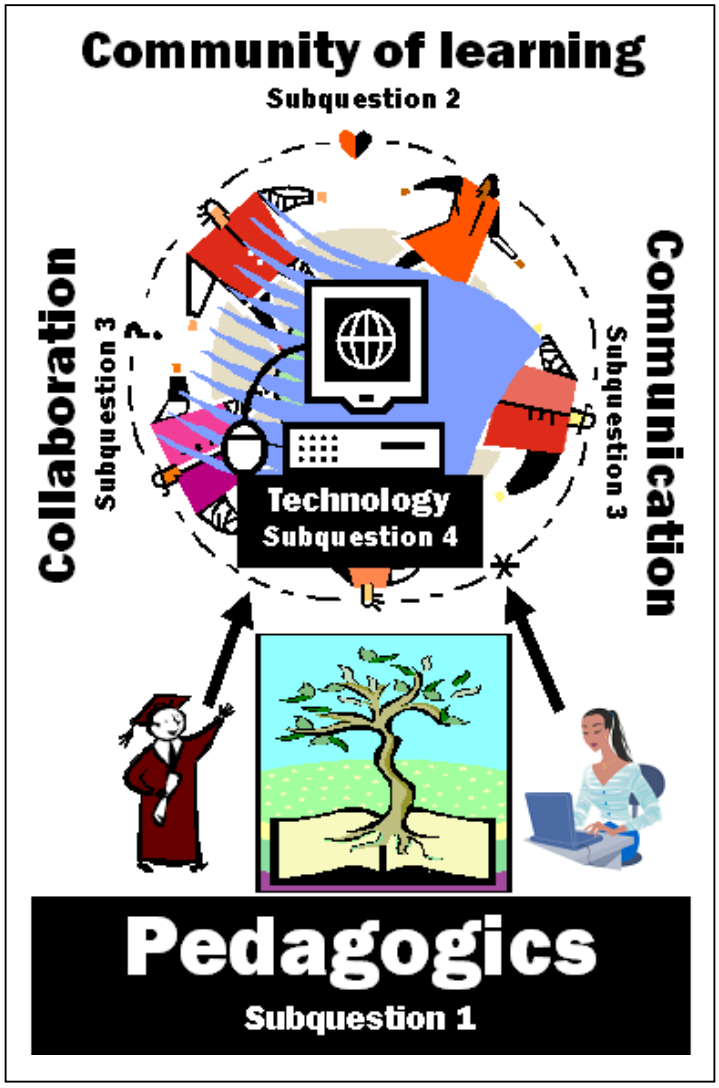

Figure 1 : Conceptual representation of eLearning for high school communities of learning
This figure shows how the researcher conceptualizes eLearning for high school learning communities.

The four research sub-questions together with an outline of the issues in each of these are dealt with in the following section.

1.6.2.1. To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?

How do learning theories (pedagogics) inform an eLearning strategy to sustain a learning community for high school learners?

Which elements in pedagogical theories and eLearning theories inform a high school eLearning strategy and why? How do learning theories (pedagogics) and eLearning theories inform an eLearning strategy that sustains a learning community for high school learners?

There are several other questions embedded in this question. They are: What are the pedagogical issues that influence eLearning for high school learners? What pedagogical issues derived from learning theories and eLearning theories will have a bearing on an eLearning resource for high school learners and why? What can we learn from pedagogics (learning theories) and eLearning theories about eLearning high school learners?

This section will include a specific investigation into educational learning theories, various pedagogical issues in relation to eLearning in general as well as in relation to specific eLearning models.

1.6.2.1.1. A general outline of educational learning theories

The following are some of the questions that my investigation into pedagogical issues and questions raised: What was the learners' response to their own learning? To what extent was the eLearning resource either an aid or an obstacle to learning? Were learners satisfied with the feedback that they got? To what extent can collaborative learning be effectively stimulated? To what extent was the eLearning resource effective in supporting the needs and learning of the high

school student?

1.6.2.1.2. A summary of cognitive learning theories – the Six Cs model

De Villiers (De Villiers, 1999) points out that because the Internet is increasingly used to deliver media and communication for educational purposes, guidelines for the quality assurance of instructional sites should incorporate established principles of instructional theories and apply them to these unique environments. De Villiers has investigated current directions and developments in learning theories and instructional design as well as various positions that have been taken on these points. She has presented this information in a concise model called the Hexa-C Metamodel of Instructional Theory and Design. The six components that De Villiers included in her model are: cognitive science, constructivism, component-based instruction, customisation, creativity, and collaboration.

From the literature on Home Schooling comes another component of the Hexa-C model that could itself be the topic of a separate thesis. This is companionship which I extracted from the home school movement (Klicka, 1995).

Companionship may indeed be a key ingredient for success.

1.6.2.1.3. Multiple intelligences

The popular ideas of Gardner (Gardner, 1993) may inform an eLearning strategy.

To what extent do the multiple intelligences described in Gardner's Theory of Multiple Intelligences exert an effect on the eLearning resource or community? They are intelligences that manifest through human activities associated with

words, questions, pictures, music, moving, socializing and being alone. Gardner challenges the widely held notion that intelligence is a single general capacity possessed by every individual to a greater or lesser extent. Gardner's point of view is that since human beings do in fact give evidence of having multiple intelligences, each individual person must therefore possess a unique cognitive profile.

1.6.2.1.4. Models and theorizing about e-learning

Although conventional pedagogical theories can be applied to eLearning in a general kind of way, the widespread proliferation of this new medium of learning is giving rise to new theories that focus specifically on various aspects of eLearning. New eLearning models continually emerge as new research findings in the area of eLearning become available. So many new eLearning models and theories occur in the literature that it would be impossible to include them all. I therefore decided to include those that are most relevant to this research and those that tend to appear most frequently in the literature.

1.6.2.2. To what extent and why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?

Frequent references are made in the literature to the creation, existence and sustaining of learning communities. An analysis of the literature reveals a number of points that are frequently made in this regard. Among them are:

- Learning and thinking styles, and gender and personality issues
- Affective-emotional issues that may influence an eLearning resource and community. (I will examine motivational factors, impressions, likes and

dislikes, enjoyment and fears.)

- Learning community-specific elements are prominent in the literature. Apart from user issues, researchers have investigated a number of elements that are unique to online learning communities. These include interaction, help, support, involvement by all concerned, and participation. Elements extracted from the literature include interaction, collaborative work, discussion, a sense of community, information about flexibility and accessibility, a strong focus on real learning in all its forms, and the attitude of participants.

1.6.2.3. To what extent and why do certain communication, collaboration and social elements influence a high school eLearning resource?

There is a strong focus on these issues, and a great deal of research is currently being devoted to the communicative and collaborative aspects of eLearning. Communicative and collaborative elements probably form the crux of current thinking and theorising about eLearning. I shall investigate these in tandem with social interaction issues.

1.6.2.4. To what extent and why do certain technological aspects and instructional design issues affect a high school eLearning resource?

Although any one of the issues from those indicated above could probably form the subject of a thesis, I decided that it would be beneficial for my research to pursue a wider rather than a more narrow form of investigation into the desirability and workability of an eLearning resource. It is for this reason that I have incorporated various technological and technical lines of investigation into the ambit of this study.

I have therefore pursued the following questions in this research. To what extent did the technology that was used support learning? What technological problems did learners encounter as they participated in the system? What technological advantages and disadvantages relating to computer hardware, software and Internet bandwidth can be identified in the implementation and support processes? What are the implications of the above for the system delivery, accessibility and operability?

1.7. Research context

The context for this research (Stakes, 2000) is the online eLearning course for which learners enrolled at a distance education institution (Brainline, 2006, Collins, 2005) between 2004 and 2005 in Pretoria, South Africa, with the view of obtaining an external Cambridge IGCSE (International General Certificate of Secondary Education) qualification. (Cambridge International Examinations, 2006).

A number of these learners were "international" students (which means that they were not resident in South Africa). This study may also be relevant to the international learning community because learning communities are not restricted by national boundaries. This study will show how eLearning for high school learners can be used transnationally.

1.8. Rationale and background for the study

1.8.1. Why this study was undertaken

While working in the field of information technology as a developer and provider of curriculum-related materials to children at school, I became

interested in the problem of how to extend support services so that they included an eLearning resource. As a result of this, I became interested in finding out why certain elements of an eLearning resource work or do not work – and indeed why any system as a whole either works or does not work. The challenge of studying eLearning offered me an opportunity to integrate academic study, practical skills and personal development.

The rationale for this study is consequently to discover what features of an online resource are desirable and workable when it comes to sustaining high school learning communities and why. This study also attempts to determine how valuable the contribution of a learning community is in the promotion of learning, and which elements of the online learning resource are most valuable for sustaining a learning community and why. I will investigate these issues from a pedagogical, community, communication and technological point of view in order to develop a holistic picture in this specific case.

The history of this type of group has a bearing on why this study was undertaken. I started out working with students who were engaged in completing their high school careers by means of an international Cambridge course in 1999. Even though I applied the standard methods and philosophy of distance education as diligently as I could to my business at that time, the pass rate of the learners was deeply unsatisfying and stood at around 10% (Cronje, 2004). In the years after 1999, I went to great lengths to apply various alternative methods of presenting and managing the courses and the students. This must have had a beneficial effect because by 2003 the pass rate had risen to around 80% – a much more satisfactory level of success for both the learners and my business.

In this study I hope to shed some light on why the system worked so well and why the success rate improved so dramatically in the year before I implemented the eLearning resource. But even after I had implemented the eLearning resource, the pass rate remained at between 80 and 90%. The figures themselves might lead one to conclude that an eLearning resource has no role to play, or that it was indeed the implemented eLearning resource (or a combination of the eLearning resource and other factors) that sustained this level of success in the learning community.

In 2004 I offered a high school learning programme using the eLearning resource Moodle (Dougiamas, 2004), which is an "open source" program (Perens, 2004), for students in the Cambridge section of the Brainline high school system. This implementation is the basis of this study.

My purpose in undertaking this study is to describe how and why the eLearning resource worked and the specific ways in which it benefited the students and the learning community of which they formed a part. My ultimate hope is that these desirable and workable features could be replicated in such a way that they will benefit learning communities throughout the world.

1.9. Uniqueness of the study

There are two reasons why this study is unique. Firstly, very little research has been carried out into high school learners who use a university-style eLearning resource, or any eLearning resource. This was confirmed by Cavanaugh in a recent meta-analysis (Cavanaugh, 2004b). This study will therefore contribute to a growing body of knowledge in this sector.

Secondly, the learners themselves belonged to a unique group in that they were all high school learners. All of these learners were exposed to a university-style eLearning resource and were required to work independently, to communicate, to learn collaboratively and to master demanding academic material. English was only the second language for approximately half the group. The research describes how these learners experienced this specific kind of learning environment and what the desirable and workable features are that can be identified in this eLearning resource.

Since the current state of available knowledge about high school learners and an eLearning resource is incomplete, this study will also provide explicit information about:

- the extent to which current learning theories and the eLearning resource were compatible with high school learners of this kind
- the extent to which the elements of the eLearning resource were desirable and workable for high school learners
- what the role of a learning community is in relation to an eLearning resource
- how an eLearning resource can sustain a learning community for high school learners
- how the communication features of the eLearning resource contributed to support the learning of these high school learners
- the technological aspects of implementing an eLearning resource for high school learners
- the quantitative data generated by the study and how it can be interpreted to maximize the implementation and operation of the eLearning resource

1.10. Purpose statement

The purpose of this study is to investigate the desirable and workable features of an eLearning resource that sustained a particular learning community of high school learners. By doing this, the study will contribute to the development of eLearning resources and learning communities.

1.11. The scope of the study

1.11.1. What is included in the study

The research focused on the operation in practice and context of an eLearning resource and the learning community who used it. The community here refers to a group of high school learners who enrolled in a private institution with the intention of obtaining a Cambridge school-leaving certificate. The research data was obtained over a period of two years in South Africa.

1.11.2. What is excluded from the study

The design and development of course material is not included in the study.

The absence of any pre-test or post-test study – Although I am inclined to agree with Kozma (Kozma, 1994) and Cobb (Cobb, 1997) that eLearning and electronic media do make a difference to learning, I did not include any pre-test or post-test research strategy in the design of the study. And while I am also sympathetic to Clark's (Clark, 2000) contention that media do not influence learning, I accept Russell's (Russel, 1999) view that when it comes to performance, there are no significant differences between delivery media. I tend to agree with Cobb (Cobb, 1997) that some media make learning easier because

they reinforce and strengthen the learner's cognitive capacity.

The "No Significant Difference Phenomenon" was once again confirmed by Cavanaugh (Cavanaugh, 2004b) whose meta-analysis showed that distance education can exert the same effects as traditional instruction on measures of student academic achievement. This study does not therefore attempt to compare eLearning and traditional instruction by means of pre-tests and post-tests.

1.12. Related research

The research context in South Africa

In order to position this research specifically in the South African context, I undertook a search into sources of information about research in South Africa, past and present and extended the search through all available international databases to include doctoral theses internationally.

I searched the following databases to find related research (Sabinet Online, 2006):

- Current and completed research – NRF (Sabinet Online, 2006)
- Electronic Theses and Dissertations ETD (Sabinet Online, 2006)
- NDLTD – International Theses (Sabinet Online, 2006)
- UCTD Theses and Dissertations at South African universities (Sabinet Online, 2006)
- SA e-Publications (Sabinet Online, 2006)
- The Internet via search engine Google (Google, 2006)

Related Research - SUMMARY of search results (Search refreshed and updated February 2006)		
Search on keyword	**Number of items reported**	**Number of items useful and included**
online	67	20
eLearning, eLearning	19	6
School and computer	367	2
Web-learning	13	2

Table 2 : Related Research Search Results Summary Grid

Although some of the related research may be indirectly relevant to this research, it was included in the literature review as part of the "funnel" approach to the literature review.

The number of research projects focusing on eLearning shows that it is an active field and that research of this kind is relevant. A detailed analysis of international and South African research is included in **APPENDIX** 1. A summary is presented in the following paragraphs.

International research - International degrees presented in this field covered the effect of conferencing on outcomes, online experiences and factors associated with successful high school educational programs. Cain (Cain, 2005) found that computer mediated communication did make a difference in outcomes. Ma (Ma, 2005) reported that learners view computer use at schools as limited and that more constructivist elements are needed. Murphy focused on the implementation of eLearning projects in Tennessee (USA) and made implementation recommendations. None of these studies provided substantial material that could be used in this research.

South African research – The research found in South Africa relates to higher

education. There are South African theses dealing with social networking, business applications, quality assurance, online facilitators, communication, mathematics and language teaching on the web, instructional systems design, a virtual campus and asynchronous tools. Although only Giladi (Giladi, 2005) covered school eLearning (done in Israel, presented in South Africa), I was able to extract valuable information from all the research but especially from instructional systems design information (De Villiers, 2005). In South African articles a wide range of topics are covered on higher education eLearning. These include administrative matters, evaluations, effectiveness, comparisons with conventional learning, social factors, learning theories, practical implementations, trends and delivery. Although none of the material covered high school eLearning in particular, I was able to extract valuable information from all this research.

1.13. Research approach

This research positions itself as "soft science". That is to say, it is qualitative research that incorporates some quantitative elements. In the words of Wolcott (Wolcott, 2005), the researcher is a "maker of quilts" who sews together selected pieces so as to arrive at an understanding of what happened in the selected case study.

The research approach

A qualitative research method, with some quantitative elements, was used in this study. The aim of a study such as this is to observe events in their natural settings and faithfully to describe and interpret the meanings that people attribute to phenomena. The goal of this research is defined by Babbie as describing, understanding and distilling practical suggestions (Babbie, 2002).

Theoretical framework

A theoretical framework, as explained by Jansen (Jansen, 2004), is a device that enables a researcher to make sense of the data that has been collected. In such a framework the researcher attempts to refrain from making a priori decisions about the data. Explanations are ultimately extruded through continuous reflection on the data during the course of the study.

The value of this approach is that while one may often find what one was looking for in research, new ways of perceiving a subject or new ways of categorising or applying data that has been gathered may be discovered if the researcher keeps an open mind (Silverman, 1993). Throughout the literature review I reflect and comment on the material, and in some cases I expand the material beyond its original context.

Sampling

The purposive sampling that was selected for this study does not permit any direct generalisation of the research results (McMillan, 2003). Instead it allows different perceptions about the eLearning system to be recorded. These variant perceptions may be useful in further research studies.

1.14. Research design

1.14.1. Type of study

The study is an instrumental case study (Stakes, 2000). An instrumental study consists of a particular case that provides insight into a specific issue such as (in the case of this research) the performance of the eLearning resource as it sustains

a learning community. In this case the instrument used to understand a high school learning community is the employed eLearning resource.

1.14.2. The subject and participants of the study

The subject of this research is the eLearning resource used. The participants were a group of high school students who studied online (and offline) with the intention of obtaining a Cambridge international school leaving certificate. They were in the age group 13 to 18 years old and were enrolled in an online learning institution called Brainline. They were mostly situated in and around South Africa, although some of them lived in Europe, in the United States, Saudi Arabia and other countries. Their parents usually had ties with South Africa. They were of mixed gender and race, although they were predominantly white.

Why I chose this case study

I chose this case study because I am interested in eLearning and have been involved in the development of alternative forms of private distance education for a number of years. Because this group was enrolled and available in the organisation which I owned (The Brainline College), it suggested itself to me as a suitable research group.

This group of students was the first group to use the eLearning resource. Because the eLearning resource is a university-style eLearning resource, it offered me an ideal opportunity to understand how suitable this technology might be for students in this age group in the first two years of the implementation of such a resource.

At the time of this research, I could not locate any other similar learning

community with the same toolset in South Africa. Circumstances seemed to align themselves at the right time and the right place with properly qualified people to make this research possible in 2004 and 2005.

More information about the research group

The gender spread was approximately equal and the learners ranged between 13 and 18 years of age. About half of them were in their first year of enrolment with the institution while the other half had been enrolled with Brainline for more than a year. English first-language students account for about 50% of the group, and the remainder take English either as a second or a third language.

1.14.3. Research methodology

1.14.3.1. Research method

This research follows a mixed research method approach (Reeves, 2000) by combining quantitative and qualitative methods. It includes a literature review that explores, analyses and synthesizes the field of eLearning theories. It also includes case study evaluations that combine qualitative and quantitative research (which is why it may be classified as a mixed research method).

1.14.3.2. Data collection methods

Data obtained from the web server on which the eLearning course was run was analyzed. Questionnaires with research questions that were designed to elicit both quantitative data and qualitative information were used. An interview protocol with open-ended questions was drawn up and the interviews were recorded before being transcribed.

Data collection instruments				
Data collection instruments			Authenticity and trustworthiness	
Observe	Select / Analyse data texts	Interview	Member checks and peer reviews	Crystalization
Researcher observations	Literature study. Messages in discussion forums. Formal tests / assignment responses. Questionnaires	-Focus groups interview with learners -facilitators and technical staff	Verification with students, facilitators and administration staff.	The telling of the same story by means of data gathered from different data collection instruments.

Table 3 : Data collection instruments
The tables above show data collection instruments and authenticity and trustworthiness indicators. The data collection methods were suited to the envisaged research objectives.

A more expanded version of this table is included in Chapter 3 together with a table linking the subquestions to the data collection instruments.

1.14.3.3. Matrix of research questions and methods – The Intellectual Puzzle

A data collection matrix was developed which tabulates the methods and instruments used to answer the research questions. The data collected contributed to answering the research questions. The intellectual puzzle for this study is included in Chapter 3 and 5.

1.14.4. The researcher and his position in the study

There is no value-free science (Denzin, 2000). It is probably impossible to "set

aside" biases. In my opinion it is better for a researcher to confront biases, viewpoints and prejudices head-on and declare all possible information about himself, his motives, intentions, etc.

Information that is fashioned by a human agent is always “cooked”. In other words, “it is always selected, filtered, interpreted, and extracted from a background set of assumptions that are implicit (rarely explicit)” (Burbules, 2004).

In the interest of objective evaluation by others, the researcher declares the following information. I am a minister of religion and a founder member of Brainline (Brainline, 2006), the institution in which the research was conducted. As a researcher I was closely involved with the subjects Economics, Business Studies, History, 3D Art and Design, and Computer Studies, and with the case study, and I worked as part of the technical team in the institution. Although I was closely involved with the learners throughout the research process, and although I obviously cared for them as the principal of the institution in which they were enrolled, I was constantly aware that I was also the owner of a business that was predicated on profit.

It is my observation and belief that neither of these two aspects of my involvement in the research institution interfered with the process or validity of the research because I was not studying either the learners or the success of the business model which I was using at the time. My intention throughout the research process was to determine the extent to which the tool (i.e. the online resource) that I was using served both myself, as an educator and a business person, and the learners.

By paying attention to whatever inherent biases may exist, it is my intention to let the data speak for itself. It is my opinion that I have never had any motive or reason to advocate any one particular system above any other. In short, I believe that research represents a serious attempt to learn whatever may be useful from the available facts and to adapt what may be learned here to other similar cases and situations.

Although I as a researcher am biased towards believing that eLearning does make a difference and does add value, I am not blind to the realities of the "No Significant Difference Phenomenon" initiated by Clark (Clark, 1983, , 1994) and rebutted by Kozma (Kozma, 1994) and Ullmer (Ullmer, 1994).

1.15. Value of the research and beneficiaries

The main contribution of this research is to provide educators and private institutions with possibilities for optimising the usage of eLearning resources, and thereby benefitting learners involved in eLearning.

Comparisons with other research enhance the value of research. To enable comparisons with other research, I describe the case in detail even though the primary aim of this research is not comparison. Comparative description tends to be the opposite of thick descriptions (Geertz, 1973), which is the desired result in this study. Comparisons may be made to online learning in other settings, countries, cultures and income groups.

Kress (Kress, 2004) states that new theories are needed for the new technology on hand. Current theories of learning are founded on theories of learning

developed in an era constituted quite differently around the assumptions of more stable and repeatable systems. These previous theories may be unable to meet the demands of the instant communication era. This research may help point to new theories.

Beneficiaries of this research may include: learners, who will directly benefit from improved eLearning resources, designers and sellers of instructional software, open-source programmers in PHP and MysQL, schools, home school learners, private and public schools, book publishers, web publishers, curriculum suppliers.

1.16. Overview of the research report

In this chapter the main research problem regarding the desirable and workable features of an eLearning resource for high school learners was discussed. The research context, rationale and background for this study were outlined. Furthermore I discussed why this research was undertaken, its uniqueness, value and purpose. All of these are linked to the main research question. Related research both in the local and international context was indicated. I also sketched the research approach, design, methodology as well as the procedures applied to test authenticity and trustworthiness.

The remainder of this research report consists of four chapters. Chapter 2 consists of the literature review, including my reflections and evaluation of the implications of the work of others in the field for this study. It includes investigations related to the research sub questions about underlying pegagogics, communication, learning community issues as well as the technical

aspects of an eLearning resource.

Chapter 3 outlines the research methodology, which is primarily a qualitative approach with some quantitative elements.

Chapter 4 tables the research results of the various research tools including questionnaires, focus groups, interviews and analysis of the text in the eLearning resource.

Chapter 5 provides the conclusions and recommendations of the study. It concludes the research by comparing literature, providing insights, making recommendations and suggesting topics for further research.

Chapter 1
Introduction, backgroud and research problem

Chapter 2
Literature review

Chapter 3
Research design and methodology

Chapter 4
Analysing the case, evidence and discussion

Chapter 5
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Introduction.
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Throughout the literature review, I identified pointers towards answers to the research questions. These are indicated as either having a positive reach meaning something that could work, or it could have a negative reach meaning that it was something found not to work in practice.

Positive pointers are indicated in green, and negative pointers in red.

Literature review POSITIVE pointers

Literature review NEGATIVE pointers

2. CHAPTER 2 LITERATURE REVIEW

> *New knowledge cannot be created by people who do not know what is already known* (Moore, 2003).

2.1. Structure and principles of this literature review

2.1.1. Introduction

The aim of the literature study (Saunders, 2000) is to undertake a critical survey of the current state of knowledge in the selected research area.

2.1.2. Grand structure of the literature review

Certain themes repeatedly surfaced as the literature survey progressed. These themes were pedagogics, communities, user attributes, learning and cognitive styles, collaboration and cooperative learning, and communication and technological features. I reduced these themes to four subsidiary questions which – taken together – add further dimensions to the main research question of this study.

The conceptual model that emerges from the literature review of the main research question may be conceptualised in the way described below:

The main research question broadly implies the following concepts:

- learning

- eLearning resource
- specific features
- high school learners
- learning communities

These elements of the main research question, supported by other themes contained in the subsidiary questions, lead to certain research nodes in the literature review that open out into whatever information is available in current thinking in the field.

The main question and subsidiary questions suggested by the literature review lead directly and logically to the research procedures and methods described in chapter 3. These research procedures, which are epistemologically implicit in the principles and aims of the literature review, consist of interventions that were planned and executed in order to arrive at a clear understanding of the concepts used in chapters 4 and 5.

2.1.3. The literature review process

I used the literature review to generate pertinent ideas that could be further refined. I also engaged in critical reflection on these ideas in order to evaluate their origins, meaning, and status in the research (Saunders, 2000). During the course of the study I continuously returned to the literature review to update it, refine it, and add new information and observations.

The following table shows how I adapted the literature review process of Saunders (Saunders, 2000) by simplifying it, and how I engaged in the reiterative actions that constituted the interventions.

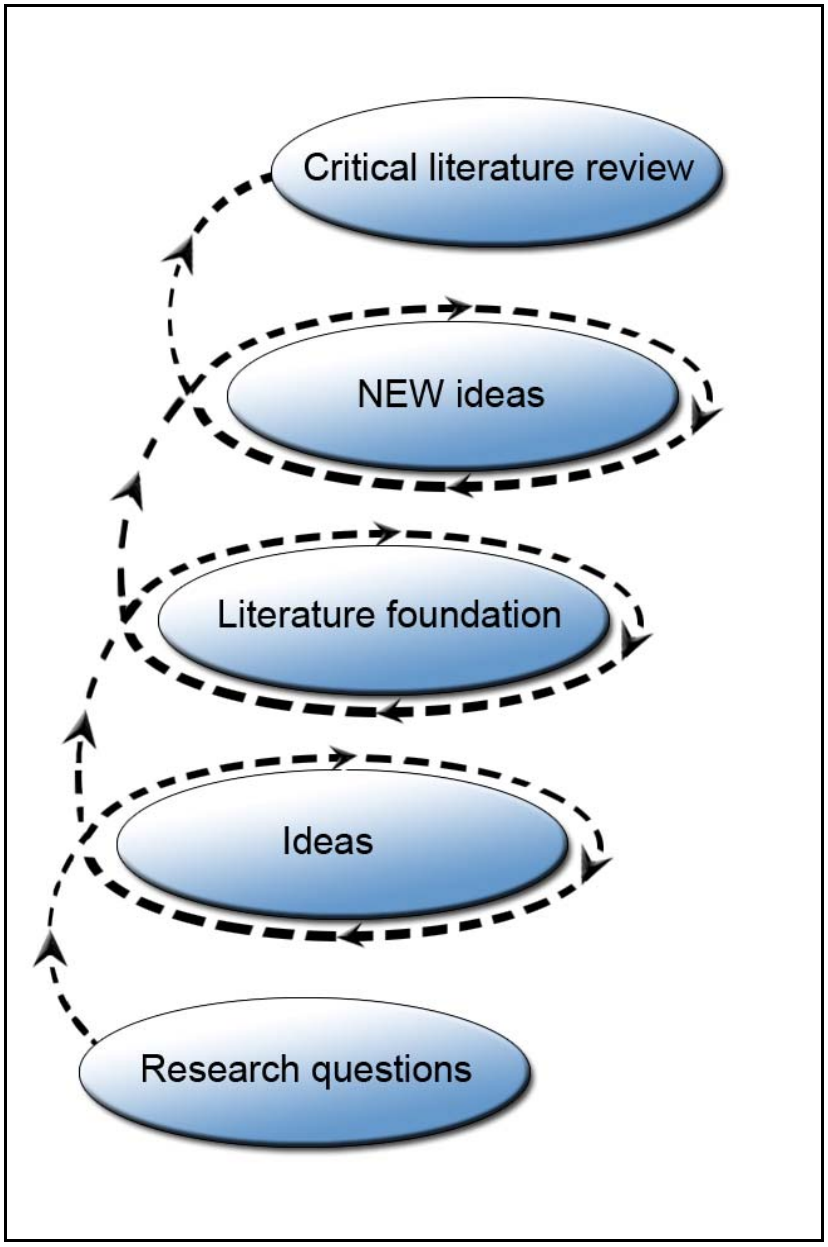

Figure 2 : Literature review process
(Saunders, 2000) Adapted and simplified from Saunders et al (2000).
The picture shows how I used the literature review process in this research.

2.1.4. Principles adhered to during the literature review process

In order to make sense of the literature I attempted to examine literature that was current, seminal and relevant. I also strove to include text from recognised

experts in various fields.

I used the following criteria as filters to determine whether I would include or exclude text from the literature review process:

- Is the material relevant to this study?
- Does the date of the material suggest that it is an up-to-date contribution in this field?
- Will the material augment the intellectual matrix of this study? (See chapter 3 for information about the intellectual matrix that I based on Mason's proposal (Mason, 2002).)
- Will the proposed text shed light on different approaches to the issues raised in this research (Saunders, 2000)?
- Is the proposed text by an author who was suggested by another reputable authority?

Funnel approach

In the initial phase of the literature review, I looked intensively at general trends in this field. My purpose in doing this was first to widen the range and scope of the literature that I was encountering before I narrowed it down specifically to literature about high school eLearning. Thus, for example, I included general issues in the tertiary eLearning sector in the initial phases of the literature search because high school eLearning is a relatively new field and I had a feeling that literature dedicated specifically to this topic might be relatively thin on the ground (as indeed it proved to be).

Reference approach

When making reference to other authors and consulting citation indices, I tried in every instance to reflect the content of the referenced material in as an

objective way as possible.

Reflections and significant implications

Throughout the process of the literature review, I correlated my reflections and opinions about the implications of the referenced material. By doing this I produced a literature review that took the shape of a coherent body of reflections on the literature that I reviewed.

The method I used to conduct the literature review

I made a thorough search of the South African database for current and completed research on the topic. I also reviewed whatever books seemed to be relevant in two libraries at two of South Africa's largest universities in Pretoria (the libraries of Unisa – the University of South Africa – and the University of Pretoria). I physically visited the journal sections of both these university libraries and combed through journals for articles that might have had a bearing on my study. I did electronic searches on available databases of all media. I investigated available online journals in the libraries of both universities.

Finally, I undertook searches with a view to augmenting the information that I already had. In this phase, I used a number of standard techniques including keyword searching and visits to reputable online institutions to search their publicly available databases and holdings. I also made requests for information about past and present research from local Internet research groups in 2004, 2005 and 2006 (Catts, 2006, Phedup, 2006), as well as from ITForum (ITForum, 2004). In addition to this, I scrutinized the bibliographies and sources that accompanied recent meta-analysis about eLearning in schools in the United States (Cavanaugh, 2004b).

2.1.5. Theoretical construct of the title.

To what extent and why are certain features of an eLearning resource workable and desirable to sustain a high school learning community?

Each concept or descriptor that forms part of the title of the study is discussed and explained below.

High school - This study focuses on high school learners. A basic assumption in the study is that high school learners as research subjects are different in many important ways from university student populations (which are more usually the subjects of research). High school learners as a research population are in what Vygotsky calls the adolescent stage of cognitive development (Vygotsky, 1926 (1992 Translation)) – the same stage of development that Piaget (Piaget, 1958) characterises as being that in which abstract reasoning is developing.

eLearning - It is vitally important to distinguish eLearning from other types of learning. For the purposes of this research I have assumed the full spectrum of eLearning capabilities of a typical university online learning strategy. The Professional Communication Society (IEEE, 2006) suggests that it is the use of computers to create an interface between students and their instruction that defines any particular resource as an eLearning resource.

Desirable ... features - A "desirable" feature in this study is not just one that is "nice to have", but one that optimises eLearning because it is workable and practical and so adds value, utility and attractiveness over and above any merely adequate functioning of the resource involved.

Workable ... features - A "workable" feature in this study is one that optimises the function and performance of the resource. It is also one that avoids striving after impossible effects that might look good but that do not enhance the efficiency, purpose and user-friendliness of the resource. A workable feature is one that steers between unattainable hopes and unrealistic expectations and the necessity to make the resource as pleasing, efficient and exciting as possible (given the limitations of the resources at hand).

an eLearning resource - Although I based the empirical investigation component of this study on a specific resource, my ultimate focus in this research was to be able to make a meaningful contribution to the design and utility of all resources of this kind.

Sustain - The purpose of the desired and workable features is to sustain communities of learning by engaging their interest, involvement and cooperation and by so doing to increase the viability, reputation, success and sustainability of the learning communities concerned.

eLearning communities - An eLearning community is a learning community that is sustained at the most fundamental level by the effectiveness of its eLearning resource. This point of view is in line with current thinking about this concept at this stage in the development of the developing science and technology of eLearning.

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- What is eLearning.
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2.2. The eLearning landscape and models.

2.2.1. What is eLearning.

Organiser

This section explores the definition of eLearning and ends with my reflection on the implications of the literature for this research.

2.2.1.1. Literature on eLearning definitions

Literature on high school eLearning is scarce.

During the course of my investigation into the literature, it became ever clearer to me that literature focusing on the salient aspects of this topic or its essential terms was in short supply and, in some cases, non-existent. This suspicion was confirmed when I received a research request from a non-profit research organisation whose activities extended to seven states of the United States. The gist of this communication made it even more clearly to me that there are serious deficiencies in research-based knowledge about K-12 school education. While the practitioners themselves believe that online education is effective for reaching and serving a wide range of students, very little empirical research had been undertaken to determine the effectiveness of online learning prior to March 2004 (which was the point at which I received the research request referred to above). New research is necessary to determine how well existing modes of online education serve students and whether such existing modes actually improve educational and other outcomes or not (NCREL, 2004).

A meta-analysis on the effects of distance education on K-12 student outcomes conducted by Cavanaugh (Cavanaugh, 2004b) also shows that while elementary and secondary school learners have learned through the medium of electronic distance learning systems of various degrees of sophistication since the 1930s, the development of comprehensive online distance learning schools for overall education is a relatively new phenomenon.

I also needed to investigate university level eLearning sources because I had made the assumption that at least some elements from those sources might also be applicable to high school learners. My analysis of high school learners and the resource therefore also demonstrates to what extent principles that are applicable to tertiary level learners can also be applied mutatis mutandis to high school learners.

eLearning is a new science.

The science of eLearning or online learning is a relatively new field of study. It differs from its predecessor, computer-based training (CBT), which stored tutorial material on CD-ROMs, because it delivers content by means of the Internet and not a means of CD-ROMS. This particular feature gives it a number of other capabilities (such as enhanced communication) that make it different from CBT. Deliberations and investigations into whether eLearning is a science in its own right or not have slowly been emerging in recent years. Mayer (Mayer, 2003) suggests that there are three elements that make it possible to classify eLearning as a science. These elements (which it holds in common with other sciences) are:

- evidence
- theory
- applications

The undeniable presence and function of these three elements in eLearning explains why eLearning is increasingly being accepted as a developing science in its own right.

The relative novelty of the term "eLearning"

Many synonyms for eLearning are in current use. These include technology-enhanced learning, web-based learning, distributed learning and online learning – to mention but a few. If one were to judge the viability of eLearning research from the number of definitions of eLearning that are current, one would have to conclude that eLearning is a topic of vital importance to a great number of researchers throughout the world. I have accordingly compiled a list of eLearning definitions. By investigating and including definitions of eLearning in this research, I hope to accomplish the following two purposes:
(1) I hope to be able to demonstrate with some precision what the current state of thinking about eLearning is in the secondary school and tertiary level distance education industry.
(2) I hope to be able to deduce useful conclusions about the main elements of eLearning from the information that I compile.

It took some time before the term "eLearning" established itself in the context in which we currently use it today. In 1995, for example, eLearning was called "Internet-based training". Thereafter it was called "web-based training" – a term devised so that those who used it could emphasise the importance of the distinction between using the Internet and an intranet. Subsequent to that, the term "online learning" made an appearance before the term that we use today – eLearning – was finally widely adopted to mean tuition delivered by means of a resource connected to the Internet.

In spite of this, the term eLearning underwent various modifications, the most important of which was the addition of the then-voguish prefix "e-" during the period of the dot com boom. But the addition of the "e-" prefix was not without important practical consequences. Because of the magical aura that surrounded this prefix in investment circles at the time, a magic unfortunately reminiscent of the infamous South Sea Bubble in 18th century England, the distance teaching industry was able to position itself to attract vast amounts of capital investment from venture capitalists throughout the world. These capitalists were prepared to invest in almost any e-connected industry because most of them were performing so well that they were synonymous in the minds of investors with limitless short-term profits (e-learningGuru, 2004).

Essential differences between distance learning, eLearning and open-learning.

- While various commentators have observed that distance education is understood to involve the use of various kinds of media that bridge the separation between teacher and learner throughout the learning process (Keegan, 1986, Moore, 1996), open learning or eLearning, by the same token, is understood to refer to a rather different process. Thus it is that Rumble (Rumble, 1989) lists the following elements as criteria of "openness" when we use the terms open learning and eLearning: access, place of study, pace of study, means of study, programme content, assessment of the programme, and associated support services.
- While distance education is understood to refer mainly to the *means* by which education is achieved, open learning emphasises instead the objectives (or outcomes) and the character or priorities of the educational process itself. For Rumble (Rumble, 1989), the “openness” of distance education is characterised by "student autonomy and the right of students to assume responsibility for their own studies, rather than [to] belong to an

educational institution which assumes responsibility for them". This assignment of meaning echoes what Garrison (Garrison, 2003) has said about third generation distance education, namely, that education of this kind is characterised by a greater flexibility of locality, time, learning strategies and resources than anything that preceded it (Pincas, 1998). It is now becoming increasingly common to use *open learning* and *distance learning* as umbrella concepts that accommodate any kind of distance education that offers "openness" (however such openness may be defined) in one or more of the categories mentioned above (Trindale, 2000).

General definitions and opinions

- The Learning & Teaching Support Network (LTSN) defines eLearning as the delivery of content by means of any kind of electronic medium. Such a definition obviously encompasses all learning, however undertaken, whether formal or informal, that is mediated by means of electronic delivery (LTSN_TSN, 2004).
- North-Eastern Illinois University defines eLearning as a wide set of applications and processes such as web-based learning, computer-based learning, virtual classrooms, and digital collaboration. Such a definition also includes within its scope the delivery of content via Internet, intranet/extranet, audio and videotape, satellite, and CD-ROM (Northeastern Illinois University, 2004).
- The University of South Dakota defines eLearning as any technologically mediated learning that makes use of computers, whether from a distance or in face-to-face situations in classroom settings (computer assisted learning) (University South Dakota, 2004).
- The University of Birkbeck defines eLearning as any kind of learning that has an electronic component in its delivery (University Birkbeck, 2004).

- Waidmayr (Waidmayr, 2004) defines eLearning as any learning that utilizes a network (LAN, WAN or Internet) for delivery, interaction or facilitation. He further narrows the scope of the definition by stating that eLearning may be synchronous, asynchronous, instructor-led or computer-based (or any combination of the above).
- The eLearningguru.com presents a rather broader definition of the field of eLearning by defining eLearning as that kind of learning that uses technology to deliver learning and training programmes (e-learningGuru, 2004). European learning initiatives, on the other hand, offer a very simple description of eLearning, namely, "using new multimedia technologies and the Internet to improve the quality of learning" (European Union, 2004).
- Conrad (Conrad, 2000) defines effective eLearning as "the integration of instructional practices and Internet capabilities to direct a learner toward a specified level of proficiency in a specified competency".
- ELearning in its broadest sense may be defined as instruction delivered by means of any kind of electronic medium including the Internet, intranets, extranets, satellite broadcasts, audio/videotape, interactive TV and CD-Rom. ELearning, for the purposes of this study, refers fundamentally to teaching and learning that is web-enabled (Engelbrecht, 2003, Garrison, 2003, Govindsamy, 2002, Rosenberg, 2001).
- Jochens (Jochens, 2004) follows the definition of Kirschner and Paas (Kirchner, 2001) which states that eLearning is learning (and thus the creation of learning and learning arrangements) in which the Internet plays an indispensable and crucial role in the delivery, support, administration and assessment of learning.
- Le Grange (Le Grange, 2004) defines eLearning as learning that is facilitated on-line by means of network technologies.
- ELearning, as defined by Huffaker (Huffaker, 2003), adds the idea of an

"anytime-anywhere" capacity to transfer information without any intervening temporal or spatial constraints. He includes in his definition the concept of reusable components and the notion of the kind of scalability that incurs very little incremental cost or effort (Rosenberg, 2001).

- Huffaker (Huffaker, 2003) is of the opinion that four fundamental characteristics should be present in the provision of eLearning to schools. These four fundamental characteristics are that the resource itself should mediate productions that motivate learners; that children should be taught and encouraged to construct their own learning paths; that both social and cognitive collaboration should be encouraged by every possible means, and that story telling and entertainment should be utilised for what he calls "stealth education". What he means by this is that even though children may be entertained by a presentational format, they are nevertheless simultaneously being educated. This idea harmonises well with the modern idea that learners are far more likely to learn something if their interest and enthusiasm are aroused.

Perhaps the most widely used definition of distance education that is also relevant to eLearning, is that of Keegan. Keegan's (Keegan, 1996) definition assumes the following five qualities or functions that distinguish distance learning from other forms of instruction:

- Distance education assumes the quasi-permanent separation of teacher and learner.
- Distance education assumes the influence of an educational organization that is responsible for the planning, preparation and the provision of student support.
- Distance education makes use of technical media.

- Distance education enables two-way communication (i.e. communication between the learner and the instructor).
- Distance education assumes the quasi-permanent absence of learning groups.

In spite of the comprehensiveness of Keegan's definition, we find a more appropriate, flexible, useful and current definition in that of Ally. (Ally, 2004) notes that because different people use different terminologies to define online learning, it has become difficult to develop a generic definition. He points out (what we have already noted above) that a large number of terms for eLearning already exist. Such terms commonly used include eLearning, Internet learning, distributed learning, networked learning, teleLearning, virtual learning, computer-assisted learning, Web-based learning, and distance learning.

All of these terms imply that the learner is at a distance from the tutor or instructor; that the learner uses some form of technology (usually a computer) to access the learning materials; that the learner uses technology to interact with the tutor or instructor and other learners, and that some form of support and feedback is provided for learners. Online learning, in Ally's opinion, involves more than just the presentation and delivery of the materials by means of the web. It is his opinion that the learner and the learning process should be the central focus of online learning. He accordingly defines eLearning as what happens when the learner uses the Internet:

- to access learning materials
- to interact with the content, the instructor, and other learners
- to obtain support during the learning process
- to acquire knowledge
- to construct personal meaning

- to grow as a result of the learning experience

What is not obvious in this definition of Ally's is the notion (vital to my research) of how all these activities serve to create a learning community.

2.2.1.2. Implications and value of an investigation into how definitions of eLearning have a bearing on this research.

The definitions that I adduced above ranged from simple statements to complex reflections. One of the salient features of most of the above definitions is that teachers and learners in eLearning are separated from each other by distance. Media are used, not only to bridge this distance, but, more obviously, to act as to means of communication between learner and instructor and among the learners themselves. As technical functionality improves as a result of on-going research, and the development and the marketing of pioneering new products, resources are more frequently able to include functional simulations of group work and peer support structures in their presentation. This inevitably then creates what it was intended to achieve – the emergence of an eLearning community. "eLearning community" then becomes a feature of more comprehensive later definitions.

On the basis of the critical examination of the literature that I investigated, I venture the following definition of high school eLearning. This definition takes into account high school learners and the idea of a learning community:

High school eLearning means learning via the Internet through interaction and the construction of meaning with others, who share common interests, towards a common purpose, mediated by its eLearning and other resources, specifically attuned to the needs of high school learners.

My definition can be seen to include the importance of a community life (albeit a virtual community life) as a valuable and desirable feature of an eLearning resource. This kind of virtual community has been made possible by fairly recent advances in technological capability.

2.2.2. General issues in eLearning.

Organiser

This section explores general issues in eLearning as found in the literature. It ends with my reflection on the implications for these issues in this research.

2.2.2.1. Literature about different issues in eLearning.

eLearning trends in Europe by Le Roux (Le Roux, 2003).

According to Le Roux (Le Roux, 2003), the following general conclusions may be drawn about the current growth of Internet teaching at selected universities in Belgium, Austria, Germany, France and the Netherlands:

Literature review NEGATIVE pointer 1: Constraints such as technological infrastructure, finances, human resource, learner acceptance as well as lecturer acceptance may restrict growth in eLearning (2.2.2.1).

1. The effect of technological limitations on the infrastructure. The southern and

eastern European countries in general lack the kind of telecommunications infrastructure that enables any kind of Internet teaching other than that which can be carried on through study centres (Le Roux, 1999). In Belgium, Austria, Germany, France and the Netherlands, however, the technology infrastructure is at a far more advanced stage of development.

2. Financial constraints. It is not financial constraints that are the main problem in Europe. The real problem concerns the viability and sustainability of suitable projects that meet real human needs.

3. Human resources. Major training initiatives have been launched in these countries (Van Branden, 2002). These initiatives have unfortunately created workload issues among the academics responsible for maintaining these programmes. Many academics in European countries are under great pressure to produce research results while simultaneously delivering, supporting and servicing online courses to students who are enrolling in ever-increasing numbers for such online courses.

4. Learner-student acceptance. (Ennsman, 2002) points out that most evaluation studies of Internet courses show that students are enthusiastic about technology-based university teaching. According to Mason (Farrel, 1999), students in Europe find Internet-based learning less flexible than traditional distance learning because they are required to be present at a computer while they study. They nevertheless welcome the opportunity to develop their ICT skills, and the brightest and most independent of these learners enjoy the online courses. There is also considerable evidence that they benefit enormously from the kind of constructivist approaches that such Internet courses frequently incorporate.

5. Lecturer acceptance. Many lecturers are sceptical about the value of eLearning, and they complain about lack of rewards and incentives in the system and the share volume of work that maintaining eLearning structures requires. Universities that impose technology-based teaching from the top without proper

consultation, without implementing a rational system of rewards and incentives, and without enlisting the support and cooperation of the staff on whom they are dependent for delivering online courses, run the risk of ending up with deeply dissatisfied teaching cohorts on their hands who, at the very least, might give less than their best to the process.

Le Roux (Le Roux, 2003) further reports that the European Union has used its various research and development funding initiatives to become a major driver and sponsor of educational change in Europe. Because of these incentives, and because they perceive eLearning to be the wave of the future, many traditional campus-based teaching institutions in Europe have hastened to incorporate distance education units on their campuses over the last few years. (De Pater, 2002, Demainault, 2002, Raaf, 2002) note that while the power and prestige of the traditional old universities remain intact, their most logical option might be to bypass distance education altogether and to invest their resources in selected modules of virtual home education.

Legget (Leggett, 1998) summarises the obstacles in implementing technology as Time, Expertise, Access, Resources and Support. These T.E.A.R.S. elements appears to be at the top of the list of most teachers.

The nature of the new networked society and the kind of new skills that are required by the workplace and eLearning

Kearsley (Kearsley, 2000) quotes Hauben and Hauben who paint a highly coloured picture of the networked society in which we currently live. In the virtual sense, they maintain, everyone lives next door to everyone else, and we are all "netizens" (i.e. net citizens) of the world. Geographical space has been replaced by virtual space which operates entirely differently from physical

space. What this suggests is the possibility of a global community of people who interact in a virtual environment that is independent of time and place. These salient features of virtual community, namely connectivity, community, communication and interaction, are fundamentally important elements in the construction of the on-line learning experience. If Don Tapscott's Net Generation (Tapscott, 1998) is an accurate reflection of the online interests and skills of today's young people, it is almost unthinkable that schools should not exploit online technologies wherever they can.

Literature review POSITIVE pointer 1: Skills needed to benefit from eLearning are communication skills, independent learning, social skills, teamwork, adaptability, thinking skills and internet navigational skills. Elearning also enhances these skills. (2.2.2)

Bates (Bates, 2000) lists those new qualities, attitudes and abilities that are required of any skilled worker or graduate in the modern world. It is interesting to note that these qualities are also indispensable for those who hope to derive the maximum benefit from any eLearning experience. The qualities that Bates lists aree:

- good communication skills
- an ability to learn independently
- social skills
- teamwork skills
- the ability to adapt creatively to changing circumstances
- thinking skills
- a familiarity with navigational skills

Such qualities are probably enormously enhanced by the eLearning process because eLearning provides opportunities for the exercise of the skills and abilities mentioned above in the context of communication, collaboration and

interaction between instructors and learners and among learners themselves (Harasim, 1995).

Why eLearning ventures and strategies fail.

> Literature review NEGATIVE pointer 2: eLearning ventures fail because CONTENT is not engaging, not well orgaised and of inferior quality. Although online experiences need to be striking, interactive and effective, they are frequently not so.
>
> Furthermore, service providers strangle infrastructure with high costs while governments are slow to subsidise. Inexperienced businesses enter the learning domain. High expectations are created and success is wrongly measured in terms of costs and scalability instead of measured in terms of educational benefit.

It is accurate to say that many eLearning ventures fail because of poor content and presentation in the courses themselves and consequent learner experiences that fail to ignite the interest, cooperation, excitement, motivation and enthusiasm of the learner. It was for these reasons that many early eLearning programmes failed and their failure unfortunately caused the collapse of many eLearning technology companies. One of the major reasons advanced to explain this failure was the inability of course presenters and designers to solicit the full and enthusiastic participation of learners in the eLearning process. At the same time it was established that learner resistance and apathy could not be attributed to the technology itself. The major reasons, it seemed, for the failure of these enterprises was (1) the inability of educators and organisations to provide striking, well-organised and high-quality content, and (2) the inability of those responsible to create an effective, engaging and interactive eLearning experience (Pailing, 2002, Van Lee et al, 2002) in (Engelbrecht, 2003). If one wishes to sustain an eLearning initiative and to remain competitive in a rapidly changing market,

it is important to identify and understand the features of an eLearning experience that lead to success. This I shall now attempt to do.

Issues that determine success or failure in the eLearning market

- The issue of the monopolistic stranglehold on the industry of the South Africa's sole service provider. Perhaps the main obstacle that hinders online education in South Africa is the high cost of Internet access when compared with other countries in the world. Several Internet groups in South Africa have united to lodge complaints with the Competition Commission against Telkom in South Africa (Stone, 2005). Although they have outlined in detail their complaints against the monopolistic practices and the extremely high cost of Internet access in South Africa, which Telkom SA as the sole authorised provider determines and controls, the situation does not appear to be about to change in the near future. The government has been talking about the imminence of authorising an additional telecommunication service provider for many years, but this never materialises.
- The issue of the inexperience of business people who enter the eLearning domain. Private business people who enter the domain of eLearning often fail to utilise the necessary pedagogical principles in their service provision simply because they are unaware of the existence of such principles. While the Internet has created an unprecedented opportunity for business competitors to enter an education market that has historically been dominated by universities (Watson, 2000) in Engelbrecht (Engelbrecht, 2003), businesses often find themselves in unfamiliar territory when venturing into the eLearning market. Because universities, in contrast to eLearning business ventures, are not orientated towards profit, the pace of

adoption of eLearning in universities has been slower than it has been in the business world (Collins, 2001), in Engelbrecht (Engelbrecht, 2003).

- The issue of government subsidy for Internet access for educational institutions. Bates (Bates, 2000) believes that it is governments that should subsidise and maintain quality Internet access for educational institutions in their countries. This view is supported by Cunningham (Cunningham, 1998) and no doubt by all university and educational institutions. Subsidies would lower costs and increase the probability of success and effectiveness in eLearning provision.
- The issue of heightened expectations engendered by perceptions of eLearning. Because it is the ICT infrastructure that enables eLearning, there is a perception that eLearning itself cannot amount to much when it fails to match the expectations of consumers and observers. While eLearning technologies may save costs and add a measure of convenience for learners, educators may reason that if eLearning programmes do not produce people who are capable practising higher-order thinking and reasoning to solve intricate and authentic problems in the workplace, such eLearning programmes must merely be an expensive indulgence and a waste of time (Govindsamy, 2002) in Engelbrecht (Engelbrecht, 2003).
- The issue of critical conditions that must be fulfilled before eLearning can be seen as an improvement or innovation. Jochems (Jochens, 2004) firmly believes that certain critical conditions must be met before technology can become a genuine mediator of educational improvement and innovation.

Literature review POSITIVE pointer 2: Pedagogical requirements amounting to a combination of web and face-to-face learning and student centredness, are preconditions for success.

- Firstly, eLearning, according to Jochems, always has to take

pedagogical, technical and organizational requirements and limitations into account before it can operate successfully.

- Secondly, Jochems suggests that it might be necessary to resort to a **combination** of web-based instruction and face-to-face instruction, and to provide learners with hard copy (print-based) self-study materials and other media to maximize effectiveness. It is his opinion that that technology cannot simply "replace" other types of learning but that it rather needs to be carefully integrated into the larger context of the educational system.
- In the third place, Jochems asserts that eLearning should always be **student centred** so that it will be in a position to offer the greatest possible value to a diverse and widely distributed set of learners.

- The issue of the benefits of eLearning being located in lower cost and scalability and not in educational effectiveness. In a study conducted for a large South African financial services organisation, Van der Spuy (Van der Spuy, 2003) came to the conclusion that classroom-based learning is more effective than eLearning. His study concluded that the benefits of eLearning were mainly benefits of efficiency. These included factors such as lower costs, better scalability, and the ability to train a great number or relatively few people at the same time without having to take account of physical conditions such as personally present facilitators or suitable premises.

The importance of online learning

The use of online technologies is limited by the degree to which it can be accessed by all students. This problem of accessibility, which I have already mentioned, is a serious national problem that adversely affects the extent to which potential learners from previously disadvantaged communities will have

access to the benefits of online education (Heydenrych, 2000c). In a country such as South Africa there is an enormous "digital divide" between the rich and poor. Even so, the government has done nothing to eliminate the stranglehold that Telkom, the sole government-sanctioned broadband service provider, has on the cost and effectiveness of telecommunications services in South Africa. For as long as this situation continues, it will be impossible for educators to realise the full potential of eLearning in this country.

Boud's four questions for determining quality in eLearning.

Literature review POSITIVE pointer 3: Learner engagement, learning contect, challenge to learners and appropriate assessment are indicators of quality.

According to Boud (Boud, 2002), answers to the following questions will provide a measure for determining the degree of quality present in any eLearning enterprise:

- Do activities support learner engagement?
- Is the learning context acknowledged?
- Does the work challenge learners?
- To what extent are the eLearning activities of students susceptible to appropriate forms of assessment?

Barriers to distance education : the perceptions of educators

Perceptions of educators concerning barriers to distance education were reported by Berge (Berge, 2005) , along with comparisons to respondents not working in K-12. For each of 64 barriers, respondents were asked to "rate each of the barriers/obstacles according to how you perceive the strength of that barrier to your current work in distance learning, or your desire to work in distance learning." Means were calculated for each of the 64 items using the

Likert scale responses. The barriers were then rank ordered according to their mean. The educators' concerns about distance education have much in common with issues that have been reported anecdotally in the literature: faculty compensation and increased time to design, develop, and implement teaching and learning within a technologically-mediated, distance environment; the effort needed for cultural or organizational change within the organization; the lack of technical expertise and support needed for the distance education efforts and the lack of access.

2.2.2.2. Implications and value of general issues in eLearning for this research.

The issues that I extracted from the literature have the following implications for this study.

Access to technology remains a serious problem in South Africa. To put it simply: where there is no access, there can be no eLearning. In the United States and in the countries of the European Union, governments tend to be solidly behind the provision of access to the Internet, and this in turn makes eLearning possible. In those countries, the problems that beset educators relate to finding projects, on the one hand, that are suited to particular needs, and, on the other hand, finding staff who are sufficiently well qualified and experienced to maintain such projects. In South Africa, the opposite is true, both in terms of the availability of money from government and the prohibitively high cost of Internet access. To what extent did the participants in this study regard access as a problem?

It is interesting to note, in the first place, that some students found Internet learning to be less flexible than distance learning from books. In the second place, the availability of a computer and Internet access was also an issue for some. Did the subjects in this study also perceive eLearning to be less flexible because of problems of access?

It has been stated that only the brightest and most independent South African students benefit from the kind of constructivist approach to eLearning that is the basis of all European approaches to eLearning (Le Roux, 2003). What kind of answer does this study suggest? Since relatively new qualities and skills such as teamwork, the ability to navigate, and the ability to communicate successfully with other people are now very widely sought in the workplace, we must ask ourselves whether the eLearning system is one that will be able to stimulate and refine these qualities in those who participate in eLearning. We also need to ask whether it is fair to expect that an eLearning system should be able to evoke and perfect such skills in participants. Can eLearning only be regarded as successful if it produces people with higher-order thinking skills?

Academics who are made responsible for maintaining an eLearning system have, as I noted earlier, expressed the point of view that an eLearning system involves more work and confers fewer rewards. When an eLearning system is imposed from the top without consultation or any attempt to solicit cooperation and agreement, it is bound to be compromised from the start. The following questions reflect issues that are contained in the subsidiary research questions.

Did the subject advisors who participated in the study feel the same way about the eLearning system in which they were involved?
How important are the pedagogical foundations of an eLearning system?

Will private businesses that enter the educational field take heed of proven pedagogical principles? (The potential market for investment in eLearning systems has already been made aware that an eLearning venture is bound to fail unless the content is suitable in every way for its purposes and unless the interest and cooperation of learners can be ensured.)
How far can Jochem's critical conditions of pedagogy first, system design, student centeredness, and blending with other media, benefit this study?

All these issues are covered in the subsidiary research questions.

2.2.3. Historical phases and trends in distance education leading to eLearning.

Organiser

This section explores the general historical phases and trends in distance education. It is important for this research to establish what the thinking and experiences of eLearning practitioners were and what can be learned from the reasons for transitions in phases. This is not intended to be an exploration of the history of eLearning, but rather an exploration of the general phases in eLearning thinking and modelling.

2.2.3.1. Literature on historical phases and trends in distance education leading to eLearning.

The relationship between human beings and technology until the present – the emergence of "technopoly"

Postman (Postman, 1992), quoted in (Le Grange, 2004), offers a broad taxonomy that delineates the relationships that obtain between human beings and technology. Initial tool-using cultures were succeeded by what he calls technocracies, and these in turn were succeeded by what he terms technopolies. Tools vary from one culture to another and it is the tools that human beings use that determine the range of technological operations that any one person can perform in that culture. People in some cultures, for example, possessed only spears and other fairly rudimentary utensils and devices. In other cultures, such as that of the early Industrial Revolution, people used water mills, coal-burning machines and steam-powered engines to drive vehicles and factory machinery.

Technocracy represents what Postman characterises as a period of great inventiveness in the sciences and technology. During an era of technocracy we see the emergence of techniques, procedures and machines that greatly improve the quality of human life. In technopoly, however, we see the subordination of all forms of cultural life to the sovereignty of technique and superior forms of technology. Technopoly is inevitably marked by widespread belief in the salvific powers of science and technology.

Moving from the industrial to (post)modern era – a warning against extreme positions

Le Grange (Le Grange, 2004) is of the opinion that eLearning has become "fashionable" and that this emerging trend might be understood as part of a broader shift in both the nature as well as the production of knowledge as more highly developed Western societies move out of the industrial age and enter what has been called the information age (what Postman would call *technopoly* because of the all-pervasiveness and prestige of electronic communication media in our society). Electronic media inevitably form part of the daily activities in a culture such as ours and to a large extent determine the identity of people in postmodern society. But he cautions that while eLearning has been more or less universally touted as a vehicle for transforming education and learning in 21st century, extreme positions that incorporate what he calls “rejectionism” (too little technology) and “boosterism” (too much technology) are equally undesirable.

Present day technology – five levels of web use in education

Hammon and Jones (Hammon, 1999) postulate five levels of web use in education. These five levels coincide with the stages in the first phase in the history of theorizing about eLearning, a phase in which the web is seen as a vehicle of delivery. I set out the five levels of the Hammon and Jones taxonomy

in the table below.

Level	Description (condensed and summarised)
Level 0:No web use	No web use
Level 1: Information web use	Only administrative information is placed online.
Level 2: Supplemental web use	Course content is provided online. The web is used as a supplement to normal classes.
Level 3: Regular web access	Regular web access and use is conditional to productive participation in class. The web replaces the textbook.
Level 4: Communal web use	Classes meet both in face-to-face situations and on the web.
Level 5: Immersive web use	All interactions occur online in a sophisticated environment.

Table 4 : Hammon & Jones : Five levels of web use in education
This table outlines the five levels of web usage in education

I compiled the following questions on the basis of the information supplied by Hammon and Jones (Hammon, 1999) in order to determine the level of web use of an Internet-enabled educational enterprise. I then boiled these questions down into two "watershed" questions that indicate an exponential "leap" in the use of the Internet.

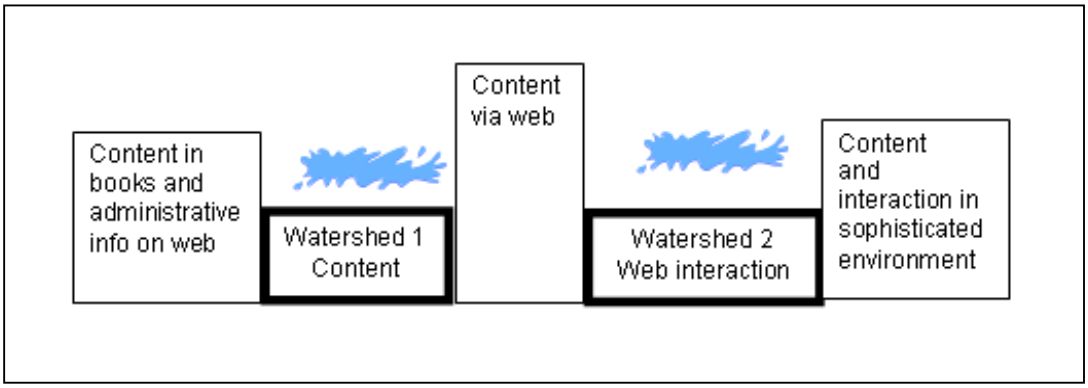


Figure 3 : The watershed-questions to determine web usage
This figure sets out the two watershed questions about web use that permit us to determine whether content is delivered online or not and the extent to which the conventional classroom is replaced by online interactions.

This figure sets out the two watershed questions about web usage that permit us to determine whether content is delivered online or not and the extent to which the conventional classroom is replaced by online interactions.

The table below contains the five questions that the researcher used to determine the level of web use by learners.

Question	Level
Question 1. Is there any web information at all? If the answer is yes, then…	The level in question is level 1.
Question 2. Is the content of the course delivered online? If the answer is yes, then…	The level indicated is at least level 2.
Question 3. Can the student participate with regular web access? If the answer is yes, then…	The level concerned is at least level 3.
Question 4. Do the students use mostly web content, and do they meet online from time to time? If the answer is yes, then…	The level being used is at least level 4.
Question 5. Do the students use only web content, and do they participate and meet only in a sophisticated web environment? If the answer is yes, then...	The level indicated is level 5.

Table 5 : Questions to determine level of web usage
This table shows five questions to determine the level of web usage by the researcher

Engelbrecht (Engelbrecht, 2003) conceptualises the evolution of eLearning in three distinct phases.

According to Engelbrecht (2003), eLearning models have evolved in three phases from models that duplicate classroom experiences towards models that incorporate and integrate technology and pedagogical issues on their own terms. While the earliest eLearning models emphasised the role of the technology in providing content (information), delivery (access) and electronic services (instructional design), more recent models have focused on pedagogical issues

such as online instructional design and the creation of online learning communities.

The first phase in models of eLearning (according to Engelbrecht 2003) was concernd with content, service to the customer (user), and content and technology.

In its very earliest stages, eLearning went through a phase of enormous excitement and enthusiasm that was characterised by unrealistic expectations. This phase was engendered to a large extent by the unbounded enthusiasm of technology vendors. Cold reality, however, served to diminish the heat of overoptimistic expectations as educators and learners failed to adopt eLearning on a universal scale (it had been universally expected that they would), and as the desired learning outcomes were not achieved (Engelbrecht, 2003, Logan, 2001, Taylor, 2002a). In the growth and experimentation phase of eLearning in the 1990s, universities and public and corporate institutions were enticed by vendors of learning management systems to base their eLearning initiatives on an eLearning model that comprised the three elements of:

- content delivery
- service to the customer (the learner)
- content and technology

The expectation was that a convenient means of learning would be created that would enable learners to learn anywhere and at any time. It was assumed that the delivery of traditional learning content by means of the Internet was all that was required to embody eLearning. The design and substance of the modules thus delivered (content development) and the training of educators and learners so that they could participate effectively in online teaching and learning received far less attention.

The second phase in models of eLearning (according to Engelbrecht 2003) concerned instructional design models.

Issues of pedagogy are supremely important in the implementation of eLearning. (Conrad, 2000) defines effective eLearning as "the integration of instructional practices and Internet capabilities to direct a learner toward a specified level of proficiency in a specified competency". Instructional value may be added by:

- customising content for the needs of the learners
- presenting outcomes-based learning objectives
- logically sequencing material to reinforce those objectives
- basing navigational options (hypertext links) on existing and desired skills and the knowledge of learners
- including in the design of the model objective-based interactive learning activities that learners must complete if they want to receive some form of evaluation

Various researchers have offered models of eLearning that fall into this second phase of instructional design. Kerri Conrad's (Conrad, 2000) development model for an e-learning experience is divided into seven stages that comprise 21 separate tasks. Collis and Moonen (Collis, 2001) identify institution, implementation, pedagogy and technology as the key components for developing online learning materials. Jolliffe, Ritter and Stevens (Joliffe, 2001) describe an 18-step process for achieving a similar goal. Sanjaya Mishra (Mishra, 2002) identifies seven important factors that need to be considered in the design of an online course. Alexander (Alexander, 2001) concludes that successful eLearning takes place within a complex system that includes the students' experience of learning, teachers' strategies, teachers' planning and thinking, and the specific teaching and learning context concerned. All these researchers

emphasise the following issues (summarised from Engelbrecht, (2003):

- needs analysis
- student profiles that will identify their needs and expectations
- institutional support for eLearning initiatives
- pedagogical choices that meet the requirements of the subject and the needs of the target learner group

These instructional design models are helpful in the sense that they provide useful frameworks for the guidance of those responsible for developing eLearning materials. These models can, of course, make valuable contributions to strategic planning because they emphasise the issues of quantity and quality of learning materials and learning support.

The third phase in models of eLearning (according to Engelbrecht 2003) is concerned with learning communities.

Models from this phase emphasise the role of online learning communities. In recent years more researchers in the field of eLearning have shifted their focus to online communication and the issue of communities in the eLearning environment. This includes attention to online interaction, communication tools and techniques for motivating learners to participate (Blignaut, 2003).

Because most universities adopted eLearning at an early stage after the stabilisation of their technological infrastructure, they have moved on to the stage in which they are now addressing pedagogical issues. They are doing this because it has become evident that many learners are not participating in the learning experience as it was anticipated that they would — even though the educators concerned conscientiously designed their learning materials in accordance with the most appropriate and highly regarded best practice instructional design models.

2.2.3.2. Implications and value of literature on historical phases and trends in distance education that led to eLearning for this research.

eLearning has undergone development over a period of time. It is important to understand the principles of distance education and eLearning in the context of its historical development if one hopes to be able to arrive at an understanding of what the best forms of implementation for eLearning might be.

When eLearning is implemented, certain levels of usage as well as a distinctive progression through such levels of usage, are clearly evident. eLearning has moved from a phase characterised by pure content delivery mechanisms to a phase in which active learning communities come into being and are sustained in the eLearning context. It is both important and necessary to learn from the experience of others why and how these different stages occur.

In the section that follows, I will investigate models that attempt to understand the most characteristic features of eLearning.

You are now here……

Chapter 1 Introduction, background and research problem

Chapter 2 Literature review

Chapter 3 Research design and methodology
Chapter 4 Analyzing the case, evidence and discussion
Chapter 5 Conclusion and recommendations

Structure and principles of this literature review
The eLearning landscape and models
Theme 1 Pedagogical theories that inform an eLearning resources
Theme 2 A learning community
Theme 3 Communicative, Collaborative, Social issues
Theme 4 Technological and Interface issues

Structure and principles of this literature review.
- Introduction.
- Grand structure of the literature review.
- The literature review process.
- Principles adhered to during the literature review process.
- Theoretical construct of the title.

The eLearning landscape and models.
- What is eLearning.
- General issues in eLearning.
- Historical phases and trends in distance education
- **eLearning models - Introduction**

2.2.4. eLearning models - Introduction

2.2.4.1. Literature on eLearning models

In this section I will investigate models that attempt to understand the most characteristic features of eLearning.

I will deal with pedagogical theories in the following sections of the literature review. In dealing with pedagogical theories, I have followed the convenient framework drawn up by De Villiers (De Villiers, 2002) in her meta-analysis of pedagogical theories that emphasise cognitive dimensions. But before I move on to these pedagogical theories, it is necessary for me first to investigate the specific models of eLearning that have emerged in recent years.

Van Merriënboer (Van Merrienboer, 2004) notes that from a teaching perspective, eLearning is still in its infancy.

(Van Merrienboer, 2004) is of the opinion that there is considerable demand for easy-to-use instructional design models that facilitate the realization in practice of the high expectations that exist about eLearning.

The constant emergence of new eLearning models

New eLearning models are continually emerging as new research findings in the area of eLearning become available. eLearning models are attempts to develop frameworks to address issues presented by online technology so that online learning can take place effectively. Models and theories provide useful tools for evaluating existing eLearning initiatives or determining critical success factors (Engelbrecht, 2003).

Theories and models that need to be investigated

In order to find answers to my main research question (i.e. What workable and desirable features of a high school eLearning resource will sustain a learning community?), I propose to investigate some models and theories of learning as part of an attempt to provide a backdrop to what learning experts regard as desirable and workable features of an eLearning resource.

The way in which I chose models for research and description

The meta-study undertaken by Cavanaugh (Cavanaugh, 2004a) into school eLearning in the United States served as my basis for determining which eLearning models were important for this study. The table below lists the elements put forward by Cavanaugh against the models and theories included in this research.

Mapping issues raised in the meta-study by Cavanaugh (Cavanaugh, 2004a) to eLearning models investigated in this section										
eLearning models in this research →	Demand-driven Learning Model - MacDonald	ELearning P3 modelsl (People-Process Product) - Khan	Online Course Design Maturity Model (Maturity Model)- Neuhauser	Community of enquiry model – Garrison and Anderson	Community-central model - Palloff and Pratt	Learner-Teacher-Content model – Anderson	Four component / ID model for complex learning : 4C/ID - Van Merrienboer	Information behaviour - Wilson, Ingwersen	Cognitive theory of Multimedia learning - Mayer	Pedagogical theories section
Cavanaugh element that may influence eLearning at school level ↓										
Academic content			√			√	√	√	√	√
The role of the program	√	√	√			√	√	√	√	√
The role of the instructor	√		√			√	√	√	√	√
The length of the program	√	√	√			√	√	√	√	√
The type of school	√	√	√			√	√	√	√	√
The frequency of learning experience	√	√	√			√	√	√	√	√
The pacing of instruction	√	√	√			√	√	√	√	√
The timing of instruction	√	√	√			√	√	√	√	√
Instructor preparation and experience			√	√		√	√	√	√	√
The setting of the students			√					√	√	√
Autonomy and student responsibility (a			√							√

characteristic for success)										
Internal locus of control – leading to perseverance in program (a characteristic for success) As part of the above: Cognitive skills development				√			√		√	√
Teaching and Learning theory: Holistic, authentic and realistic learning (cognitive development)									√	√
Teaching and Learning theory : Historical and cultural context (cognitive development is strongly linked to input from others)				√					√	√
Teaching and Learning theory : Collaborative learning				√						√
Teaching and Learning theory : Constructivism										√

Table 6 : Elements in the meta-study by Cavanaugh (Cavanaugh, 2004a) - linked to eLearning models in this research

The table shows the features and elements of eLearning models described by Cavanaugh (Cavanaugh, 2004a) in a meta-study about eLearning at secondary school level. Each of these issues and elements is then linked to the specific eLearning models that are described and investigated in this research.

In addition to the inclusion of topics from the meta-study by Cavanaugh (Cavanaugh, 2004a), I selected the above-mentioned models for inclusion in this literature study because they recur frequently in the literature and are frequently referenced by other researchers in this field. Here is a brief summary of why I selected certain models rather than others:

- When Engelbrecht (Engelbrecht, 2003) investigated eLearning models in 2003, her meta-study on eLearning models included the Demand-Driven model of MacDonald (MacDonald, 2001) as well as the People-Process-Product model of Khan (Khan, 2004). This, in turn, led me to Neuhauser's Maturity model (Neuhauser, 2004), which adds depth to the process-type models mentioned above.
- Merrill (Merril, 2002) summarised instructional design theories with a notion of "first principles" akin to those of (Reigeluth, 1999a) "basic principles". These referred, in turn, to Van Merriënboer's model (Van Merrienboer, 2001),
- The Cognitive Load model of Mayer (Mayer, 2001b) stood out prominently in the field of Educational Psychology, and so I also included it in my selection.

While each of these models will be discussed in the following section, some of them will be discussed in more detail in the section on communication and community of learning.

2.2.4.2. Demand-driven Learning Model explained

The demand-driven learning model was developed in Canada as a joint effort

between academics and other experts (MacDonald, 2001). Although this model strongly reflects a vendor's appreciation of technology, content and service, the main focus in the model is on cost-effectiveness. Because the primary purpose of this model is to encourage academics to take the initiative in development and teaching online, it emphasises the following three consumer demands:

- high quality content (i.e. content that is comprehensive, authentic, well-researched and supported by adequate references)
- delivery (i.e. delivery that is web-based together with a user-friendly interface and attractive and functional communication tools)
- service (this refers to resources, administration and technical specifications)

The value of the demand-driven model lies in its focus on what consumers might reasonably be expected to demand as well as sound pedagogical fundamentals.

The table below describes the Demand-Driven model in tabulated form.

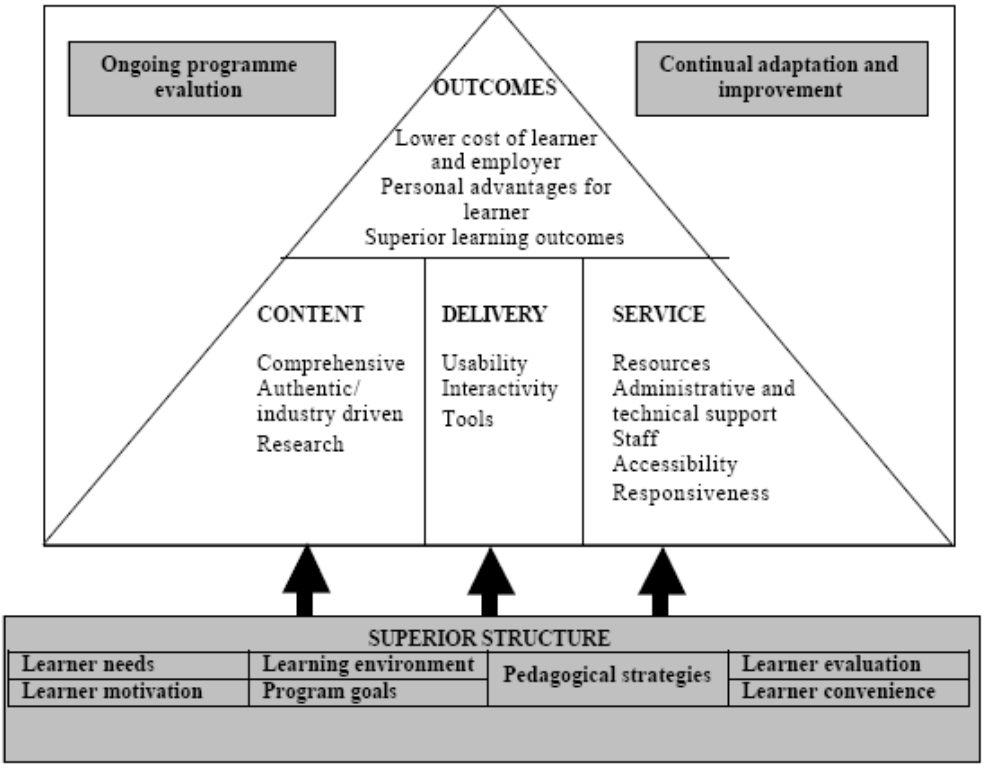


Figure 4 : The Demand-driven learning model
(MacDonald, 2001)

2.2.4.3. The ELearning P3 model (People-Process-Product).

Although this model is also similar to the Demand-Driven model, it focuses on the people and the process involved in eLearning and was devised by Khan (Khan, 2004). The eLearning P3 model provides a comprehensive picture of the eLearning process and helps the researcher to identify the respective roles and responsibilities that will be assigned for the design, development, evaluation, implementation and management of all eLearning and combination learning materials and systems in an eLearning strategy.

Although it is a very simple model and describes the process of **implementing**

an eLearning strategy, it does not attempt to explain the more complex and subtle dimensions of eLearning. This model is useful because it offers broad and comprehensive guidance to institutions that are starting out with eLearning implementation for the first time.

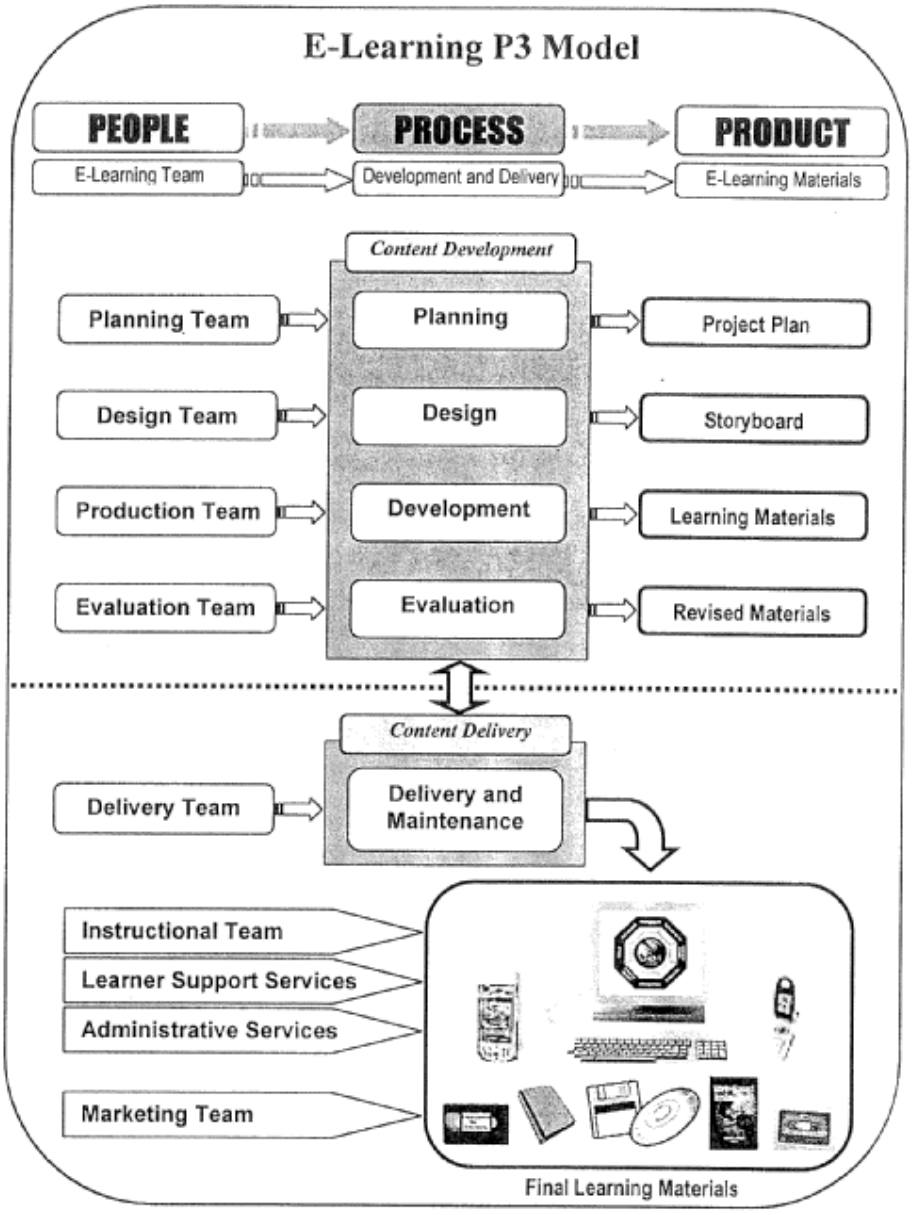


Figure 5 : Khan's ELearning P3 Model
Khan provides a comprehensive picture of eLearning in his ELearning P3 People-Process-Product model, and his diagram (above) sets out the relevant roles and responsibilities assigned by the model.

2.2.4.4. The Online Course Design Maturity Model (Maturity Model).

The model from Neuhauser (Neuhauser, 2004) goes a step further than the P3 (People-Process-Product) model of Khan in that it offers a detailed path that one may follow if one wishes to improve any eLearning project.

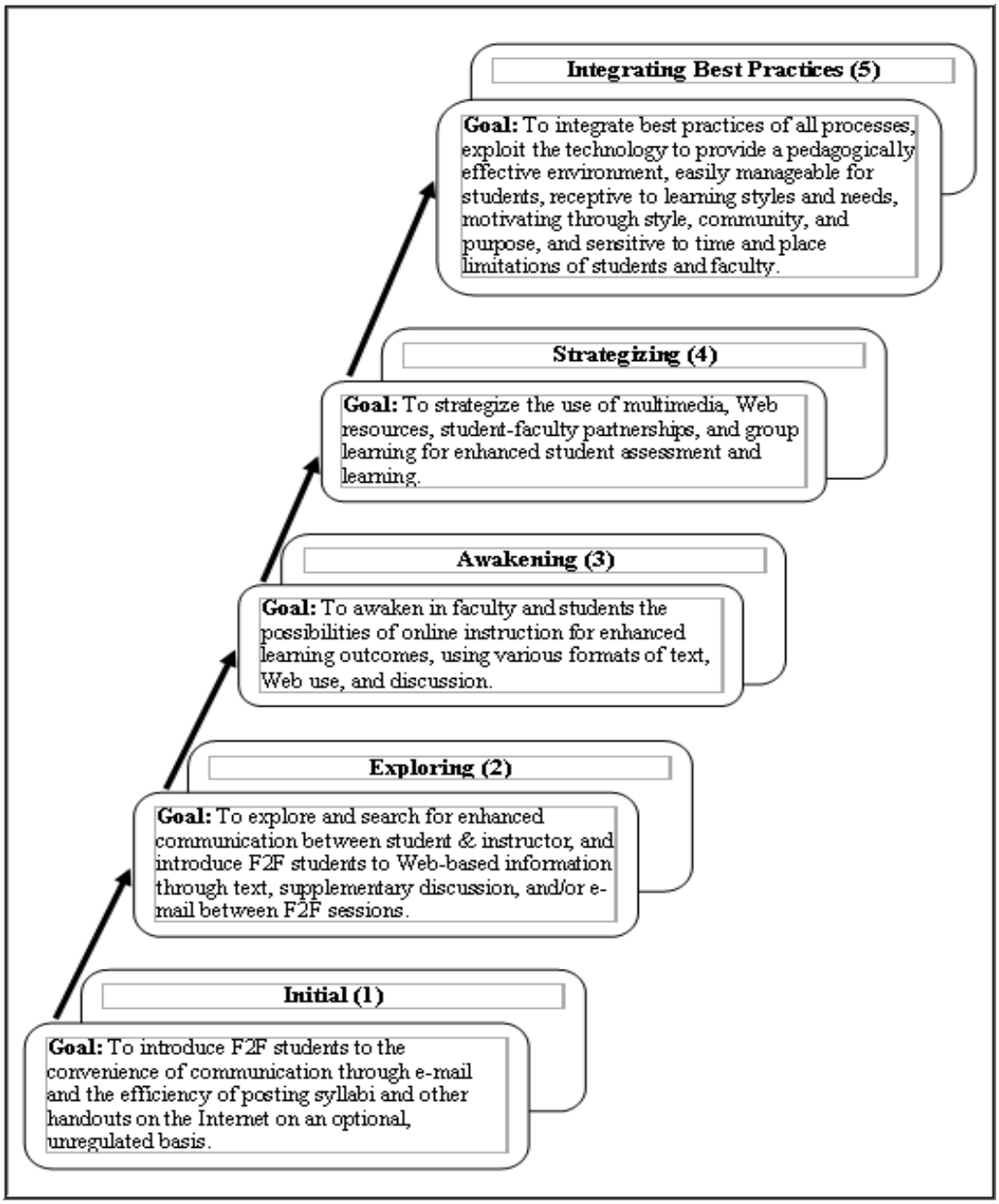


Figure 6 : Neuhausers Maturity Model
Neuhauser's Online Course Design Maturity Model offers a guide to the improvement of any eLearning enterprise

In the first phase of the model we are confronted with the initial stages of development in which students are introduced to electronic communication in a face-to-face format. This is followed by the posting of course material on the Internet. In the second phase, communication and discussions are encouraged. The third phase is characterised by eliciting the real potential of online instruction by means of enhanced learning outcomes. Phase four deals with the use of multimedia and the necessity for assessment. The final phase is concerned with the integration of best practices and the effective exploitation of technology to create a pedagogically sound environment.

Literature review POSITIVE pointer 4: A pedagogically sound environment is one that is learner-friendly, easily navigable, and receptive to the learning styles and needs of learners. It is also one that strengthens motivation, provides a learning community, enhances learning experiences and is sensitive to limitations. (2.2.4.4 Neuhauser's Maturity model)

The ultimate end goal is to integrate the best practices of all processes, to use the available technology to create a pedagogically sound environment that is both learner-friendly and easily navigable, to be receptive to the learning styles and needs of learners, to strengthen the motivation of learners, to provide a community that enhances the learning experience in all its dimensions, and to be sensitive to the limitations of both learners and faculty members.

Neuhauser provides a grid that shows the five levels of the model together with various elements of an eLearning environment which she calls "process areas". I have indicated where the eLearning resource implementation of my study was levelled in 2004 and 2005. Ellipses indicate 2004 placements and blocks indicate 2005 levels. It was my observation that the eLearning resource in my research

performed mainly on levels 2 and 3 and only on level 4 in terms of individualisation and the use of technology.

Online Course Design Maturity Model					
	Key Process Areas				
	Components and Appearance	Individualized and Personal	Use of Technology	Socialization and Interactivity	Assessment
Level 5 Integrating Best Practices	•Develops learning objects •Engaging •Effortless navigation •Intuitive •Processes integrated and linked to others •Multiple sensory input	•Resources supporting learning preferences •Interactive learning aids •Electronic mentors •Sensitive to cultural differences •Self-regulated learning •Learning objects matched to student needs & interests •Learning preference awareness	•Extensive generation and use of Web links and resources •Choices on path, practice, community •Provides integration of processes •Blogs	•Community of learners •Collaborative problem solving & critical thinking •Social presence •Alignment of learning preferences to practices	•Multiple assessments for student performance and course improvement •Feedback for effective self-learning •Multiple options for expressing knowledge •Learning preference
Level 4 Strategizing	•Learning objects to meet course goals •Well-structured content •Audio, video and/or animation •Multimedia •Attention getting	•Learner-instructor partnership •Learner-controlled links •Private e-mail faculty-student contact	•Students filter, integrate, and disseminate knowledge from Web resources	•Student-generated discussion •Student facilitation of task & maintenance of groups •Collaborative tools used •Sensitive to student needs	•Versatility of projects •Peer review of work •Student-instructor readiness for online work
Level 3 Awakening	•Lectures integrated with links and discussion •PowerPoints & HTML	•Primarily instructor controlled •Private e-mail with students	•Discovery of Web resources •Faculty and students comfortable with use of technology	•Instructor-controlled discussions •Sensitive to student participation •Frequent contact	•Test pools •Papers from student to instructor •Student access to CMS
Level 2 Exploring	•Notes online •Blended course	•Instructor controlled	•Search engines, library	•If used, discussions are instructor-	•Papers through e-mail

	•Colors & fonts		databases •E-mail	led	
Level 1 Initial	•Syllabus •Course information •All text	•Limited access, instructor controlled	•E-mail; minimal use of CMS	•E-mail	•None online

Table 7 : Neuhauser's Online Course Design Maturity Model with pathway grid and process areas
Neuhauser's grid shows the process areas and the various levels through which an eLearning resource may progress through time. The elipses shows the 2004 level of this current research and 2005 is indicated by the blocked sections.

This model is important because it indicates a feasible growth path for an eLearning resource. The model not only indicates the implementation of a eLearning resource; it shows the extent to which the various elements have been implemented.

2.2.4.5. The community of inquiry model developed by Garrison and Anderson.

The purpose of the community of inquiry model developed by Garrison and Anderson (Garrison, 2003) is to offer educators an in-depth analysis of the characteristics of eLearning. It also clarifies how eLearning is able to

- guide and direct higher-order learning
- facilitate critical discourse about higher-order learning in the eLearning context

A community of inquiry is an essential prerequisite for higher order learning because it creates an environment in which learners can take responsibility for their learning and control it on the basis of what they learn through interaction. The access and communication facilities of an eLearning environment offer distinctive features that support learners (Garrison, 2003)

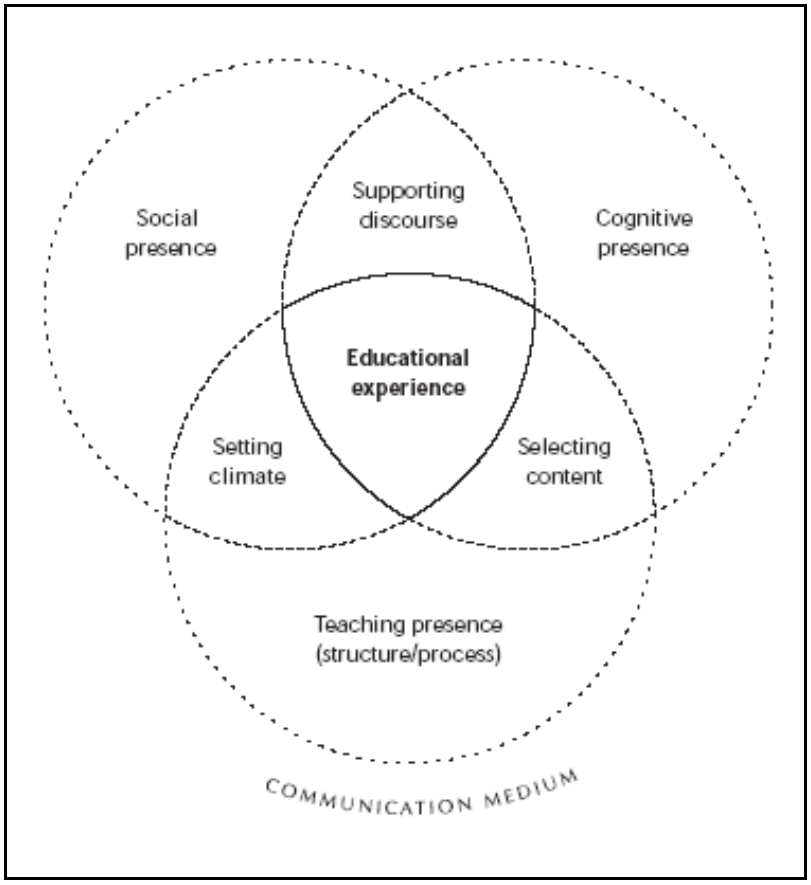


Figure 7 : Garrison, Anderson, Archer : Community of Learning Model
(Garrison, 2003)

This model clearly demonstrates the current interest in how discourse and collaboration are able to confer pedagogical benefits. It shows how deep and meaningful learning become possible as a result of sufficient levels of three "presences" (Garrison, 2000).

Literature review POSITIVE pointer 5: Higher-order thinking, a supportive environment and teaching direction are required for deep and meaningful learning. (Three presences: cognitive, social, teaching. Garrison: community of Learning model 2.2.4.5)

- The first presence is cognitive presence. It assumes that serious learning can only take place in an environment that supports the development and growth of critical thinking skills. Garrison regards cognitive presence "as

the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry. In essence, cognitive presence is a condition of higher-order thinking and learning."

- The second presence is social presence. It refers to the necessity of establishing establish a supportive environment that enables students to enjoy whatever degree of comfort and safety they might need in order to express their ideas in a collaborative context. The absence of a properly regulated and constructed social presence creates an environment in which students are unable to disagree, share opinions, explore differences and accept both support and confirmation from peers and teachers without losing face and experiencing discomfort and embarrassment. Social presence is defined as "the ability of participants in a community of inquiry to project themselves socially and emotionally as 'real' people (i.e. their full personality), through the medium of communication being used".
- The third presence is teaching presence. In formal education, as opposed to informal learning opportunities, a teaching presence is critical. Garrison defines it as "the design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes".

The community of inquiry eLearning model builds on the demand-driven model (the first phase in eLearning modelling) and on the instructional design models (the second phase), and it focuses more strongly on communication in eLearning.

2.2.4.6. Palloff and Pratt's – community-central model.

Palloff and Pratt's (Palloff, 2001) model for distance learning firmly places community in the centre of the model. This model will be discussed in more detail in the section about eLearning communities further on in this chapter.

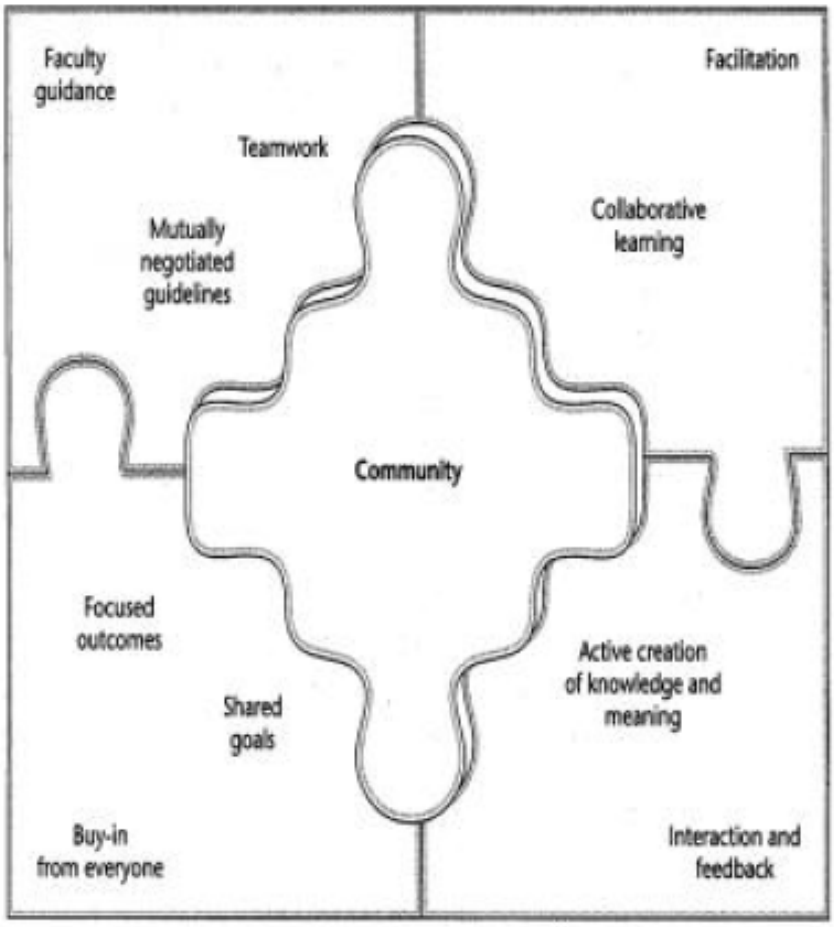


Figure 8 : Palloff and Pratt's model places the learning community firmly on the centre of the metaphorical online learning puzzle
(Palloff, 1999)

2.2.4.7. Anderson's Model of eLearning – learner,teacher,content.

Anderson's model (Anderson, 2004d) combines and emphasises individual learning and learning with a community as the two most important elements of a learning community.

Literature review POSITIVE pointer 6: Various forms of interaction are needed for success. These include student-student, student-teacher, student-content and student-interface interactions (Anderson 2.2.4.7)

His model builds on what Michael Moore has described as a three most common modes of interaction in distance education: student-student, student-teacher, and student-content (Moore, 1989), in (Anderson, 2004b). Hillman (Hillman, 1994) argues that all interaction takes place through some other medium in distance education. He proposes a fourth kind of interaction – learner-interface interaction – that is critically important because a learner's skills in using the technology will exercise a decisive influence on his or her success as an eLearner.

The number of forms of interaction was expanded by Anderson and Garrison (Anderson, 1998) to include teacher-teacher, teacher-content, and content-content interaction. Hillman's emphasis on the interface is bundled together with "content" in Anderson's model.

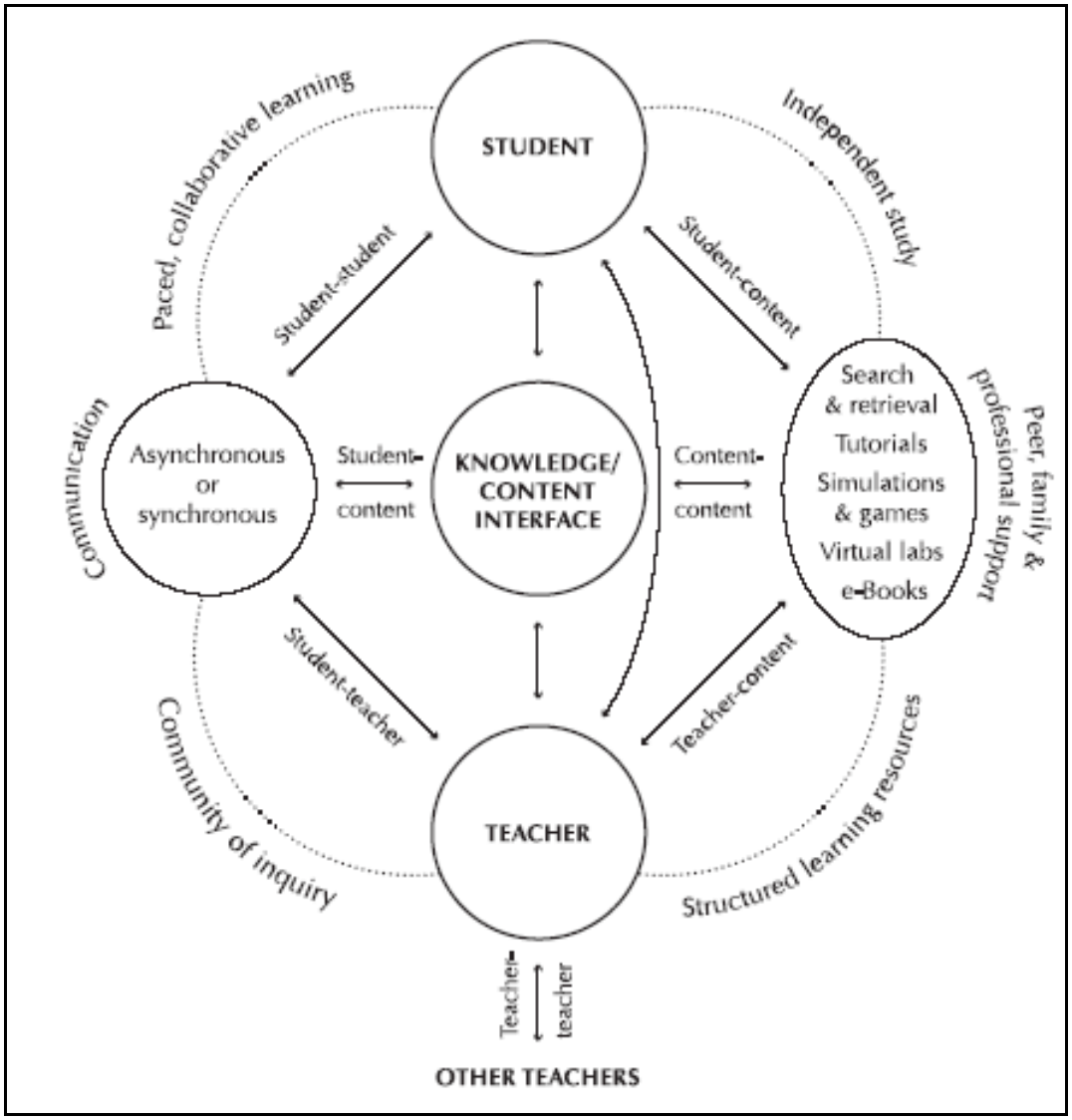


Figure 9 : Anderson's Model of ELearning (Anderson, 2004)
This figure explains Anderson's model of eLearning

The model above illustrates the two major human actors – learners (top) and teachers (below) – and their interactions with one another and with the content. While learners can interact directly with the content (top right) that they find in multiple formats (but especially on the Web), many choose to have their learning planned, directed and evaluated with the assistance of a teacher (bottom centre). Such interaction may take place either within a community of inquiry (left-hand side) or individually by means of independent study (right-hand side). He notes that "independent study" does not mean unsupported study. While a student

may study alone, he or she may at any time call upon support from peers, family and others.

Anderson incorporates the distinctive kinds of learning postulated by Prensky (Prensky, 2000) (see below). He is of the opinion that eLearning is able to accommodate each of the following kinds of learning through a combination of community activities and independent study:

- behaviours modified by means of imitation, feedback and practice
- creativity enhanced through active playing
- facts acquired as a result of association, drill, memory, and questioning
- judgment strengthened through reviewing cases, asking questions, making choices, and receiving feedback and coaching
- language improved because of imitation, practice, and immersion
- observation sharpened because of viewing examples and reacting to feedback
- procedures learned from imitation, practice and modelling
- processes internalised because of system analysis, deconstruction and practice
- systems absorbed through the discovery of principles and undertaking graded tasks
- reasoning strengthened as a result of working with puzzles, problems and examples
- skills (physical or mental) honed through imitation, feedback, continuous practice and graded challenges
- speech and performance abilities acquired through memorization, practice, and coaching
- theories comprehended as a result of logic, explanation and questioning.

2.2.4.8. Merrill's First Principles of Instruction.

Merrill (Merril, 2002) posits various basic principles of instructional design which he calls "first principles" and which Reigeluth (Reigeluth, 1999a) calls "basic methods". Merrill believes that one should be able to support a wide variety of instructional programmes and practices on the basis of a few essential (first) principles of instruction.

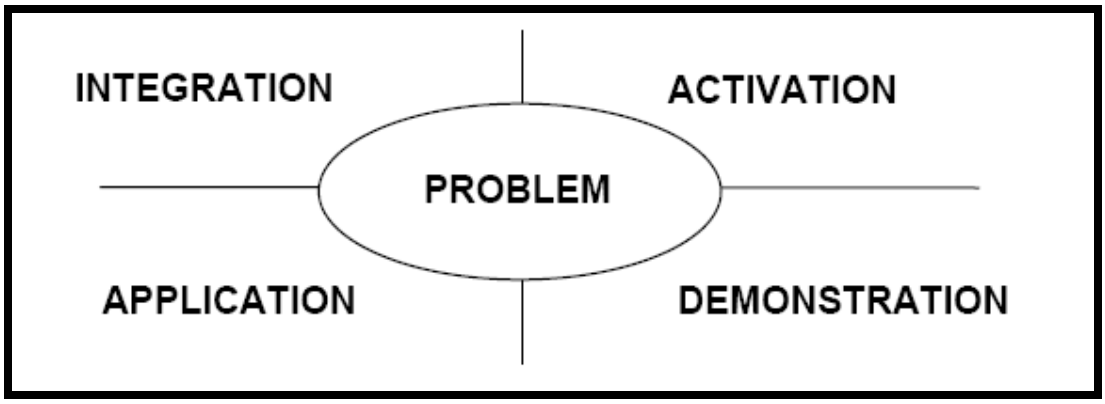


Figure 10 : First principles of instruction (Merrill, 2002)
This figure shows the principles of instruction indicated by Merrill. Merrill's understanding is that these elements are necessary components of all instructional design.

The figure above shows the five principles that Merrill believes are common to all sound instruction.

> Literature review POSITIVE pointer 7: Learners need to be engaged in real world problems (centre) while being activated by past experiences. They also need demonstrations of what they need to learn (as opposed to just being told), and they need to apply all new knowledge. Merril maintains that thse factors are common to all sound instruction (2.2.4.8)

These five principles will be discussed later in this chapter (in the section dealing with technology 2.6.3).

2.2.4.9. Van Merriënboer's 4C/ID four component model for complex learning.

Van Merriënboer (Van Merrienboer, 2004) proposes an instructional design model for complex learning. He calls his model the four-component instructional design model – commonly abbreviated as the 4C/ID model (Van Merrienboer, 1997) in (Jochens, 2004).

Modern instructional design models assume that it is rich learning tasks that make learning effective and satisfying (Clark, 1999, Van Merrienboer, 2001) (Merril, 2002, Reigeluth, 1999b). Well-designed learning tasks are those that stimulate learners to integrate skills, knowledge and attitudes. The process of complex learning evokes, coordinates and sharpens different aspects of behaviour.

Van Merriënboer (Van Merrienboer, 2004) positions his model by saying that theories about learning with multimedia operate on one of three different levels: the psychological level, the message design level, and the course design level. He places his model on the level of course and curriculum design. Since this model is an ADDIE model (analysis, design, development, implementation and evaluation) for instructional systems design, it concentrates on the second phase – the design of integrated eLearning. His model does not therefore offer any kind of analysis of the target group, learning goals or context; neither does it deal with the development of course material, interfaces and navigational strategies.

Van Merriënboer's model is an example of an instructional design model that

emphasises integration, coordination and the transfer of learning. A summary of this model suggests that well-designed learning environments can always be described in terms of the following four interrelated components:

> Literature review POSITIVE pointer 8: Well-designed learning environments incorporate learning tasks that are meaningful, supportive information, just-in-time information. They also allow for the practice of essential tasks. (Van Merriënboer 2.2.4.9)

- Learning tasks: These have to be concrete, authentic and meaningful.
- Supportive information: Supportive information of this kind needs to be able to build a bridge between what learners already know and what they need to know to be able to tackle their learning tasks efficiently.
- Just-in-time (JIT) information: Information of this kind is organized into small units and is presented to learners precisely when they require it.
- Part-task practice: These are additional exercises that strengthen those recurrent learning operations for which a very high level of automaticity is required after instruction has taken place.

The 4C/ID-model emphasises the importance of the psychological study of real-life complex task performance.

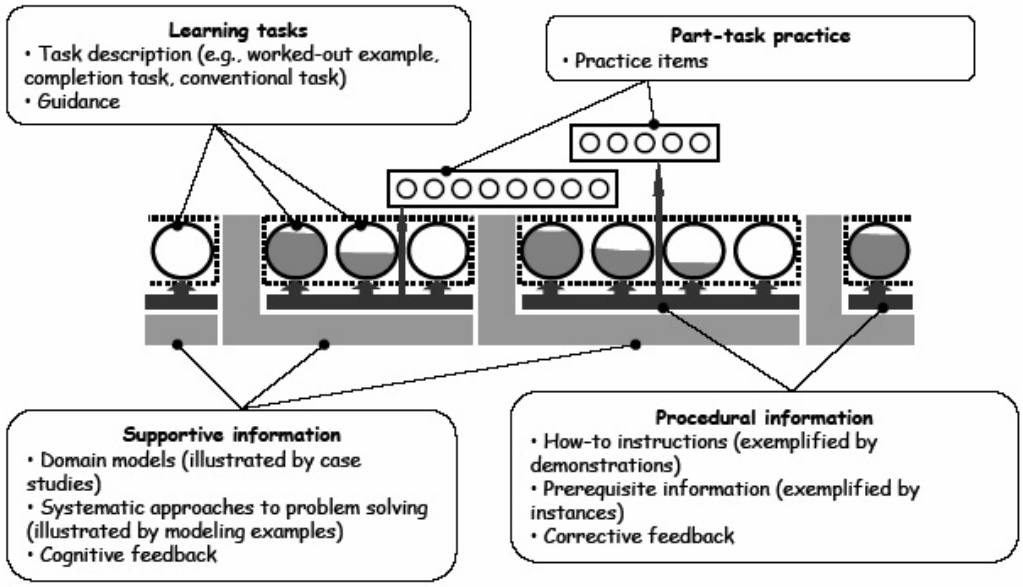


Figure 11 : A schematic overview of the four components in the 4C/ID-model and their main elements. (Van Merrienboer, 2004)

The diagram above presents a schematic overview of the four components in the 4C/ID-model and their main elements.

In the diagram, Van Merriënboer's learning tasks are represented as circles. A sequence of tasks serves as the backbone of the course or curriculum and is represented by more than one circle. Equivalent learning tasks belong to the same task class represented by the dotted rectangles around a set of learning tasks.

Learning tasks within the same task class are equivalent to each other in the sense that they can be undertaken with the same information – even though there are different from one another because they vary according to the context in which they occur in the real world.

Each new task class is more difficult than previous task classes. The fact that students receive much more support and guidance for whatever work they had to undertake for the first learning task in a class, is indicated by circles that are

almost filled. Decreasing support in the form of scaffolding required by learners is indicated by circles that are only partly filled.

As students engage with a task, the how-to instructions (supportive information) indicate that the procedures they must follow to accomplish the task. Essential information (just-in-time information) ensures that learners are able to carry out those instructions. Corrective feedback is given if errors are made. Finally, part-task practice (the smaller circles in blocks) offer a large set of practice items for additional training in routine procedures.

Van Merriënboer extrapolates the following multimedia principles for design for each of his four components of the 4C/ID model:

- Learning Tasks and Learning in Simulated Task Environments: Learning tasks should be presented in a graded order from simple to complex – instead of being presented in all their complexity from the very beginning (Sequencing principle). The use of real (actual) environments together with examples selected from the real environment is to be preferred over all hypothetical environments and examples (Fidelity principle). Tasks should be organised and regulated in such a way that they are different from one another in exactly the same way that they would be different in the real world (Variability principle). Tasks should be selected to suit the needs of individuals students (Individualization principle). New tasks should be added to the schedule only once the lessons of all previous tasks have been learned (Training-wheels principle). Students should be invited to work on known examples before tackling new ones (Completion-strategy principle).
- Supportive Information and Learning from Hypermedia. Do not repeat what is already known (Redundancy principle). Do not explain principles

directly. Rather explain them indirectly by means of examples (Self-explanation principle). Permit learners to control the pace of their instruction (Self-pacing principle).

- Procedural Information and Electronic Performance Support Systems (just-in-time-information). Show what is needed at the exact time when it is needed (Temporal split-attention principle). Position such information where it is needed on the screen (Spatial split-attention principle). Place a spotlight on elements as they are being explained (Signalling principle). Explanations accompanied by voice-over narration are preferable to text alone (Modality principle).
- Part-task Practice and Drill & Practice CBT Programs. Whenever new items are introduced, back them up with drill-and-practice exercises specifically designed for those new items. Computer-based drill & practice training is appropriate for part-task practice (Component-fluency principle).

A well-designed eLearning application will combine the four components in one coherent environment. It is important furthermore to realize that the 4C/ID model is a design model, and not a pedagogical model.

Two pedagogical models that are consistent with van Merriënboer's 4c/ID are Case-Based Teaching and Project-Centred Learning.

In case-based teaching, cases are used as learning tasks. A case is a complete event compiled and documented in such a way from the real world that the process of problem-solving contained in it is clearly visible. In this kind of learning, cases reflect "frozen experience". They give students the opportunity to observe, study and analyze real problems in their natural context without time constraints. Effective case designs offer students support resources and help systems (such as learning tools with just-in-time information) that teach them to

analyze, to utilize tools and to gather data.

In project-centered learning, students work relatively independently in a group on a project where a project is "an unfamiliar problem that has to be solved".

What is implied by the 4C/ID model is that while students will begin each new task with a high level of support, they will receive less and less support as they work their way towards the completion of the task in hand.

2.2.4.10. Models on information behaviour – Wilson, Ingwersen and others

The models included in the section are relevant to this research because the definition of "information behaviour" in this field (Fisher, 2005) refers to a very broad spectrum of human behaviour as such behaviour is seen in sources of information and the use of information. How learners use information may be directly relevant to this research.

Wilson (Wilson, 2000) defines "information behaviour" as "the totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use".

Wilson also includes the following actions as examples of information behaviour:
(1) information seeking, which he regards as a general quest for information through interaction with the Internet, (2) information searching, which he defines as searching at the micro level by means of mouse clicks on links, and (3) information use behaviour, which he regards as the physical and mental acts that human beings undertake when they incorporate information into an

existing user knowledge base (such as when people mark text with a highlighter and mentally compare items of information).

Wilson distinguishes between data, information and knowledge. The figure below presents a graphic representation of the different ways in which Wilson defines data, information and knowledge (Wilson, 2000).

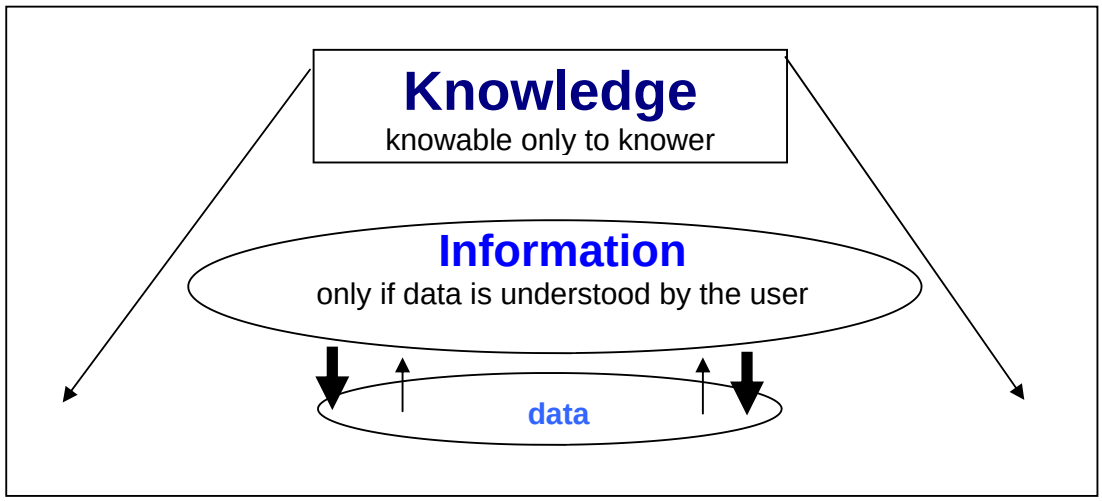


Figure 12 : My interpretation of the different ways in which Wilson defines data, information and knowledge (Wilson, 2000)

Wilson subsumes data under information. Data can only "inform" a user if it makes sense to that user. While knowledge consists of information, it is more complex than information and is only knowable to the user who "knows". Such a "knowing" user can offer information about his or her knowledge..

Literature review POSITIVE pointer 9: Learners display information behaviour that shows their need to "make sense" of information. This "cognitive discomfort" is the driving force in learning. Intervening variables (personal, roles, environmental) which constitute the context of the learner, also play a role in information behavior. (Wilson, Ingwersen 2.2.4.10).

Wilson's 1981 model of information behaviour (Wilson, 1981, , 2000) was developed and expanded by Niedzwiezka (Niedzwiezka, 2003) and others. Their

work is based in turn upon the "sense-making" model of Dervin (Dervin, 1983) – whose work is considered to be a landmark in this field – and upon that of others who also emphasised the information needs of urban residents. According to Niedzwiezka, users have a basic need to "make sense" of information, and the "cognitive discomfort" they feel before they do (the need to make sense of information) is the primary cause of all user activities.

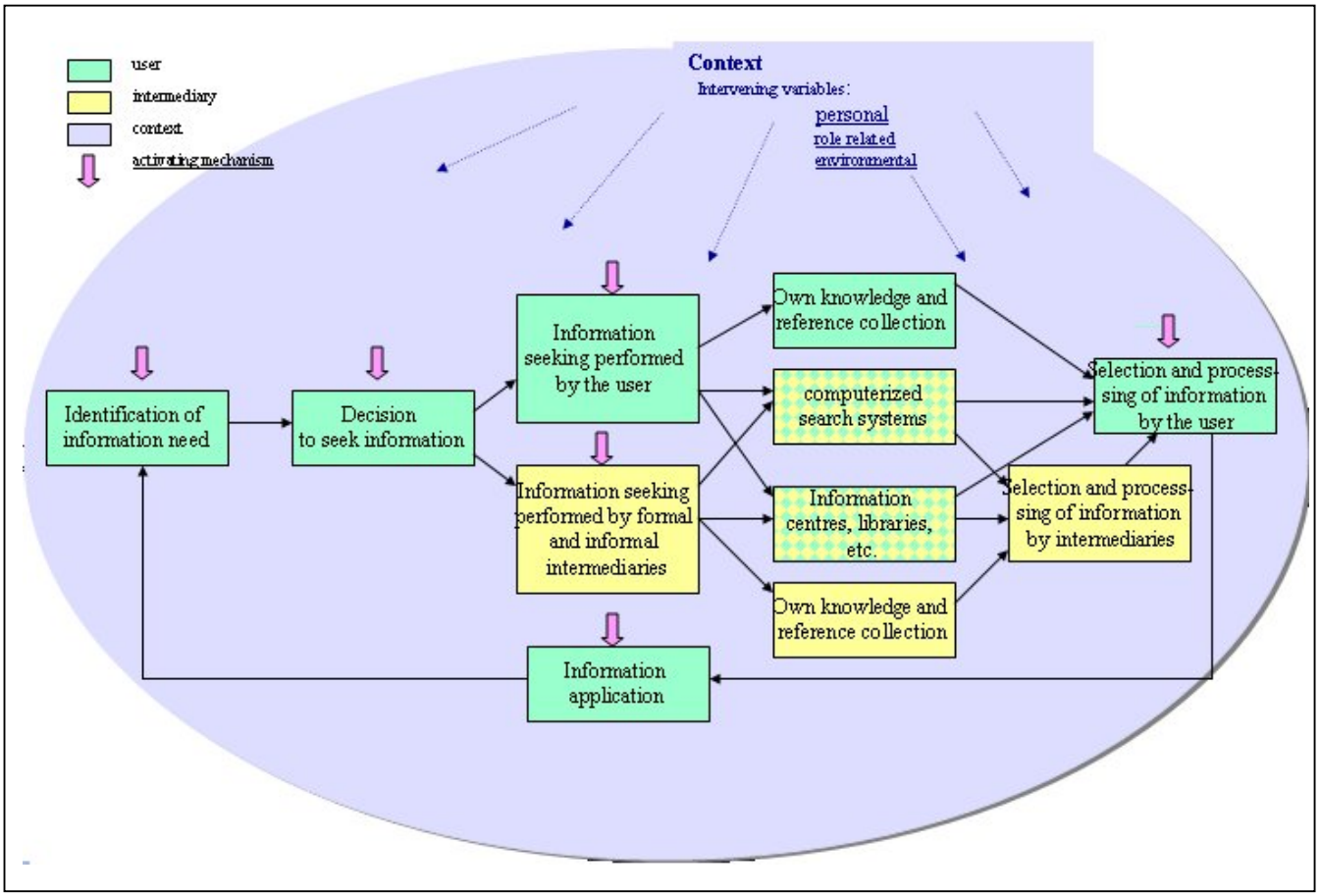


Figure 13 : Wilson's 1996 model of information behaviour as augmented by Niedzwiezka

On the basis of research in various fields (psychology, sociology, decision-making and others), Wilson (Wilson, 2000) identifies a number of significant determinants of information behaviour that he calls "intervening variables". Niedzwiezka (Niedzwiezka, 2003) moved these variables (shown at the top right-hand corner of the model) to encompass all the elements of the model.

Such variables can be of a personal, role-related or environmental nature. Because all of these variables may play a role in workable and desirable features of a high school eLearning system, I have included this model here.

- Personal demographic variables include sex, age, social and economic status, education and job experience, and so on. The several roles that a person plays (including professional roles) position that person in a social system and define his or her places in formal and informal communication networks.
- Role-related or interpersonal variables entail the nature of a job as well as the standards and patterns of behaviour that a person establishes in a particular professional situation. They also define the place that a person occupies in an organization (or system of organizations) as well as the person's characteristic hierarchy of values and his or her level of responsibility.
- Environmental variables (which may be analysed in terms of country, local or organizational levels) include legislation, economic conditions, levels of stabilization, the organizational structure of a sector (dependency and competencies), information culture (traditional vs. innovative; individual vs. collective; level of acceptance of inequalities in access to information), IT technology, localization of information sources, types of organization, and organizational cultures.

The table below shows how these items correlate with elements in this research (in accordance with Wilson's determinants/intervening variables)

Intervening variables (Wilson, 2000)		Elements in this research	
Personal psychological	Outlook on life system of values	Yes	Focus groups
	Political orientation	No	
	Style of learning	Yes	Questionnaire
	Emotional variables	Yes	Questionnaire
	Attitude towards innovation	Yes	Questionnaire
	Stereotypes	Yes	Questionnaire
	Preferences	Yes	Questionnaire
	Prejudices	Yes	Questionnaire
	Self-perception	Yes	Questionnaire
	Interests	Yes	Focus groups
	Knowledge of subject	Yes	Focus groups
	Task	Yes	Analysis of content
	Information on search system	Yes	Questionnaire
Personal Demographic	Sex, age	Yes	Questionnaire
	Social & economic status	Yes	Questionnaire
	Education	Yes	Questionnaire
	Previous experience	Yes	Questionnaire
Role-related	Job character	No	
	Standards of behavious	No	
	Place in organisation	No	
Environmental	Country	Yes	Chapter 1
	Legislation	Yes	Chapter 1
	Culture of organisation (IT)	Yes	Chapter 1
	Level of IT	Yes	Analys web activity

Table 8 : How this research correlates with Wilson's intervening variables (Wilson, 2000)

The concept of the "context" of the user that O'Reilly (O'Reilly, 1983) introduced is important for this research. The contextual and individual variables affecting the use of information include communication networks, roles, information availability (quantity, quality, saliency, content, form and credibility), and

individual information processing variables (perceptual set, criteria used, and processing style).

Ingwersen (Ingwersen, 1984, , 1995) used his model to focus on the cognitive aspects of information. Ingwersen and Jarvelin's model, entitled "Dimensions of Contexts for Information Search and Retrieval" (Ingwersen, 2004), is presented in the figure below. It specifically emphasises the importance of a user's **context** in information behaviour.

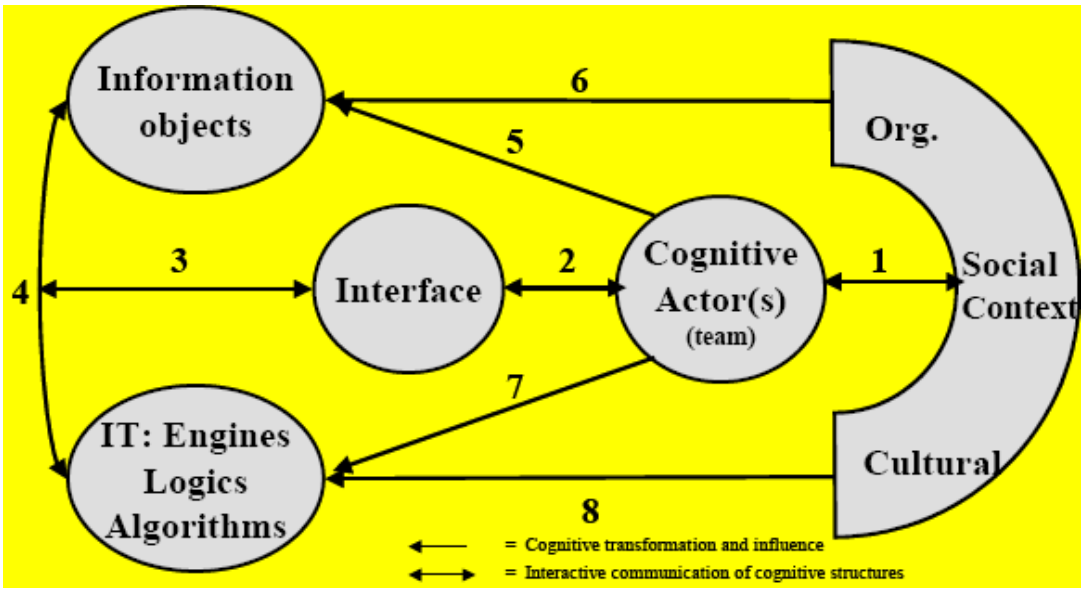
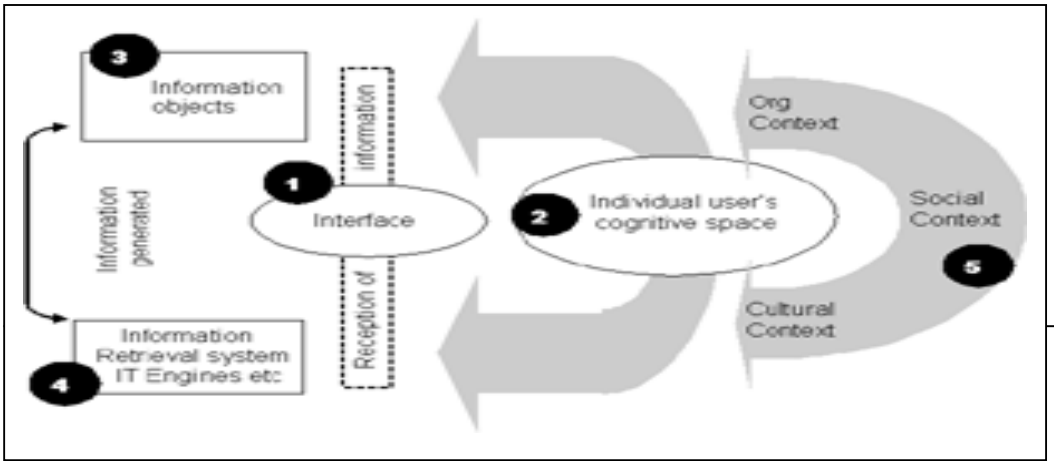


Figure 14 : Ingwersen's 2004 cognitive model of Information Search and Retrieval

I then deliberately simplified this model so that I would be able to indicate the elements of this research on the diagram of the model. It is useful to map research elements on a model because mapping indicates crucial and relevant



issues, and reveals other issues that may not have been covered by the research.

Figure 15 Simplified version of Ingwersen at al.'s 2004 Cognitive Model of Information Search and Retrieval (simplification undertaken by author)

	Element in Ingwersen (Ingwersen, 2004)	Element related to in this research
1	The interface (1) may be human or computer	Computer with Internet access and the eLearning programme Moodle which provides the interface for the user to work with
2	The individual user's cognitive space	Learners participating in the Cambridge learning programmes
3	The information objects	web-supported courses that the student is engaging with, including the content, resources, activities, tests, discussions etc
4	The information retrieval system	The organisation Brainline
5	Contexts (organisational, social, cultural)	It includes the institutional and external and social factors, including the underlying assumptions that are required for eLearning, eg positive attitutes, motivation, class size.

Table 9 : Elements in Ingwersen at al.'s Cognitive Model of Human Information Behaviour compared to elements covered in this research

2.2.4.11. Cognitive theory of Multimedia learning.

Sweller (Sweller, 1988) was the first researcher to propose a cognitive load theory in 1988. Three years later, he and Chandler (Chandler, 1991) published an expanded version this theory. One of the fundamental assumptions of this theory is that working memory is limited (Baddeley, 1992), a fact that was first demonstrated by Miller in his report entitled, "The magical number seven plus or minus two" (Miller, 1956). Miller argued that the average memory span of human beings is limited by its capacity to distinguish and remember only approximately seven different and discrete items in any given setting (items such as different pitches of sound). This imposes severe limitations on the amount of *information* that a human being is able to receive, process, and

remember at any given time.

Mayer (Mayer, 2001a) continued to undertake research in this area because he wanted to determine whether or not multimedia images (i.e. those containing words and pictures) would be able to expand the average human cognitive load capacity. His rationale was that multimedia learning should be designed in a way that conforms to the optimal performance of the human mind. The cognitive theory of multimedia learning grew out of this research.

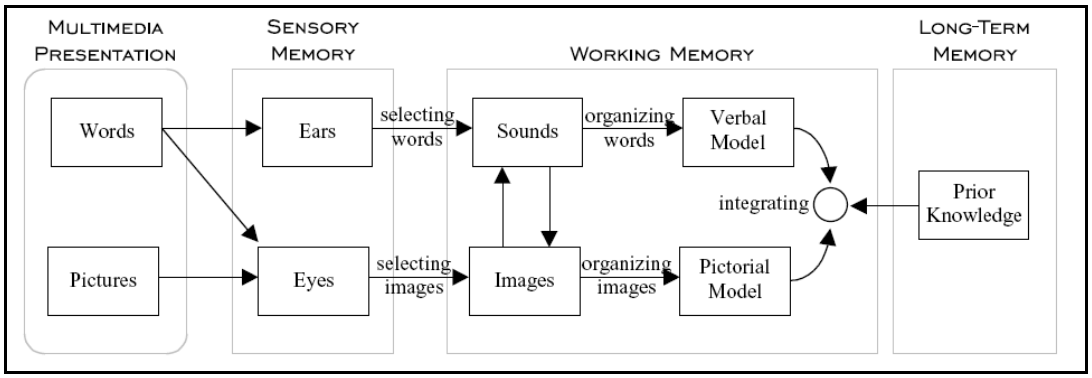


Figure 16 : Cognitive theory of multimedia learning by Mayer
The figure shows the model of Mayer with two input channels

The Cognitive Theory of Multimedia Learning attempts to explain how people learn respectively from words (such as printed text or spoken words) and from pictures or images (such as illustrations, photographs, charts, animations and video presentations). The theory is based on following three assumptions derived from research:

> Literature review POSITIVE pointer 10: People learn best from words *and* images. There are only two separate channels for processing information (visual and verbal), and these channels each have a limited capacity. The most effective learning comprises selecting, organizing and integrating words *and* pictures. (Mayer 2.2.4.11)

- Dual channels: People have separate channels for processing visual and verbal material.
- Limited capacity: People are able to process only a few elements in each channel at any one time.
- Generative processing: Meaningful learning occurs when learners engage in appropriate cognitive processing during learning. Such processing comprises selecting relevant information, mentally organizing the selected information into coherent pictorial and verbal models, and then integrating the pictorial and verbal models with one another and with prior knowledge.

Mayer's ten research-based principles for the design of multimedia instructional messages will be dealt with later in this chapter in the section dealing with instructional design and technological issues.

Since all of the above theories may have an impact on desirable and workable features of a high school eLearning resource, they have been included and considered in this research.

2.2.4.12. The value and implications of the literature on eLearning models for this research.

The models presented here serve to indicate that eLearning must be regarded as a new emerging science in its own right. The models cover a spectrum ranging from simple process and implementation structures (demand-driven, people-process-product and maturity models) to those that theorise about communities

in an eLearning environment (community of inquiry, community-centred and learner-teacher-content models). They include models for understanding complex learning in eLearning (Van Merriënboer) and information behaviour (Wilson and Ingwersen et al.). They also include a model from the field of educational psychology that explains cognitive processing in multimedia learning (Mayer).

These models are necessary for understanding the eLearning resource in this research since they provide useful information and theories for answering the question as to why certain elements of an eLearning resource might be workable and desirable for high school learners.

You are now here……

Chapter 1 Introduction, background and research problem

Chapter 2 Literature review

Chapter 3 Research design and methodology
Chapter 4 Analyzing the case, evidence and discussion
Chapter 5 Conclusion and recommendations

Structure and principles of this literature review
The eLearning landscape and models
Theme 1 Pedagogical theories that inform an eLearning resources
Theme 2 A learning community
Theme 3 Communicative, Collaborative, Social issues
Theme 4 Technological and Interface issues

Literature on grounding eLearning in pedagogical thinking.
Behaviourism.
Cognitive learning theories – Hexa C + Meta Model.
Hexa C Meta Model - Cognitive learning.
Hexa C Meta Model - Control Content (Component Display).
Hexa C Meta Model - Constructivism.
Hexa C Meta Model - Creativity and motivation.
Hexa C Meta Model - Customization.
Hexa C Meta Model - Collaboration and co-operative learning.
Add-on to the Hexa C Meta Model - Companionship.
Implications and value of literature on pedagogical.

2.3. Theme 1 – Pedagogical theories that inform an eLearning resource

This section of the literature foundation relates to the first sub-question of the research namely :

> To what extent, and why, do pedagogical theories inform a high school eLearning resource?

2.3.1. Literature that describes how eLearning is grounded in pedagogical thinking and learning theory.

Theories that describe how people learn are still vitally important in eLearning.

Even though eLearning appears to be acquiring the status and dignity of a science in its own right, it can never divorce itself from being an activity that is central to progressive modern education. Because of this, it will always have to take account the accumulated knowledge and research that has been conducted over the years in the field of learning theory. It is therefore be necessary for me relate this specific case to education theories in general and to examine the ensuing implications.

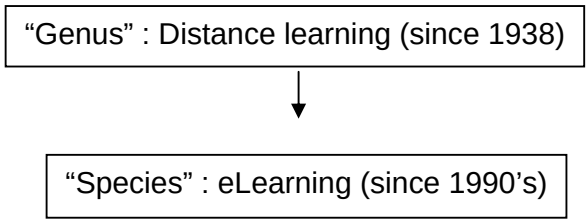
> Literature review POSITIVE pointer 11: Issues that are relevant to how people in general learn are also relevant to how people learn in an online environment. We can therefore only benefit from examining what those who have gone before us learned from the difficulties that they faced and overcame. (2.3.1)

It is the contention and experience of practitioners and theorists such as Garrison

((Garrison, 1990), in (Anderson, 2004d) that online learning may be regarded as a particular case or subset of learning in general. Since this is the case, we may expect to find that issues that are relevant to how people in general learn are also relevant to how people learn in an online environment.

eLearning is rooted in Distance Education.

Moore (Moore, 2003), in an evaluation of distance learning in the United States and Europe, clarifies the contention made in the last sentence of the previous paragraph by defining distance learning metaphorically as the "genus" and eLearning as one of the "species" of that genus.



He notes that practitioners and theorists of eLearning are often impatient to put their theories into practice by moving quickly into action and realisation without first basing their practice in an adequate comprehension of whatever previous experience, knowledge and theories might be relevant to their activity. He suggests that this could be remedied if eLearning were to learn from its roots in distance education.

The eLearning historian, Charles Feasley (Feasley, 2003), in his typology of various kinds of distance education organisations throughout the world, concludes that the problems and challenges that had to be faced by organisations and institutions in the past are similar to those faced by their counterparts today. We can therefore only benefit from examining what those who have gone before us learned from the difficulties that they faced and overcame.

Since more and more private businesses are entering the eLearning domain, they might be tempted to bypass considerations of design and create "instant" eLearning environments without properly grounding them in sound pedagogical principles.

> Literature review NEGATIVE pointer 3: eLearning environments, driven by quick profit taking but without proper grounding in pedagogical principles, may create short-term solutions but sacrifice long-term benefits.

The Internet has created unprecedented opportunities for private business competitors to enter a higher education market that was dominated in the past by universities (Watson, 2000), in (Engelbrecht, 2003). Because universities and public schools are not required to be profit-oriented, the pace at which eLearning was adopted was understandably slower than it might have been if eLearning had been developed by the business world (Collins, 2001). The incorporation of solid pedagogical principles into eLearning in the academic and educational world nevertheless exerted a long-term beneficial effect on eLearning ventures wherever they were undertaken by schools and universities because academics tended to be more interested and concerned with the *pedagogical* basis of eLearning initiatives.

Instructional theory acknowledges the importance of sound pedagogical principles.

Reigetluth stresses the importance of pedagogical grounding because, as he says, instructional theory describes how human learning and development can be arranged and organised so that it "helps people [to] learn better" (Reigeluth, 1999a).

The conception of learning evolved enormously during the twentieth century. Learning here refers to the acquisition and realisation of mental states and abilities of all types including conceptual knowledge, technical skills, automatic

rules, mental models, and problem-solving (Grabinger, 1996) in (Jin, 2002).

Learning is fundamentally a social activity. It is therefore also a communicative activity (Lewis, 1994) in (Jin, 2002). Two major theoretical perspectives have dominated research in learning: sociocognitive theory derived from Piaget, and sociocultural theory derived from Vygotsky. Both of these theories emphasize the importance of *social* interaction in the learning process although they differ enormously in their details (O'Malley, 1994) in (Jin, 2001).

Constructivist learning holds that there is a world we experience; that learners create their personal interpretation of the world on the basis of their experiences and their interactions with the world. It emphasizes that human beings learn most effectively when they construct their own knowledge by means of active learning rather than when they receive information as passive recipients from an "authoritative" source (Grabinger, 1996). Learners can also construct knowledge jointly constructed in circumstances of cooperative social interaction with other learners. Chan (Chan, 1996) in (Jin, 2001) argues that since we as human beings acquire knowledge from the consensual social reality in which we exist, it is natural that learning should also take place in a socially cooperative environment. Since nearly all learning depends to a greater or lesser extent upon social interaction, all learning may be considered to be "interactive" in some or other way.

The learning theory perspectives that I will investigate below all fall into three main categories – the behaviourist, cognitive, and constructivist theories of learning, with a focus on the latter two.

Merging behavioral and constructivist approaches

Behaviourist theories and assumptions dominated conventional instructional

practice in education until cognitive psychology became widely influential from the 1980s. A major debate about constructivism commenced in 1991 (De Villiers, 2002). In 2000, Cronje (Cronje, 2000) proposed a model that successfully integrated what scholars traditionally assumed to be the conflicting and mutually exclusive claims of the objectivist and constructivist approaches. As such claims seemed to become more and more untenable, mainly because of the work of Cronje (2000) and others, it became more and more acceptable to incorporate different elements from different learning paradigms wherever such an approach was warranted. Calvin (Calvin, 2005), for example, affirmed that it was not incompatible to combine behavioural (objectivist) and constructivist approaches since they are no longer mutually exclusive in practice. In support of this view, he quoted the opinions of various practitioners such as Robleyer and Edwards (Roblyer & Edwards, 2000), Donald and Deborah Leu (Leu, 2004), and others.

Cronje (Cronje, 1999) pioneered the use of the two extremes of learning theory – behaviourist mastery and cognitive constructivist learning – in the context of the same approach. On one side of the spectrum he proposes we find the objectivist approach. This approach assumes that an objective "reality" that exists outside the learner and that learners need to acquire behavioural mastery in order to understand that reality and achieve some degree of mastery over it. But at the opposite end of the spectrum, we find the constructivist approach. The basic assumption of this approach is that because all reality is constructed within the mind of the learner, learners need to be presented with carefully constructed learning tasks so that they can construct their own meanings and knowledge. Although these two approaches are theoretically irreconcilable, they only occupy theoretical positions as polar opposites on a continuum and can both in practice contribute useful elements to a desired learning outcome.

Cronje (Cronje, 2001, Cronje, 2000) discusses the possible integration of the apparent "opposites" of objectivism and constructivism, i.e. the old and new pedagogical dimensions following on the ideas of Reeves and Hammon (Reeves, 1996)

One dimension	<- Category ->	Other dimension
Objectivism	Epistemology	Constructivism
Instructionist	Pedagogical philosophy	Constructivist
Behaviourist	Underlying philosophy	Cognitivist
Reductionist	Instructional sequencing	Constructivist
Authoritarian	Role of instructor	Egalitarian
Errorless learning	Value of errors	Learning from experience
Extrinsic	Motivation	Intrinsic
High	Structure	Low
Non existent	Learner control	Unrestricted
Non-existent	individual differences	Multi-faceted
Unsupported	Co-operative learning	Integral

Table 10 : Pedagogical polarities or dimensions as set out by Reeves and Hammon (1996)
(Reeves & Hammon, 1996)

The table above displays the various opposing elements of the pedagogical spectrum.

Behaviourist mastery learning theory is based on the objectivist principle that knowledge exists outside the learner and that the instructor must train the learner until the learner's comprehension of that knowledge approximates as closely as possible to the actual *object* of knowledge "outside" the learner. This kind of a learning is achieved by means of carefully programmed instruction that ensures that learners have mastered certain concepts before being allowed to progress to the next level of understanding. Paced instruction is traditionally reinforced with stimulus-response drills. For this kind of learning to be effective, it is essential that the stimulus and response be contiguous to one another, i.e. for them to occur within the same time frame.

Literature review POSITIVE pointer 12: Knowledge acquired by means of repetition is transferred from short-term memory to long-term memory. (Behaviourist)

Knowledge acquired in this way is transferred from short-term memory to long-term memory by means of repetitive drill and practice. The emphasis here is on efficiency rather than effectiveness. While new knowledge may be relatively quickly acquired from this kind of technique, it leaves the learner with little or no capacity to transfer or extrapolate what he or she has learned to other (new) situations (Cronje, 1999).

Cronje (Cronje, 2001) notes that cognitive constructivist learning contrasts with behavioural learning theory because it assumes that knowledge is a personally constructed rather than a learned response. Constructivist learning is a product of active mental and emotional processing and collaborative interpretation in carefully controlled learning settings.

These "opposites" are two different constructs, with different outcomes

Sherry (Sherry, 2002) found that one needs to distinguish between student learning outcomes, which are "products" of learning, and the student learning processes. The first is easy to assess, while the latter is more difficult. According to Sternberg (Sternberg, 1998) motivation drives metacognition that, in turn, stimulates the developmentn of thinking and learning skills. Thinking and learning skill development further stimulates metacognition, resulting in the development of expertise. The opposites are two different constructs, one a process, and the other a product of learning.

The following assumptions of cognitive learning are adapted from Merrill (1991), an exponent of radical constructivism.

Merrill (Merril, 1991) affirms the basic proposition of constructivism, namely that learning is constructed by an individual learner out of his or her active experience and engagement with real-life learning tasks. Since each individual's

constructive activities and interpretations are personal, there is no shared reality (in the behaviourist sense of the word). The knowledge that individual learners obtain from interpreting and solving the same problems, is entirely personal and individual and is a influenced by each learner's previous knowledge and experience. Since the learner draws upon individual experience to acquire knowledge and skills, learning is also collaborative. This means that it is enriched by multiple perspectives because nearly every kind of knowledge is situated in a real-life context, which is where learning should take place. Since cognitive learning theory accepts that the brain is a parallel processor that is able to process multiple stimuli, it also affirms that learning takes place through the active immersion and involvement of the whole physiological and emotional complex of the learner in the learning task and context.

Literature review POSITIVE pointer 13: While a challenge tends to improve learning, threats and fear tend to inhibit learning because learning takes place through the active involvement of the *whole* physiological and emotional complex of the learner. (Cognitive–Constructivist)

Because of this, challenges improve learning while threat and fears interfere with it and prevent it from being effective. And since learning also takes place both consciously and unconsciously, incidental learning should not be neglected. The human brain is constantly monitoring the environment for possible meanings. Where it does not find any coherent meaning, it creates patterns of arbitrary information as it attempts to reach some kind of understanding of events. In so doing, it might create mental models that may or may not accurately reflect the truth of any particular situation. Memory consists of short-term memory, which lasts a few seconds, and long-term memory, which is associative and more enduring.

*How can educationists reconcile the application of constructivism, behaviourism and cognitivism for learners in schools***?** It is the opinion of Kurt Rowley (Rowley, 2004)

that constructivism is a theory that has not (yet) fully developed into a concrete, recognizable instructional strategy, but that it contains elements that can be usefully incorporated into any strategy where it might be relevant. Constructivism suggests to him an awareness of the role of the learner as a self-instructor. Bruckner (Buckner, 2004), on the other hand, encourages designers to devise a practical application (or a set of instructional strategies) that aligns the strengths and weaknesses of each theory with a particular instructional task or population of learners.

It was Bruckman's experience (Bruckman, 2003) that she had to use traditional external motivation to scaffold constructionist courses. When researchers used the MOOSE Crossing virtual reality environment in an attempt to co-evolve technological design and pedagogy, they also found that they had to use traditional methods to motivate their learners. They were thus reduced to offering "badges" to engender extrinsic motivation, even though their brief was to use only constructionist approaches.

> Literature review POSITIVE pointer 14: Traditional (extrinsic) as well as constructivist (intrinsic) motivation is required for motivation in practice. (Bruckman 2.3.1)

This confirms Cronje's (Cronje, 2000) view that it is necessary in practice to integrate the two polar-opposite approaches when it comes to design and implementation.

Hexa-C Metamodel of Cognitive Instructional Theory

De Villiers (De Villiers, 1999) also advocates the retention and use of known principles. She believes that because the Internet is being more and more widely utilised to deliver media and communication for educational purposes, guidelines for the quality assurance of instructional sites should incorporate established principles of instructional theories and apply such principles to the

unique conditions of each environment. After investigating current directions, developments and theoretical positions in learning theories and instructional design, she presented a concise model that she calls the Hexa-C Metamodel of Cognitive Instructional Theory and Design. Her model is constructed from the following six components:

- cognitive science
- constructivism
- component-based instruction
- customisation
- creativity
- collaboration

Because each of these components is a desirable characteristic and possible evaluation criterion for educational design, they will all be investigated in this research. De Villiers expanded and solidified her research in a doctoral thesis in 2002 (De Villiers, 2002). I shall now discuss each of the elements in De Villiers's model after first reviewing the relevance of behaviourism to this discussion. Cognitive science will be discussed in a subsequent paragraph.

2.3.2. Behaviourism

Behavioural laws, understood in the context of behaviourist theory, provided the foundation for most conceptions of learning during the first half of the twentieth century. Because behaviourism emphasizes visible behaviour or action rather than mental operations and views, it defines learning as a change in the behavioural or stimulus-response mechanisms of the learner. The dominant themes of early behaviourism were reflexes and their associated responses – where the response is a physically observable and measurable event (Schoenfeld, 1993) in (De Villiers, 2002).

Behaviourist learning theory asserts that learning outcomes are demonstrated by observable measurable behaviour. Instructional intervention is therefore accompanied in behaviourism by selective reinforcement and is used to direct and shape learning. Skinner (Skinner, 1938) in (De Villiers, 2002), the classical protagonist of this theory, was reluctant to address the role of internal cognitive or conceptual activity as part of the learning process precisely because such processes are difficult (if not impossible under normal circumstances) to observe, measure or even infer.

Behaviourist learning is predicated on applying environmental stimuli to learners and so producing a required response that can be measured by observing a learner's overt reactions to the responses. It is an essential part of the behaviourist paradigm immediately to reward correct responses with appropriate reinforcement. The principle of operant conditioning which underlines the sequence of actions states that if the occurrence of an operant is followed by the presentation of a reinforcing stimulus, the power of the desired conditioning is increased. An initial stimulus is typically a question to which the response is the learner's answer. Reinforcement (after the desired response has been evoked) may be either an extrinsic reward or a positive comment.

The eLearning Guild (E-learning_Guild, 2004) describes behaviorism as a learning theory, which is an outgrowth of behavioural approaches to psychology as they developed in the mid-twentieth century. Most behaviourist instruction is based on B.F. Skinner's well-known theories, and especially on his assertions about "schedules of reinforcement". Skinner suggested that learning takes place when a learner develops an association between making a particular response to a stimulus and receiving a reward (or reinforcement). Because positive and

negative reinforcement techniques are effective for teaching particular kinds of behaviours, behaviourism has been widely used in educational models. And even though behaviourist theory is no longer predominant, it still affects the instructional design process. Most designers are familiar with and use the ADDIE model (Analysis — Design — Development — Implementation — Evaluation) – a design model with behaviourist roots. Within ADDIE itself, needs assessment, task analysis, and audience analysis all have their origin in behaviourism, as does the emphasis on determining performance objectives, criterion testing, the development of instructional strategy, and the evaluation of the design and results of instruction.

Literature review NEGATIVE pointer 4: Behaviourism's major weakness is that because it ignores mental activities, it is unable to explain or facilitate every kind of learning. (2.3.2)

2.3.3. Cognitive learning theories – Hexa C + Meta Model.

In the latter part of the twentieth century, cognitive learning theories dominated thinking about learning. I shall outline these cognitive learning theories in the following section by examining the six components of the Hexa-C Meta Model of De Villiers (De Villiers, 2005) because it provides a coherent summary of cognitive learning theories.

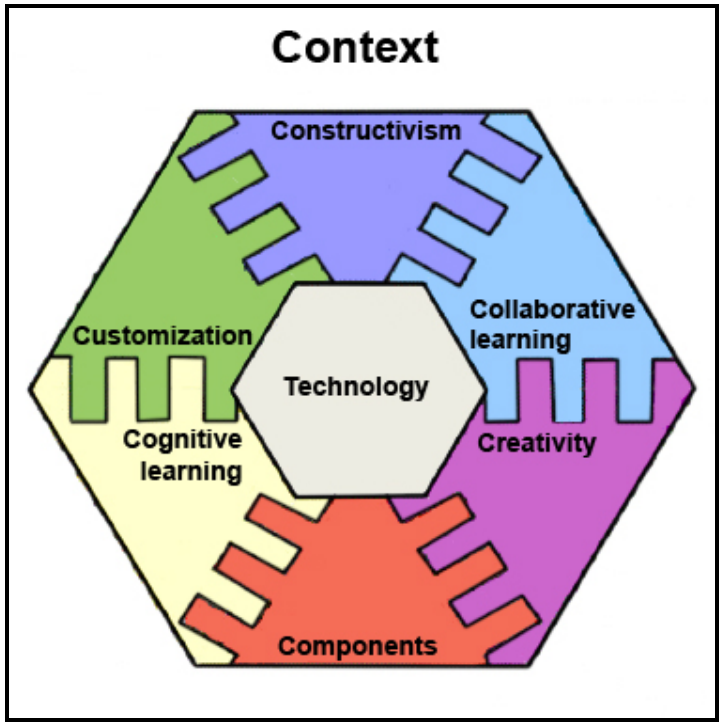


Figure 17 : Framework of the Hexa-C Metamodel by De Villiers
(De Villiers, 2002)

2.3.4. Hexa C Meta Model - Cognitive learning.

As a result of the major weaknesses of behaviorism, researchers in the mid-1950s began to publish their findings on a number of problem areas such as attention, memory and problem-solving – all of them problems that were not being adequately addressed by behaviorism. These semi-marginalised studies eventually evolved into mainstream concerns as cognitive psychology and information processing theory, and became the precursors of the learning theory known as "cognitivism" – currently the predominant influence in instructional design. Robert Gagné, Dave Merrill , Richard Mayer and Ruth Clark are probably the best-known exponents of cognitivism (E-learning_Guild, 2004).

Both behaviorism and cognitivism regard the learner as a recipient of knowledge and meaning in a world that exists objectively and externally to the learner. In this system, a teacher or instructional system is an "authority" that prescribes a methodology by means of which learners receive "correct" information and guidance. This philosophical position has become the basis for a great deal of contemporary teaching, eLearning and guidance. It determines the guiding principles by means of which designers create drill-and-practice applications, tutorials, help systems, electronic performance support, online references and instructor-mediated programmes.

Paradigm shift from teacher focus to medium of instruction

Between the1970s and the mid-1980s, there was a strong emphasis in educational circles on the instructor and the instructor-student relationship (De Villiers, 2002). In the mid-1990s, there was a noticeable paradigm shift, and intelligence and cognition were thenceforth regarded as being distributed between learners and their environment and not just between the instructor and the student. From this time on, the medium of instruction also began to be regarded as a part of the environment that supported the learner. Students were no longer viewed merely as passive automata who were required to store and remember information. They came instead to be regarded as true learners and independent thinkers who were actively able to process information and relate whatever information they acquired to their prior knowledge and experience. In a setup of that kind, a teacher becomes a facilitator – one who is, so to speak, on the learner's side (Reigeluth, 1999a).

De Villiers (De Villiers, 2002) positions constructivism and pragmatic instructionism (which evolved from cognitive learning) within the cognitive family as two opposing polarities. Cronje (Cronje, 2000) notes that contemporary practitioners tend to be

pragmatic about learning theories and practices, and that they tend to use whatever works for them in specific situations without dogmatically positioning themselves philosophically before the event.

In this research there are several questions in the questionnaires and interviews that investigate how these elements manifested in the research group.

In the following items, I discuss what the literature says about cognitive learning and eLearning as it manifests in practice.

Graff (Graff, 2003) found that cognitive style and segmentation had an effect on learning.

Fifty participants were assigned to one of two web-based instructional systems that contained information on the subject of psychological ethics. The information in one of the web systems was segmented to a greater extent than was the information in the other. Half of the participants using each web system were given an overview of the system and half of them were not. After inviting participants to study the information for a predetermined time, participants were tested on what they had managed to absorb from the site. The findings indicate that while cognitive style and segmentation exerted an effect on performance, the prior provision of the overview seemed to make little difference (i.e. exert no effect).

Children demonstrate meta cognition in an online project.

The Junior Summit Project was designed to allow children's voices, especially those that are rarely heard, to enjoy exposure in an open forum under the auspices of an online global community.

Literature review POSITIVE pointer 15: When children are given the chance to act as moderators and facilitators, they are able to solve complex and daunting problems online – as is seen in this case with 3000 children in 139 countries. (Junior Summit Project)

Cassel (Cassel, 2002) brought together 3,000 children between the ages of ten and sixteen from 139 different countries in an online forum. Children were appointed as both the moderators and facilitators of the online forum. In that capacity, they translated for one another and solved all the problems that arose with a minimum of adult intervention. In short, they took active control of their learning experiences and learned in the process to solve problems (a component of metacognition), negotiate among themselves, understand the communications of others, and in general obtain valuable experience in reading languages that were foreign to them. This project was such a success because of the active involvement of the children that they refused to let it die even long after it had ended. After the termination of the project at a six-day event at the Massachusetts Institute of Technology, the children continued to maintain the forum on their own. The elements involved here, all of which are important for this research, include problem solving and understanding the communications of others.

Vocabulary analysis shows increased sophistication.

Literature review POSITIVE pointer 16: Elementary school children are capable of developing sophisticated language use in an online course using discussion forums. This points to the presence of deep understanding. (2.3.3)

An analysis of the vocabulary of elementary school learners who used a discussion forum (Scardamalia, 2004) showed that the mean rating of the vocabulary of his children was at least as sophisticated as, and, in several instances, more sophisticated than the vocabulary used by pre-service teachers enrolled in a course dedicated to constructing elements of a progressive curriculum for the mind, brain and perception.

The results of this research showed that these young students were tackling substantive problems and solving them successfully. The use of sophisticated vocabulary is an indicator of deep understanding. Forms of high-order thinking outcomes such as deep understanding, motivation, intellectual curiosity, and the habits of lifelong learning are especially relevant in cognitive science because these are the most challenging kinds of learning that a human being can develop (Jin, 2001). It is important for the purposes of this research to note that sophistication in thinking can be achieved in younger students.

Open-ended assignments leads to higher-order thinking.

Fisher (Fisher, 2002) found that the use of open-ended assignments with deliberately vague or open-ended themes increased the likelihood that students would think more deeply about a topic.

> Literature review POSITIVE pointer 17: Open-ended assignments tend to encourage deep thinking. (2.3.3)

While assignments should pose fully framed themes or questions, they should also contain some degree of intentional open-endedness (Haavind, 2000). These findings are beneficial for this research because they indicate that that open-ended questions may produce a superior quality of response in learners.

Reflecting on performance by means of weblogs helps students and teachers to see the links between theory and practice.

> Literature review POSITIVE pointer 18: Reflection on one's own performance (an activity that public weblogs enable) is a key component in linking theory and practice. (2.3.3)

Levin and Camp (Levin, 2002) have persuasively argued that "without the disposition to reflect on their performance", students and teachers are less likely to improve their practice or to be able to see the links between their theory and practice. From the point of view of teaching and learning, plain text weblogs are

an adequate tool for promoting reflective practice (Roberts, 2004). A weblog is a personal public Internet publishing space with sequential logging (researcher's definition). (There will be further discussion about weblogs in communicative issues later in this chapter.) Because weblogs are publicly available to anyone who knows the URL and wants to look at them (Ferdig, 2004b), and because they allow for a measure of privacy (since the writer does not have to include personally identifying information in the postings), online reflection has the potential significantly to change students' perceptions about themselves as education professionals and the power and validity of their ideas (Hemandez-Ramos, 2004).

The use of weblogs (personal public publishing space with chronological logs) and online discussion forums in the same course, fulfilled several pedagogical and learning goals. On one level, the experience was designed to increase student awareness of differences in the quality and effectiveness of electronic communication tools and environments. On another level it was designed to help students to develop a sense of themselves as creators of knowledge rather than mere consumers of information, and to see themselves as meaningful contributors to professional dialogues. On yet another level, their participation in the course's online community (the discussion forum) confirmed the idea among students that their peers were also valuable sources of information and ideas (Hemandez-Ramos, 2004).

Weblogs and discussions are pedagogically significant because they break down the walls that surround the classroom.

Literature review POSITIVE pointer 19: The quasi-public nature of weblogs engenders a better quality of writing. (2.3.3)

Carraher's (Carrager, 2003) findings point to the possibility that weblogs break down the "firewall around the classroom" and open the lines of communication

among students, teachers, researchers, curriculum developers and teacher educators. If nothing else, the quasi-public nature of weblogs seems to be an effective tool for improving the quality of student writing and (by implication) therefore contributes to a greater amount of thoughtful reflection on the part of students. Hawkes and Romiszowski's (Hawkes, 2001) found that "while the computer-mediated teacher dialogue was less interactive [than face-to-face meetings], it was significantly more reflective".

Superficial eLearning in the form of rote memorization.

Some eLearning applications are superficial because they merely replicate rote memorization techniques. In this they do not seem much different from those older learning machines that broke lessons into small incremental steps and then rewarded correct responses and punished incorrect ones. It is the opinion of Beal and Arroyo (Beal, 2002) that such approaches facilitate learning because they allow children to practise with and master new information. They believe that intelligent computers would be able to use such techniques to tutor individual children in specific areas of weakness and difficulty.

In contrast to this, Huffeker (Huffaker, 2003) notes that the new science of learning focuses instead on how to encourage children to engage in the deep processing of information. In a deep process of this kind, the learner creates links with his or her existing knowledge bases and also focuses on generating knowledge (process) rather than being concerned with the end results of learning (Bransford, 2000). Metacognition can play an important role in this kind of process, even when the application concerned is mediated in the form of an entertaining educational video game (Bransford, 2000).

In this research, the stated aims of the online courses are mostly analysis,

synthesis and evaluation. Rote memorization plays a very minor role. Such goals may bring students closer to attaining the kind of proficiencies that are expected at contemporary universities. Mitchell (Mitchell, 2003) is of the opinion that there seems to be a great disparity between what is traditionally known and practised at school and what is expected in a university situation. Participation in courses with objectives similar to those that are needed for success in a university does nevertheless increase the chances that a learner will be successful at university.

2.3.5. Hexa C Meta Model – Control Content (Component Display)

Component display theory (Merrill, 1983) is based on Gagné's main assumption that different conditions of learning should be matched to different learning outcomes. Component display theory (CDT) lies between behavioural learning (seen in the objectives that are set) and cognitive learning (because of its emphasis on conceptual understanding). Components displays theory is based on the relationships that exist between the content to be taught and the type of performance required. The four types of content are fact, concept, procedure and principle. The three performance levels are remember, use and find (synthesis).

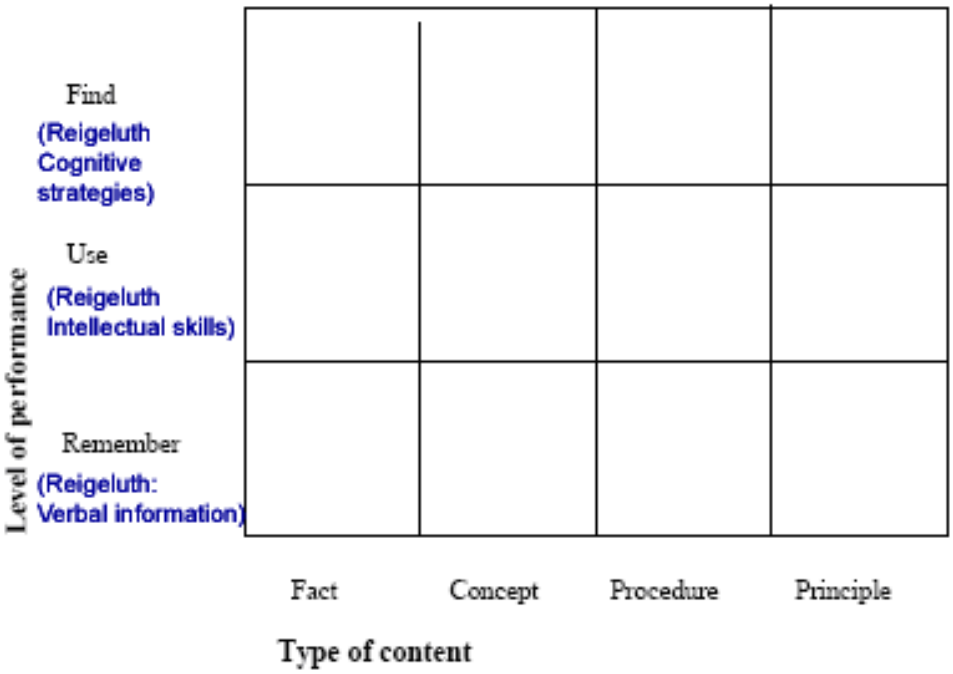


Figure 18 : Merrill's performance -content grid for CDT
(Merrill, 1983)

Various questions are included in the questionnaires in this research to evaluate the extent in which this theory may contribute desirable and workable features to an eLearning resource.

2.3.6. Hexa C Meta Model – Constructivism.

Constructivism orginates from Bruner's theoretical framework for instruction.

Literature review POSITIVE pointer 20: Learning is an active process of participation in constructing new ideas on the basis of past and current knowledge. (Bruner 2.3.6)

Bruner (Bruner, 1967), 1994, in (De Villiers, 2002) says learning is an active process in which learners construct new ideas or concepts on the basis of their past and current knowledge. Bruner does not believe that instruction means getting learners to put things "into" their minds. In his opinion the instructional process means teaching learners how to work effectively with those processes by

means of which learners can obtain and establish knowledge for themselves. “Knowing is a process, not a product" (Bruner, 1967).

Development of cognitive structures

Constructivism consists of enabling learners to develop cognitive structures as they build upon their previous knowledge and experiences both in learning environments and in the world at large (Reeves, 1997). Learners select information, transform it, construct hypotheses, and make decisions about what this process means to them. To do this, they use whatever cognitive structures (such as schemas and mental models) they possess. By doing this, they construct cognitive structures that enable them to organise their knowledge and discover further principles. In so doing, they move *beyond* given information and conditions and established their cognitive processes on a higher level.

Constructing one's own reality

According to Reeves (Reeves, 1997), constructivism establishes the conditions in which learners can construct their own knowledge. This means that they are given opportunities to construct their own reality by making use of their previous experiences and knowledge and their personal interpretations of their own reality. This is the opposite of the objectivist viewpoint in which – to use a mechanical metaphor – predetermined constructions are “inserted” into the mind of a learner. Although constructivism does not deny the existence of external reality, it asserts that truly significant learning is always *personal* because individuals inevitably construct their own reality by drawing on their own unique experiences and using their minds as filters to interpret novel events and conditions in their environments. Each learner therefore inevitably constructs and compiles a knowledge base that is personal, unique and individual. While the most extreme formulation of this viewpoint is that no

single universal reality or objective entities exist (Reeves, 1997), the moderate or middle view is that while objective conditions do actually exist, the human mind always interprets them according to the knowledge, expectations and prior principles of the observing mind (in this case, the mind of the learner).

Learning is an active process.

The constructivist point of view is that significant learning presupposes an active process of constructing knowledge, and that it is a process in which learners themselves carry out the necessary construction activity (E-learning_Guild, 2004). Learning does not mean the mechanical acquisition of preconstructed or predetermined knowledge. Learning presupposes the development of new meanings, ideas and concepts on the basis of prior knowledge and experience. The instructor's task is not to instruct in a mechanical or behaviouristic way. An instructor is someone who carefully scaffolds the construction process by creating a nurturing and supportive environment in which learners can become involved in their own construction processes without undue obstacles, difficulties or hindrances. Technology and computer technology in particular, as well as the Web, offer innumerable creative resources that have proved their worth in supplementing constructivist learning techniques and practices.

Intrinsic motivation, cognitive readiness, and the social negotiation of meaning.

Individuals are thought to be intrinsically motivated to search for information and exploit it to promote their own learning (Hannafin, 1992). If this is true, then understanding is a process and not an event.

Hannafin believes that a "zone of proximal development" – a condition of cognitive readiness – must already be in place before learning can occur. Reflection and reconstruction of knowledge is regarded as more important than

activities that promote the mere acquisition of knowledge. The role of mental activity in learning is vital, and comprehension must be considered in relation to a learner's interactions with the environment. Learning also differs from one individual to another (Chien Sing, 1999). Since we reinforce our personal reality by reference to the beliefs that we share with others, we call this process of sharing and agreement the "social negotiation of meaning". All human beings instinctively and naturally make use of collaborative efforts to construct their own personal worldviews.

De Villiers (De Villiers, 2002) condensed the general features and characteristics of constructivism as follows:

Literature review POSITIVE pointer 21: Constructivism is based on active participation, real-world problems, multiple perspectives, self-regulation, intrinsic motivation, collaborative learning, personal goal setting, just-in-time information, integrated assessment in context and regarding errors as part of the learning process. (De Villiers 2.3.6)

- Active participation – Here the emphasis is on tasks, experimental activities, experience and alternative constructions of what is already known.
- Complexity and cognitive conflict – Exposure to the real world provides learners with opportunities to resolve cognitive conflict. Unnecessary complexity and uncertainty are reduced by interaction, inquiry and exploration.
- Multiple perspectives – Learners are presented with various interpretations and understandings of the same subject matter so that they themselves can evaluate alternative solutions.
- Real-world context – Constructing learning tasks in terms of the real world enables learners to identify the differences between objective and hypothetical conditions.

- Self-regulation and intrinsic motivation – Students should assume responsibility for their own learning, their own success and their own self-regulation. Tasks of sufficient complexity and depth should be given to students so that they can learn to plan intelligently and set their own goals.
- Collaborative learning – Learners should construct their knowledge through social negotiation and cooperation – and not through competition.
- Personal learning objectives – Because learners have different learning objectives, they should be given the freedom to set their own goals.
- Flexible entry behaviours – Learners should be offered just-in-time information to support complex tasks as the need arises.
- Integrated assessment – Assessment needs to be carried out in context if it is to be valid. The focus of assessment should be on what learners themselves construct in the real world as they tackle authentic learning tasks.
- View of errors – Errors should be regarded as a natural and necessary part of the learning process. No negative values should be attached to errors. Errors are beneficial in the context of supportive educational structures. Mistaken ideas or results should simply be regarded as indicators of the direction in which the correct solution may lie.

The following sections present practical applications and reflections on constructivist learning in the literature.

Jonassen's (Jonassen, 1999) approach in his Constructivist Learning Environments emphasizes the necessity of progression in the solving of problems.

Literature review POSITIVE pointer 22 : Interesting and relevant problems that are gradually increasing in difficulty aid constructive learning (Jonassen2.3.6)

Teachers should present learners with stimulating, relevant and engaging

problems that are not too tightly structured. Important aspects of any particular problem should be left to learners to identify, explore and resolve. Learners should initially be presented with tasks that they know how to perform. They should then gradually be given more complex and difficult tasks which they themselves are then expected to solve.

Some students resist constructivist approaches and prefer traditional approaches.

> Literature review NEGATIVE pointer 5: S tudents may resist a constructivist approach in favour of being "spoon-fed" in a more conventional lecturing situation. Some students do not like to be disturbed in their face-to-face "comfort-zones". (2.3.6)

When he applied the constructivist and collaborative approach in teaching, Wentzel (Wentzel, 2000) noticed that his biggest problem took the form of resistance to such methods on the part of some of the students themselves. Their clear preference was for a more conventional lecturing approach. Their resistance astonished him. For the first two weeks of his programme, he explained the constructivist method to the class. He also prefaced each lecture in the following few weeks with a résumé and open discussion of the constructivist approach to learning. Every time he did this, some students brought up problems which he dealt with as best he could. He continued to do this until he reached a point about six weeks into the semester that he felt was a point of no return. Up until then, he had been willing to change the approach – and even discard it completely if the majority students were uncomfortable with it. In the seventh week of the programme, a significant minority of students suddenly stated that they wanted him to discard the approach completely. But by that time a complete reversion to conventional methods was, for various practical reasons, impossible. Their resistance, however, forced him to water down the method so as to prevent seriously disruptive conflict between those who in the class who favoured constructivism and those who did not.

Some learners prefer face-to-face "comfort zones" rather than online courses.

Henning (Henning, 2002) found that when face-to-face learning groups were compared to eLearning groups, a substantial number of students were deeply disturbed by the experience because it moved them out of their cognitive comfort zones in which they were accustomed to memorise and reproduce content with a minimum of critical application. These students appeared to be so trapped in their customary educational comfort zones that they were extremely unreceptive to self-directed learning.

The brightest and most independent students benefit from constructivist approaches.

> Literature review NEGATIVE pointer 6: Bright and independent learners seem to benefit more from constructivist approaches online. (2.3.6)

In his discussions with European universities, it became apparent to le Roux (Le Roux, 2003) that students in European universities welcomed the opportunity to develop ICT skills, and that the brightest and most independent of them enjoyed and obtained considerable benefits from the kind of constructivist approaches that are utilised in Internet courses.

When constructivist courses are difficult to implement, they should be augmented with guided construction.

> Literature review NEGATIVE pointer 7: Constructivist online courses are difficult to implement online because of time contrants in building relationships. (2.3.6)

Czerniewicz (Czerniewicz, 2001) argues for a guided construction model of learning. In her experience, a purely learner-centred online discovery course based on constructivist principles is difficult to implement. Time constraints compound the problems that arise. Building relationships takes time. Course designers can facilitate learning by creating appropriate structures in the learning environment. She refers to a subtle and complex process of course

design in which tutors and course designers create and develop an environment or framework that enables a whole range of learner-centred activities that build on existing knowledge and encourage and shape interactivity of a purposeful kind.

Online courses require more creative imagination and skill than conventional instruction.

> Literature review NEGATIVE pointer 8: Designing online courses may require more imagination and skill than traditional courses. (2.3.6)

Czerniewicz (Czerniewicz, 2001) cautions that we need to be wary of expecting too much from online teaching and learning. Online learning does not exempt us from the necessity of making our teaching and learning methods imaginative and effective. While technology offers learners increased access to learning, designing online courses may well require even more imagination and skill than traditional courses in order to compensate for the inherent disadvantages of the technology and the way in which it is applied.

Dick and Carey (Dick, 1996) argue that "boring instruction" is the product of approaches that are inherent limited in scope and flexibility. Such approaches are hamstrung by the rigidity of their models and presuppositions. Approaches of this kind require students to complete each step in a strict and invariable sequence before they tackle the next step. In this kind of practice, no allowance is made for pragmatic compromise, flexibility, creativity or ingenuity on the part of the student. Some of the conditions that Dick and Carey propose for liberating the personal creativity of students are:

- Client criteria: Instruction should be made relevant to the needs and perceptions of clients (learners). A learner analysis will enable the instruction designer to match the interests and context of learners to expected outcomes.

- Participatory design: Instructors and learners should cooperate to produce an optimal design.
- Flexibility in applying the strategy: There should be flexibility about the activities that will be included, and about their presentation and division.
- Technology: Current technology should be fully exploited.

The computer can act as an "over-the-shoulder" guide to learners.

Hague (Hague, 1996) developed a model in which the computer behaved metaphorically as a "surrogate" teacher who provided "over-the-shoulder" guidance. In this scenario, the computer offers clues that help students to understand problems as well as answers and argumentation on demand – just as a teacher would if he or she were looking over the shoulder of the learner. Constructivist-style scaffolding of this kind undoubtedly enhances a constructivist learning style.

Online learning must be anchored, contextualised and useful in practice.

Fisher (Fisher, 2002) is of the opinion that instructors should strive to introduce contextualized learning experiences into virtual discussions. All course content should be constructed so that it is applicable in the workplace and promotes constructivist habits of thinking and learning.

Psychological motivation includes attention, relevance, confidence and satisfaction.

Keller (Keller, 1987) synthesized existing research on psychological motivation and created the ARCS model. ARCS stands for Attention, Relevance, Confidence, and Satisfaction. The success or failure of any e-learning initiative can be closely corrolated to learner motivation according to him. Attention is gaining and keeping the learner's attention. Relevance is answering the critical

question for the learner "What is in it for me?". Confidence is motivating the learner that the objectives are achievable, and satisfaction means learners must obtain some type of satisfaction or reward from the learning experience.

2.3.7. Hexa C Meta Model – Creativity and motivation

Creativity entails originality, novelty and innovation without a loss of functionality (De Villiers, 2002). Instruction is creative when it inspires, motivates and encourages learners to take risks and rely on their own abilities and expertise.

Motivation and creativity are strongly related. Motivation is concerned with attitudes and emotional factors (Wagner, 1998). While extrinsic motivation depends upon reinforcements that are external to the work, intrinsic motivation arises out of internal states or effects such as satisfaction, frustration, etc. Intrinsically interesting learning environments for children are recognisable because they are able to maintain steady levels of attention and inspire motivation (Malone, 1987). One of the most important features of stealth education (Huffaker, 2003) is that it incorporates entertaining features into learning formats in a seamless and game-like way.

> Literature review POSITIVE pointer 23: To keep school-level learners motivated, one shoud strive to create intrinsically interesting learning environments – in a game-like fashion. This can be done in a "stealthy" way, i.e. without learners realizing that they are actually learning. (Creativity and motivation 2.3.7)

Stealth education with games (interesting learning environments based on stealth educational principles) increase the effectiveness and power of the learning experience.

It appears that intrinsically interesting learning environments increase the effectiveness of learning. Lepper and Malone (Lepper, 1987) found that when children were given the option of choosing an action-oriented dart game to learn

the fundamentals of fractions, they chose to play more often (and hence learned more) than when they were given the option of partaking in a drill-and-practice routine designed to induce mastery of the same material. This suggests that stealth education applications that mediate intrinsically interesting and seamless educational experiences are more likely to succeed in getting children to interact with entertaining educational software in out-of-school settings than are simple drill-and-practice applications designed to achieve the same end.

Experiences of success and positive emotions increase motivation.

Literature review POSITIVE pointer 24: Positive emotions (linked to experiences of success) increase motivation in online learning. The opposite is also likely to be true. (Creativity and motivation 2.3.7)

Dreyfus (Dreyfus, 2001) points out that research into skill acquisition by nurses shows that only those nurses who were able to experience the joy of a job well done (as well as remorse for mistakes and failures) were able to make a success of their online learning. He also noted that those who were unable to experience such emotions eventually suffered burn-out. He contends that the positive emotions of the former group reinforced their success while the negative emotions (or inability to experience positive emotions) of the latter group inhibited them from being as successful in their online learning as those in the first group. One may deduce from this that positive emotions serve to increase motivation.

2.3.8. Hexa C Meta Model – Customization

Flexible learning and customization

Jochens (Jochens, 2004) describes two features of customization or flexibility. The first is flexibility with regard to time and place, and flexibility with regard to

student needs. The second feature of flexibility relates to mass customization. This means that products and services are increasingly produced according to the specifications of the individual client only when they are actually needed. In the field of education one can observe a similar trend away from the production of uniform standardised supply-oriented educational products and services towards products and services that are demand-oriented and tailor-made for the needs of individual clients. Student-centred instruction ideally provides individual students with personalized learning routes that take individual competencies and capacity into account. It also enables students to choose between different levels of guidance, different delivery modes and so forth.

2.3.9. Hexa C Meta Model – Collaboration and cooperative learning

Difference between collaborative and cooperative learning

Panitz (Panitz, 1996), in (De Villiers, 2002), explains the difference between collaborative and cooperative learning.

Collaborative learning is a philosophy of learning. It is more than just a classroom technique. It implies an ethos of respect for the unique abilities and personal contributions of each individual in a group. One of its most important tenets is that authority and responsibility should be shared within teams. It emphasises universal active participation and organic interaction between learners and instructors.

Cooperative learning is a set of processes that allows people to work together towards the accomplishment of some specific goal. It is a more directive than collaborative system and is usually controlled by an instructor. While cooperative learning is teacher-centric, collaborative learning is learner-centric.

While collaborative learning tasks are frequently open-ended, cooperative learning is predicated on carefully demarcated and well-defined problems that are limited in scope and that have predictable solutions or answers. It is the teacher who usually maintains control of tasks in cooperative learning.

In general, the scope of collaborative learning is broader than that of cooperative learning. While cooperative learning is useful for mastering foundational knowledge, collaborative work is more appropriate for students who have become competent in a particular field. Both collaborative and cooperative learning are effective learner-learner-educator paradigms, particularly in the context of interactive environments where students take more responsibility for their own learning and for their interactions with their peers.

Key elements in cooperative and collaborative learning

- Johnson and Johnson (Johnson, 1991), in (De Villiers, 2002), describe the elements of cooperative and collaborative learning as:
- Shared goals – Learners are encouraged when they see that goals are attainable because others very much like themselves have succeeded in that learning area in the past. This kind of encouragement makes learners more willing to discuss their problems and offer one another mutual assistance.
- Positive interdependence – The knowledge that everyone is involved in the learning process makes learners more willing to share their knowledge with one another.
- Individual accountability – Achievement of the goals of the group becomes the personal responsibility of each individual learner.
- Promotive interaction – Because of the openness and cooperation within the group, learners gradually hone their ability to communicate with one

another and debate ideas within a group.

- Interpersonal skills – Learners improve their ability to communicate with one another through practice and participation.
- Empowerment of learners
- Cooperative evaluation systems

Nelson's (Nelson, 1999) theory of collaborative problem solving provides an extensive list of guidelines for the design and practice of participation in authentic learning environments. These are designed to strengthen critical thinking. The steps that Nelson suggests include building readiness, forming groups, defining the preliminary problem, defining and assigning roles, engaging in an interactive problem-solving process, finalising a solution or a project, synthesising and reflecting, assessing products and processes, and providing closure.

The following paragraphs present what the literature says about the practical application of collaborative learning.

Collaborative learning is usually used in constructivist environments in which learners explain and justify their points of view. By doing this, they broaden their understanding as they attempt to resolve their cognitive conflicts (Duffy, 1991).

> Literature review POSITIVE pointer 25: Collaborative learning enhances confidence and motivation. Metacognitive skills are learned more effectively within groups. (2.3.9 Collaborative learning)

One of the functions of the group is to listen carefully to each individual's point of view so that each member's personal confidence and motivation is strengthened. When learners learn how to collaborate effectively in an educational setting, they develop and strengthen valuable life skills that prepare them for the workplace. Metacognitive skills, in particular, are learned more effectively within groups.

Literature review POSITIVE pointer 26: Elementary school children learn how to interact and share knowledge online in a science project. (2.3.9 Collaborative learning)

When children learn together in network of science clubs, they learn much more than science.

The acquisition of scientific knowledge is a collaborative activity in those cases where groups of people pool their knowledge and talent to solve particular problems. This method of acquiring scientific knowledge contrasts with the more traditional academic approach in which individual children work on their own to solve problems and acquire individual knowledge and expertise (Huffaker, 2003). The group involved with KineticCity.com (Malcolm, 2002) used collaborative group learning in their after-school programmes. Clubs of learners were given the opportunity to interact with and work with other clubs, thereby encouraging a global vision of community of practice. On their website is a rotating globe with a real-time feature showing existing clubs as well as individual players in other parts of the world. When they collaborate, these children are therefore internalising more than just science concepts; they are learning how to interact and share knowledge and resources with one another both locally and globally. Because the program uses an action-adventure format in which good triumphs over evil in an action-orientated format, the learner inevitably identifies with the hero who helps to save the planet "Vearth" from an evil hacker who is spreading computer viruses that will destroy the world. The subtext of this story is a science curriculum that is carefully designed for elementary school standards.

Children succeed in the social dimension of learning online.

The social dimensions of learning can also be fostered in online communities. In

a properly designed online community, children learn valuable lessons from one another that include tolerance, patience and the sharing of resources (Cassel, 2002). Because membership of an online community transcends constraints of time and space, it can bring people closer as they tackle complex problems in a cooperative spirit (Huffaker, 2003)

> Literature review POSITIVE pointer 27: Children learn tolerance, sharing resources and to solve complex problems online (2.3.9 Collaborative learning)

Cassel's Junior Summit Project (Cassel, 2002), mentioned earlier, demonstrates how children are able to use cooperative learning in an exciting and creative way when they are given the opportunity to do so in an appropriate environment.

Students in online learning environment write four times more than others who do not have access to an online cooperative learning project.

Scardamalia (Scardamalia, 2004), for example, found that students who were engaging in a year-long examination of species adaptation and interdependence in Grade 4 at the University of Toronto Institute of Child Study Laboratory School and who were using a discussion forum to explain and make sense of their observations, wrote about four times *more* than students without access to the online software.

> Literature review POSITIVE pointer 28: Grade 4 children write four times more in an online cooperative course than others in a conventional course. (2.3.9 Collaborative learning)

Although the group was engaged in an investigation of the Giant Madagascan Hissing Cockroach, individual student were encouraged to identify and pursue their own research interests. By working in small groups, they explored and learned a great deal about the anatomy and physiology, habitat, reproductive strategies and evolution of various insects. A professional entomologist from the University of Toronto participated as an expert in the project.

2.3.10. An add-on to the Hexa C Meta Model – Companionship

I add "companionship" as a significant possible contributor to the success or failure of learners involved in online high school learning.

Companionship is important for young learners because they are at a difficult stage of development in their high school years and so respond rather differently than adults would to online learning. I would therefore add **companionship** as an additional component to the Hexa-C model of De Villiers (De Villiers, 2002).

> Literature review POSITIVE pointer 29: Companionship is an important contributor to success in home schooling. (2.3.10 Companionship)

While the value of companionship in an online learning environment might well constitute a topic for doctoral research, the concept occurs in its original place in the home school movement as described by Klicka (Klicka, 1995) – one of the founders of the modern home schooling movement in the United States. He is of the opinion that companionship might be a crucial ingredient in the success in home schooling.

Harris (Harris, 1995) bases his ideas of companionship on principles he finds in the Bible.

Harris quotes the following verse from Proverbs 13:20 as the basis for his opinion: "Those who walk with the wise become wise, but a companion of fools will suffer harm." He is of the opinion that children need to learn from the example of their parents. Children need to spend more time doing whatever their parents normally do as wise adults – "work, study, worship, hospitality, political action, evangelism, rest, recreation, and all other things that make up a good routine". He adds: "If children are not permitted to be with their parents in these activities, where will they learn them? Certainly not from their peer groups" (Harris, 1995).

A companion is more than a facilitator or a moderator.

My own concept of the companion in companionship is that he or she is someone who is more like a loving mentor, parent or guardian. My hunch on why it may be important is based on my experience with my own home-schooled children. Sometimes my children seem to want to learn something from me in particular and not from books or other sources – even when these other resources are readily available. At certain times they demonstrate a need to discover things together with me as their parent.

Closely related to this concept, the literature in general is very clear about the importance of the role of a facilitator, moderator or mentor.

> Literature review POSITIVE pointer 30: An online facilitator has five important roles to play. These roles are administrator, social supporter, instructor, guide and mediator. (2.3.10 Companionship)

Adendorf (Adendorff, 2004) suggests that the following five roles in an online facilitator are applicable to the work situation of adults in eLearning: administrator, social supporter, instructor, guide and mediator. The inclusion of social supporter and guide in this list suggests the appropriateness of companionship in online learning. Blignaut and Trollip (Blignaut et al., 2003) developed a taxonomy of online instruction that also included the affective functions of a facilitator.

In the paragraphs that follow, the practical applications of companionship in the literature are discussed.

Students who were preparing for SATS and who appointed mentors tended to view more and study more.

Loken (Loken, 2004) studied 100 000 students who were preparing for SAT, ACT and GRE tests and who were given the option of nominating a parent or teacher as a mentor to monitor their progress..

> Literature review POSITIVE pointer 31: If the progress of students is watched by a mentor, they are more active and spend more time studying. (2.3.10 Companionship)

If they entered the email address of the parent or teacher whom they nominated as a mentor, that person would receive updates about their progress on the website. About 18% of the 55,000 SAT students nominated a mentor. What Loken found was that the mentored group viewed significantly more pages and answered significantly more questions of every type when compared with students who had not opted to select a mentor.

The facilitator's/moderator's role.

> Literature review POSITIVE pointer 32: An online moderator must be able to offer emotional support by caring, enduring insults, dealing with emotions, listening and gauging intentions. (2.3.10 Companionship)

Hortor (Horton, 2000) emphasises how important it is for online moderators to be compassionate and caring people who are able to endure insults and abusive behaviour and deal with emotional outbursts in a tactful and diplomatic manner. They should, in addition, be superb communicators who are skilled in the art of attentive listening. They should also be able accurately to gauge the intentions and emotions of each participant.

Dreyfus (Dreyfus, 2001), in Le Grange(Le Grange, 2004), argues that learning is a profoundly social process that requires expenditure of time and face-to-face contact..

> Literature review POSITIVE pointer 33: Mastery (an advanced stage of learning) can only be achieved through apprenticeship, which requires time and a special kind of involvement. (2..3.10 Companionship)

Learning also requires lecturers to be able to interact with students and companions who are capable of interacting with students. He says that if learners are to progress beyond being raw consumers of information (such as one finds in drill and practice exercises), a special kind of involvement is required. Learners ascend to the next level of competencies through instruction or experience. They also learn to discriminate between those elements that are important and those that can be ignored. He argues that mastery, which, in his view, is the most advanced stage of learning, can only be achieved through apprenticeship because apprenticeship is an institution for passing on style. He uses the example of musicians to illustrate his point. Musicians perfect their technique by learning from different masters, each of whom is an expert in a particular technique or techniques. Companionship seems an appropriate term for what is required to achieve this particular kind of learning.

The most advanced stage of skill development is found in Aristotle's notion of practical wisdom.

If learning is to be as comprehensive and perfect as possible, learners need to acquire not only the skills of experts through imitation of their style; they also need to acquire the culture of mentors if they are to obtain their wisdom. Dreyfus (Dreyfus, 2001) points out that cultural style is so embedded and pervasive that it generally remains invisible unless it is consciously juxtaposed and contrasted to other cultural styles. To illustrate his point he compares the ways in which American and Japanese parents handle their babies. He argues that while cultural style is passed down silently "from body to body", it is nevertheless what makes us distinctively human and serves as the basis for all our learning. It is through being an "apprentice" to our parents and teachers that we internalise the practical wisdom that is inherent in their personal cultural style. This assumes that parents are creditable models. Some people have to

spend their whole lives trying to unlearn lessons that they internalised by having inadequate parents as models.

Embodied presence is essential if skill development is to go beyond the stage of mere competence. Dreyfus (Dreyfus, 2001) argues that net presence or telepresence can only take skill development to a limited level of competence, and he cautions that skill deficiencies might become more pervasive as more and more people learn through the medium of network technologies (eLearning). On the basis of this assumption, he makes a strong case for the necessity of bodily presence in learning. He questions the ultimate value of the kind of learning that is mediated through network technologies. Because he believes that the presence of a teacher is beneficial, he is strongly supportive of the idea that physical real-time companionship is necessary for achieving successful learning and for developing skills beyond the level of competence. Again this assumes a competent teacher who is a good rather than a detrimental influence and a hindrance to a learner's progress.

One may say in defence of eLearning that not everything that a student needs to learn goes beyond the level of Dreyfus's "competence" level. One may also suggest in addition to this argument that "real" experiences are rarely provided for in conventional education and that a great number of teachers are neither competent nor good role models. It is unfortunately true that many teachers only serve to hinder the progress and distort the understanding and ethical sensitivity of learners.

2.3.11. Implications and value of literature on pedagogical theories in this research

Pedagogical theories embody the cumulative speculations of the human race on how we learn. There are three main pedagogical theories that are most influential in creating the current status quo. They are the behaviourist, cognitive and constructivist theories. There is a growing trend towards the kind of pragmatism that uses whatever is best suited to any particular situation or individual need. Pragmatism is also evident in the modern tendency to combine behavioural, cognitive and constructivist approaches. It is important for this study to investigate what elements from each of these theories may be most workable and desirable in an online resource and to identify the reasons why this may be so.

There is a place in a behavioural approach for rewarding and reinforcing correct responses and for accommodating extrinsic motivation, criterion testing, performance objectives and evaluation. The major weakness of the behavioural approach is that it does not give due weight to the part played by mental, emotional, social and cultural activities in human learning.

The Hexa-C Meta Model of Ruth de Villiers conveniently summarises the following six components of the cognitive family of learning theories. De Villiers lists them as Cognitive learning, Component display, Constructivism, Creativity and motivation, Customisation, Collaboration and Cooperative learning. (To these I have added another C in Companionship.) All of these provide the substance of subsidiary question 1 which helps to formulate a large part of the answer as to why certain elements in an eLearning resource are workable and desirable in a resource designed for high school learners..

You are now here……

Chapter 1 Introduction, background and research problem

Chapter 2 Literature review

Chapter 3 Research design and methodology
Chapter 4 Analyzing the case, evidence and discussion
Chapter 5 Conclusion and recommendations

Structure and principles of this literature review
Theme 1 Pedagogical theories that inform an eLearning resources
Theme 2 A learning community
Theme 3 Communicative, Collaborative, Social issues
Theme 4 Technological and Interface issues

Definitions of an eLearning community.
Characteristics of an eLearning community.
Taxonomy of an eLearning community.
The role of online instructors in a learning community.
User and personality issues in a learning community.
Implication of literature on learning communities.

2.4. Theme 2 – A learning community

In this section issues from the literature that relate to the second research sub-question will be investigated

> 2. Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?

What is a learning community?

The definitions, descriptions and characteristics of eLearning communities will be discussed and investigated in the sections that follow.

2.4.1. Definitions of an eLearning community

The difference between a community of learning and a community of practice

Jonassen and McAleese (Jonassen, 1993b) differentiate between a community of learners and a community of practice in the following way: a community of learning refers to the results of the cognitive process of creating a new cultural product while a community of practice refers to the construction of "physical" objects. "Both concepts assume that learners construct knowledge by interpreting their perceptual experiences in terms of prior knowledge, current mental structures and existing beliefs" (Jonassen, 1993b).

What is a social community –one in which communication takes place?

It is necessary to describe an eLearning community thoroughly before fully describing and explaining what a social community is. Human beings can only exist in a network of relationships with other human beings. Without human

relationships, it would beimpossible to develop properly as a human being. Because human beings need stability and familiarity as they progress through their developmental stages, they need to spend an adequate amount of time in each of these stages (Niemand, 2003). According to Fernback and Thompson (Fernback, 2003), communication is the fundamental process that structures a community of learning.

Analyzing the word "community"

The words *community* and *communication* are derived from the stem of the same Latin root word, *communis*, which means *common* (Williams, 1983). A community may be defined as follows: a combination of place, content and people, and the interactions and relationships that take place between them (Tillman, 2000). One may also define community as a group of people who have shared interests, purposes and goals and who come to know one another better over time (Kim, 2000). These definitions correspond with the definition found in the Random House Dictionary of the English Language, where a community is defined as: A social group of any size whose members reside in a specific locality, share government and often have a common cultural and historical heritage. The subsidiary definitions from the same dictionary are: A group sharing common characteristics or interests and perceived or perceiving itself as distinct in some respect from the larger society within which it exists (Dictionary, 1987).

Some definitions of a learning community

The origins of the virtual or online community can be traced to the Electronic Information Exchange System (EIES) implemented in 1976. The EIES focused on computerized conferencing that would enable its users to exercise a collective intelligence capability (Kitchin, 1998) or decision-making capacity. Virtual

community and online community are interchangeable concepts (Niemand, 2003).

According to Baten (Baten, 2004), a learning community in general might best be described by what it "looks like" in practice. When one looks at a learning community one sees people who exhibit genuine respect towards each other. A learning community is made up of individuals who are comfortable with shared responsibilities and who have an unflinching curiosity about "hot" issues. In some ways it also resembles a place of safety such as a field or stadium where a sport is practised: in other words, a place where new ideas and behaviours may be tried out or run by others for experimental purposes rather than a place where only right answers are acceptable.

A learning community comes into being when a curriculum is deliberately restructured to link relevant coursework in a particular way. This kind of restructuring provides a linkage between courses and coursework so that students find greater coherence in what they are learning and are able to enjoy a greater amount of interaction among themselves and with members of their faculty (Evergreen State College, 2004).

Penn State's College of Education describes a learning community as "possibly an entire group of participants and facilitators who meet together for lectures, discussions and sharing" (Penn State College of Education, 2004).

Cascadia Community College (Cascadia, 2004) describes a learning community as a variety of learning strategies designed around a common theme or question. This gives students opportunities to acquire a deeper understanding of the material they are learning while they interact among themselves and with their teachers.

2.4.2. Characteristics of an eLearning community

One cannot produce a workable and desirable eLearning resource merely by moving education and learning online.

While eLearning is valuable because it enables a learner to be instructed by anyone at any time in any place, the implementation and maintenance of an eLearning programme requires more than merely moving conventional educational and learning practices online (Engelbrecht, 2003). eLearning is defined by singular characteristics that will be discussed in this section.

Learning communities are communities in which participants help and support one another in their learning. Fisher (Fisher, 2002) explains that that the most important feature of eLearning is that the learners help one another to learn from each other and from the study material. It is a necessary part of eLearning that learners reflect on theory and practice with one another. It is this reflection that changes a learning community into a community of practice. In many instances, the learning that has already occurred is made visible. An eLearning community can also serve a number of other valuable purposes. These include the provision of support and friendship and the mutual help that learners offer one another in the completion of assignments by, among other methods, the exchange of material.

Learning communities are communities in which support and participation are indispensable components of the online experience.

Wherever the distinctive supportive and participative characteristics of a learning community are absent, one cannot speak about an online learning course (Palloff, 1999).

Learning communities are communities in which there is a subtle shift away from

individual performance towards a community knowledge that is jointly constructed.

Marlene Scardamalia (Scardamalia, 2004) suggests the following useful principles that define what she calls a "knowledge building community":

- The participants take charge of their own learning.
- Ideas become refined during discourse.
- Inquiry becomes deeper and sustained rather than superficial.
- The focus tends to remain on understanding rather than on task-driven processes.
- It is possible to use more complex texts instead of simplified and watered-down versions of the same material.
- Ideas are continuously improved.
- Learners are able to discover deep connections between ideas and concepts.

Learning communities are communities in which the most valuable advantage is the generation and sharing of ideas that are of value to the whole community rather than to single individuals. Scardamalia (Scardamalia, 2004) believes that it is only possible to accomplish this by creating an emphasis on jointly constructed community knowledge rather than individual performance. The best way to effect such a shift is by inviting participants to share responsibility for advancing the work of the group rather than simply to demonstrate their own personal competence.

Learning communities are communities where teaching and learning are interchangeable; everyone is always involved in both; Participants advance the knowledge of others in the course of building their own knowledge (Scardamalia, 2004). There is not a hierarchical knowledge relationship between those who know and those who need to know instead: different agendas and

different needs create a productive tension that helps refine goals and the means for achieving them.

The Pallof and Pratt Model: A sense of community is indispensable to a learning community and a learning community is indispensable to online learning.

Palloff makes the bold statement that without the support and participation of a learning community there can be no online course (Palloff, 1999). Palloff and Pratt (Palloff, 2001) constructed a model or framework for distance learning that accords *community* a central place. When online classes make "an attempt to form connections and communities online, this sense of community allows participants to feel that they have entered a lively, active conversation" (Palloff, 2001). This is similar to what happens in active contact learning in face-to-face sessions. In an online classroom it is the relationships and interactions among participants that create the knowledge (Palloff, 1999).

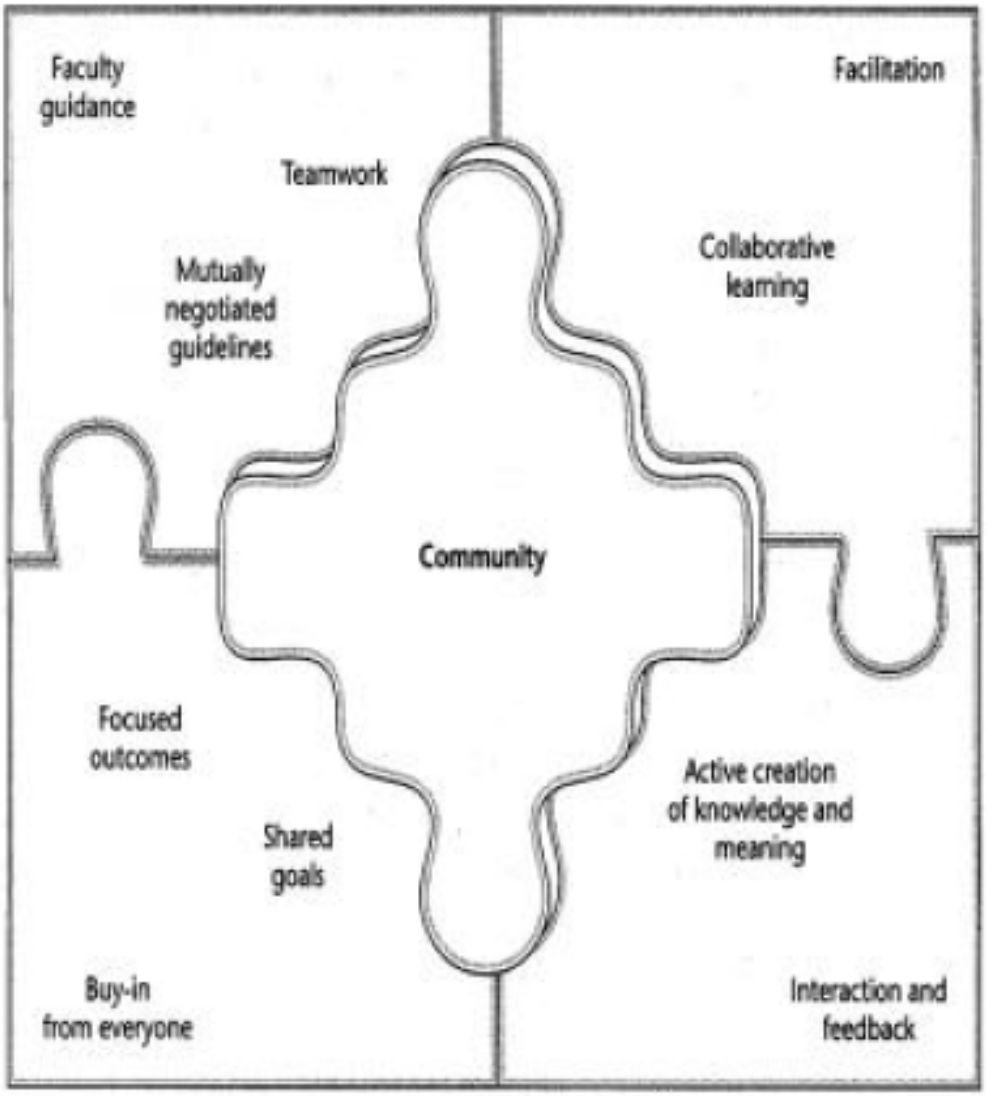


Figure 19 : Palloff and Pratt's view of a learning community being central to to puzzle of online learning
(Palloff, 1999)

Learning communities are communities in which there is a common sense of purpose.

According to Kellogg (Kellogg, 1999), who places a high value on the uniqueness of learning communities, a learning community may be defined as "a small subgroups of students ... characterized by a common sense of purpose ... that can be used to build a sense of group identity, cohesiveness, and uniqueness that encourage continuity and the integration of diverse curricular and co-curricular experiences".

Learning communities are communities in which independent research is important. Lin et al. (Lin, 2001) assert that an efficient eLearning communities is an environment in which students are given opportunities to:

- plan and execute independent research that results in problem solving
- work collaboratively and utilise whatever expertise is available in the community
- make use of various technologies to construct their own knowledge rather than use those technologies that are known as "knowledge tellers"
- get sufficient continuous feedback and criticism to revise their own thoughts, assumptions and arguments
- strengthen their sense of responsibility and refine their attitudes and emotional intelligence in the context of the group

Improving online support by creating learning communities at Unisa.

Heydenrch maintains that Unisa (UNISA, 2004) urgently needs to improve its online support (Heydenrych, 2000a). It would be possible to do this by creating learning communities through integrating Internet communication technologies into courses in such a way that learners would be able to communicate with other learners, lecturers, experts and sources of information and so enhance the knowledge construction process. But he does point out that this could only be done if curricula were open and flexible. Unisa actually selected to use the strategy of online courses with supplementary communication as the basis of a new approach to communicating with students. This was also the compelling reason why Brainline selected MOODLE and provided the case study for this research (Brainline, 2006).

Learning communities are communities in which entrenched patterns of thought are challenged with a view to constructing a more viable kind of understanding.

Pratt (Pratt, 1997) identifies certain elements that he believes would improve the quality of an online learning community. Among these is his assumption that learners will be provided with a stimulating, welcoming and challenging introduction to the course content when they first encounter the online course. He then assumes that they will make progress by using different principles and structures to create their own knowledge as their journey progresses. He also believes that it will be necessary for learners to establish themselves properly themselves in the community of practitioners by assimilating some of the rhetoric and traditions of the community. This they do by becoming apprentices in the community. Because most learners arrive with prior knowledge and assumptions, they will need to be willing to challenge their own "knowledge comfort zones".

He maintains that it is the responsibility of the tutors and instructors to facilitate a creative disturbance in the thinking patterns of neophytes so that new learners will be able to reconstruct their own understanding of the field. He believes that this will happen as new modes of thinking are cultivated and as cognitive development is stimulated. Because it is important for learners to be confident, self-assured and self-sufficient, such qualities will have to be nurtured within the teaching context.

Shared activities lead to shared understanding

Roschelle (Roschelle, 1992) studied how students were able to construct meaningful interpretations of scientific concepts through coordination of social interaction and perception-action processes and concluded that coordination between social and neural processes is important. Shared activities lead to shared understanding. Pea (Pea, 1994) supports this view and says symbols both represent and create reality.

2.4.3. Taxonomy of an eLearning community

Instead of following the usual convention of presenting the literature about learning communities conventionally and discretely, I decided rather to present a taxonomy of this aspect of eLearning because it seemed to me that the literature could best be presented in this form and because it contains the common elements of what an online community (or an eLearning community or an e-community) looks like when one relies on the literature. The word i-community is not appropriate here because an i-community may include the computerization and administration of a whole community such as one finds in Hewlett Packards "e-Inclusion" (HP_i-community, 2004) – their vision of a future in which people have expanded access to social and economic ICT opportunities to learn, work and develop themselves.

The result of condensing, combining and distilling the elements in the grid is depicted in the table below. There are seven main themes in current academic thought about learning communities. They are active interaction, collaboration from an independent base, lively discourse and discussions, a sense of community, information sharing, real quality learning and an attitude of open involvement. All these are summarised in the table below.

Literature review POSITIVE pointer 34: The main characteristics of learning communities are active interaction, collaborative inclination, lively discourse and discussions, a sense of community, information that is flexible and stimulating, quality learning and an attitude of open involvement combined with respect. (2.4.3 Learning community)

The recurrent ~~ing~~ common elements ~~distilled and grouped~~ from the ~~different~~ authors in the literature resolve themselves into the following elements:
1. Active interaction help given, support, involvement by everyone in teaching and learning, participation **2. Collaborative inclination from an independent base** self-regulation, independent research, the self-construction of principles and structures **3. Lively discourse and discussions** lively engagement, stimulating and enjoyable interactions, the use of a specific rhetoric, challenging modes of interaction **4. Sense of community** relationships, the sharing of diverse experiences, acceptance of responsibility, coherence, adherence to the traditions of eLearning, participation in the building up of the community, acceptance of membership of a particular community **5. Information** freely available information, information that is open and flexible, stimulating content **6. High-quality learning** knowledge-building, deep understanding, sustained inquiry, assimilation of difficult and complex texts, a movement from theory to practice, integration of knowledge, construction of one's own knowledge, participating in the construction of other learners' knowledge, the willingness to challenge knowledge and move out of comfort zones, the cultivation of new ways of thinking, cognitive development, critical thinking, participation in an invigorating quest for wisdom **7. Attitude of open involvement** open-mindedness, a safe space in which to test new ideas, mutual respect, the willingness to revise one's own thoughts and assumptions, the growth of emotional intelligence in groups, the ongoing personal development of all participants.

Table 11 : Ceommon elements from the literature that describe~~of~~ a learning community

The table above summarises the~~shows a summary of~~ common elements that ~~were~~ extracted from the literature that describes a ~~a~~ learning community

2.4.4. The role of online instructors in a learning community.

Online instructors or facilitators occupy a central role in online learning. In this section I will investigate and discuss the role of online facilitators in eLearning.

Cavanaugh's meta-analysis accords a critical role to online teachers in high school eLearning.

Literature review POSITIVE pointer 35: The role of online teachers are critical for success. (2.4.4 Learning community – instructors)

In her recent meta-analysis, Cavanaugh (Cavanaugh, 2004a) states that the one factor that warrants special consideration in the assessment of effectiveness in virtual schooling is *teacher quality*. Darling-Hammond maintains that teacher effectiveness in classrooms is a strong determinant of differences in student learning and that it far outweighs differences in class size and heterogeneity for determining differences (Cavanaugh, 2004a, Darling-Hammond, 2000). Because she detected similarities in student outcomes between distance and classroom learning, she (Cavanaugh) drew the conclusion that *teacher preparation* is critical in distance education. As professional development becomes more common and as expertise expands, she expects to see a corresponding increase in student successes. In my research, the way in which students *experience* the role of the teachers is analyzed in the questionnaires and interviews. The view of Adendorff (Adendorff, 2004) coincides with that of Cavanaugh when he notes that there is a growing body of knowledge about the new roles that online instructors have to take.

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Andersons three critical roles of an online teacher

In a work about teaching presence, Anderson, Rourke, Archer, and Garrison (Anderson, 2001) delineated the following three critical roles that a teacher

undertakes when he or she creates an effective teaching presence.

Literature review POSITIVE pointer 36: The three critical roles of an online instructor are to design the learning experience well, to encourage discourse and to provide direct instruction. (2.4.4 Learning community – instructor)

- The first role requires the teacher to design and organise a learning experience that takes place both before the establishment of the learning community and during its operation.
- The second role requires a teacher to devise and implement activities that will encourage discourse between and among students, between the teacher and the student, and between individual students and groups of students and content resources.
- The third role goes beyond the moderation of learning experiences and requires a teacher to add subject matter expertise by using a variety of forms of direct instruction.

Facilitating discourse is a key task of the facilitator.

For Anderson (Anderson, 2004c), one of the critical ways in which teachers exercise presence is by facilitating discourse. He deliberately uses the term *discourse* rather than *discussion* because it conveys "the process and power of reasoning" rather than the more common social connotation of mere conversation. Discourse also helps students to elucidate misconceptions in their own thinking or disagreements with the teacher or with other students. In his view this kind of conflict indicates a cognitive dissonance that is critical to intellectual growth (cf. the theories of Piaget). Teacher presence requires that students' contributions be read regularly and replied to with a view to developing the understanding of the learning community.

The successful facilitation of discourse requires hard work.

If the teacher is to be successful in Anderson's key task of facilitating the content of an online subject at postgraduate level, the amount of work that he or she would have to contribute would be comparable to writing a doctorial thesis (Murnane, 2003). Difficulties intrinsic to online learning should be addressed as part of the continuing business of education. Le Roux (Le Roux, 2003) reports that it is the opinion of leading officials at European universities in those European countries that are in the forefront of Internet teaching,that online teachers are buckling under workloads that are so overwhelming that the problem needs immediate attention. One of the reasons why this happens is that academics are under great deal of pressure to produce research results at the same time that they deliver courses to vastly increased numbers of students. The same will probably be said about high school eLearning in the future.

Teachers feel that their hard work goes unnoticed.

Most teachers feel that they are isolated and that their work is difficult. Even worse, teachers feel that their knowledge about their profession and about their students' performance goes largely unacknowledged by external stakeholders (Wiggins, 1993). Research by Bonk, Ehman, Hixon and Yamagata-Lynch (Bonk, 2004), by Sandholtz, Ringstaff, and Dwyer (Sandholtz, 1997) and by Shaw (Shaw, 2004) paints a sad picture of what schoolteachers in the United States and in other industrialized countries (Stoel & Thant, 2002) believe about the nature and image of their work. Nearly all of them experience teaching as an isolated job in which the teacher bears a heavy burden of responsibility (Hawkes, 2001) without proper compensatory recognition and reward. All teachers are expected to cover an extensive curriculum at a predetermined rate. This leaves them with little or no time to engage each student as an individual. Teachers tend to regard themselves as transmission mechanisms for whatever subject content administrators wish to impart to learners.

The implications of the different roles for the online facilitator – an online facilitator should not lecture online.

Fisher believes an online facilitator has to be responsive to the group as human beings and should not therefore lecture online. "Be a facilitator [and] not a controller" (Fisher, 2002). Because this is a role that is quite different from that to which teachers are habitually accustomed, it requires teachers to adapt and re-vision their skills and thinking.

Literature review NEGATIVE pointer 9 : The online facilitator should NOT lecture online. (2.4.4 Learning community – instructor)

Heydenrych (Heydenrych, 2001) also believes that online teachers should not lecture online. He feels that it is necessary to adapt existing lecturing modes to online learning. Lecturing in its traditional form is highly compatible with desirable and efficient online learning environment. To present online students with endless screeds of text without any kind of interruption or gloss (as often occurs in lecture hall teaching) is extremely counterproductive. If content is to be stimulating, it should be brief and concise and should be accompanied by intelligent and meaningful interruptions and activities. Learners should also be given regular opportunities to test their own ideas, comprehension and conclusions. The teacher should regularly offer mechanisms that enable learners individually and collaboratively to construct their own knowledge.

Horton (Horton, 2000) provides a number of "lecturing" options that can be sequenced to form the core of the course without a lecturer having to resort to online lecturing. These include tutorials, activity-centred lessons, learner-customised tutorials, knowledge-paced tutorials, exploratory tutorials and answer-based generated lessons.

If a lecturer simply makes the tools available by dumping lectures online, he or

she will fail to motivate students (or facilitators) to make full use of the course (Ferdig, 2004a). Sorensen and Takle (Sorensen, 2002) believe that discussion forums should have "forced requirements on the collaborative dialogue [prompting] students to engage in dialogue and actually [causing] more interactivity than was [originally] required to appear".

A system in which discourse is led by questions from the teacher becomes boring because it is teacher-centric. Many online courses rely extensively on a particular model of discourse in which the teacher posts questions or items of discussion that are relevant to course content (Rourke, 2002). He found that an overreliance on this form of discourse can quickly become enervating because great deal of learner energy has to be directed towards responding to teacher-initiated items rather than to the formulation of the learners' own questions and comments. He also observed greater levels of participation, motivation and student satisfaction in those cases where discussion groups were led by student moderators. In spite of this, it cannot be assumed that students have the necessary skills to undertake successful moderation of class discussion. Role modelling by the teacher is therefore necessary for initial discussions.

In an eLearning environment the tasks of the teacher become far more complex because they incorporate all kinds of pedagogical, social, managerial and technical issues (Palloff, 2001). This constructs a totally different reality for a new teacher because it demands some very different and additional responsibilities.

It is scarcely surprising in light of what has been discussed above that Engelbrecht (Engelbrecht, 2003) observed that if one is to develop, deliver and administer eLearning programmes and train educators to become competent eLearning facilitators, a high level of investment in ICT infrastructure is

required.

After his visit to European universities, le Roux (Le Roux, 2003) reported in a similar vein that it takes time for teachers and lecturers to become accustomed to their new roles, but that after some years of technology-led projects, the training of university lecturers in Belgium, Austria, Germany, France and the Netherlands is finally coming up to speed. Although major training initiatives are taking place in all sectors of education, it takes time for eLearning to become comfortably embedded in institutions.

Practical suggestions for facilitators.

Schultze (Schulze, 2000) investigated perspectives and trends in education and Internet at South African universities. I extracted the following items from his reports that may be of value in this research:

Literature review POSITIVE pointer 37: Practical suggestions for facilitators are to combine web and face-to-face learning, to pace students and to use textbooks creatively. (2.4.4 Learning community – instructor)

- Although lecturers are sometimes apprehensive about technology, attitudes change with training, usage and familiarity. The initial investment of time needed to learn technicalities and to develop material is substantial. After that, success depends on the amount of interactivity that is built into the course – even though most lecturers experience web-based courses as more time-consuming than conventional lectures.
- Web-based teaching and lecturing should be combined. Computers are just one of a range of tools that can be used to enhance the environment in which people learn. It would be optimal to use a combination of lectures and web-based delivery, with the ratio tilted towards favouring electronic delivery.

- Essay-type assignments should be produced on paper. Most lecturers in the study did not mark essay-type assignments electronically. It was felt that paper would probably remain the basic medium for essay-type assignments.
- Lecturers should pace students because it was felt that pacing was a lecturer's responsibility. But students are paced in the broad sense of the word and not in the narrow sense because they may work a little faster. The student-tracking facilities of some software programmes help a lecturer to determine where students are.
- The textbook was still accorded a role because it was felt that textbooks are still a primary source of information.

An eLearning teacher should first establish trust by making optimal use of introductory comments.

Literature review POSITIVE pointer 38: The online instructor should establish trust first. (2.4.4 Learning community – instructor)

The first task of an eLearning teacher is to develop a sense of trust and an atmosphere of safety and security within the learning community. In the absence of such trust learners will feel uncomfortable and will consequently be reluctant to post their thoughts and comments. Trust of this kind can be built up by asking students to post a series of introductory comments about themselves (Engelbrecht, 2003).

The lack of contact and feedback from teachers becomes a precursor of failure.

Literature review NEGATIVE pointer 10 : Lack of interaction and feedback are common problems in eLearning resources.

Galusha (Galusha, 1997) and Hara and Kling (Hara, 2000) discovered that some of the most common reasons why eLearning resources lack the necessary degree of interaction and feedback from teachers is because of poorly designed course

materials, a lack of support services (such as the provision of tutors and technical assistance), a sense of alienation, and a lack of experience in online learning. Pincas (Pincas, 1998) values the role of expository strategies and believes that its absence accounts for some of the reasons why eLearning is viewed negatively by students. "There is very little inclination to resist or even abandon the tried and tested imparting of knowledge by expository methods in favour of untried, labour-intensive ... and time-consuming autonomous learning" (Pincas, 1998).

2.4.5. User and personality issues in a learning community.

In this section, I will investigate personality and social issues in relation to eLearning. These issues can be linked with the information behaviour of learners discussed earlier, and it is important for this research to determine which aspects will affect the workable and desirable features of high school eLearning.

Niedzwiezka (Niedzwiezka, 2003) asserts that it is *personality* that largely determines the information behaviour of an individual.

Literature review POSITIVE pointer 39: Personality characteristics influence choices and what is regarded as important in information behaviour.

While personal characteristics influence choice and importance of information needs, she regards personality as

> a set of unique and relatively stable individual features of a person which express his/her identity, and are developed in a process of biological, psychological and social development by the person's environment and his/her own cognitive activity (Olechnicki, 2000), in (Niedzwiezka, 2003).

A great number of human cognitive needs originate outside a person: from the social roles that a person plays to those induced by environmental conditions. Olenicki (Olechnicki, 2000) defines a social role as

> a defined, socially conditioned and internally cohesive set of rules and expectations in reference to the desired behaviour of an individual in specific situations connected with his/her social position. It is also a set of basic privileges, rights and regulations that relate to the person's position in a group. An individual can simultaneously play many social roles, among them professional roles (Olechnicki, 2000)

2.4.5.1. Gender differences in a learning community.

Gender differences are already detectable in the type of games built by boys and girls in a controlled learning project.

"Active learning & metacognition: children as constructors of their own learning" was the title of The Game Design Project developed by Kafai (Kafai, 1996). It was a six-month-long series of games in the programming language called Logo. Every day primary school children actively controlled their learning by creating plans – an important component of metacognition (Bransford, 2000) – which they would then implement to create their own fraction video game. The results documented gender differences in the construction of video games.

> Literature review POSITIVE pointer 40: Boys build action-adventure type games in fantasy worlds, while girls never presented evil themes and prefer real-world settings.

Although both boys and girls built games that told stories, boys tended to construct action-adventure games based on the concept of good versus evil. By contrast, the games that girls created never utilised good versus evil as a theme. Instead they focused on teaching or developing skills that reflected their personal interests. While most of the girls constructed their games in real-world settings, most of the boys built fantasy worlds.

Gender differences were found in how different genders search the web.

Roy (Roy, 2003) analyzed the different ways in which boys and girls searched the web for information. Statistical analysis of the search variables revealed that boys tended to employ a different search pattern from girls.

Males are abstract, logic and rule driven, and females are concrete, bottom-up thinkers

Sherry Turkle (Turkle, 1992) has done extensive research on gender differences related to computers. She found males to be abstract – logic, rule driven, and females concrete, bottom-up thinkers.

2.4.5.2. Multiple intelligences, learning styles, mind styles, thinking styles and personality types in a learning community

Some educational theories attempt to model the different ways in which people learn and process information (these ways are called the perceptual modalities of individuals). Learning styles, mind styles and other theories classify the different ways in which people learn and the ways by means of which they tend to approach information. Keefe (1979) defines learning styles as "characteristic cognitive, affective, and psychological behaviours that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment".

In the field of perceptual modalities, at least four different models stand out. These are described briefly below. The modalities that are investigated in this study in their relation to the eLearning programme are

- multiple intelligences and the three "styles"
- mind styles
- learning styles
- thinking styles

As one of the most important individual-difference variables in human performance, learning styles have attracted the attention of many scholars and educational psychologists. In the investigation of learning styles, various labels that use the root word "style" have been generated. The three most popular terms are cognitive styles (mind styles), learning styles and thinking styles. Although the three types of style are conceptually different (Sternberg, 1997), they share one major characteristic and that is that all three kinds of style are different from *abilities*. Whereas an ability refers to what one can do, a style refers to one's preferred method of using or displaying one's own abilities. Major research into and theorizing about styles have been documented in Jonassen and Grabowski (Jonassen, 1993a), Riding and Cheema, (Riding, 1991), Riding and Rayner, (Riding, 1998), and Sternberg and Zhang,(Sternberg, 2001).

Seven multiple intelligences – Gardner

Howard Gardner (Gardner, 1993) argues that there are at least seven modalities (which he calls intelligences) that can be used to describe individual style. His work has stimulated a great number of researchers to think about learning in new and creative ways. He suggests that individual styles may be:

- Verbal-linguistic: a sensitivity to the meaning and order of words
- Musical: a sensitivity to pitch, melody, rhythm, and tone
- Logical-mathematical: an ability to identify chains of related components and an ability to recognize patterns and order
- Spatial: an inherent ability to perceive the world accurately and to re-create or transform aspects of that world
- Bodily-kinesthetic: an ability to use the body skilfully and handle objects adroitly
- Interpersonal: talent for understanding people and relationships
- Intrapersonal: an ability to access one's own interior emotional life as a

means for understanding oneself and others.

Mind Styles (cognitive styles)

According to Anthony Gregorc (Gregorc, 1998), there are four basic learning styles. In his Mind Styles Model he categorizes learners as Concrete Sequential (CS), Abstract Sequential (AS), Abstract Random (AR) and Concrete Random (CR).

- Concrete Sequential (CS) learners are hardworking, conventional, accurate, stable, dependable, consistent, factual, and organized.
- Abstract Sequential (AS) learners are analytic, objective, knowledgeable, thorough, structured, logical, deliberate, and systematic.
- Abstract Random (AR) learners are sensitive, compassionate, perceptive, imaginative, idealistic, sentimental, spontaneous, and flexible.
- Concrete Random (CR) learners are quick, intuitive, curious, realistic, creative, innovative, instinctive, adventurous.

David Kolb's (Kolb, 1983) Learning Style Model classifies learners as having preferences for (1) concrete experience or abstract conceptualization (i.e. how they take information in), and (2) active experimentation or reflective observation (i.e. how they internalize information).

- Type 1 (concrete, reflective). A characteristic question in this learning type is "Why?". Type 1 learners respond well to explanations of how course material relates to their experience, their interests and their future careers. To be effective with Type 1 students, the instructor needs to function as a *motivator*.
- Type 2 (abstract, reflective). A characteristic question of this learning type is "What?". Type 2 learners respond to information that is presented in an organized, logical way, and they tend to benefit from it if they have time

for reflection. To be effective, the instructor needs to function as an *expert*.

- Type 3 (abstract, active). A characteristic question in this learning type is "How?". Type 3 learners respond to having opportunities to work actively on well-defined tasks and to learn by trial-and-error in an environment that allows them to fail safely. To be effective, the instructor should function as a *coach* and provide guided practice and feedback.
- Type 4 (concrete, active). A characteristic question of this learning type is "What if?". Type 4 learners enjoy applying course material in new situations in order to solve real problems. To be effective, the instructor should *stay out of the way* and maximize opportunities for such students to discover things for themselves.

Sternberg's 1988-1997 theory of thinking styles (Sternberg, 1997), known as the Theory of Mental Self-Government (Sternberg, 1988), proposes that just as there are many ways of governing a society, so there are many ways of managing one's own activities. In managing activities we choose to use styles with which we feel comfortable. We may also vary the use of our thinking styles in dependence on the stylistic demands of a given task. In the last analysis, thinking styles are at least partly socialized – something that suggests that thinking styles can be modified. The theory illustrates the following thirteen thinking styles divided into five dimensions of mental self-government: functions (legislative, executive, and judicial styles); forms (hierarchical, oligarchic, monarchic, and anarchic styles); levels (global and local styles); scopes (internal and external styles); leanings (liberal and conservative styles).

The Myers-Briggs Type Indicator (Myers, 2004), which is based on the work of Carl Jung, identifies sixteen different personality style. These styles are based on:

- How you relate to the world (Extravert or Introvert). Extroverts try things

out and focus on the world around them. Introverts think things through and focus on the inner world of ideas.

- How you take in information (Sensing or Intuiting). Sensors are practical, detail-oriented and focus on facts and procedures. Intuitors are imaginative, concept-oriented and focus on meanings and possibilities.
- How you make decisions (Thinking or Feeling). Thinkers are sceptical and they tend to make decisions based on logic and rules. Feelers are orientated towards emotional considerations and they tend to make decisions on the basis of personal and humanistic considerations.
- How you manage your life (Judging or Perceiving). Judgers set and follow agendas, and seek closure even with incomplete data. Perceivers adapt to changing circumstances; they resist closure so that they can get more data.

A number of studies reported positive effects when they took these perceptual modalities into account.

Ghaoui (Ghaoui, 2004), for example, found that learning styles (among other elements such as the mapping of learning motivational factors combined in an eLearning interface) enhanced memory retention. Namlu (Namlu, 2003) reported on the application of learning strategies and observed that the lowering of affective anxiety levels could improve academic achievement. In his investigation of the effect of thinking styles based on Sternberg's mental self-government theory (Sternberg, 1997), Nachmias (Nachmias, 2002) found that learners with liberal or internal thinking styles outperformed the other students in an eLearning course. Such learners tended to be introverted, task-oriented and were sometimes socially naive or less aware than other students. They preferred to work alone and complete their projects independently. Doherty (Doherty, 2002) found that reflective learners (similar to those investigated by Nachmias) exhibited a greater likelihood to enrol in Internet-based courses. Zhang (Zhang,

2003)) found that creativity-generating thinking styles predicted better use of the Internet and communication tools.

Some studies, however, reported that approaches to learning styles makes no difference.

Jelfs (Jelfs, 2002) from the Open University in United Kingdom found only weak correlations between deep, strategic and surface approaches to learning and the perception of computers and information technology at an overall level. She concluded that more research is needed. The study involved 95 second-year Psychology students in ten separate sessions. The findings of this research goes against the received wisdom professed by Ross (Ross, 1998) who asserts that in order to avoid alienating certain learners, courses should be developed in such a way as to address individual differences. Ross believes that students need to know what the individual learning styles are so that they can choose the pathway most suited to their needs. Similarly, Ford (Ford, 1995) maintains that teachers need to understand the learning strategies of individual students so that learning strategies can be matched to individual students.

Mayer (Mayer, 2005), who has completed two decades of research in the field of educational psychology, is of the opinion learning styles research has not yet produced any noteworthy results.

> Literature review NEGATIVE pointer 11: Mayer (Mayer, 2005) who has been active in research for two decades in educational psychology, concludes that learning styles research has not yet produced any noteworthy results. Like Mayer, I also found no definite direction in the results

I nevertheless included in my research a section on personality types and styles in the questionnaires in the hope of finding out how different personalities and learning styles would respond to the eLearning resource. Like Mayer, I was unable to detect any significant correlations in the results.

2.4.5.3. Motivational issues in a learning community

If children are allowed to create their own environment, they will become motivated.

> Literature review POSITIVE pointer 41: Motivation in children is increased when they are allowed to develop their own learning environments. (2.4.5.3 Motivation)

Research by Kafai (Kafai, 1996) showed that when children were allowed to develop their own learning environments, their motivation increased. He concluded that educational activities can be beneficial if they teach mathematical skills at a concrete level and methods of scientific discovery at an abstract level. He believes that the heightened motivation observed in this research constitutes a promising development for education.

Attention and motivation should be benchmarks in the creation of intrinsically interesting learning environments for children (Malone, 1987). Stealth education (Huffaker, 2003), which introduces stimulating and entertaining features into learning situations in a seamless, game-like way, is an important means for making this happen.

2.4.6. Implication of literature on learning communities in this research

A learning community requires a variety of learning strategies to be designed around a common theme or question so that students will have opportunities to understand the material they are learning more effectively as they interact with one another and with their teachers.

Successful learning communities are characterised by mutual support among learners and an emphasis on jointly constructed knowledge rather than

individual performance. These are places in which the sense of community is central and in which a common sense of purpose is experienced by all participants. They also provide models of association that challenge existing thinking patterns.

Recurrent common elements in a taxonomy of an eLearning community include active interaction, an inclination for collaborative activity from an independent base, lively and stimulating discussions, a sense of community, information that is open and flexible, quality learning experiences, and an attitude of free and fearless involvement.

Online instructors play a crucially important role in eLearning even though they feel that all their hard work goes mostly unnoticed and unacknowledged. The do's and don'ts of online facilitation include issues such as the idea that teachers should not lecture online but should experiment with innovative ways of involving students and increasing their motivation.

User and personality issues such as gender differences, multiple intelligences, mind styles, learning styles, thinking styles and personality styles all influence participation in a learning community to some extent. Heightened motivation can be achieved if a challenging and interesting eLearning environment is created.

You are now here……

Chapter 1 Introduction, background and research problem

Chapter 2 Literature review

Chapter 3 Research design and methodology
Chapter 4 Analyzing the case, evidence and discussion
Chapter 5 Conclusion and recommendations

Structure and principles of this literature review
Theme 1 Pedagogical theories that inform an eLearning resources
Theme 2 A learning community
Theme 3 Communicative, Collaborative, Social issues
Theme 4 Technological and Interface issues

The tools of online communication.
Face to face versus online learning.
The nature of online discussions
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Lurking
General findings in literature about online communication.
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Games, fun and learning.
Implications and value of literature on communicative

2.5. Theme 3 - Communicative, collaborative and social issues.

In this section, issues from the literature that relates to the third sub-research question will be investigated

> 3. In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?

Communication, collaborative and social elemenst are so prominent in the literature that it warrants a separate section to investigate it in more depth.

2.5.1. The tools of online communication

Heydenrych (Heydenrych, 2001) outlines a comprehensive descriptive list of synchronous and asynchronous communication tools, which is included in **APPENDIX** 2. The list contains synchronous tools that enable desktop video conferencing, audio conferencing, audiographics and chat rooms. The asynchronous tools themselves include groupware, file transfers, simulations, email, newsgroups, and discussion forums.

Blogs and instant messaging are more recent additions to the toolset and are discussed under separate headings in this chapter

Hernández-Ramos (Hemandez-Ramos, 2004) explains how communication tools cluster in terms of variables in the diagram that follows.

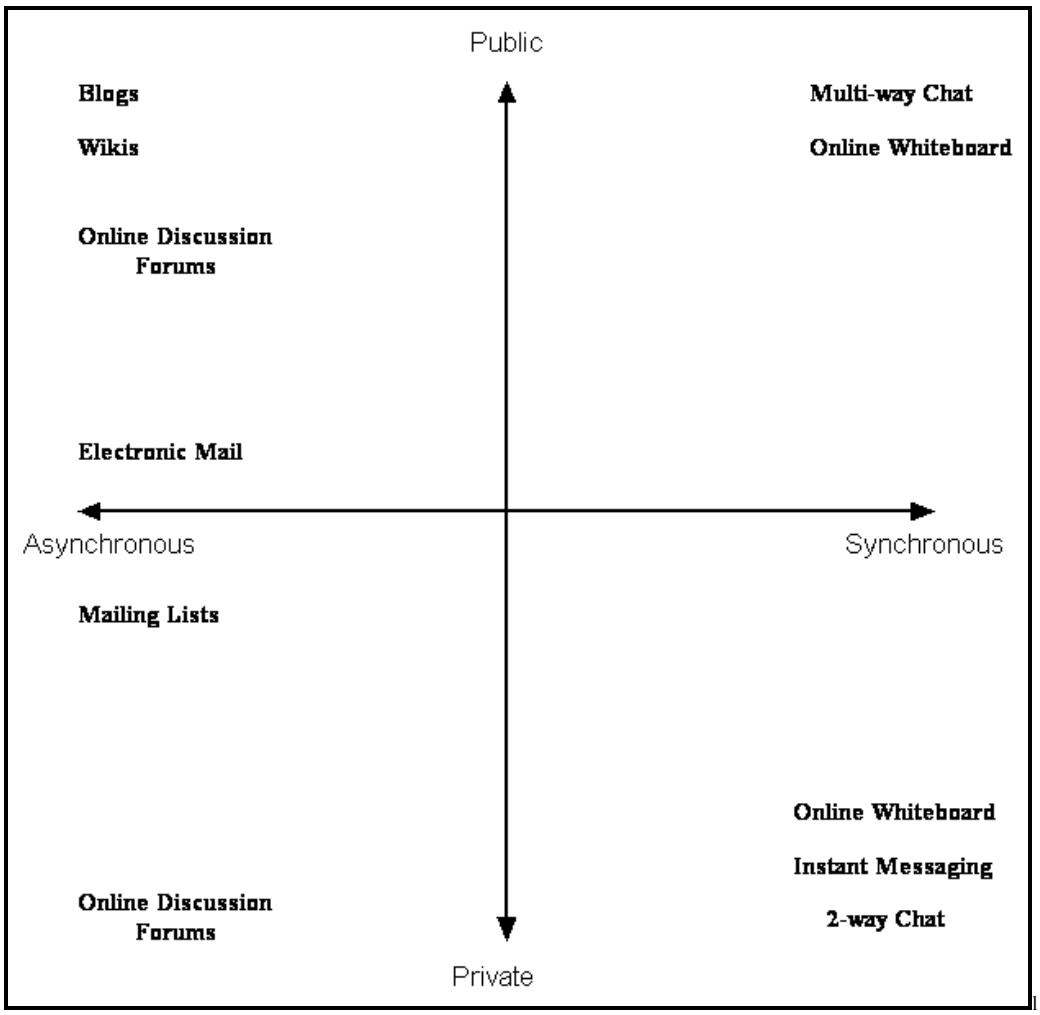

Table 12 : Computer-supported communication and collasboration tools located according to public-private and synchronous-asynchronous dimensions.
(Hemandez-Ramos, 2004)

2.5.2. Face to face versus online learning.

The following items from the literature are relevant to this research.

Hong Kong school learners prefer fae-to-face learning to online learning.

Yuen (Yuen, 2003) found that even though Hong Kong school learners expressed positive sentiments about eLearning, they nevertheless preferred face-to-face learning to online learning. When they were asked to explain their preference for face-to-face learning, many of them replied the teachers were able to help them with difficult learning problems.

Learners who expressed a preference for group work in discussions said that they would like to engage in group work again.

Flynn (Flynn, 2001) found that participants who worked in groups in discussion forums liked it significantly better than those who worked alone in discussion forums. Those who expressed this preference agreed that they would like to work in groups again at other times in future.

Solving problems through online discussions is more rewarding than face-to-face discussions and fewer messages are generated.

Literature review POSITIVE pointer 42: Solving problems through online discussions is more rewarding than face-to-face discussions and fewer messages are generated (2.5.2 Communication)

Jonassen (Jonassen, 2001) found that participants who solved problems by means of computer conferencing were more satisfied with that process than with conventional face-to-face problem-solving conferences. They expressed the opinion that computer conferencing was an inherently superior problem-solving process. Computer conferencing also generated fewer messages than did face-to-face conversations because it allowed more time for quiet reflection about the

process in hand.

2.5.3. The nature of online discussions

Types of communications in online discussions

Davidson-Shivers (Davidson-Shivers, 2001) analysed how students participated in synchronous and asynchronous online discussions and identified nine different types of online communication. He found that some students initiate communications or attempt to obtain responses ("soliciting"). Some respond directly to soliciting while others react but do not react to soliciting. Categories of communication include procedural communications (scheduling and organising) and technical communications. There are chatting communications such as jokes and supportive communications which are similar to chatting but which have an underlying purpose of reinforcement. Soliciting, responding and reacting take up the greatest amount of time in online activity

When too many new topics are introduced into a communication forum, attention is diverted unconsciously away from really important online discussion topics.

Literature review NEGATIVE pointer 12: Too many new topics could unintentionally shift the attention away from important topics in online discussions. (2.5.2 Communication)

Hewitt (Hewitt, 2003) found that computer conference users tended to focus more strongly on recently introduced topics than on older ones. This could be a problem because when too many new topics are introduced into a communication forum, attention is unconsciously diverted away from really important online discussion topics. He suggests the following measures to forestall this problem:

- Moderators could, from time to time, draw the attention of participants back to topics that are really important.

- Individual students could be assigned to keep certain threads alive.
- One could redesign features of the computer conferencing software with this particular problem in mind

The slight time delay that is a feature of online discussions gives discussions of this kind a unique character and leads to a significant change in communication patterns.

Literature review POSITIVE pointer 43: The slight time delay in online discussions gives time for reflection and results in a unique communication character and patterns. (2.5.3 Communication)

Hudson (Hudson, 2000) suggests that online conversation patterns are significantly different from offline discussions because of the slight delay that occurs when participants compose their replies. This particular feature may also strengthen the sense of community that develops between online communicators. This effect was confirmed in the research undertaken by Browne (Browne, 2003) as well as Berge (Berge, 1997). Their findings show that this particular feature is beneficial for learners because asynchronous communication allows time for reflection and considered responses.

The time of day during which learner discussions normally take place in online courses is the afternoon.

Literature review POSITIVE pointer 44: Online discussions are more frequent in the afternoon. (2.5.3 Communication)

Collins (Collins, 2004) conducting research into the time of day when students use email and the electronic bulletin board. He found that while most email and forum discussions took place in the afternoons (37% and 35% respectively), approximately 20% of discussions took place in the mornings and 20% took place in the evenings.

How students classified their own contributions to computer-mediated discussions.

Leinonen (Leinonen, 2003) found that students classified their contributions to

computer-mediated discussions in one or another of the following categories:

- I am an active contributor.
- I am a non-active contributor.
- I am a central comment receiver.
- I am an isolated (non-contributing) student.

I have used these categories in my analysis of discussions in this research.

Personalization effect – better learning with conversational style.

Literature review POSITIVE pointer 45: Online communication in conversational style is more beneficial to students than a formal style of communication. (2.5.3 Communication)

The difference between debate and dialogue – dialogue being the preferred mode in online discussions

Watson (Watson, 2004) accentuates the difference between debate and dialogue. Debate is about contending, disputing and arguing whereas a dialogue is an interchange of ideas that seeks to establish greater learning or understanding in the context of mutual harmony. Dialogue is associated with conversation and interaction.

Text-based discussion has its own specific dialect which is colloquial.

As students become more comfortable in the text-based conversation setting, they become increasingly able to express their thoughts, emotions, frustrations, and even gestures by using symbolic or representative techniques (Fisher, 2002).

The communication setting and the type of task has an influence on results.

Schweizer's (Schweizer, 2003) empirical results show that achievement in a group of learners does not depend solely on the communication setting. An interaction between the communication setting and the type of task was observed. If the group members had to share and exchange their knowledge to

come to a joint solution they achieved better results in synchronous settings, especially in a video conference and face-to-face setting.

Students prefer summarised feedback from online facilitators: expectations and value by students. Students want summaries.

Hyland (Hyland, 2001) investigated the type of feedback students got, what they expected, and what value it had for them. Around 98% of students found the feedback to be of value. When he asked about their expectations of feedback, the majority (70%) said that a summary or a simple highlight of problem areas would be sufficient, while only 30% wanted the corrections to be done for them. What students did with the feecback provided interesting feedback: 44% put it away and would reread the comments for future assignments, 36% attempted corrections, 30% made a mental note, 19% wrote down points to remember, and 2% took some other action.

New creative ideas (such as audio emails) are needed to entice students to participate.

Literature review POSITIVE pointer 46: New creative ideas to enliven threaded discussions are needed. (2.5.3 Communication)

While Le Blanc (Le Blanc, 2004) feels that threaded discussions continue to be the most accommodating method for participating in discussions, Hawkes (Hawkes, 2001) and Nicholson (Nicholson, 2003) say that if discussion forums are to be used effectively for community formation and reflective thinking, new creative ideas are needed to entice users into participating. One such idea may be audio emails. Woods (Woods, 2001) employed “Audio” emails and found that it increased student participation and added to the learner’s sense of community and satisfaction in an online course.

New “voice” for teachers and learners in an online environment

Mitra (Mitra, 2002) says that the online environment results in multiple "voices"

for both teachers and learners because power and authority roles shift online. We still have to find out what the consequences of these new voices and power structures might entail in the future.

2.5.4. What worked in online communication according to the literature

Eleven strategies to promote online discussions

Fisher (Fisher, 2002) documents 11 strategies that support online discussions.

> Literature review POSITIVE pointer 47: Fisher's 11 strategies to promote online discussions include starting face-to-face, setting open-ended assignments with particular guidelines and roles, the use of emoticons, and limiting group size. (2.5.4 Communication)

A course should start face to face with a view to building community and sharing personal experience. Assignments should contain open-ended assignments, use collaborative project-bases activities with clear guidelines and set roles for communication. Emoticons (expressions without words) and metaphorical language (stories, quotations and reflections) should be used wherever possible. Group size should be limited and the focus should be on facilitation instead of control.

Only the course calendar, posted lecture notes and quizzes improved course involvement.

In a study designed subjectively to measure which students' attitudes and factors influenced Web-enhanced instruction, Wemet, Olliges, and Delicath (Wernet, 2000) gave a questionnaire to graduate and undergraduate students enrolled in courses using WebCt.

> Literature review POSITIVE pointer 48: The only online components that made a difference in learning were lesson notes, the online calendar, quizzes and tests. (2.5.4 Communication)

Wemet et al. found that posting lecture notes and taking quizzes and tests online were the only components of the Web-based software that students judged to

increase course involvement. Additional analyses revealed that reviewing the course calendar and taking quizzes and tests online were the only factors that students felt improved their performance in the course. This finding indicates that research must explore online components individually to determine the relation of each course component on performance and involvement (Sain, 2003).

Delport (Delport, 2003) found that if lecturers interact frequently with discussions, email, contact, etc., learners perceive the learning environment to be varied and challenging.

It appears that the use of all communication tools excluding the calendar, was dependent on encouragement by the lecturer to interact frequently.

Literature review POSITIVE pointer 49: Learners associate email and the use of chat facilities with higher order thinking. (2.5.4 Communication)

If email and chat facilities were used frequently, learners associated these with higher order thinking. It is suggested that:

- the e-mail facility be used for deeper problem analysis and where ternate solutions and strategies are to be generated.
- the bulletin board be used for application, analysis, evaluation, and synthesis.
- the chat facility be used to build attitudes, beliefs, confidence and motivation.
- an environment be created in which communities of learners are formed. Opportunity should also be provided for socialising because this promotes interdependence and collaboration.
- feedback be provided to individuals and groups and encouragement be provided in a timely and continual way via e-mail and the bulletin board

Benefits of discussion forums with threaded discussions

Although Clawson and Choate (Clawson, 1999) reported that a class newsgroup may give students an additional opportunity to engage one another in discussions about class material, they presented no evidence to support this assertion. Kahn (Kahn, 1991) evaluated the use of computer bulletin boards in a social psychology class. They suggest that using a computer bulletin board can lead to a more extended discussion of the content than can occur during scheduled class time. This gives the student more time to read messages posted by others, reflect on them, and compose thoughtful responses (Althaus, 1997).

Increased social presence leads to more communication, and privacy brings comfort online.

Tu (Tu, 2002) made a study to determine the social presence (feeling of community) in the online learning environment.

> Literature review POSITIVE pointer 50: If there is a feeling of community in an online course, increased interaction may be expected. (2.5.4 Communication)

His results showed that social context, online communication and interactivity determined the level of social presence. Increased online interaction takes place if there is an improved level of social presence. Privacy plays an important role in the level of comfort experienced by learners.

Setting goals for a conversation and using supportive and probing comments add to the success of discussions.

Sherry (Sherry, 2000a) makes a distinction between conversation in terms of dialectic conversation (inquiry), discussion conversation (advocacy of one's own position), dialogue conversation (sharing multiple perspectives) and design conversation (creating something new). She adds the following factors as contributors to successful online discussions: having a goal for each

conversation, the publishing of discussion guidelines, articulating thinking processes, valuing multiple perspectives, resolving conflicts, stating intentions, using supportive and probing comments, and using software effectively.

Good teacher communication designs lead to more frequent use of tools.

Fishman (Fishman, 2000) found that if teachers have proper designs for communication activities the learners use the communication tools more frequently.

Abbott's factors that make e-communication projects work.

Abbott (Abbott, 2005) investigated case studies of email and video conferencing projects in 2005 and found that the following key issues related to the success of projects: access to technology, support for teachers, understanding of pedagogical potential and the proper structuring of projects.

A successful online instructor should be a "reflective colleague".

Literature review POSITIVE pointer 51: A successful online instructor should be a "reflective colleague". (2.5.4 Communication)

Russel (Russell, 1997) came to the conclusion that a successful online instructor should be like a reflective "mirror" with supportive affirmations, clarifying beliefs and alternative explanations. The benefits that learners experience may be that they get help, feelings of support, new ideas and alternative viewpoints.

Adapting asynchronous communication to meet the seven principles of effective teaching

Debard (DeBard, 1999-2000) speculates about adapting asynchronous communication to meet the following seven principles of effective teaching: encouraging student-faculty contact, cooperation among students, active learning, prompt feedback, emphasizing time on task, communicating high

expectations and respect for diverse talents and ways of knowing.

A lively conversational group helps to create a community through relationships and interactions.

Palloff and Pratt provide their framework for distance learning, which places community in the middle of the model. When online classes make "an attempt to form connection and community online, [this] allows participants to feel ... that they have entered a lively, active conversation" – much the same as in an active contact learning situation. They sum up their position thus: "In the online classroom, it is the relationships and interactions among people through which knowledge is primarily generated" (Palloff, 1999).

Students who prefer a face-to-face class also to have an online component.

Hiltz (Hiltz, 1996) evaluated an undergraduate and graduate course that used an online component in conjunction with a traditional class. Students responded to scales regarding interaction, motivation, interest in the course, and learning. Undergraduate students in these classes preferred the course with an online component when athey were sked to compare their previous class experiences to those of the current course.

Discussions have a positive outcome in final examinations in research by Althaus.

Further support for online courses comes from Althaus (Althaus, 1997) in research in which a traditional class offered during one semester was compared to the same class offered in conjunction with online discussions in a subsequent semester. A majority of the 142 students reported that computer-mediated discussions (CMD) should be adopted in other classes. Additionally, over 90% of students reported that the use of CMDs helped them to master course material. Furthermore, Althaus found that students who used the CMD regularly (at least once per week) scored significantly higher results in the final examinations than

those students who engaged only in face-to-face discussions or did not use the CMD at least once a week.

After participating online, an improvement in the quality of comments is experienced.

In one grade 5/6 discussion class (Scardamalia, 2004), ratings by outside observers indicated that many of the comments made by students were perceived as being at a much higher level of expertise – namely at the level of a high school or university student, a teacher, or of a science centre staff person – than would be expected from a grade 5/6 student.

2.5.5. What did NOT work in online communication according to the literature

Research on asynchronous and synchronous communication is lacking.

Sain (Sain, 2003) states that research into the specific effects of the various components of an eLearning interface, e.g. asynchronous and synchronous tools, are lacking. This is also reported by Siegel (Siegel, 1998) and Thyer (Thyer, 1997).

Learners did not develop a significant degree of discussion.

Hughes (Hughes, 2002) found that while learners could overcome anxieties about online learning, they did not generally develop any significant degree of real discussion. A move to online delivery needs greater attention to design and the development of facilitator skills than has been previously recognized.

Competition does not promote cooperation.

Literature review NEGATIVE pointer 13 : Competition does NOT benefit inter-group cooperation. (2.5.5 Communication)

Fu-Yun Yu (Yu, 2001) analysed the role of competition in computer-assisted cooperative learning environments in terms of cognitive, affective and social

outcomes and found that competition does not promote inter-group cooperation.

Users in chat rooms do not want to be recorded.

Hudson (Hudson, 2004) researched the possibilities of recording chat sessions. When researchers entered chat rooms and said that the chat session would be recorded, only 4 out ot 766 (0.5%) users gave consent to that arrangement. The researchers were asked to leave 63% of the chat sessions. This shows how high is the premium placed on confidentiality and privacy.

Female learners requested more information but did not like to explain issues in online discussions.

Li (Li, 2001-2002) explored gender differences in online discussions and found that in developing conversations, female learners requested more information from other users than their male counterparts, but that they were less reluctant to offer explanations about topics than did male learners.

Worrying aspects of online discussions in reality

Khine (Khine, 2003) investigated trainee teacher's online discussions and found that his findings are worrying because:

- they continued in habits of non-activity
- they could not keep a discussion thread going for a prolonged time
- they did not question
- they preferred information acquisition to constructivism
- they neither gathered nor sourcing out information

Learners spend most of their time in forums socialising and not on tasks.

Literature review NEGATIVE pointer 14: Learners spent more time socializing in discussion forums than on focusing on the tasks at hand. (2.5.5 Communication)

Pena-Shaff (Pena-Shaff, 2001) found that learners spent more time socializing in discussion forums than on focusing on the tasks at hand. One may be fooled into thinking that eLearning activity is about the work when activity may in reality be devoted mainly to social interchanges.

Discussions centred on sharing and comparing information rather than on constructing knowledge.

Hendriks (Hendriks, 2004) made a study to determine students' social construction of knowledge through computer-mediated communications.

Literature review NEGATIVE pointer 15: Online interaction centered around information rather than constructing knowledge. (2.5.5 Communication)

His results showed that the volume of student interaction was predominantly in the category of sharing and comparing information rather than in constructing knowledge.

Students do not automatically take to discussions (positive and negative aspects of online discussions)

Ferdig (Ferdig, 2003-2004) found that while students do not automatically take to proper discussions online, if they are carried out properly, they may offer benefits in the following five areas: interactivity, active learning, teacher/student relationships, and increase in higher-order thinking skllls and flexibility. The negative features may include: a lack of the visual and intonation clues that are found in face-to-face communication, the necessity to sometimes schedule discussions, poor equipment, and a inadequate user interface that may hamper discussion.

Simply making discussion forum available is not enough to motivate usage.

Ferdig concluded that making the tools available in the context of a single university course is unlikely to be sufficient to motivate students to make full use of these resources (Ferdig, 2004b) .

> Literature review NEGATIVE pointer 16: Simply making a discussion forum available does not motivate students to use it properly. (2.5.5 Communication)

Sorensen and Takle (Sorensen, 2002) found that, for discussion forums, "having 'forced requirements' on the collaborative dialogue prompted students to engage in dialogue and actually caused more interactivity than was required to appear". This again points to the need for additional research and practical experience in incorporating these tools into teacher preparation courses.

When students are forcced to participate in discussion forum, unnecessary communications are generated.

Sorensen and Takle (Sorensen, 2002) found that, for discussion forums, "having 'forced requirements' on the collaborative dialogue prompted students to engage in dialogue and actually caused more interactivity than was required".

Learners misuse guest lecturers for their own interests.

Trushell (Trushell, 1998) found that when students were given a chance to ask a guest lecturer questions, they did so in order to use this information in their essays but that they were not really interested in his or her viewpoint.

Computer communications undermine the enjoyment of good stories.

Gordon (Gordon, 2005) is of the opinion that computer communications undermine the narrative sensibility of learners, specifically their ability to tell, enjoy, listen to, view and read good stories.

Why an email collaborative project failed.

Kwok-Chi Ng (Ng, 2001) reports that the use of email to foster collaboration did

not work because the following reasons: there was a lack of technology and proper training, tutors were not required to participate, and too much reliance was placed on student initiative.

Collaboration discussion – the pitfalls and the dangers

To make use of this complex phenomenon to assist learning, proper instructional design is a prerequisite. Without this, some learners may be disoriented and find themselves disadvantaged. Horton (Horton, 2000) warns that poorly designed group learning activities can stigmatise poor achievers and create dysfunctional interactions among learners. He goes to paint a darker picture that makes proper design and facilitation paramount: "In reality the process is often brutalising, inefficient and demoralising. Exchanges are peppered with flames, slurs and slams. Discussions can meander worse than a rudderless ship with a drunken captain on a stormy night." He mentions the following common problems that may arise in poorly designed group learning:

- spamming (self-serving messages)
- e-mail bombing (messages to disrupt the group)
- spoofing (pretending to be someone else in the forum)
- flaming (making abusive and emotional attacks on someone else)

In addition some learners may dominate the conversations and discussions to the extent that others cannot use the group to their advantage. Facilitators in on-line discussions should moderate actively and diplomatically in addition to setting realistic expectations and conveying the rules. To minimize the domination effect, the facilitator should give everyone a chance to type, motivating that reading is just as important as typing .(Gainesville-State-College-eLearning, 2007). In severe cases, the facilitator may consider to moderate all postings and reduce the number of postings by the dominating learners and then directly request submissions from lurkers. Teams can also be made and the

dominators placed at the head of these teams with the request to involve their whole team. "Voting" can be used to get the opinions of many learners quickly and the results can then be used in the discussions.

2.5.6. Lurking

In Internet culture, a lurker is a person who reads discussions on a message board, newsgroup, chatroom or other interactive system, but does not participate (Wikipedia, 2006).

The top five reasons for lurking.

> Literature review NEGATIVE pointer 17: The top five reasons for lurking (being present but never responsive) are: there is no need to respond, students are unacquainted with the group, help is available without posting, software problems, an acvtive dislike of the group. (2.5.6 Communication-lurking)

The top tive reasons for lurking, according to research done by Preece (Preece, 2004) are:

- They had no need to post.
- They first wanted to know more about the group.
- They got the help without any posting.
- They had software problems.
- They did not like the group's dynamics.

Preece drew two key conclusions from his analysis. First, there are many reasons why people lurk in online discussion communities. Second, and most important, most lurkers are not selfish free-riders. From these findings, it is clear that there are many ways to improve online community experiences for both posters and lurkers. While some solutions require improved software and better tools, moderation and better interaction support will produce dramatic improvements.

Discussion forums allowed students to ask questions they would not normally ask in class.

> Literature review POSITIVE pointer 52: Discussion forums allowed students to ask questions they would not normally ask in class. This means that lurkers were freeer to ask questions online. (2.5.6 Communication – lurking)

Students who were in a classroom discussion with researchers who were researching a novel (Scardamalia, 2004) use of the database put forward the idea that communicating asynchronously through the database allowed them to raise questions of understanding and to present theories about cultural differences that they did not feel comfortable to raise in class. This means that the Internet does offer opportunities for those who may be lurkers in a regular class to ask questions online.

Wenger (Wenger, 2004) talks about big lurking groups and small core groups in discussions involving large groups.

> Literature review POSITIVE pointer 53: A possible solution to the lurking problem is to have small core groups within big groups. (2.5.6 Communication – lurking)

The combination of a core group and a lurker group is a pattern Wenger has observed in most communities. He feels that one would not spend one's energy efficiently by trying to get everybody to contribute in the same way. It is more important to have an energized core group that attracts more and more people into it. He suggests that instead of trying to pull everybody in, the intensity of conversation at the level of the core groups should be increased. To find ways to involve new voices is important.

2.5.7. General findings in literature about online communication

Positive correlation between discussions and grades

Collins (Collins, 2004) found a positive correlation between online discussions (forums and email) and course grades. Barbour (Barbour, 2004) also found that the level of online writing was an indicator of success in an online course.

Personality type and discussions

Ellis (Ellis, 2003) analysed personality type and participation in online learning using the Myers Briggs Type Indicator (Myers, 2004) and found the following:

- Introvert-type learners are more willing to contribute in discussion forums.
- Judging-type learners prefer face-to-face interactions.
- Sensing-type learners prefer asynchronous discussion forums.

The Internet lowers inhibitions.

Spears (Spears, 2001) found that the Internet lowered inhibitions among those that participated and that this may be an advantage in certain circumstances.

Synchronous communications are preferred for writing collaboratively.

Barile (Barile, 2002) found that synchronous communication programs like Netmeeting are more appropriate tools for writing collaboratively than just email alone. He also found that email groups produced shorter rough drafts than those in forums. The lack of expressiveness in online environments did not seem to deter groupwork.

A tool to assess online discussions

MacKinnon (MacKinnon, 2000) developed a system called "cognotes" to enable assessment with a view to promote onlne discussions. He graded categories of responses as follows: acknowledgement of opinions (1 mark), thoughtful query (1), compare (2), contrast (2), evaluation (1), an example with a deduction or analogy (2), clarification, elaboration, building on a point (2), cause and effect (2),

and off-topic discussions (0).

Increased activity due to online communication

Contrary to assumptions that web-based instruction inhibits teacher-learner interaction, Lavooy (Lavooy, 2003) found the opposite to be true. The Lavooy found that online communication resulted in an increase in student-student and instructor-student interactivity.

Time is needed for sophisticated discussion.

Graddy (Graddy, 2003) found that online conversations become more sophisticated as learners interact with each other over the duration of a course.

Computer conferencing is more effective in handling evaluative tasks.

Research by Sumner (Sumner, 2002) showed that computer conferencing was more effective than face-to-face meetings for the handling of evaluative tasks because of broader participation, the expression of opinions and more analysis.

Female learners dominated social discussions. Synchronous discussion is good for sociabilityand asyncrhonous discussion is good for learning tasks.

Im (Im, 2003-2004) found that female learners dominated social discussions and were more active than male students but that the level of discussion never developed beyong sociability. Synchronous discussion is more useful for promoting social interaction while asynchronous discussion is more useful for task-oriented communication.

Patterns of engagement seem to be persistent and early intervention is needed.

Brett (Brett, 2004) found that patterns of online engagement are established quickly, are persistent, last over time, and are characterised by stability and

robustness. It is therefore advisable to intervene early and provide extra support at the beginning of a course.

Vocabulary shows an increased sophistication when users participate in discussion forums.

An analysis of the vocabulary of elementary school students using a discussion forum (Scardamalia, 2004) showed that the mean rating of their vocabulary terms was at least as sophisticated and, in several instances, more sophisticated than the vocabulary used by pre-service teachers enrolled in a course about constructing elements of a progressive curriculum for the mind, brain and perception. With the caveat that use of a domain vocabulary is an indirect measure of deep understanding, results indicate that these young students were tackling substantive problems in the domain.

It is a surprise finding that the threaded discussion component does not satisfy students or increase performance.

Results from research conducted by Sain (Sain, 2003) indicate that the traditional class sections of a group of psychology students reported levels of satisfaction that were significantly higher than those reported by the experimental group, that is, the group with threaded online discussions. Students in the traditional classes also spent more time on the weekly assignment and wrote significantly more sentences when completing the weekly task than did the classes using the online procedure. Analysis by the author suggests that other research may have inherent weaknesses in terms of selection bias. He cautions that his findings indicate the need for more research on the issue.

2.5.8. Suggestions to enhance online communication in literature

Online teachers should include scaffolding aids in their online discussions.

Land (Land, 2001-2002) found that scaffolding is important in online learning. This seems to reflect the natural way learners behave in conversations. When students engaged in reflection and evaluation in learning they did so through concessions and oppositions to the postings of their peers.

Why learners are drawn to conflict in online discussions – a lack of cues

Zafeiriou (Zafeiriou, 2003) investigated conflict in online discussions and found that learners have a tendency to disagree with their peers rather than to agree. The reasons are:

- the nature of the online environment when there is a lack of social and communication cues
- learner attitudes, i.e. they never felt that a conflict online was a real conflict

Suggestions for more productive interaction online

Wu (Wu, 2003) suggests the following ways to facilitate productive interaction in an online environment from a social constructivist perspective:

- structure interaction with authentic tasks
- use real life questioning strategies
- assign roles properly
- have independent assessment
- incorporate awareness techniques
- provide training
- moderate interaction
- provide effective feedback
- model desirable behaviours

Factors that influence successful online discussions – planning, netiquette, etc.

If democracy, community and critical thinking are to be fostered in computer mediated discussions, Fauske (Fauske, 2003-2004) found that attention should be given to proper planning, netiquette, assessment and the role of the instructor.

Media-rich messaging may overcome the disadvantage of a lack of visual clues in online discussions.

Bellamy (Bellamy, 1998) developed a graphic messaging system called "Boardwalk". It is a messaging system that allows media-rich messaging and the graphic display of messages. It is hoped that graphics in messaging might overcome some of the disadvantages of online discussions such as a lack of visual clues.

Asynchronous discussions are for reflection and synchronous discussions are for quick thinking.

Groen (Groen, 2005) is of the opinion that the asynchronous aspects of a course allow for reflective and thoughtful discussions whereas the synchronous features encourage learners to "think on their feet" and be assertive.

Feedback plays a critical role in the dialogue between online tutors and learners – different perspectives on feedback.

Hyland (Hyland, 2001) deals with various feedback issues that relate to tutors and learners. There are three levels at which the marking of assignments could function. These are as a means of assessment, a way of communicating knowledge or as a way for facilitating learning. Learners prefer tutors to act as a facilitator and point out principle features rather than detail. Only around one third of students wanted the tutors to correct their work. The action taken by students after receiving an assessment shows that around 40% do something with the feedback. Learners prefer not to enter into a direct dialogue with their

tutor about feedback on the telephone.

It is better to build a learning community with synchronous communication than with asynchronous tools (Fisher, 2002).

Students usually build a community through the skill, imagination and creativity of the members themselves. He found that synchronous environments allowed for this.

A strategy to prompt students in discussions – summarise a few postings and ask a question.

A useful strategy in discussions may be for the instructor to take a topic or a theme worthy of careful focus and hold it up for the group to consider. Such an intervention might include three or four short quotes or paraphrases from earlier comments followed by a bit of explanation or clarification and then a single question to elicit more focused dialogue (Haavind, 2000).

Computer-supported communication and collaboration tools such as electronic discussion boards have been used for some time to promote reflective learning and other goals, including community formation and problem-based learning (Hawkes, 2001). Nicholson and Bond (Nicholson, 2003), for example, stated that electronic discussion boards can play an integral role in the development of preservice teachers. First, they benefit preservice teachers in terms of time, scheduling, and geographical issues. Next, they provide emotional and intellectual support and foster a sense of community. And finally, they promote the growth of reflective discourse (p. 261).

2.5.9. Weblogs – blogs and wikis

Ward (Cunningham, 2004) defines a **wiki** as "the simplest online database that could possibly work". Wiki is a piece of server software that allows users to freely create and edit Web page content using any Web browser. Wiki supports hyperlinks and has a simple text syntax for creating new pages and crosslinks between internal pages on the fly. Wiki is unusual among group communication mechanisms in that it allows contributions to be edited in addition to the content itself.

There has been a lot of discussion about the similarities between wikis and weblogs, but no definitions that allow us to compare them. If we assume that a wiki is a weblog-like system that allows anyone to edit anything, then a wiki represents an interesting amalgam of many voices and not just the unedited voice of a single person (Winer, 2004).

On a **weblog**, only the author can change the content. Weblogs are unique in that only a weblog gives the writer of the weblog a publication in which ideas can stand alone without interference. It gives the public writer a kind of relaxation not available in other forms. This might mean that although the "quality" of the writing may be different, it is not necessarily poorer if one assumes that the purpose of writing is to inform and not just impress.

Blogs and discussion forums. Although private online discussion forums share the medium (the Web) with blogs, the context is significantly different (Jonassen, 2003) . In most online discussions, also called "threaded discussions" by Carroll & Witherspoon (Carroll, 2002), only those who are authorized to join the discussion (usually through their participation in a class or some other formal or semi-formal activity) can participate, and all participants may already be known to each other.

Discussions usually have a starting point topic such as whenh a professor posts a question to which all students must reply. While all postings are visible to all participants, some systems allow users to draft postings, save them for editing in a private space (not visible even to the professor or the system administrator), and to publish them when they are ready. Online discussion systems usually also allow certain users to be designated as "moderators" or administrators with privileges to edit or even delete postings considered problematic or unacceptable. Participants can post replies to other people's postings and thus initiate sub-threads. It may be possible, depending on the system and the instructor's preferences, for participants to create new topics unrelated to the original topic, a feature that also supports work by small groups on specific projects or tasks. "Peers can serve as excellent sources of feedback. Over the last decade, there have been some very successful and influential demonstrations of how computer networks can support groups of students actively engaged in learning and reflection" (Bransford, 2000).

Weblog (blogs). Because they are published in public, students spend more time in preparing them.

While electronic discussion boards in one form or another have been around for a while and have been used in a variety of education settings, Web logs (also known as "blogs") are a relatively new phenomenon (Hermandez-Ramos, 2004), and their uses in education are also still being explored and developed. Carlson (Carlson, 2003) wrote that blogs "are used by scores of memoirists, editorialists, exhibitionists, and navel gazers, who post their daily thoughts on Web sites for all to read". The most common use of blogs in teaching is to encourage writing in a public space. This usually motivates students to expend more effort on the process because the audience is more "authentic" (Jonassen, 2000). The audience

are not only the instructor and one's peers, but a potentially large and unknown audience.

Weblogs offer a better alternative to journals. Journals are submitted as papers to the instructor and are largely a two-way form of communication between student and teacher. The limitations of these exchanges are that students write with only the teacher as an audience and that there are thus limited possibilities for feedback (Hermandez-Ramos, 2004).

According to Carrager (Carrager, 2003), Ferdig and Trammell (Ferdig, 2004b), Richardson (Richardson, 2004), Roberts (Roberts, 2004), blogs have more potential for pedagogy than website creation and maintenance if one uses HTML-based tools. For beginners, the options of not having to type a single line of HTML code and of being able to select a pleasant-looking template to display one's online journal by simply pointing and clicking, is a huge benefit. With simple text-based blogs, even novice users can concentrate on writing and not worry much about technical matters. More advanced users will benefit from the ability to include graphics, photographs, audio, hyperlinks, and even video in their blogs, and from being able to allow for email feedback from readers of the blogs. For faculty members, the system's simplicity translates into being able to assist students to sett up their blogs and solve basic problems (such as those with the interface). In addition, tools like RSS ("Rich Site Summary" or, informally, also called "Really Simple Syndication" or news aggregators) allow users easily to keep track of changes to many blogs (which are really websites) from one browser window, thus simplifying what would otherwise be a very time-consuming task (Roberts, 2004).

Blogs published either in private or public have educational merits.

From a teaching and learning perspective, plain text blogs are perfectly adequate as a tool for promoting reflective practice (Roberts, 2004). Other advantages are that blogs are publicly available to anyone who knows the URL (Ferdig, 2004b), that they allow for a measure of privacy (the writer does not have to include personally identifiable information in the postings), that online reflection has the potential significantly to alter students' perceptions of themselves as education professionals and their perceptions about the power and validity of their ideas (Hermandez-Ramos, 2004).

The pedagogical significance of blogs and online discussions

The use of blogs and online discussion forums in the same course fulfilled several pedagogical and learning goals. At one level, the experience was designed to increase awareness in students about differences in electronic communication tools and environments. At another level, a goal was to help students develop a sense of themselves as creators of knowledge rather than just consumers of information and to see themselves as meaningful contributors to professional dialogues. On yet another level, their participation in the course's online community (the discussion forum) suggested the idea that their student peers could be seen as valuable sources of information and ideas, a connection that ideally they would carry past their graduation date (Hermandez-Ramos, 2004).

The pedagogical significance of blogs and discussions being able to break down the walls around the classroom.

Carraher's (Carrager, 2003) suggestions point to the possibilities of blogs breaking down the "firewall around the classroom" and opening lines of communication between students, teachers, researchers, curriculum developers, and teacher educators. If nothing else, given their public nature, blogs seem to be

an effective tool for encouraging higher quality writing and more thoughtful reflection by the students. The value of blogs was corroborated for online discussions by Hawkes and Romiszowski's findings (Hawkes, 2001) that "while the computer-mediated teacher dialogue was less interactive [than face-to-face meetings], it was significantly more reflective".

Weblogs that are used with reflection on performance can help to make link with reality.

Levin and Camp (Levin, 2002) argue persuasively that "without the disposition to reflect on their performance, teachers are less likely to improve their practice or to be able to see the links between theory and practice". They added: "We believe that this habit of mind is so important that we must try to teach all prospective teachers how to reflect on their practice."

Blogs can be used to expose students to a wide audience and help them to become active creators of knowledge.

Hernández-Ramos (Hemandez-Ramos, 2004) states that there were two key motivations behind the use of blogs and discussion forums for their online reflection.

The first is that the "conversations" will include talking to a potentially large audience – the general public. This may make some students uncomfortable. One student wrote, "I'm definitely not into the blogging thing yet. It feels very weird to me to be writing for an unknown audience, and at the same time it is not private." The second motivation is to help students to become active creators of knowledge. Students have trouble seeing themselves as active creators of knowledge, or at least as budding professionals whose ideas are worthy of consideration by others. For example, one student wrote, "I feel like I am adding to the useless information out on the Web."

Blogging raises the standard of written and published text.

From a pedagogical perspective, the expectation is that the quality of what is written and published on the blogs and discussion forums will be of higher quality, an insight corroborated by experience and some research (Norton, 2003). Norton also acknowledges that by making their reflections public and visible via blogs to their peers in the discussion forums, students are contributing to general social discourse and their audience is no longer only the instructor.

2.5.10. Instant messaging

Instant messaging (IM) is becoming a widely used application. Instant messaging allows for two users to communicate directly via text or video with each other through an Internet network. There are several of these free public services available. Because instant messaging was not part of the eLearning resource in this research in 2004 and 2005, I only mention this growing phenomenon which may be a topic for future research in high school eLearning.

Literature review POSITIVE pointer 54: Instant messaging may become a very important feature in the future of eLearning. (2.5.10 Communication – instant messaging)

In 2002 there were more than 130 million instant messaging users in the world. Research by Farmer (Farmer, 2004) points to the fact that most of today's learners are younger than the microcomputer. His paper highlights selected current literature in the area of students' knowledge of communication technology with a focus on instant messaging. In a survey of technology usage, students rated their daily use of four technologies, namely email (83%), browser (75%), discussion forums (16%), and instant messaging (61%). Instant messaging is already being used almost as much as email. We may see a shift in these figures in the future.

Upmystreet.com (Upmystreet.com, 2004) is a British web initiative which, if one has has a postal code, can tell about local house prices, crime rates, schools, tradesmen, public transport and government services. Discussion boards were recently added to the site, with a search function that makes it possible to see discussions taking place near a given location. The site even calculates how "far away" each discussion is. The result might be termed "geochat" (Economist, 2004). The popularity of this service may point to the importance of human proximity in interaction. This research also shows the importance of physical human interaction in an eLearning environment.

2.5.11. Journals

A journal is usually a two-way communication tool between a student and a teacher. Journals can be limiting because of their dedication to two-way communication. Traditional requests to get students to write journals and submit as papers to the instructor remain a basic two-way form of communication between student and teacher, with only the teacher as audience and limited possibilities for feedback (Hemandez-Ramos, 2004). Thus, an exercise that should be (ideally) a self-motivated, intrapersonal learning activity that benefits from review and feedback by the instructor often becomes just another writing task with unclear grading criteria.

2.5.12. Collaborative issues

2.5.12.1. The nature of collaboration in literature

Successful collaboration is more than just group interaction.

Czerniewicz (Czerniewicz, 2001) states that there are assumptions that having a direct experience of networked learning by using web-based conferencing leads

to participant collaboration and that being part of an ongoing online discussion means that students are collaborating. She argues that while collaboration is valuable and while it may have motivational, intellectual, enjoyment benefits (Harasim, 1995), it is easy to underestimate what successful collaboration requires. Putting a group of people together either offline or online and giving them interesting reading is not enough to create a successful collaboration. She does not agree with the Harrisim's idea that once an idea is articulated and presented to the group forum it becomes part of an ongoing interaction. She agrees with Mason (Mason, 1992) who makes the crucial point that "student activity may be mistaken for student learning [... and that ...] group interaction could be mistaken for group collaboration".

Collaboration energises learners

Collaboration can energise learners, promote deeper learning, and make learners more self-reliant. Horton (Horton, 2000) reports evidence that collaboration is a proven part of online learning. Adding discussion groups, chats and e-mail to courses motivates learners, increases participation in projects, and enlivens discussion. Learners are more willing to participate in on-line discussions and other activities than in traditional communication. When there is collaboration learners feel more empowered. They become more daring and confrontational regarding the expression of ideas. Learners are treated equally because they are anonymous. Learners become more self-reliant because they are forced to lok for their own sources and rely more on fellow learners.

Because of the lack of non-verbal cues, specific attention must be given to expressions in online environments.

The instructor needs to supply emoticons and non-verbal cues in text-based synchronous environment to strengthen communication and mutual respect

(Fisher, 2002). Instructors must create metaphors for non-verbal cues. These include raising an eyebrow, leaning in, raising a hand, listening eagerly, smiling, LOL (laughing out load), etc.

2.5.12.2. What worked in collaboration according to the literature

Reaching understanding collaboratively in an online forum led to much deeper understanding.

Twenty-two Grade 12 students used a discussion forum to understand Amy Tan's novel The Joy Luck Club (Scardamalia, 2004). Over a period of about six weeks, students created more than 400 notes. They made predictions about the novel, reflected on their changing conceptions of what the novel was trying to achieve and compared the novel to a film treatment. Small groups specialized in understanding the culture and perspective of one of the four families traced in the novel.

> Literature review POSITIVE pointer 55: Reaching understanding collaboratively leads to much deeper understanding. (2.5.12.2 Collaboration)

Students and their teacher unanimously found that reaching understanding collaboratively led to a much deeper understanding than their previous literature studies had allowed. Additionally, students called upon students in another course on Chinese history and culture to help them understand cultural issues highlighted in the novel. Finally, students in a classroom discussion with researchers about use of the database put forward the idea that communicating asynchronously through the database allowed them to raise questions of understanding and to present theories about cultural differences that they weren't comfortable about raising in class.

Scardamalia (Scardamalia, 2004) offers useful principles about what she calls a

"knowledge building community". This includes participants to take charge of their own learning, the progressive refinement of ideas during discourse, sustained rather than superficial inquiry, a focus on understanding rather than on task-driven processes, the use of difficult texts rather than watered-down and simplified material for easy consumption, a continuous improvement of ideas and the discovery of deep connections between ideas.

She believes that a hallmark of engagement in a knowledge building community is the production of ideas of value to others, and not simply demonstrations of personal achievement. To accomplish this, a shift is needed from a primary focus on individual performance to community knowledge that is jointly constructed.

The shift to community knowledge that is jointly constructed may be accomplished when participants share responsibility for advancing the work of the group rather than simply demonstrating their personal competence. And because teaching and learning are interchangeable, everyone is always involved in both, and participants advance the knowledge of others in the course of building their own knowledge. There is not a hierarchical knowledge relationship between those who know and those who need to know, and different agendas and different needs create a productive tension that helps participnats to refine goals and the means for achieving them.

Perserverence, aptitude, ability and quality of instructional events are essential.

To learn online takes more than just being in the group. Carroll's model of learning, revived by Reeves (Reeves, 2000) and quoted in Czerniewicz (Czerniewicz, 2001), provides a useful way of thinking about learning in an online group as he identifies several variables that are considered essential for learning achievement. One of these is old-fashioned perseverance. The others are

aptitude, the opportunity to learn, the ability to learn and the quality of instructional events.

It is important for collaboration tohave a real purpose.

McConnel, in (Czerniewicz, 2001)says if the group does not address its own learning and come to some initial agreement about itself, then it is likely to fragment and the members will essentially "end up learning in isolation".

> Literature review NEGATIVE pointer 18: If collaboration serves no real purpose, learners will end up learning in isolation. (2.5.12.2 Collaboration)

The responsibility here lies with the group. But he acknowledges that this problem may be defined in number of different ways by the teacher, by the learner and by the group. Czerniewicz (Czerniewicz, 2001) thinks that the specific course that she participated in waited too often for the problem to emerge from the group, and that when tutors intervened they were too open-ended. More specific suggestions could have been provided because “positive interdependence is the knowledge that you are linked closely with others in the learning task and that success ... depends on each person working together to complete the tasks” (McConnell 2000:121, in (Czerniewicz, 2001)and because “the success of cooperative groups depends on each person feeling responsible for the success of the group". She never felt that her involvement was ever necessary for anyone else's well being or for learning success. She never had a feeling of responsibility in any immediate sense to any specific fellow participants. If she had, she would (she said) have been far more likely to be more involved and more genuinely collaborative.

2.5.12.3. What did NOT work in collaboration according to the literature

Merely listening is not considered sufficient in the online environment.

Listening (without participation) is considered to be lurking – a word that still has negative connotations. Listening or lurking does not show, i.e. it is not visible. To be active and overt, listening has to be verbal and typed. It has to be much more insistent.

> Literature review POSITIVE pointer 56 : eLearning systems should record lurking by flagging items that were visited. (2.5.12.3 Collaboration)

Czerniewicz (Czerniewicz, 2001) suggest that each time a student visits an item such as a discussion forum without saying anything, the system should record the visit as a view and should post a message in the discussion area indicating that the student listened to the discussion.

2.5.12.4. General findings in terms of collaboration in the literature

Children learn together in a network of science clubs.

The acquisition of scientific knowledge is often a collaborative activity in which groups of people pool their knowledge and talent to solve problems. This view of science contrasts with the more traditional academic approach in which individual children work on their own to display what they know (Huffaker, 2003). KineticCity.com (Malcolm, 2002) embraces collaborative group learning in its programme. After-school programmes create local clubs of learners who are given the opportunity to work with and communicate with other clubs, thereby encouraging a global community of practice. On their website, children can see a rotating globe with a real-time feature of existing clubs as well as individual players in various parts of the worid. These team-building exercises and venues for global communication promote the social side of learning. By collaborating, children learn more than just science concepts; they learn how to interact and share knowledge and resources with one another, both locally and globally.

2.5.12.5. Suggestions about collaboration in the literature

Discussion is always a vital feature in defining an online learning community.

Lin et al. (Lin, 2001) conclude that efficient on-line learning communities provide students with opportunities to be "knowledge tellers" and to get continuous feedback and criticism so that they can revise their own thoughts, assumptions and arguments.

Project-based learning activities with feedback are essential.

Activity-driven experiences for students are important for generating understanding based on actions with connections to prior knowledge. Feedback from peers on these activities and projects is an essential part of their development (Fischer, 2002-2003).

Feedback must be timeous and promote higher order learning

Sherry (Sherry, 2000b) stresses the importance of feedback, specifically the timing of feedback. Feedback may be given too early, while the student is still in the exploration and planing stage, and too late, when the project is finished and major problems have been solved according to the student. More important is to give feedback at an intermediate stage, when the project has taken shape, and the student has specific problems or questions that need to be dealth with, to allow revision of activities or plans. Furthermore, it is advisable that the discourse follows a demand-give-acknowledge interchange that promotes activities in Bloom's Taxonomy in terms of higher order learning, such as analysis, synthesis and evaluation. Wells (Wells, 1996) suggests an "extend" that can take the form of exemplify, justify, explain etc.

The recommended class size is no more than 20 to 30. Small and big groups are both

necessary.

When discussing the importance of intensive instructor participation and interaction in eLearning, Palloff (Palloff, 1999) recommends a class size of no more than 20. When Le Roux (Le Roux, 2003) visited a number of prominent European universities, he found that the ideal eLearning class size in the opinion of European universities is around 30.

> Literature review POSITIVE pointer 57: The ideal size of an eLearning class is around 20-30 participants. (2.5.12.5)

While most interviewees agreed that the number of students per lecturer in postgraduate courses should not exceed 30, Czerniewicz (Czerniewicz, 2001) argues that group size affects collaboration and discussions and that both big group and small group discussions are necessary. Some students may shy away from big groups, but would be more willing to participate in smaller groups. She therefore prefers separate discussion spaces for both small and big groups.

The following table shows that economies of scale can be achieved, using the Internet.

The students are still perceiving the system as delivering quality in this study, while reports about KNOU (Jung, 2000) is negative about student satisfaction. It also seems as though the activity of the facilitators were satisfactory and the workload managable even with this many students to look after in this study.

Comparison of class size and teacher-student ratios – Korea (KNOU) and this study		
	Class size	Teacher to pupil ratio
This study	60	1 : 166 or 57
Korean (KNOU)	1156	1 : 1080

Table 13 : Comparison of class size and teacher-student ratios – Korea (KNOU)and this study
The table shows the comparison of the average class size and teacher to student ratios of this study compared to the Korean National Open University (KNOU).

Recording why a student exits from a communication session

In an eLearning resource, it is valuable to record the pages that were viewed (e.g. "Linda listened to this discussion"). And when a student leaves the discussion area, it is valuable to ask why the student did not reply. The student can then answer by selecting an option such as – I am in a hurry, It does not interest me, I will do it later, It is not important enough to comment on – from a drop-down menu of options.

If collaboration is not accompanied by clear guided assistance, the time taken to collaborate may discourage activity.

It is advisable that learners be assisted in collaboration or else it may take more time to generate their own ways of collaborating than they can afford (Czerniewicz, 2001). There is some evidence from research that learners can benefit from having clear guidance about how to participate in learning situation. In practice this means providing more structure to assist learners when they communicate with one another, suggesting ways for engaging with content, making opportunities for information sharing, and facilitating problem-solving activities. Providing structure, creating an enabling environment and facilitating a process does not automatically mean removing learner control as these notions are not mutually exclusive. One can argue that a skillfully structured course may free rather than constrain the learner.

Serim (Serim, 1996) feels that the Internet will help more student's to have their work published.

Internet publishing should help learners to become more comfortable with the idea of publishing their own work to the world or merely to their own online community. Projects such as online newspapers can serve this purpose.

Learning is situated, embedded in activity, context and culture.

Lave (Lave, 1991) says that in contrast with most classroom learning activities that

involve abstract knowledge which is out of context, learning is situated; that is, as it normally occurs, learning is embedded within activity, context and culture. It is also usually unintentional rather than deliberate. Lave and Wenger (Lave & Wenger, 1991) call this a process of "legitimate peripheral participation."

2.5.13. Social issues

Learning may best be achieved through social construction.

Fisher (Fischer, 2002-2003) maintains that learning may best be achieved through the social construction of knowledge in a "community of practice" in an environment where the student is both a member of a learning community and also an agent of learning within that environment. In this model, the success of learning is dependent on the ability of students to cooperate with one another to construct learning.

The nature of the new networked society

Kearsley (Kearsley, 2000) quotes the following address by two members of the networked society in which we currently live.

Welcome to the 21st century. You are a Netizen (a Net citizen), and you exist as a citizen of the world thanks to the global connectivity that the Net makes possible. You consider everyone as your compatriot. You physically live in one country but you are in contact with much of the world via the global computer network. Virtually, you live next door to every other single Netizen in the world.

In this manifesto, geographical separation is replaced by proximity in virtual space. It suggests that it is possible to create global communities of people who interact in virtual environments that are independent of time and place. These

characteristics of connectivity, community, communication and interaction are indispensable for the construction of online learning experiences.

Online learning means more than "pressing keys". It also means social and cognitive engagement.

In the online learning community, active learning means more than "pressing keys" (Heydenrych, 2001). It also implies social and cognitive engagement and the kind of participation that comes from making input, responding conscientiously to peers and sharing ideas unselfishly. "Attendance" in a learning network activity means membership of an online community that requires and enables active input.

Students expect active and challenging media.

Both (Fischer, 2002-2003) and Tapscott (Tapscott, 1998) report that "net generation" students expect to be active rather than passive in their search for entertainment, knowledge and social interaction. Such learners thrive in a social and educational space with resources that reflect real-life learning activities that are practical, highly motivating, and challenging. Students today have come to expect media that enable them to communicate and form communities around issues of identity, shared values, common interests and the possibility of translating theoretical ideas into practice.

Fisher is of the opinion that online courses should always commence with a face-to-face contact session.

(Fischer, 2002-2003) writes: "Prior to the course it is most valuable to initiate a physical meeting of all the course members. The emergence of a mixed mode of learning, face-to-face and online learning activities, is becoming popular."

Czerniewicz (Czerniewicz, 2001) argues (as many others do) that, wherever possible,

online courses should include a face-to-face component so that the benefits of networked learning (such as increased access and flexibility) can be maximised and so that problems can be minimised. Where a face-to-face component is simply not possible, there are significant implications for the claims of the course, its goals and its design. While it is difficult to get to know other participants in face-to-face classes, getting to know others is even more difficult in an online environment (Czerniewicz, 2001).

A network course with no face-to-face contact may leave participants feeling isolated.

Czerniewicz (Czerniewicz, 2001) experienced feelings of isolation when studying online in a twelve-week course on networked teaching and learning produced entirely online by a British university.

> Literature review NEGATIVE pointer 19: A network course with no face-to-face contact may leave participants feeling isolated. (2.5.13 Social)

She maintains that the most immediate consequence of learning exclusively online with no face-to-face contact was a sense of isolation. She asserts that because she never got to know anyone on her course, she was left without any sense that she and the other students had actually learned something together. She is careful to explain that this does not mean that she did not learn from her fellow students. She merely claims that the learning that did take place was not the consequence of collaboration or interaction. As one of her co-students remarked: "I feel lost with this personality thing and don't 'know' any of you" and "I ... yearn for something that helps us get to know each other. I don't feel that we ever did do that properly somehow" (Czerniewicz, 2001).

Online learning in isolation by means of a resource whose design makes no allowance for social interaction may engender student dissatisfaction and unhappiness.

As one participant in Czerniewicz's course (Czerniewicz, 2001) commented, "When you have a small group of what are essentially strangers trying to work together without any common sense of association, it might provide with a very negative experience." This remark suggests that such an experience might even be damaging to learners.

If one wants to act correctly towards other people, one first has to get to know them.

The more we know about other people, the more consciously are we able to moderate our behaviour towards them. Donath observes that knowing and understanding other people is "fundamental for knowing how to act towards them [because] the complex rules of social conduct that govern our behaviour towards one another cannot function in the absence of information about the other" (Czerniewicz, 2001) quoting Donath, (2000). It was so important to her to have a sense of an audience that she found it extremely disturbing and almost immobilising not to know the people to whom she was talking.

Appropriately descriptive personal profiles of participants in a course are a significant aid to socialisation and communication in a course.

Czerniewicz (Czerniewicz, 2001) is of the opinion that even descriptive personal profiles of participants may be insufficient to establish social bonds between students studying the same course. She tested the validity of this assertion by printing the participant profile that every person had provided. She also studied their photographs and read their personal descriptions whenever she participated in discussions. But she soon began to experience this procedure as tedious and time-consuming because she couldn't easily remember so much information and associate it the many individuals participating in the discourse. She felt, on one hand, that there were simply too many people. On the other hand, she began to feel that what her fellow students had written about

themselves was superficial and inadequate — as superficial and inadequate in fact as she felt her own profile to be.

Czerniewicz (Czerniewicz, 2001) felt that meaningful participation could only occur on the basis of information that was not available in the personal profiles of participants.

> Literature review POSITIVE pointer 58: If meaningful interaction is to take place, participants should be aware of one another's opinions, background, interests, assumptions – as well as other "meta" information. (2.5.13 Social)

Czerniewicz says that she wasn't necessarily interested in what other people looked like. But she did want to know how her fellow students would respond to certain questions and what they would think about certain issues. The information that Czerniewicz wanted (because she felt that it would enable her to be a meaningful and engaged participant) could have been obtained by answers to the following questions: Is this interesting to the people/person I am addressing? Do they have similar problems to the ones I am describing? Do they know less than me? Do they know more than me? Do they consider this a worthwhile topic of conversation? What background in this area do they have? What assumptions do they make? Do they share my interest in solving this problem? Because she did not know how her fellow students would answer these questions, she felt hesitant to become engaged — and that consequently limited the scope of her participation.

Creating an online presence for oneself when participating online is a challenge.

In a discussion about lurking and listening styles, Gergens (Gergens, 1996) states that having an online presence requires what is called "a new pattern of self-consciousness". This means constructing another version of one's self which is another representation of the self by selectively assembling a coherent portrait out of an enormous range of possible qualities and descriptors. An online "presence" of this kind helps a student to keep feelings of isolation under

control. Constructing such an identity requires one to think about one's usual modes of communication. If one habitually prefers to listen, this kind of online activity may elicit an image of a “lurker” (non-active participation) — something that still has negative connotations. And so online listening needs to be made visible if it is not to be antisocial and negatively construed. In her words: "To be active and overt, listening has to be verbal and typed. It has to be much more insistent that I am used to" (Czerniewicz, 2001). This remark inspired the researcher to redesign a section of the discussion forums so that participants could leave brief feedback remarks when they were exiting a discussion without participating, and so that they could also record how many views they had expressed in the logfile of the interface (more about this later in this chapter).

Czerniewicz is also the opinion that a social gathering place or informal space, tearoom, lounge, cafe or something similar should be made available to participants so that they can "pick up on throw-away comments not directly relevant to the thread of conversation" (Czerniewicz, 2001).

Personal absences from online discussions should be visible to other participants.

Czerniewicz (Czerniewicz, 2001) found that online learning frequently left her without any sense of personal connection.

Literature review POSITIVE pointer 59 : When away from an online group, this should be indicated. (2.5.13 Social)

"When I had to go away for ten days there was no indication that my absence had been noted, as would have been likely to happen in a contact situation."

Online social identities and online presences need attention to be successful.

If participation in this kind of environment is to be successful, participants will have to become more visible, more insistent, more persistent and possibly even more aggressive. In other words, most people will have to become rather

different from their usual learning selves (Czerniewicz, 2001).

2.5.14. Social and community elements.

Set roles ensure proper functioning

Fisher (Fischer, 2002-2003) found that communities benefited from the assignment of roles to participants. Once a community has been established, it grows through continuous interaction. The success of cooperative groups ultimately depends on each member taking active responsibility for assuring that the group functions efficiently. This can only happen if each member conscientiously fulfils the tasks assigned to him or her.

There are a variety of ways to ensure that this is done. One such method is to assign specific roles to each member. There are numerous roles that can be assigned to participants. They include summarizer, facilitator, technician, researcher, insight-provider, critic — to name but a few. If this kind of role assignment is to be successful, it is essential to allow students to choose roles that are congenial and meaningful to them personally, and it is also important to minimise the number of role definitions in the community.

Mind-body separation (as a result of new technology) may be problematic.

The current dominance of network technologies in highly developed societies, and their increasing use in educational settings, doubtless serve to reinforce the kind of mind-body separation that already has deeply negative implications for successful learning and personal development. Dreyfus (Dreyfus, 2001), in (Le Grange, 2004) goes so far as to argue that the physical bodily presence of humans is essential for developing skills to a level beyond mere competence. He argues that the best kind of learning is inextricably social and that it requires an input of both time and face-to-face lecturer-student and student-student contact

over a period of time. In his opinion there is no way in which this process can be short-circuited if one wants to obtain the best results.

2.5.15. Games, fun and learning.

Children are nearly always eager to interact with media when they have been personalised and when they are intuitive and enjoyable to work with.

Malone (Malone, 1987) argues that children participate and interact happily with media when the messages they see are personalized, intuitive, challenging and amusing.

Combining eLearning with entertaining activities

Huffaker (Huffaker, 2003) suggests that one way of getting children to spend more time actively engaged in learning outside formal classrooms may be to combine appealing content with entertaining production features. Since eLearning as already a "learner-centred" activity that can be customised to suit individuals by offering self-pacing activities, personalised repetition and interactivity, the addition of entertainment features may well augment these formidable advantages and serve to improve motivation, attention and learning.

Children obviously prefer games to schoolwork.

Roberts (Roberts, 1999) is of the opinion that although the use of eLearning has become more widespread in modern schools, efforts to get children to engage in eLearning outside the formal classroom setting continue to be less than successful.

Literature review NEGATIVE pointer 20: Children prefer computer games to school work. Their preferred choice of media is entertainment. (2.5.15 Games)

While children will use online resources to do their homework (PEW, 2001), they

still prefer media that offer only entertainment. Two of the reasons why games are played is because they have a social component (60%) and because they are challenging.

Games are played for social reasons.

Literature review POSITIVE pointer 60 : Around 60% of computer games are being played for social reasons. (2.5.15 Games)

Recent research undertaken by The Entertainment Software Association (ESA, 2004) found that approximately 60% of people who play games do so for social reasons. Sixty percent of all Americans aged six and older (equivalent to about 145 million people) play computer and video games. The average age of game players is 28 years. Forty-three percent of all game players are women. The vast majority of people who play do so with friends and family. Almost 60% of frequent game players play with friends, 33% play with siblings, and about one-quarter play with their spouse and/or parents. The research of The Entertainment Software Association (ESA, 2004) shows that the main reasons why games are played are because games are fun (87%), because they are challenging (72%), because they provide an interactive social experience that can be shared with friends and family (42%) and because games provide excellent cost-efficient entertainment at relatively low prices (36%). Games are almost universally enjoyed because production features such as rapid action, fast pacing, sound effects, and music are attractive features to almost any player (Malone, 1987).

2.5.16. Implications and value of literature on communicative, collaborative and social issues for this research.

Communication issues

While some learners refer face-to-face learning, others report that eLearning

provides a more rewarding format for solving problems.

The nature of communication in eLearning is unique. The slight time delay in online discussions provides time for reflection and considered responses. In such situations, students are either active contributors, non-active, comment receivers or isolated. A conversational style of communication in online learning is more satisfactory because it is conducted in terms of the specific and conventional dialect and colloquial features of text-based discussions.

It is also noteworthy that a significant number of students prefer to receive feedback from online facilitators in the form of summaries rather than corrections to their work.

Several authors have compiled lists of strategies that make for success in eLearning online resources. These include the necessity to begin courses with real-time face-to-face sessions so that participants can begin to build a sense of community and share their personal experiences and reactions to what they have committed themselves to study. Assignments should contain open-ended assignments, use collaborative project-based activities with clear guidelines and set roles for communication. Emoticons (iconic expressions without words) should be used wherever possible in combination with metaphorical language (stories, quotations and reflections). The size of groups should be limited so that focus rather than control become pre-eminent features of the online experience.

While some researchers found that only the calendar function, quizzes and notes posted by lecturers (a reflective colleague) improve the online performance of students, others found that other factors such as increased social presence, respect for privacy and threaded and lively discussions also improved

performance.

Researchers indicated the following strategies and events as counterproductive in online eLearning:

- Failure to make a proper use of discussion forums. Some groups of students fail to make any significant use of discussions.
- Competition. Competition does not promote cooperation.
- Desire to remain anonymous. Some chat room users do not want their conversations to be recorded.
- Preference for socialising. Some students spend most of their time in forums socialising rather than attending to eLearning tasks.
- Failure to construct knowledge. Some discussion forums are used for sharing and comparing information rather than for constructing knowledge.

Students have to be encouraged and motivated to participate in discussions; they will not automatically or instinctively use discussion forums to construct knowledge – often because they associate computer communication with relaxation and entertainment. Simply making a discussion forum available does not ensure that it will be correctly used.

The top five reasons for lurking (reading but not participating) are that a lurker:

- sees no need to post anything
- wants to know more about the group before posting
- thinks that it is helpful not to post something
- has software problems
- is alienated by the group dynamics

The other side of the coin is that some lurkers reported that in asynchronous discussion forums, they found they had the courage to ask questions that they would not normally ask in a class situation. It appears to be better not to involve everyone in a group but rather to focus on that relatively small core group through which the majority of the group can benefit.

The literature also contains a number of suggestions for improving online discussions. These include punctuating interaction sessions with authentic tasks, using real-life questioning strategies, assigning roles to individuals, obtaining independent assessment, incorporating awareness techniques, providing training, moderating interactions, offering effective feedback, and modelling desirable behaviour.

Weblogs or blogs (as they are known) can also be immensely useful eLearning tools. Because ideas on blogs are published in public and because this exposes students to a potentially huge audience, they do tend to spend more time in preparing blog material. This makes them active creators of their own knowledge and obviously also raises the standard of their and published texts.

Collaborative issues

While learners may become energised by collaboration, particular attention needs to be paid to devices that indicate emotions and attitudes in any online environment because online forums are completely devoid of non-verbal clues. Successful collaboration requires more than just group interaction. Collaboration is only successful when it leads to greater levels of understanding. While perseverance, aptitude, ability and the quality of instructional events are all important, it is essential for collaboration to be purposeful and properly directed.

The following features were found to be counterproductive to collaboration. Students sometimes resisted the hard work of collaboration and preferred lectures because they allow them to be passive consumers of predigested information. Poorly designed group learning activities can irritate learners, stigmatise poor achievers, exacerbate differences of capacity and ability, and promote dysfunctional interactions among learners.

General findings indicate that it is possible for children to learn together and write four times more than they normally do in conventional learning environments.

Successful eLearning emphasises proper discussion and links learning activities to projects. Feedback is indispensable. The optimal eLearning class should consist of no more than 20 to 30 learners. These learners should receive clear guidance and assistance so that they can begin to collaborate actively with one another without wasting any time.

Social issues

Modern networked societies are predicated on social interactivity (which is more than just "pressing keys"). eLearning is best be achieved through social construction, and research has shown that children grow socially as they become more skilled in active learning and metacognition. Modern learners expect media to be both active and challenging. Initial face-to-face contact sessions at the beginning of courses are immensely valuable because some learners feel isolated without some degree of face-to-face contact. Without a skilful design that accommodates social interaction, learning in isolation may be a less than satisfactory experience for many learners. Most students seem to prefer to be

able to access richly descriptive personal profiles on their fellow participants on the course, and doing so undoubtedly strengthens the social cohesion of participants in a course.

You are now here

Chapter 1 Introduction, background and research problem

Chapter 2 Literature review

Chapter 3 Research design and methodology
Chapter 4 Analyzing the case, evidence and discussion
Chapter 5 Conclusion and recommendations

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……
Structure and principles of this literature review
Theme 1 Pedagogical theories that inform an eLearning resources
Theme 2 A learning community
Theme 3 Communicative, Collaborative, Social issues
Theme 4 Technological and Interface issues

General
Setting up an eLearning resource - Choosing an eLearning interface
eLearning applications - an overview of features and capabilities.
Student experiences and evaluations of eLearning.
Costs and cost-effectiveness of eLearning.
Practical lessons learned in general about eLearning resource implementations.
Implications and value of the literature.

2.6. Theme 4 - Issues of technology and the interface

2.6.1. General

To do good work, one must first have good tools. (Chinese proverb)

This section in the literature review deals with the subsidiary question :

> To what extent and why do certain technological aspects and instructional design issues affect a high school eLearning resource?

To what extent does technology support learning? What technological problems did the learner encounter in participating in the system? What are the technological implications of computer hardware, software and Internet bandwidth for system delivery, accessibility and operability?

2.6.2. Setting up an eLearning resource - Choosing an eLearning interface – objectives.

2.6.2.1. Platforms investigated

I investigated eLearning platforms that have been available in the market since 2000. The systems ranged from expensive high-end systems such as WebCT (WebCT, 2006) and Blackboard (Blackboard, 2006) – who merged in 2005 – to open source software (OpenSourceInitiative, 2004), which is free and which reveals all source codes.

Open source platforms and the choice of MOODLE

SourceForge.net (Sourceforge, 2004) is probably the world's largest Open Source software development website. They provide free services to open source developers. A browser search with the descriptor **eLearning** showed that about 80 open source eLearning tools were available.

Moodle claims to be based on a social constructivist pedagogical approach. Because it is free, using it seemed to be a sensible choice. Dougiamas (Dougiamas, 1998) says that he found the constructionist metaphors to be an excellent basis for thinking about how Internet-based tools support learning. When he later came to develop Moodle, Dougiamas (Dougiamas, 2000) inserted frequent reading and writing activities that guide the user in a logical and structured way through a course (Dougiamas, 1999).

2.6.2.2. Webhosting hardware and services

When I conducted a Google search with the words “free hosting”, I found 8,7 million entries in 2004 and 654 million in 2006. The hosting services that feature vary greatly in quality, purpose and size. They range from those with a very minimal customisable capability to those for which you have to supply your own server and pay for using the net of the hosting company. Hosting services will frequently claim to provide "free" bandwidth and unlimited or uncapped access. The choices from what is available are too numerous to document here. The basic elements in making a webserver operational appear to be:

- computer hardware (which can be purchased or rented from hosting companies)
- server management software (purchased, rented or open source)
- specific software for the eLearning resource (purchased, rented or open source)

2.6.3. eLearning applications – an overview of features and capabilities

Although most current eLearning platforms share certain common features, we will see an increased level of sophistication in user communication and elements in the future that will accommodate the expression of human emotions and feelings. I will now identify and discuss the elements most commonly found in eLearning platforms.

Synchronous and asynchronous communication in eLearning resources

Computer-mediated communication (CMC) means using computers to transmit information ("communicative statements") from one user to another. For example, a user at one computer terminal enters a message that is then sent off and stored on a central computer (a server). Other users can then log on to that server, view the message, and respond to it (Heydinger, 1979)and (Rice, 1987).

There are two forms of computer-mediated communication – asynchronous and synchronous. Communication that does not occur in real time is considered to be *asynchronous*. This means that individuals can post a message to a server and that other people can sign on to that server at other times and retrieve and comment on the information posted by the original author of the message. The communication may take place over a long period of time such as days, weeks or even months. While it is possible that individuals posting to these servers may be online at the same time as those who are viewing the responses, it does not necessarily have to be so for effective communication to take place. E-mail, LISTSERVs, newsgroups (e.g., "Usenet"), bulletin boards and blogs are all examples of systems that allow asynchronous communication. Although all these methods are extremely widely used, there is a very little empirical research that evaluates the effectiveness and proper use of these different systems (Maki,

2003).

The second category of computer-mediated communication is *synchronous* communication. Synchronous communication, such as happens in chat rooms, requires participants be online at the same time as all other individuals in the group who are participating. The messages that are generated are not stored on a third-party computer and only individuals signed into that particular chat room can read and reply to the posted messages. As is the case with asynchronous communication, there is very little research that evaluates the effectiveness of these methods as pedagogical tools (Maki, 2003).

Some instructors have attempted to combine both of these communication techniques when using the Internet as a way to supplement the traditional class format or, indeed, to supersede it. This method of teaching requires the use of special software that is designed to facilitate a communication process of this kind. In a study that was designed subjectively to measure how students' attitudes and other factors influence web-enhanced instruction, Wemet, Olliges and Delicath (Wernet, 2000) gave a questionnaire to a select group of graduate and undergraduate students who were enrolled in courses that used WebCt. Their finding was that the students were of the opinion that posting lecture notes and taking quizzes and tests online constituted the only way in which the Web-based software increased involvement in the course. This finding indicates that research is needed to explore each of these online components individually so that the relationship of each of these components to overall course performance and student involvement can be understood.

Types of online activities in an eLearning resource – as described by Heydenrych (Heydenrych, 2001)

- Web casts – In this activity a number of learners are taught content that is best taught by means of traditional classroom activities through intensive participation in a conventional training event transmitted by a network. The online activities that mediate instructions include a demonstration, a debate, an interview, questions and answers, a panel discussion, a game format activity called "Stump the experts!", a conference, a reference desk, an impostor test, a round-robin lecture, and an oral examination.
- Sequence of presentation – Learners read, listen to and watch carefully crafted explanations by means of a web browser. The presentation sequence is used to provide a consistently high-quality explanation to all learners. Examples are a slide show, videotape or a book. Learners should be able to control the presentation.
- Drill and practice activities – Learners repeatedly practise applying specific knowledge or a well-defined skill. The purpose of this activity is to help learners to memorise facts that they need to be able to recall without hesitation. It is possible to program the activity in such a way that it generates an infinite number of new problems. The level of difficulty is increased as the learners become more skilled.
- Scavenger hunts or search activities – Learners are required to find reliable sources of information on the Internet. "Scavenger hunts", or Internet searches, are used to make learners more self-reliant by getting them to locate reliable sources of information about the subject which they are studying. The format does not have to be complex – a simple list of questions is quite sufficient. Merely *answering* questions is not enough: the results have to reference reliable sources of information for future use.
- Guided research – Learners gather, analyse and report on information. Guided research is used to teach learners how to conduct informal research on a subject (Horton, 2000). This activity is especially valuable for learners

who will have to conduct research in their future jobs. The importance of evaluating, selecting and organising facts is emphasised in this activity.

- Guided analysis – Learners analyse data in order to evaluate its validity, identify trends and infer principles. Guided analysis is used to teach formal analysis techniques and to train learners how to discover trends and principles for themselves (Horton 2000:265). In this activity, learners are asked, for example, to summarise, compare and contrast, to plot data, to classify and to outline items. The on-line facilitator explains the technique thoroughly at the beginning of each step. The overall aim is to keep the analysis as simple as possible.
- Team work or collaborative work – Learners work as coordinated teams to produce a single design or to solve a complex problem. Collaborative work is also used to coach learners in basic teamwork skills. The goal of the activity is carefully defined beforehand. In cases where learners are not accustomed to working in teams, they will need about twice as much time as those to whom teamwork is a familiar activity.
- Brainstorming – Learners use brainstorming to generate creative solutions to a problem or to accomplish some goal. Brainstorming is used to teach problem solving, creative thinking and team design (Horton 2000: 265). Is important to observe the basic rule of brainstorming, namely "**There are no bad ideas!**"
- Case studies – Learners are asked to study a carefully chosen example of a real-world event, process or system that is rich in detail, and then to abstract useful concepts and principles from the case study. Case studies are used to teach tropes of complex knowledge that cannot be reduced to a simple formulas or sequential points. A facilitator is needed to ask questions that lead searchers towards rather than away from the principles that the case is designed to illustrate. Learners are free to test their ideas

with their classmates.

- Role-playing scenarios – Learners are assigned roles in simulations that require complex interpersonal interaction. Role-playing scenarios are used to teach subtle interpersonal skills and to reveal the complexity of many human endeavours (Horton 2000:265). The scenario has to be the explored in sufficient depth to enable participants to appreciate all the necessary details and conditions. Roles have to be carefully assigned so that they are experienced as positive and creative rather than negative, humiliating or distressing.
- Virtual laboratories or simulations – Because learners conduct virtual experiments with *simulated* laboratory equipment, activities of this kind in virtual laboratories prepare learners to handle real laboratory equipment. They also guide learners to discover the general principles and laws that support the activity.
- Group critiques – Learners submit work to these groups so that they can listen to and react to the criticisms and comments of their peers in the class. Group critiques are used to teach learners how to use the critical comments of others to improve their own work and how to critique the work of others in a helpful way. The facilitator has to make sure that the criteria for critique are specified before the activity begins. Critical comments have to be carefully monitored and moderated so that criticism is experienced as genuine, constructive and caring rather than destructive, spiteful, frivolous or bullying. Every precaution should be taken to prevent group critiques from becoming interpersonal battlefields.
- Learning games – Learning games are computer simulations that give learners opportunities to practise highly interactive tasks (Horton 2000: 265). Such games are used to give learners some experience of performing tasks without the risk or cost involved in the real activity. The rules of the

game should be clearly explained to participants beforehand. A learning game is used to challenge learners and to teach them to manage their competitive impulses.

Important characteristics of eLearning resources summarised in the Edutools.info Project

Leslie's (Leslie, 2003) synopsis of the findings of the Edutools.info project summarises the most important characteristics common to the 45 course management systems that he evaluated. The top 15 important characteristics of the researched resources are listed in the table below, together with an indication of whether the characteristic is also present in the eLearning resource that serves as a case study for in this research. It is one of the goals of my research to confirm that the eLearning resource that I am using is on par with other comparable resources throughout the world. The eLearning resource used in this research, Moodle, shares most of the important characteristics listed in the table below.

The top 15 important characteristics common to 45 eLearning resources summarised by Leslie (Leslie, 2003) from the Edutools.info project					
Common important characteristic as summarised by Leslie		Is this characteristic dealt with in this research?	Important characteristics common to all the resources as summarised by Leslie		Is this characteristic dealt with in this research?
	Learner tools for Communication		**Instructor tools for Adminstration**		
1	Discussion forums	Yes	Authentication	1	Yes
2	File exchange	Yes	Course authorization	2	Yes
3	Internal email	Yes	Hosted services	3	Yes
4	Online journal/notes	Yes	Registration integration	4	NO
5	Real-time chat	Yes	Automated testing	5	Yes
6	Video services	NO	Course management	6	Yes
7	Whiteboard	NO	Instructor helpdesk	7	Yes

	Learner tools -		**Support tools**		
8	Bookmarks	Yes	Online grading tools	8	Yes
9	Calender / progress	Yes	Student tracking	9	Yes
10	Orientation / help	Yes	Accessibility compliance	10	Yes
11	Searching in course	Yes	Course templates	11	Yes
12	Work offline/synchronize	NO	Curriculum Management	12	Yes
	Student involvement tools				
13	Self-assessment	Yes	Customised look and feel	13	Yes
14	Student Community Building	Yes	Instructional design tools	14	Yes
15	Student portfolios	NO	Instructional Standards compliance	15	Yes

Table 14 : Top 15 important characteristics in 45 eLearning resources
This table shows the top 15 common characteristics of 45 eLearning resources analysed and indicates whether the characteristic has been included in this research

Communication tools should aid "awareness".

Gerosa (Gerosa, 2003) says it is important for communication in an eLearning resource that the people be "aware" of other people and what they are doing. There are awareness elements in a resource that could promote communication. I have made a list of awareness elements indicated by Gerosa and compared these with similar elements available in the resource used in this research.

Awareness element in Gerosa	**Element present in this research resource**
Course code and information	Yes
Other courses or services available	Yes
Express yourself (Chat)	Yes
Lesson plans	Yes
Conferences (Discussions)	Yes
Topics discussed	Yes
Teachers available	Yes

Table 15 : Awareness elements listed by Gerosa and availability of the same type of service in the eLearning resource of this research
This table outlines elements identified by Gerosa (Gerosa, 2003) as "awareness" elements and indicates whether or nor there are similar awareness elements in the resource of this research.

Interface design for digital courses – principles

The most important delivery medium in integrated eLearning is the computer interface, not only because it is highly suitable for presenting rich environments in which students can work collaboratively, but also because its multimedia capabilities make it possible to present educational content in any form imaginable. One problem often overlooked in all the enthusiasm, however, is the lack of clear guidelines on what to put where on the screen, and it is often not known what the consequences are of certain choices for the learning processes of students working with computers (Park, 1994) in (Tabbers, 2004).

Tabbers (Tabbers, 2004) suggests principles for designing digital courses.

A lot of research has been done on the relation between interface design and learning, especially in the fields of human-computer interaction and educational psychology. Two important areas of interest are the layout of the graphical user interface and the way in which multimedia content is presented. Both of these are firmly based on human-computer interaction and educational psychology literature. I make the following suggestions for interface design:

- Do not complicate the user's task - The GUI (graphical user interface) should make tasks easy; they should not make them more difficult than necessary. A good GUI does not let the user perform unnatural acts. It avoids computer jargon, hides the software's internal workings, finds an optimal balance between power, complexity and usability, makes common tasks easy by providing customised support and wizards, and minimizes the need for deductive reasoning in operating the software (Johnson, 2000)

and (Van der Harstt, 1999) in (Tabbers, 2004).

- Promote mastering the GUI - Experts tend to think that users automatically perceive and understand a GUI in the way they intended it to be understood. This is often not the case. Confusion on the user's side can be prevented by avoidance of textual, typographical and graphical ambiguity, consistency, and provision of a low risk environment (Johnson, 2000).
- Deliver only relevant information - Instead of simply presenting all available information, only relevant information should be displayed so that the user's attention is focused on only that information (Van der Harstt, 1999).
- Design for responsiveness – Responsiveness (the perceived speed of the software) is very important to users. To optimize responsiveness it is important for the software to provide feedback on what it is doing when it is busy and when it is not. The software should enable the users to work at their own pace (Johnson, 2000).
- Do not neglect individual differences - An inexperienced user will need more scaffolding than an experienced user, and the GUI should provide this.
- Support different pedagogical scenarios equally - The goal of eLearning is to allow the user to learn as efficiently as possible. In order to reach this goal, different pedagogical scenarios can be provided (Tabbers, 2004).
- Optimize individual freedom. – The GUI should respond optimally to the users' initiatives.
- Conform to the user's model. – A good GUI uses a metaphor that is known to the user (Tabbers, 2004).

Richard Mayer's work on cognitive load and multimedia learning

The following guidelines go beyond the GUI and guides presenting multimedia

content. Tabbers (Tabbers, 2004) analyses the work done by Richard Mayer (Mayer, 2001a) on multimedia learning and the work on cognitive load theory by Sweller (Sweller, 1999). Both researchers base their design guidelines on the architecture of the learner's mind. The mind consists, roughly speaking, of an unlimited long-term memory, in which all prior knowledge is stored, and a limited working memory, in which new information is processed and linked to information in long-term memory.

Literature review POSITIVE pointer 61: The capacity of the working memory (which is limited) of a human being has consequences for presenting content in an eLearning environment (Mayer). (2.6.3 Technological)

The capacity limitations of working memory have important consequences for the presentation of multimedia content in eLearning environments.

There are five main cognitive processes in the cognitive theory of multimedia learning: selecting words, selecting images, organizing words, organizing images, and integrating.

- Selecting words occurs when the learner pays attention to some of the verbal material (spoken text) entering through the ears for further processing in the verbal channel of working memory.
- Selecting images occurs when the learner pays attention to some of the visual material entering through the eyes (pictures or printed words) for further processing in the visual channel of working memory. The visual representation of the printed words can be converted into the sounds of words in the verbal channel and verbal representations can be converted into pictorial ones.
- Organizing words involves building a verbal model, that is, a coherent structure containing some of the selected verbal material in the verbal channel.

- Organizing images involves building a pictorial model, that is to say, a coherent structure containing some of the selected pictorial material in the visual channel.
- Integrating involves building connections between the verbal and pictorial models with prior knowledge from long-term memory.

Mayer's ten research-based principles for the design of multimedia instructional messages.

Mayer (Mayer, 2005) and his colleagues have conducted a decade's worth of research into the effects and nature of multimedia presentations on human learning and produced the following principles. Based on more than 80 experimental comparisons, Mayer has developed a collection of ten research-based principles for the design of multimedia instructional messages.

- **Five principles are aimed at reducing extraneous cognitive processing** (i.e. processing that is not related to the instructional coherence principle, signalling principle, redundancy principle, spatial contiguity principle, and temporal contiguity principle). The coherence principle is that people learn more deeply when extraneous words, pictures, and sounds are eliminated rather than included. The signalling principle is that people learn more deeply when the important words are highlighted. The redundancy principle is that people learn more deeply from animation and narration than from animation, narration, and on-screen The spatial contiguity principle is that people learn more deeply when corresponding portions of the picture and printed words are near rather far from each other on the page or screen. The temporal contiguity principle is that people learn more deeply when corresponding portions of the animation and narration are presented simultaneously rather than successively.
- **Three principles are aimed at managing intrinsic cognitive processing**

(basic processing related to the instructional goal): the segmenting principle, the pre-training principle, and the modality principle. The segmenting principle that people learn more deeply when a narrated animation is presented in learner-paced segments than as a continuous unit. The pre-training principle is that people learn more deeply when they have had training in the names and characteristics of the main concepts. The modality principle is that people learn more deeply from animation and narration than from animation and on-screen text.

- **Two principles are aimed at promoting generative processing** (i.e. deeper and more reflective processing related to the instructional goal) through social cues: personalization principle and voice principle. The personalization principle is that people learn more deeply when the words are presented in conversational style rather than formal style. The voice principle is that people learn more deeply when the words are spoken in a non-accented human voice rather than a machine-generated voice or a foreign-accented human voice. In the section that follows I describe the research that supports these principles.

Basic principles of instruction – Merrill's "First principles"

Merrill (Merril, 2002) offers basic principles of instructional design which he calls "first principles", which are what Reigeluth (Reigeluth, 1999a) called "basic methods". His reasoning is that there should be only a few first principles of instruction that can support a wide variety of instructional programmes and practices. He extracts the following five principles common to sound instruction.

Literature review POSITIVE pointer 62: Merrill suggests five principles common to good instruction: being engaged in real-world problems, activating previous experience, demonstrating what is to be learned, and applying new skills. (2.6.3 Technological)

He extracts the following five principles common to sound instruction:

- Problem – Learning is facilitated when learners are engaged in real-world problems, which must be shown or introduced to the learners. Learners must be engaged in the problem and their solutions to the problem should be compared to one another.
- Activation – Learning is activated when previous experience that is relevant is activated. Learners must be directed to recall, describe, relate or apply knowledge from past experiences that can form the foundation of the new knowledge.
- Demonstration – Learning is facilitated when the instruction demonstrates what is to be learned rather than just gives information about what is to be learned. Learning is best when students are shown examples rather than told generalities.
- Application – Learning is facilitated when learners are required to use their new knowledge or skill to solve problems.
- Integration – Learning is facilitated when learners are encouraged to integrate (transfer) the new knowledge or skill into their everyday life.

2.6.4. Student experiences and evaluations of eLearning.

What surveys reveal about student experiences.

In an attempt to enhance the quality of course design and delivery, Galusha (Galusha, 1997) Hara and Kling (Galusha, 1997, Hara, 2000) and others report on learners' frustration with online learning. Unfortunately, not much is known about the quantitative nature of these studies, and evaluation of the research design and methodology is beyond the scope of this article. Galusha (Hara, 2000) and Hara and Kling (Hara, 2000) find the most common problems to be:

- poorly designed course materials
- lack of feedback or contact with the teacher

- lack of support services, such as the provision of tutors and technical assistance
- alienation and lack of experience of online learning

Hara and Kling (Hara, 2000) describe students' experiences in a specific postgraduate course "at a major university" and some factors contributing to their distress. These are evident in these quotations:

- If I have one complaint about this [course], it is that time goes so quickly. I can be hooked up with a computer for a whole day and then realise that I haven't had a dinner or I haven't prepared my lesson plans.
- I did not enjoy our class excursion ... because the technology did not live up to expectations.
- I don't really like turning on the computer and finding that I have eleven messages on my e-mail. It's a pain. ... just time consuming ....
- One of the problems is that I'd like to have feedback. A kind of constant feedback. With ... this distance ed., I guess you don't get that kind of feedback.
- I am not satisfied with the articles that I have found so far; so I'm doing more research.
- This computer is frustrating. I would imagine it is like sitting in class and only understanding some of what is being said, then being asked to answer a question. I have felt ... panic ... isolation ... frustration ... anger. ....
- I don't know exactly what the instructor wants.
- I want to complain, but it's not the instructor's problem, or the [course's] fault. It is my problem. There is nothing she can do about it.

Hara and Kling (Hara, 2000) also quote some positive comment, which should not be ignored. They include:

I do believe you are all the best classmates and instructor I have ever met.
I can see your hard work, your enthusiasm, and your patience.
I'd like to say that the most successful condition I've learned from this class is a warm and supportive class atmosphere.

Pincas (Pincas, 1998) offers some reasons for the unfortunate circumstances in which students find themselves from time to time. The cursory manner in which written assignments are treated is probably due to "the workloads of the markers and their lack of time, rather than any indolence or indifference. What is more serious is the inadequate insight into the importance that the instructional written dialogue can have in distance education. In general this special form of dialogue is underestimated" (Pincas, 1998).
He goes on to say that "when distance education universities were conceived, a mistake was made with regard to supplementary written dialogues because these were seen as a burdensome obligation in the context of marking assignments – something that is on the periphery of the learning and teaching process". As may be expected, the influence of traditional academic learning culture is still strongly felt. "There is very little inclination to resist or even abandon the tried and tested imparting of knowledge by expository methods in favour of untried, labour-intensive ... and time-consuming autonomous learning" (Pincas, 1998).

In evaluating WebCT, students found the following:
The most used application was the calendar, then the bulletin board and then the uploading of assignments. It was more useful to the students to contact the teacher directly rather than their fellow students. 53% experienced no technical problems, and those who did experience problems commented on the problems in uploading assignments. Overall 79% found WebCT useful for their course

(Wernet, 2000)

2.6.5. Costs and cost-effectiveness of eLearning.

Eight propositions to lower the cost of eLearning.

Taylor (Taylor, 2002b) elaborates on the Cost-Income Equilibrium and puts forward eight propositions to lower the cost of eLearning:

- Increase income per enrolment – charge more for a course.
- Decrease startup cost – cooperate with others for technical assistance.
- Decrease the marginal cost (the ongoing cost of each learner enrolled).
- Increase market share – use advertising and marketing effectively.
- Increase marginal cost gradually - limit costs until a course is proven viable.
- Change mode of delivery – change the mode of delivery of a course to where it is more cost effective. One need not stick with one mode of delivery.
- Reduce fixed costs. Buildings are expensive outlays. Rather invest in electronic equipment where necessary.
- Wait or do nothing. If the effectiveness or viability of a course is in doubt, rather wait and do nothing.

Cost-effectiveness under the spotlight

Kwok-Chi Ng (Ng, 2000) comments on cost-effectiveness of eLearning. *Cost-effectiveness* is a term borrowed from the field of Economics, and it is concerned with comparing different ways of achieving the same objective so that the most cost-effective choice will be the least costly of the alternatives that are being compared. Cost-effectiveness is relevant because of the sizeable investments that are being made in computer and Internet infrastructure in institutions

worldwide. It is suggested by Rumble (Rumble, 2003) that to be able to measure cost-effectiveness, the following is required:

- Describe the nature of the business objectively.
- Clearly define the product.
- Determine the extent to which the product aim can be achieved (quantify the production costs).
- Establish the cost of the operation.
- Apply eLearning.

The cost of one online course is $100 000.

In order to find the most cost-efficient solutions, the University of Washington collaborated with APEX in the creation of online high school courses. There was a great need for such courses because of a severe teacher shortage and overcrowded facilities in the target research area. APEX itself created the online courses by employing a 15-member team for eight months to produce a single course for between $100,000 and $200,000. The price of this production cost should be compared to the $475 that a student is required to pay for tuition at the University of Washington for an 18-week course. This $475 course fee ensures that online instruction and mentoring by a qualified and experienced teacher will be available to the student for the duration of the course (NASBE, 2001).

2.6.6. Overall practical lessons learned about eLearning resource implementations.

Combined use of printed and online resource reduces costs significantly.

Monge-Najera (Monge-Najera, 2001) found in research about the Internet and multimedia in a Third World setting that the simultaneous use of traditional materials like printed textbooks together with online courses and simple automated evaluation reduces costs of implementing and maintaining an eLearning resource significantly.

The use of a call centre to support online resource suggests that most calls do not need to be answered by a professor.

Most calls can in fact be more than adequately dealt with by someone who is paid a much lower salary than a professor. Tait (Tait, 2000) suggests that online learning support should take into account the characteristics of the students, the demands of academic programmes and courses, the geographical environment, the technological infrastructure, the scale of the programme and the requirements of management.

Adria (Adria, 2001) conducted research into the role of a call centre in supporting an eLearning resource. He found that most student inquiries required only routine answers and that only a small proportion of student inquiries required a response from someone who possessed the specialised knowledge of (say) a professor or some other academic expert.

Webserver logs analysis are useful.

Ingram (Ingram, 2000) conducted research into webserver logs. He suggests that webserver logs are useful because they provide (inter alia) information about

which pages are most popular and patterns of student usage over time. When this kind of information is used in conjunction with data from surveys, it can be an enormous help to those who need to design and revise an eLearning resource. A webserver typically logs the following information:

- Transfer log – a log of every file sent (including all graphics)
- Error log – error messages sent to the user
- Referrer log – the previous pages that a visitor was viewing
- Agent log – information about the visitors browser

Logging visits to a site is more useful than a "hit" on a site.

A "hit" is recorded every time a server is accessed. It also records a hit for each graphic inside a file. In contrast, a "visit" gathers and reports information more intelligently and provides answers to questions such as:

- How many different people visited the site?
- How long did they stay?
- What pages did they access while visiting?
- What sequence of pages did they follow?

The challenge is to keep online learning alive.

A constant challenge to educators is to keep online courses "alive" (Fischer, 2002-2003) – by which is meant "lively" or "exciting" (the opposite of boring, dead and sterile). One of the major problems of online course design is how to make learning stimulating so that communities engage in participation. What differentiates online courses from ordinary correspondence courses is that the former strive to create that sense of community that is usually much stronger in traditional face-to-face environments simply because people can see each other and interact with one another. In similar vein, Czerniewicz (Czerniewicz, 2001) pleads for designers and implementers to make online courses stimulating,

original, innovative, fun, motivating and as varied as possible by introducing a variety of activities suited to different outcomes and purposes. She felt that the experimental online course that she attended was a disappointment because of its lack of variety. She sadly concludes that most online courses do not offer this kind of variety and that the predominant feature of online courses (or what Goodyear (Goodyear, 2000) in (Czerniewicz, 2001) describes as the dominant mode) is nearly always primarily the online discussion forum.

Hyperlinks to information outside courses should be used to keep it "web-like".

Czerniewicz (Czerniewicz, 2001) believes that unless hyperlinks are inserted to link the online course material to material, sites and discussion threads outside the course, online courses can begin to look very un-web-like. Not to do this is not fully to exploit the possibilities inherent in the medium.

The challenge to eLearning lies in the instructional design.

According to Czerniewicz (Czerniewicz, 2001), one needs to achieve a balance between learner-directed freedom and a structure that supports learners and encourages both peer and learner-facilitator interaction. A stimulating learner-centred, problem-oriented approach should not be thought to be in contrast to learner-centeredness or control. Similarly, direction and structure should provide an enabling framework that promotes exciting activities and productive collaboration.

In designing multimedia, Jonassen (Jonassen, 1999) in (Hedberg, 2004) suggests that there are six elements that should be available in an eLearning environment. These are:

1. The problem space – There should be a space in which problems are introduced. Problem spaces should vary in the level of challenge that they pose to the student.
2. Related realistic materials – Use must be made of realistic examples and cases

that lead students to reflect on best practices.

3. Information resources – These might include any relevant sources such as web sites.

4. Cognitive tools – Cognitive tools that support data collection should be made available to students. These include word processors, note-takers and spreadsheets for analysing data, etc.

5. Conversation and collaboration tools – While most online implementations make use of discussion forums and synchronous chat, they also, to a lesser extent, utilise whiteboards, file sharing and concept maps.

6. Social and contextual support – This kind of support can be provided through a discussion forum in which mentors provide feedback.

Learning strategies that support various types of learners should be implemented.

Jonassen (Jonassen et al, 1995), in (Hedberg, 2003) lists the following types of learners who need support:

1. Active learners need to engage in interactions with and manipulations of the exploration environments that have been constructed.

2. Exploratory learners need to apply various strategies to search the online environment.

3. Intentional learners are those who are trying to achieve cognitive objectives.

4. Conversational learners learn by means of engaging other learners in conversation in the context of an instructional system.

5. Reflective learners are able to articulate what they have learned and reflect on the processes and decisions that they used to achieve understanding.

6. Ampliative learners are those who generate assumptions, attributes and implications out of what they have learned and who are able to expand on the bare information that is offered.

What is required is open-ended thinking together with problem solving and critical thinking.

Hannafin, Hall, Land and Hill (Hannafin, 1994), in (Hedberg, 2003) suggest that the best learning settings are open-ended because they require learners to tackle cognitively complex tasks that evoke skills such as problem solving, critical thinking collaboration and self-regulation.

Three steps to create a learning environment.

Hedberg (Hedberg, 2003) suggests that the following three steps can be used to create a learning environment:

Step 1 - Information design and project space definition. This can be generated by asking the following questions: What is the topic or content of this project? Who are the intended users? Why is this project being undertaken?

Step 2 - Interaction design. Hedberg says that effective interaction design should match cognitive expectation because this will ensure that users are motivated and engaged. Not all interactions are meaningful interactions. The real challenges is to create interactions for users that are easy to access and experience. He quotes the following guidelines by Norman (Norman, 1988) for constructing interactions:

- Visibility – The user can easily see the device and its alternatives.
- An effective conceptual model – Consistency in program design is essential.
- Effective mapping – The relationships between actions and results, controls and their effects, and between the system state and what is visible need to be made clear and consistent.
- Feedback – Continuous feedback is required with regard to actions.

Step 3 - Presentation and interface design. The third step produces the visual

presentation of the design concepts.

Retention is improved in learning in proportion to the number of senses that are used.

Rief (Rief, 1996) makes the following deductions from her research: Learners normally retain 10% of what they read, 20% of what they hear, 30% of what they see, 70% of what they say. But as soon as senses are combined, the percentages are different. Learners then retain 50% of what they see and hear, and 90% of what they say and do. And wherever learners are actively engaged in some or other activity, retention is improved.

The virtual universities and the "hamburger" universities

Since entrepreneurial businesses (like McDonald's – therefore "hamburger") began to invest more and more funds in higher education, numerous online delivery systems have been developed. These systems are tested and given trial runs at institutions of higher education, and are refined as they are used under licence. Such patterns of investment increase the likelihood that more and more businesses will continue to invest money in virtual campuses outside the scope of public higher education. What motivates such investors is the knowledge that whoever is first in getting the public to invest in their product will be the most likely to make sizeable profits from their investments. One may classify such ventures into two main classes: the virtual universities and the "hamburger" universities. The burning question, according to Heydenrych (Heydenrych, 2000b), is: Whose content will be used?

Virtual universities were found in the first place because it was calculated that non-virtual institutions simply did not have the capacity to meet the demands of all those who wanted personally to experience tertiary education. Although Western Governors' University (Western Governors University, 2004) made a disappointing start, its reason for existence was born out of the founding

governors' frustration that universities and colleges were not responding to the needs of business and industry and were not preparing students properly for the workaday world. Course content can come from basically anywhere, as it is competence that is assessed in the final analysis. Virtual universities are however accused of parasitizing on current face-to-face institutions. They are alleged to do this by mining subject content, employing junior lecturers (who can be utilised as online tutors at no extra cost), and by using lecture halls where and when they are needed.

The "hamburger universities" are establishments that employ suitably qualified staff with appropriate skills to further the interests of the particular business and to assure the standards and quality of service of a particular business. MacDonald's Hamburger University (MacDonalds Hamburger University, 2004) is a collection of centres for the training of all grades of workers. At the other end of the scale, there are institutions like DeVry (DeVry University, 2004) which dates from 1931, and which offers degree courses in Accounting, Business Administration and Telecommunications Management. Both these universities address particularly well-defined and demarcated business needs, and they train people in a narrow spectrum of skills and knowledge that are immediately needed in a corporation or a country's economy. They are therefore always narrowly dependent on business needs and sponsorship.

There is some evidence that using online technology to offer learning opportunities of this kind, either at higher education institutions or private concerns, may lead to academic insecurity, low-quality learning content, online imperialism, the manipulation of job market needs and, last but not least, a society that is deprived of the liberal arts input that produces intellectually, socially and psychologically well-rounded citizens. It is against

a backdrop of this kind that an open-source freeware eLearning program such as Moodle may at least remove some of the concerns raised by the economic imperialism that is evident in this debate.

How Unisa accepts and processes assignments.

Unisa (University of South Africa), the biggest distance learning university in Africa, is situated in South Africa (Unisa, 2006). Is this university, multiple choice assignments are processed online or by means of a mark-reading sheet — a form from which predefined marked positions can be read by machine (Optical Mark Reader, 2004). Unisa offers their students two ways of submitting a written assignment; they may either browse and upload a pre-typed file or copy and paste or type text into a displayed box. Written assignments that are sent in are printed on the working day following their arrival. They are then given to lectures on paper for marking. The results obtained are uploaded electronically and comments on assignments are mailed to students by means of ordinary "snail" mail.

The overall challenge in an online learning environment is to get a number of disparate elements to work together effectively at the same time.

The challenge for teachers and course developers working in an online learning context is to construct a learning environment that is simultaneously

- learning-centred
- content-centred
- community-centred
- assessment-centred

There is no single "correct" medium of online learning, nor any one formula that dictates the kind of interaction that is most conducive to learning in all domains with all learners at all times. Teachers need to learn to develop their skills so that

they can respond to their students and their needs by developing a set of online learning activities that are adaptable to diverse student needs (Anderson, 2004a).

Students may sometimes do only what is required to pass a course and nothing more

No matter how many interesting and elements there are in any particular course, there are always some students who will only do the minimum required to pass. Research conducted by Wemet, Olliges, and Delicath (2000) show that it is only the course calendar, posted lecture notes and quizzes that can be relied upon to improve course involvement. Their study was designed subjectively to measure students' attitudes and those factors that influence web-enhanced instruction. Results from a questionnaire administered to the sample of students showed that the posting of lecture notes and the taking of quizzes and tests online were the only components of web-based software that students judged to increase course involvement. Additional analyses revealed that the reviewing of the course calendar and the taking of quizzes and tests online were the only factors that could be judged to improve performance in the course. This finding indicates that research needs to be undertaken to explore online components individually so that researchers can determine the rating of each course component in terms of performance and involvement (Sain, 2003).

Ideal eLearning response time to communication – opinions from some European universities.

When le Roux (Le Roux, 2003) visited a number of prominent European universities, he found that most interviewees agreed that the ideal maximum response time for responding to student questions is 24 hours.

Lazenby (Lazenby, 2002)) found that when students are given their course content on CD, they tend to ignore the eLearning resource.

What this means is that students are prepared to forfeit rich communication and the possibility of high-level interactions if they perceive that they can gain some advantage by only using a CD to access their course content.

The Semantic Web – the future of the Internet medium

Berners-Lee, who invented the principles on which the web is based, sees the future of the Internet as one in which content is endowed with semantic meaning (Berners-Lee, 1999), in (Anderson, 2004b). The "Semantic Web" will be populated by a variety of autonomous agents — small computer programs designed to navigate the web as they search for particular information before they act on that information in support of their assigned task.

In pursuit of this aim, student agents will be used in universities to conduct intelligent searches for relevant content just as secretaries will be used for booking and arranging collaborative meetings, reminding students of deadlines, and negotiating with the agents of other students for assistance, collaboration or opportunities for socialization. Teacher agents will be used to provide remedial tuition and assist with record keeping. They will also be used to monitor student progress and even mark and respond to student communications. Content itself can be augmented with agents who control rights to its use, automatically update it, and track the ways in which students use the content concerned (Thaiupathump, 1999). The Semantic Web also supports the reuse and adaptation of content by supporting the construction, distribution and dissemination of digitized content that is formatted and formally described. The recent emergence of educational modelling languages (Koper, 2001) allows educators to describe — in a language accessible on the web — not only the content but also the activities and context or environment of learning experiences. All these capabilities afforded by the Semantic Web allow us to

envision an eLearning environment that is rich with student-student, student-content and student-teacher interactions that are affordable, reusable, and facilitated by active agents (Koper, 2001).

2.6.7. Implications and value of the literature about the technological components of this research.

The open source program, Moodle, provides a cost effective, stable and fully functional eLearning platform that contains most of the features found in expensive commercial programs. Since the emphasis of Moodle is on social constructivist pedagogics, it has proved to be extremely supportive of this research.

Hosting a service with an appropriate hosting service is critical to the speed and functionality of the service and makes a significant speed gain possible. It seems to be inevitable that hardware upgrades need to be made almost every year.

The principles suggested by Mayer for managing cognitive load and multimedia learning are paramount in course design. His theory shows how selecting words, selecting images, organizing words, organizing images and integrating information is significant in learning. Mayers' work, together with Merrill's First Principles of Instruction, constitute a solid foundation for successful online course design. Merrill's principles facilitate learning by means of real-world problems and tasks, constructing new learning on the basis of previous experience and knowledge, being able to demonstrate what has been learned, and being able to apply knowledge to real-life contexts and situations.

The most common problems in eLearning are caused by poorly designed course materials, a lack of adequate feedback and support for students, and feelings of alienation on the part of participants.

Although it is not possible precisely to calculate the cost and cost-effectiveness of eLearning, factors such as start-up costs, ongoing costs, delivery mode, fixed costs and various others factors all have a bearing. It can be said, however, that the cost of developing one online course can be as high as US$100 000.

Practical lessons learned from eLearning applications include the following:

- The combined use of printed and online resource significantly reduces costs.
- Most calls for help to a student call centre do not require a response from someone of professorial rank (and the expenses that that involves).
- The meaningful logging of visits (more than just a hit) can provide useful information for course improvement.

The challenge is to keep online learning "alive", i.e. lively and interesting. Hyperlinks to sites and information outside courses seem to help to keep online learning "web-like", i.e. lively, challenging and up-to-date.

The main challenge for eLearning lies in getting instructional design right. Effective design takes into account working with problems, the use of realistic materials, the identification of good information resources and cognitive tools, and the need for conversational and collaboration tools and social support.

Learning strategies need to be implemented to support various kinds of learners. Open-ended tasks that require problem solving and critical thinking are necessary adjuncts of the best online learning strategies.

Finally, retention rates are improved in direct proportion to the number of senses that students are required to utilise when they learn.

Chapter 1
Introduction, backgroud and research problem

Chapter 2
Literature review

Chapter 3
Research design and methodology

Chapter 4
Analysing the case, evidence and discussion

Chapter 5
Conclusions and recommendations

3. CHAPTER 3 RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

The research problem is designed to obtain information about how high school children react to the various elements of an eLearning environment. Both the resource and the eLearning community need to be analysed before they will yield information about the kind of elements in an eLearning resource that will best support a learning community of high school learners.

An intellectual research puzzle, proposed by Mason (Mason, 2002), will be set out specifically for this research in the form of a main research question, subsidiary questions and objectives. In addition, a research strategy and research design to address the research questions will be proposed.

The methods applied include observation, analysis of written texts, various questionnaires, focus group interviews with an external interviewer, interviews by the researcher, and telephone interviews. The data gathered in the resource repository has also been analysed.

For every method used, the related collection instrument with its concomitant objectives, advantages and disadvantages are explained. Corrective measures to counterbalance the disadvantages are described. Member checks, peer reviews, crystallization, and investigator triangulation have been used to ascertain levels of trustworthiness and authenticity in the study.

3.2. Research problem and motivation for the study

As I mentioned in chapter 1, the purpose of this research is discover "to what extent and why are certain features of a high school eLearning resource workable and desirable for sustaining a high school learning community"?

Given such a purpose, the objectives of the research are:

1. to investigate how and why pedagogical and eLearning theories and issues influence an eLearning resource
2. to analyse how and why certain features of a learning community inform an eLearning resource
3. to evaluate how and why communication, collaboration and social issues inform an eLearning resource
4. to determine the way in which various technological and instructional design issues affect an eLearning resource and to suggest why they affect eLearning

3.3. Research questions

From the objectives, the following research questions emerge:

1. To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?
2. Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?
3. In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?
4. How do certain technological aspects and instructional design issues affect a high school e-learning resource?

The main research question and the essence of the enquiry (Mason, 2002) can be summarised as follows:

To what extent and why are certain features of an eLearning resource workable and desirable for sustaining a high school learning community?

According to Mason (Mason, 2002), the main research question and the essence of the enquiry can be summarized in the form of an intellectual research puzzle. This is represented below in tabulated form. The research question is posed and the research objectives and subsidiary questions are linked.

The intellectual puzzle for this study (summarised)		
To what extent and why are certain features of a high school eLearning resource workable and desirable for sustaining a high school learning community?		
Research Question	Research Objectives	Subsidiary Questions
To what extent and why are certain features of an eLearning resource workable and desirable for sustaining a high school learning community?	Find out to what extent the eLearning resource allowed students to engage in learning.	Question 1 To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource? -Cognitive Theories – Hexa-C plus -Multiple intelligences -eLearning theories and models
	Find out to what extent the eLearning resource facilitated the creation and maintenance of an eLearning community	Question 2 Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning -Personality -Gender -Learning and thinking styles -e-community specifi elements
	Find out to what extent the eLearning resource enabled students to communicative and collaborate	Question 3 In what way and why can certain communication, collaboration and social elements inform a high school eLearning resource? -Communication –discussions -Collaborative learning
	Find out what technological contraints and opportunities were imposed by the resource	Question 4 How and why do technological aspects and instructional design issues impact on

	on the students and vice versa	a high school eLearning resource? -What are the features of eLearning resources and what are their influences -How was the resource (Moodle) used during the year.

Table 16 : The intellectual puzzle applicable to this study in terms of the schema set out by Mason (2002)

3.4. Research paradigm.

Merriam (Merriam, 1998) asserts that it is helpful to position research in terms of the philosophical tradition in which the research is framed. The philosophical basis of research will elucidate the way in which one thinks about the development of knowledge (Saunders, 2000) and about the production of knowledge (Merriam, 1998).

Cohen (Cohen, 2002) points out that the three dominant approaches or paradigms in the study of behaviour are normative (positivist) research, interpretive research and critical research. While normative (positivist) research attempts to explain behaviour by reference to its causative factors, interpretive research attempts to understand actions and meanings rather than causes. Critical research, by contrast, tends to focus on themes of interrogation, critique and the transformation of actions and interests. While interpretive research tends to be explanatory in a non-statistical way, normative or positivist research models itself on the kind of research that has predominated in the natural sciences since the Enlightenment. Critical research tends to engage in ideological critique and action research and often displays an emancipatory bias. Normative research is more technical. Interpretive research has a practical interest. Interpretive research draws its conclusions from engagement with actual dynamic conditions and situations.

In interpretive research, the researcher is personally involved (as is the case with this research), and research is conducted from the "inside" and not "from the outside" – as it is in normative research (Cohen, 2002). In interpretive research, the researcher seeks to discern the meaning of actions as they are expressed in a specific social context (Carr, 1986).

Positioning this research in Burrel and Morgan's research paradigm

Burrel and Morgan (Burrel, 1979) offer forward a diagram to position research in terms of epistemological range and ontological dimensions.

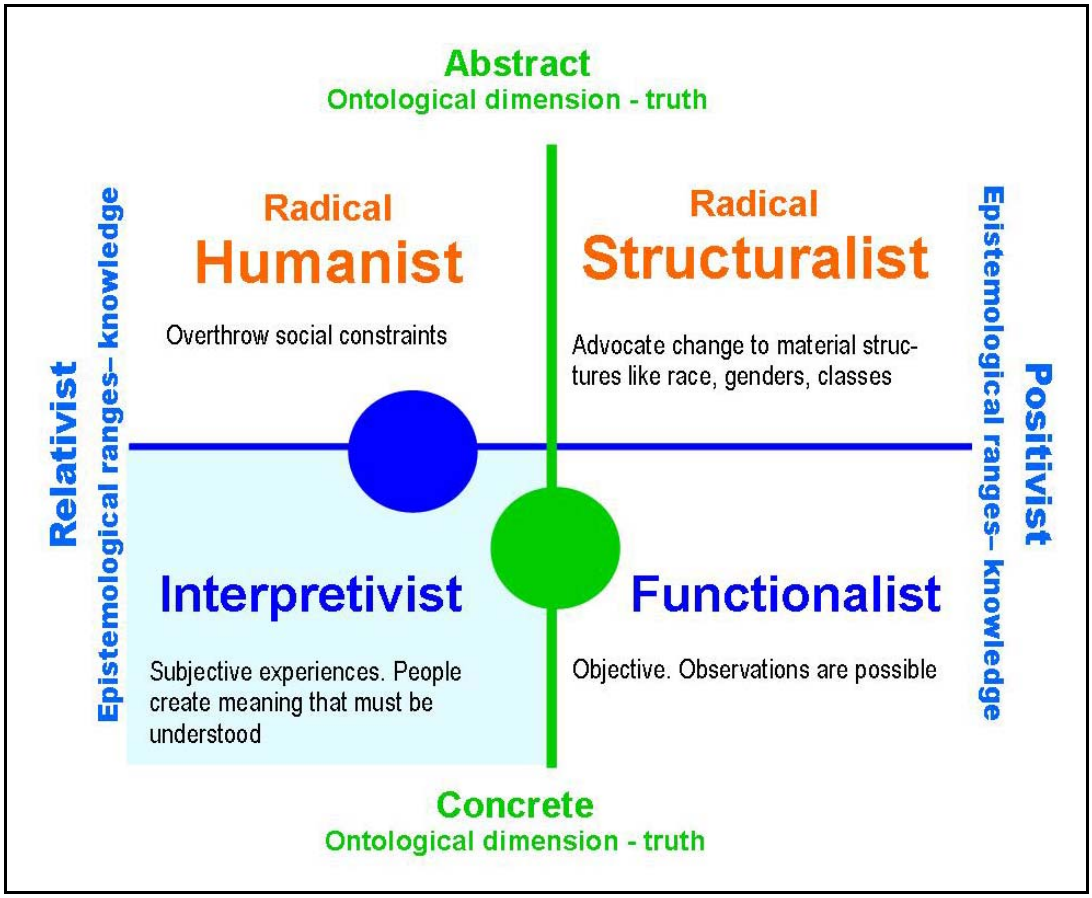


Table 17 : Research paradigm
(Burrel, 1979)

The diagram above shows how the present research fits into the interpretivist quadrant.

This research falls into the Interpretivist quadrant.

The interpretivist paradigm (represented in the bottom-left quadrant) maintains that social scientists are concerned with understanding the social construction of reality or the ways in which people create and share meaning. According to Burrel and Morgan (Burrel, 1979), the interpretivist paradigm is informed by a concern to understand the world as it is at the level of subjective human experience. The interpretivist researcher attempts to understand and analyse this reality.

Although this present research falls into the interpretivist-interactionist quadrant, it also shows characteristics of the functionalist quadrant because it analyses data in a quantitative manner as a prelude to making suggestions about how eLearning for the learners under consideration could be improved. This extended case study can also be considered a formative evaluation of an eLearning system as well as a developmental research approach for increased usability, since the aim was to study how the resource sustains a learning community and interpret resulting phenomena, as well as to offer suggestions about how the resource might be improved. A more detailed description of the positioning of this research in terms of Burrel's paradigm is included in APPENDIX 3.

3.5. Research approach.

The research approach in this study is qualitative with some accompanying quantitative elements. My aim in doing this research was to study events in their natural setting and to interpret whatever phenomena arose out of these events in terms of the meaning attributions of the people (the learners) who were the

subjects of this study. According to Husen (Husen, 1999), such an approach is widely used in the humanities. It characteristically emphasises efforts to understand (verstehen) the whole (holistic) picture. This approach is well suited to this study because it incorporates both these elements. I investigated how a defined group of learners used a particular eLearning resource in its natural setting. This investigation was the prelude to an attempt to understand and interpret how the resource sustains a learning community.

The qualitative approach is also suited to this research because it focuses on the subjective experiences and opinions of individuals and is sensitive to and interested in the contexts in which people interact with each other (Mouton, 2001).

The quantitative research contained in this research serves to triangulate (crystallize) and corroborate the findings in qualitative interpretations.

The nature of qualitative study

"Qualitative" implies an emphasis on the quality of the entities that are being scrutinized rather than on conclusions drawn from the kind of numerical and statistical data that is generated in experiments in the hard empirical sciences (Denzin, 2000). Qualitative researchers look for meaning in the socially constructed nature of reality as it exists, in the relationship between the researcher and what is being studied, as well as in the situational constraints that shape the research (Denzin, 2000).

Nelson defines qualitative research as interdisciplinary, transdisciplinary, and sometimes counterdisciplinary (Nelson, 1992), in (Denzin, 2000). Qualitative research incorporates the humanities, the social sciences and the physical sciences simultaneously. It is the source of many different points of view,

attitudes and assumptions. It makes use of multiple paradigms and its practitioners will use as many methods as they need to produce meaningful results. Qualitative researchers are committed to the naturalistic point of view and to an interpretive understanding of human experience. Qualitative research exists in a creative tension between two apparently opposed worldviews. On the one hand, "it is drawn to a broad, interpretive, post-experimental, postmodern, feminist, and critical sensibility. On the other hand, it is drawn to more narrowly defined positivist, postpositivist, humanistic, and naturalistic conceptions of human experience and its analysis."

Savenye and Robinson (Savenye, 1996), in (Adendorff, 2004), define qualitative research as research devoted to developing an understanding of human systems which typically includes ethnographies, case studies and generally descriptive studies. This research is based on an extended case study.

Merriam (Merriam, 1998) and Cresswell (Creswell, 1998) define qualitative research in terms of its characteristic. These are summarised in the table below.

Characteristics of qualitative research			
Characteristics	Creswell (1998)	Merriam (1998)	In this study this occurs as....
Natural settng as source of data	yes	yes	The online environment as it is used in a natural (i.e. actual educational) situation
Researcher as key instrument of data collection	yes	-	– The researcher observes. – The researcher selects, analyses and synthesizes texts. – The researcher conducts interviews.
Data collected as words or pictures	yes	yes	Data collected through the various text formats
Outcome as process rather than product	yes	yes	The online activities are a reflection of a process rather than a product.
Inductive analysis that	yes	yes	General principles

pays attention to particulars.			(conclusions) are derived from particular facts and instances (see below for more on the inductive approach)
Focus on participants' perspectives and personal meanings	yes	yes	Personal meanings are deduced from questionnaires, focus groups and interviews.

Table 18 : Characteristics of qualitative research
The table above clarifies the characteristics of the kind of qualitative research that is used in this study.

The inductive approach (Bradford University, 2004, Saunders, 2000) used in this research is evident from the researcher's method. The researcher gathered ideas, opinions and data which he then collated, classified, processed, analysed and presented in the form of conclusions or findings. These conclusions are not imbued with the same status that they would have had the research been quantitative, and they in no way compromise the *sui generis* nature of the original ideas and opinions of the participants.

Qualitative research is qualitative if it complies with the following criteria:

- It is primarily concerned with identifying and understanding the unique meanings that participants attach to events and to their experience of such events.
- It strives to understand and to incorporate the research context into the research process.
- It strives to amass a collection of qualitative data that is richly textured and layered.
- It never loses sight of the fact that the researcher is part of the research process.
- It is not overly concerned to generalise results.

Cresswell (Creswell, 1998) explains that qualitative research is preferred in a study of this kind for the following reasons:

- The research question usually starts with *how* or *what* questions.
- The topic needs to be extensively explored and it contains a number of variables about which knowledge needs to be obtained.
- The researcher is actively involved as an active learner in the process.

3.6. Research strategy.

A research strategy is a general plan of the research. More specifically, it describes the means that the researcher will employ to go about answering the main research question and the subquestions. It sets out the complete research plan (Cohen, 2002).

The case study is the primary strategy for effecting the research. Miles and Huberman (Miles, 1994) describe a case study as a phenomenon that occurs in a "bounded context" (Merriam, 1998).

This research also complies with Stake (Stake, 1995) and Cresswell's (Creswell, 1998) assertion that a case study must have observable boundaries. Merriam (Merriam, 1998) proposes two questions that should be asked to confirm the limits of data collection:

1. Is there a limit to the number of people involved who could be interviewed?
2. Has a finite amount of time been allocated to observations?

The current research fits this pattern as both these questions can be answered in the affirmative. The case study involved around 200 learners and the data was drawn from observations that took place over a period of two academic years. The research began at a particular time and ended at a particular time. The

subject of the study (the learners and the researcher) constituted a specifically defined group bounded in time and space and by circumstances.

According to Merriam (Merriam, 1998), Shaw (Shaw, 1978) and Creswell (Creswell, 1998), in (Adendorff, 2004), a case study contains special features that are particularistic, descriptive and heuristic. The following table provides a summary of these features.

Special features of a case study	
Features described by Merriam, Shaw and Creswell (quoted in Adendorff)	Features operational in this study
Particularistic A case study focuses on a specific event or situation. It may be able to suggest what to do or not to do in a similar situation, or it may examine a specific instance that highlights a general problem.	This study focuses on a specific eLearning environment. Data from the study may throw light on the kind of general problems that are being experienced in other similar situations where high school learners use a comparable learning resource..
Descriptive Case studies produce rich and thick descriptions of the phenomenon being studied. These include numerous variables that are indicative of the interactions that took place in a specific time period. Case studies also expose to scrutiny the complexities inherent in any particular situation, the influence of personalities, differences of opinions, and the influence of timelines such as deadlines. Case studies also the source of the quotations that are extracted from interviews, other kinds of data, and the way in which information is presented.	The study produces rich and thick descriptions of the eLearning environment experiences of the learner. It generates a multiplicity of variables and reveals the extent of the interactions that took place during the period of the study. It vividly mediates the complexities inherent in the situation. It reveals the influence of teachers, administrative staff, parents and learners, and shows how opinions differed among these groups. Deadlines were operational throughout the study and the effect of this can clearly be seen. The data includes interviews and quotations from those concerned, as well as data from many other sources such as server logs and eLearning resource logs.
Features described by Merriam, Shaw and Creswell (quoted in Adendorff)	Features operational in this study
Heuristic A case study helps the researcher to understand what is being studied. It brings new meanings to fore. It extends experience and	The researcher has attempted to provide the reader with a clear understanding of the high school-level eLearning that took place in the

confirms or disproves what is already known. It may explain the reasons for a problem and locate what has happened in the context of background information. Its evaluations and summaries may extend the usability of the case.	particular circumstances of the study. Numerous issues and situations were analysed. Possible improvements were pondered and evaluated before suggestions for improvements were made. The summary in the last chapter shows the increased usability that is one of the results of this study.

Table 19 : Special features of a case study
(Creswell, 1998, Merriam, 1998, Shaw, 1978) in (Adendorff, 2004)

This research is an explanatory case study.

The explanatory case study type fits this research. Yin (Yin, 2003) elaborates on three different types of case studies, exploratory, descriptive and explanatory. Exploratory case study is aimed at defining the questions and hypotheses of a subsequent study, or at determining the feasibility of the desired research procedures. A descriptive case study presents a complete description of a phenomenon within its context. An explanatory case study presents data bearing on cause-effect relationship, explaining how events happened.. This research is not ethnography, phenomenology, biography or grounded theoretical study (more detail provided in APPENDIX 4.

3.7. Research design.

3.7.1. A summary of the research design for this study is presented below.

Research design	eLearning course for high school learners during 2004 and 2005					
Data collection methods	Observation	Content and data analysis	Interview Focus groups with learners	Interview Focus groups with teachers	Interview Individual interviews with learners	Interview Individual interview with teachers
Data collection instruments	Researcher notes	1. Asyn- chronous Moodle electronic messages in discussion forums. 2. Formal tests / assignment responses 3. Formal test responses 4. Self-administered questionnaires	Recorded and transcribed	Recorded and transcribed	Recorded and transcribed	Recorded and transcribed
Data source	Researcher notes and reflection	Server logs, eLearning resource logfiles, test results, questionnairre data results,	Recording and transcribed text	Recording and transcribed text	Recording and transcribed text	Recording and transcribed text
When administered	2000-2006	Jan-Dec 2004 and 2005	Oct 2004 & March 2006	Oct 2004	May 2006	Oct 2004
Person or people who conducted the procedure	Researcher	-Researcher. -Specialists	Group 1: External specialist as discussion leader Group2 : researcher	Group 1 External specialist as discussion leader Group 2 : by researcher	Researcher	Researcher
Verification: Trustworthiness and authenticity	Member checks	Member checks Crytalization (triangulation) Results from various data sources used Correlation:2004 & 2005	External specialist as discussion leader Member checks Crystalization Correlation:2004 & 2005	External discussion leader Crystalization	Member checks Crystalization	Member checks Crystalization
Ethical cosiderations	Covert observation	Consent obtained Restrict information to case study only	Consent obtained Restrict information to case study only	Restrict information to case study only	Restrict information to case study only	Restrict information to case study only

Table 20 : Research design for this study

3.7.2. Research design - the case study of this research.

The case study, as has been noted, is an explanatory instrumental case study (Stake, 2000) or a particular case that provides insight into an issue. In this case, the case study was based on the actual learning resource of participating high school pupils who were officially enrolled in 2004 and 2005 at the college for the eLearning courses that would lead to an officially recognised qualification. More details about the specifics of the case study as well as the setup of the case study are set out in the paragraphs below.

3.7.2.1. The case study group and background.

The learners in this study group were enrolled in 2004 and 2005 with a distance education institution for high school learners called Brainline (Brainline, 2006) in Pretoria, South Africa, with the view of obtaining an external Cambridge IGCSE qualification (Cambridge International Examinations, 2006).

This group of learners was the first group to participate in and use the eLearning resource to further their studies for this secondary-level qualification. Although this resource is similar to a university-style eLearning resource, it is obviously pitched at a level that is suited to the needs of secondary school learners. This research provides a view of the kind of strategy that was implemented during the first and second year of implementation.

Approximately 200 learners enrolled for the courses that are relevant to this research. The learners enrolled for the course came from four different age groups and ranged in age from between 13 and 18 years old.

For some of these learners, it was their first year in a system of this kind. Others had been in the system for between three and four years.

The average amount of time spent by learners in the sample in a distance education environment was two years (see picture of questionnaire result in this regard).

3.7.2.2. The eLearning program used.

The eLearning resource used in the college is more or less representative of what is usually found in eLearning resources of this kind. The open-source system Moodle (Dougiamas, 2000) was used and adapted for the resource.

The resource has many different features and includes elements that address the usual needs of distance education learners. Such elements include online lessons, forums, quick and trouble-free access to marked assignments, assignment memorandums and examinations. The resource also includes other features such as the template for an online personal journal, a chat room and an online events calendar. The calendar keeps learners informed about important dates such as assignment deadlines, examination deadlines, the scheduling of quizzes, communication times between the learners and subject advisers, and group projects created by subject advisers.

3.7.2.3. The process.

The aim of the course is to do everything possible to help enrolled learners to pass the demanding Cambridge examinations at the end of two, three or four

years of study. In order to achieve this, several measures were put into place that provide pace and purpose in the study schedule. Four assignments that mimic the kind of final examinations that learners can expect to see are required to be completed by each learner, together with satisfactory attendance at face-to-face workshops four times each year.

3.7.2.4. The samples

Several sampling strategies were used. What these strategies were depended on was the data collection tool that was used. They ranged from "typical" samples that reflected the average learner and situation in this case (Adendorff, 2004, Burns, 1997). These were used to select candidates for interviews. Then there was the kind of strategy in which no samples were drawn and questionnaires were sent to all learners.

The sample selection was in no way atypical, extreme, deviant or intensely unusual (Merriam, 1998). The participants or learners selected themselves by enrolling without coercion or compulsion for the courses (and with their parents' consent). The participants in the study were selected because they happened to have enrolled for the course. Learners who have English as a first language make up approximately 50% of the group. The balance use English either as a second or a third language in a country (South Africa) in which there are thirteen official languages.

3.8. Research methodology and data collection.

3.8.1. Research method.

Once the research objectives have been clarified, certain research methods are

then selected. Reeves (Reeves, 2000) presents six major types of research methods that are used by educational technologists namely quantitative methods, qualitative methods, critical theory methods, historical methods, literature review methods, and mixed research methods. This research follows a mixed research method approach by combining quantitative and qualitative methods. It includes a literature review that explores, analyses and synthesizes the field of eLearning theories. It also includes case study evaluations that combine qualitative and quantitative research (which is why it may be classified as a mixed research method).

3.8.2. Data collection methods

An analysis of data obtained from the web server on which the eLearning course was run was done. Questionnaires with research questions that were designed to elicit both quantitative data and qualitative information were used. An interview protocol with open-ended questions was drawn up and the interviews were recorded before being transcribed.

Data collection instruments				
Data collection instruments			Authenticity and trustworthiness	
Observe	Select / Analyse data texts	Interview	Member checks and peer reviews	Crystalization
1. Researcher interview; the researcher's notes; the diary of the researcher	2. Literature study 3. Asyn-chronous Moodle electronic messages in discussion	7. Focus group interview with learners 8. Focus group interview with learners by an external interviewer with	Verification with students, facilitators and administration staff that the data was correctly interpreted.	The telling of the same story by means of data gathered from different data collection instruments.

as a participant observer; observations about students' learning	forums. 4. Formal tests / assignment responses 5. Formal test responses 6. Self-administered questionnaires	the researcher as an observer. 9. Personal semi-structured telephone interviews with students 10. Focus group interviews with facilitators and administration personnel. 11.Focus group interview with technical staff..		

Sub-questions	Observe	Texts	Interview Focus groups
To what extent and why do certain pedagogical theories and eLearning theories inform a high school eLearning resource?	1	2,3,4, 5,6	7,8,9,10,11
Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?	1	2,3,4, 5,6	7,8,9,10,11
In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?	1	2,3,4, 5,6	7,8,9,10,11
How and why do certain technological aspects and instructional design issues affect a high school eLearning resource?	1	2,3,4, 5,6	7,8,9,10,11

Table 21 : Data collection instruments
The tables above show data collection instruments and authenticity and trustworthiness indicators. The data collection methods were suited to the envisaged research objectives.

3.8.3. Matrix of research questions and methods - The Intellectual Puzzle.

A data collection matrix below tabulates the methods and instruments used to answer the research questions. The data collected contributed to answering the

research questions.

The intellectual puzzle for this study (summarised)		
To what extent and why are certain features of an eLearning resource workable and desirable for sustaining a high school learning community?		
Research Question	Research Objectives	Subsidiary Questions
To what extent and why are certain features of an eLearning resource workable and desirable for sustaining a high school learning community?	Find out to what extent the eLearning resource allowed students to engage in learning.	Question 1 To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource? What are the pedagogical and eLearning theories and issues that inform an eLearning strategy that sustains a learning community for high school learners? – Cognitive theories – Hexa-C plus – Multiple intelligences – eLearning theories and models
	Find out to what extent the eLearning resource facilitated the creation and maintenance of an eLearning community	Question 2 Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning? -Personality -Gender -Learning and thinking styles -e-community specifi elements
	Find out to what extent the eLearning resource enabled students to communicative and collaborate	Question 3 In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource? -Communication –discussions -Collaborative learning -Social- and community of learning issues
	Find out what technological contraints and opportunities were imposed by the resource on the students and vice versa	Question 4 How do certain technological aspects and instructional design issues affect a high school e-learning resource? -What are the features of eLearning interfaces and what are their influences -How was the resource (Moodle) used during the year.

Table 22 : Summarized Intellectual Puzzle for this research / The Research Matrix

3.8.4. Observation.

Observation can provide additional information about a research topic. This technique was not used extensively in this study.

A brief overview of the epistemological and ontological positions on the use of observation follows here. The ontological position (Mason, 2002) assigns a central place to interaction, action and behaviour. People make meaning and sense of their world by means of their conversations with others in their daily routines.

The figure below illustrates the different ontological views on observation in a pictorial format (Saunders, 2000). The researcher's role in this study is indicated by the shaded circle. It indicates the researcher in the role of observer.

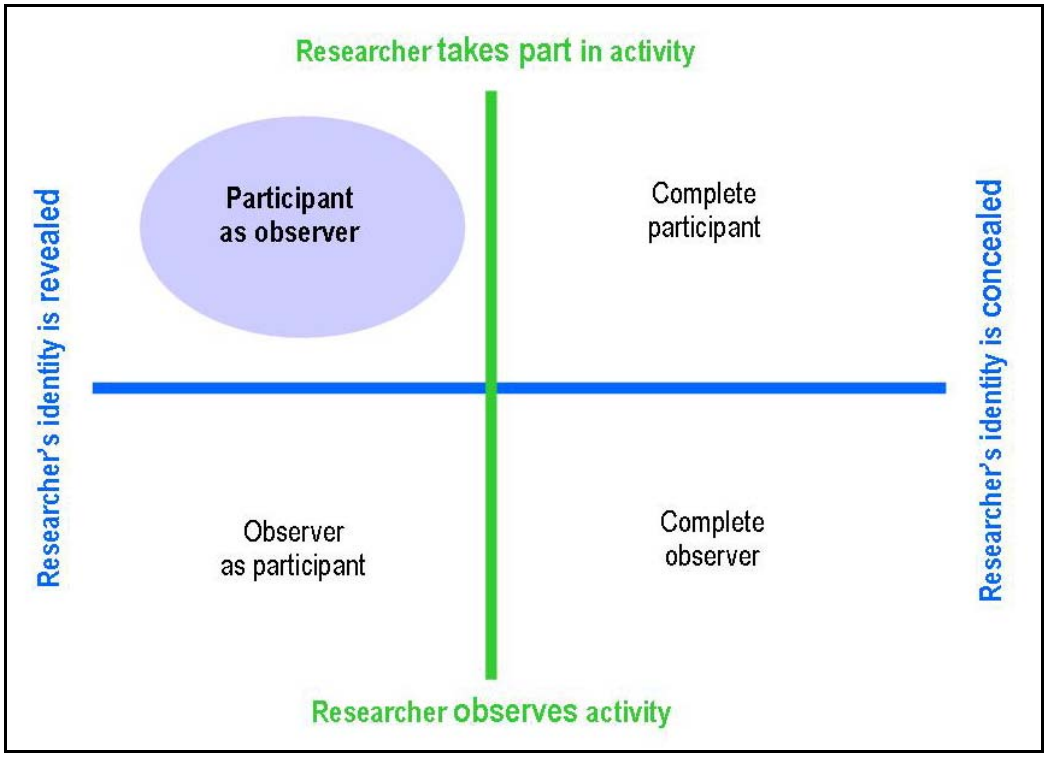


Table 23 : Typology of participant observation researcher roles
(Saunders, 2000)

The role of the researcher may be determined from answering the questions asked by Saunders (Saunders, 2000). The first question asks whether the researcher(s) takes part in the activity or not. In those cases where researchers take part in the activity itself, their role should be indicated in the top quadrants. The next question asks whether the researcher's identity is revealed or concealed. This clarifies the researcher's role in the research. If indeed the researcher plays an open part as an observer in the research, this should be indicated in the top-left quadrant. The researcher then is defined as a participant and observer. In the present study, the researcher took an active part in the activity because he was a subject adviser, an administrator and the creator of the system. Because of the extent of the researcher's involvement and the possibility of bias that this engenders, the role that researcher observation plays in the analysis and evaluation of data has been minimised in this study.

3.8.5. Electronic messages.

Textual communications in the form of documents, or pieces of text in a written (typed) format, were the most important means of communication in the eLearning resource. The eLearning resource makes use of discussion forums and chatrooms. These were analysed.

Assignments and feedback on assignments make up a significant element in the resource but are of a purely subject academic nature. These were analysed indirectly through questionnaire questions.

This study uses a substantial number of written (typed) text. The texts are used in triangulation (crystallization) to corroborate the evidence from other data sources. They are important in their own right as they act as a form of expression and communication (Mason, 2002). Mason states that it is important to read, analyse and interpret the texts in the context of how and why they were produced and used and what meaning they have for the participants. The texts must be analysed in the light of what they are seen to be and what they represent in the natural setting.

In the Table below the list of documents or written (typed) texts is indicated.

Selection of texts that were analysed for data	
1. Literature review	Paper-Electronic
2. Self-administered questionnaires 5.1 Questionnaire 1 – Students 5.2 Questionnaire 2 – Students 5.3 Questionnaire 3 – Teachers	Paper-Electronic
3. Computer generated log fils	Electronic
4. Asynchronous Moodle electronic messages in discussion forums.	Electronic
5. Formal test responses	Paper-Electronic
6. Focus groups interviews	Paper-Electronic

Table 24 : Written (typed) text used in this research
The table lists the types of written (typed) text used in this research

Advantages and distadvantages of textual documentation.

According to (Saunders, 2000), the advantages of using textual documentation may be summed up by the following three assertions:

- Textual documentation introduces few biases into information.
- Comprehensive information can be obtained from textual documentation.
- Gathering the data from textual documentation does not interfere with the program.

McNamara (McNamara, 2004b) summarises the disadvantages of using documentation for data collection, together with counter measures that can be used to offset the disadvantages. These are set out below. They are all relevant and applicable to this study.

Disadvantages	Countering measures in this research
Data from documentation may take a long time to gather and organise.	The data from documentation in this study was gathered over a period of two and a half years. Electronic data-gathering techniques made is possible to obtain the information quickly.
Data from documentation may be incomplete.	The documentation from which the data was gathered was not incomplete because it consisted of scheduled submitted work that had been submitted and regular postings. Data was gathered right up to the end of two academic years. This therefore presented a complete picture of events in this area.
Data from documentation restricts one to what already exists.	The eLearning system is not closed down at the end of the academic year. The researcher was therefore able to rerun queries on the database after year-end.

Table 25 : Disadvantages of using textual documentation and its countering measures in this study

The table above shows the disadvantages that may be incurred if one uses textual documentation for data collection, and the counter measures that one may apply. (These were all applied in this study.)
(McNamara, 2004a)

3.8.6. Literature review.

The literature review generated text documents that were applicable to this research. Issues that were extracted from the literature were included in questionnaire questions and interviews.

3.8.7. Questionnaires.

Various questionnaires for data collection were used in this study. The figure below sets out a typology of questionnaires (Peterson, 2000, Saunders, 2000). The highlighted blocks indicate the type of questionnaires that was used in this study. Two questionnaires were written questionnaires and two were online questionnaires. Completing the questionnaires was optional and no pressure was applied on learners to complete them.

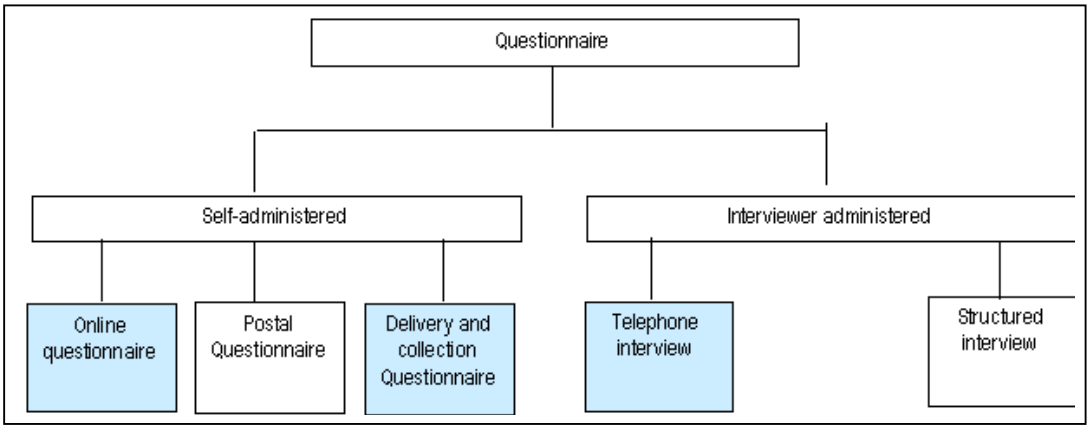


Table 26 : Types of questionnaires
The picture shows the varrious types of questionnaires possible
(Saunders, 2000)

The researcher used questionnaires as a data collection method specifically to gather information about the various subsidiary research questions (see Appendices for details of the self-administered questionnaires).

The objectives of the questionnaires were inter alia to reflect on and gather information about the learners with regard to:

- the pedagogical aspects of eLearning for high school learners
- learning community issues
- communication, collaboration and social issues
- technological and instructional design elements

When I prepared the questionnaires, I was mindful of the ethical implications of asking for participation. I therefore quite clearly stated that participation was voluntary.

The advantages of a questionnaire are that:

- it can be completely anonymous
- it is relatively inexpensive to administer
- it is easy to compare with other sources of data and to analyse
- it can be administered to a large number of people
- it can generate large amounts of data (McNamara, 2004b)

The disadvantages of using questionnaires and the countermeasures to compensate for these disadvantages are listed below (McNamara, 2004b); (Creswell, 1998, Peterson, 2000); (Krosnick, 1987).

Disadvantages of questionnaires	Countermeasures to compensate for these disadvantages in this research
Questionnaires may produce an artificially inflated amount of data. (This is known as *the ballot effect:* just because there is a question, it will attract at least some answers.)	Questions and answers are structured in a way that attempts to prevent guessing and that strives to solicit genuine opinions.
The effect of the position in a questionnaire may influence the results. (It is known that the third and fourth positions tend to attract more attention.)	The answer structure used is highly structured, i.e. a.Yes, b.tends to be yes, c.tends to be no, d.no. The position effect is thus not applicable.
Respondents might not answer questionnaire	A comprehensive range of questions was

questions carefully and thoughtfully.	included in the questionnaire. This made it possible to crosscheck for reliability.
The wording in a questionnaire could influence clients to answer in a biased manner.	The questions were framed in such a way that they would be readily understood by the learners, and care was taken to avoid words and phrases that might stimulate bias.
Questionnaires are impersonal.	At least two of the questionnaires were personally delivered to each participant.
A questionnaire doesn't give one the full story.	A large number of questions was used in an attempt to obtain as full a story as possible.
The response rate is low in questionnaires.	In this case, the response rate was over 30%. This is considered to be a good response rate. SMS messages were used to request participation.
Follow-up letters are needed with questionnaires in order to obtain a better response rate.	The computer system that is used generated these follow-up letters automatically. Telephone calls were also used to encourage learners who had agreed to participate to complete their questionnaires.
The data collected in questionnaires is limited in quantity and quality.	The broad range of questions that was asked compensated for this.
Anonymity cannot really be guaranteed when one uses questionnaires.	A learner could choose whether to include a name or remain anonymous.
The learners might not regard the questionnaire as important. The email that contains the questionnaire may go missing.	Emails were coded so that parents could immediately spot emails that were related to studies. They would consequently not be identified as trivial or personal. SMS messages were also sent to the cell phones of all learners.

Table 27 : Disadvantages of questionnaires and measures to compensate for these disadvantages (Creswell, 1998, McNamara, 2004a)

The table above outlines possible disadvantages of questionnaires and the countermeasures that were implemented to compensate for these disadvantages. (Creswell, 1998, McNamara, 2004a)

Peterson (Peterson, 2000) is of the opinion that when respondents are asked about their satisfaction or intention, they do not answer from memory but rather give an answer that is based on the particular question that is being posed. In addition, inspection of the answers commonly given to "satisfaction" questions suggests these answers are overinflated. Study participants consistently report very high levels of satisfaction. They also appear to overstate their intention to behave in certain ways. Bryant (Bryant, 1996) found that women consistently report being more satisfied than men. Because of these anomalies, Bryant suggests that considerable caution should be exercised in the construction of

satisfaction and intention questions, and that great care and caution should be exercised in their interpretation. It is preferable to direct satisfaction questions to particular concrete situations, propositions, dimensions or elements rather than to ask respondent for estimations of overall satisfaction.

Questionnaire design

When constructing the questionnaire, the researcher took particular cognisance of the work done by Schwartz (Schwarz, 1999) and Peterson (Peterson, 2000) in the construction of the questions for high school learners. Their advice is to ask questions that take the context of the learners into account. They advise one to evaluate each question by vetting each constructed question in terms of the following three questions:

- Can study participants understand the question?
- Can study participants answer the question?
- Will study participants answer the question?

Three questionnaires were developed for investigation from the student and teacher perspectives. The questionnaires are all included in the appendices.

- Questionnaire 1 – Student personality evaluation
- Questionnaire 2 – Student educational questionnaire
- Questionnaire 3 – Subject adviser educational questionnaire

Questionnaire data summary				
	Type of content	Administered to	2004	2005
Questionnaire 1	Personality indicator	Students	Yes	Yes
Questionnaire 2	Educational issues and personality	Students	Yes	Yes
Questionnaire 3	Educational issues and personality	Subject advisers	Yes	No

Table 28 : Questionnaire data summary
The table shows the questionnaires with their type of content, to whom it was administered and the relevant year group.

Questionnaire 1 – personality type indicator – students

The first questionnaire, which is similar to the Myers-Briggs type indicator instrument (Myers, 2004), comprised a set of questions drawn up by the researcher to obtain the basic personality profile of the learner (the questionnaire used is included in **APPENDIX 5**. It is a self-administered questionnaire that may be completed either on paper or online, and it consists entirely of closed-end questions.

A member-check form was designed on this personality profile and completed by the learner. The member-check form is included in **APPENDIX 6**.

This questionnaire was administered in 2004 and again in 2005.

Questionnaire 2 – students

The second questionnaire, presented in **APPENDIX 7**, a student questionnaire, was a self-administered questionnaire, developed by the researcher, peer-reviewed by a university lecturer and teachers. This questionnaire focused on the research questions in this study. It consisted almost entirely of closed-end questions, with four possible answers to each question. The scale of answers is a balanced number (four) of questions (Peterson, 2000) that allows for more objective questioning and evaluation.

A few input questions were asked. These mostly solicited essential biographical information. No information was either biased or embarrassing in nature. A minimum amount of writing was required in answering. Great care was taken to pitch the questions to the level of the learners, and the purpose of the questionnaire was carefully explained to the learners.

This questionnaire was administered in 2004 and again in 2005.

The following themes were included in the questionnaire, all linked to the research questions:

- Personal data
- Personality data (cross-check of questionnaire 1)
- Computer and Internet access and costs
- Help through teachers and/or the system
- Human Computer Interface
- Cognitive Science
- Creativity
- Constructivist learning
- Customization
- Control
- Collaborative learning
- Communication
- Companionship (parents – teachers roles and importance)

These constructs were repeated in the questionnaire for the subject advisers.
A total of 84 questions were included in the questionnaire. The questionnaires were handed out to students, emailed and faxed.
A summary of questionnaire questions sequenced in terms of the research subsidiary questions is presented in **APPENDIX 8**.

Questionnaire 3 – subject advisers

The third questionnaire, presented in **APPENDIX 9**, was designed for the subject advisers and online teachers. It was a self-administered questionnaire,

peer-reviewed and was similar in design to the learner questionnaire, but with the questions geared towards educators. This questionnaire was administered only in 2004.

3.8.8. Sampling procedure with questionnaires

Purposeful sampling was used (Merriam, 1998). Although all Cambridge students were invited to participate, the main focus was to get the input of the final year students because they had the most experience in the online system.

3.8.9. Analysys of questionnaires.

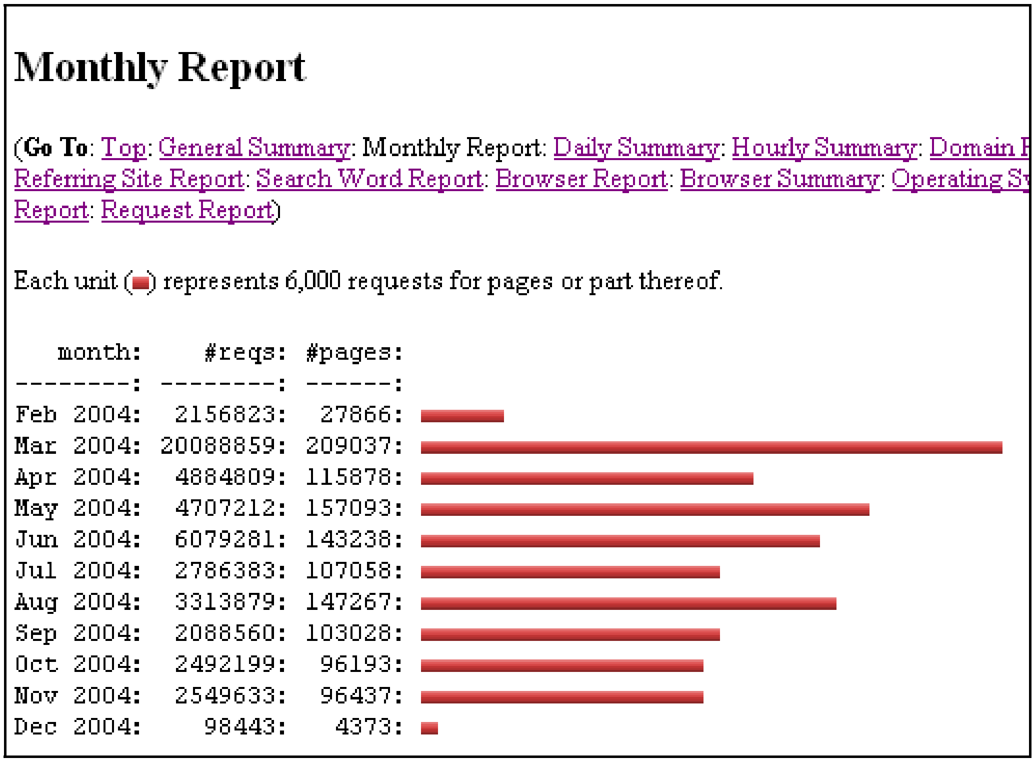
The questionnaires were managed and analysed with QuestionPro.com (Questionpro, 2006). A complete general overview of results are presented in **APPENDIX 10,11 and 12**. Noteworthy aspects are extracted and noted.

This study is based on data for the two years 2004 and 2005. Wherever possible the data is compared, checked and analysed to detect possible trends.

3.8.10. Computer generated log files and database content.

3.8.10.1. The webserver logs.

The webserver, which hosted the eLearning resource, generated records of three different sets of logfiles for all activity from three different programs and sources. These logfiles were comprehensively analysed and triangulated from the three different sources. A comprehensive analysis of these logfiles is provided in chapter 4. An example is included below.



Monthly Report

(**Go To**: Top: General Summary: Monthly Report: Daily Summary: Hourly Summary: Domain R... Referring Site Report: Search Word Report: Browser Report: Browser Summary: Operating Sy... Report: Request Report)

Each unit (▬) represents 6,000 requests for pages or part thereof.

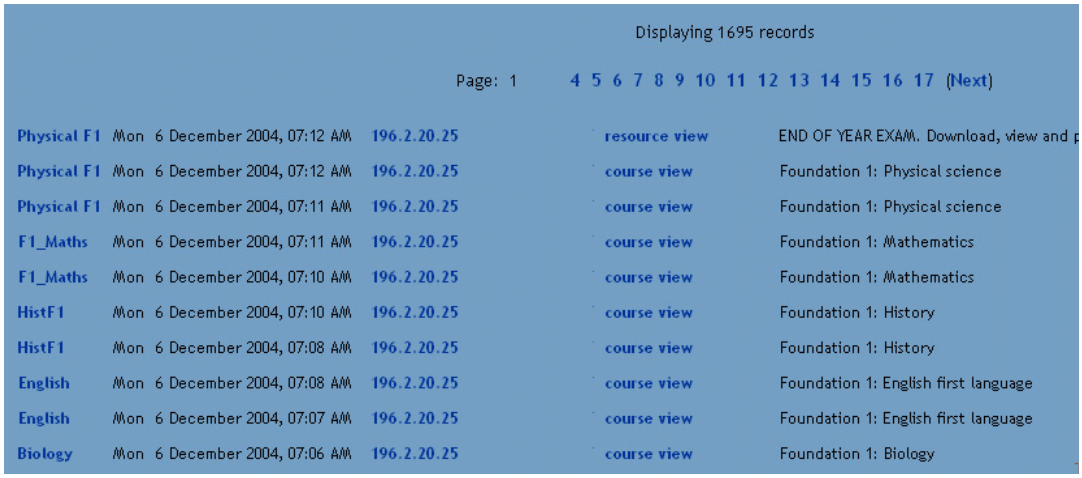
month:	#reqs:	#pages:
Feb 2004:	2156823:	27866:
Mar 2004:	20088859:	209037:
Apr 2004:	4884809:	115878:
May 2004:	4707212:	157093:
Jun 2004:	6079281:	143238:
Jul 2004:	2786383:	107058:
Aug 2004:	3313879:	147267:
Sep 2004:	2088560:	103028:
Oct 2004:	2492199:	96193:
Nov 2004:	2549633:	96437:
Dec 2004:	98443:	4373:

Table 29 : Example of statistics on the webserver
(brainONLINE, 2004a)

3.8.10.2. The eLearning resource log files.

Apart from webserver logs that were logged by the webserver, the eLearning resource itself kept track of a different set of user activity in its own logfiles. These logfiles were analysed. Unfortunately there were a number of kinds of data that were not logged. Although these are unavailable for this research, the suggestion that they be used in future research forms part of the recommendations at the end of this study.

An example of logfiles kept by the eLearning program is shown below.



Displaying 1695 records

Page: 1 4 5 6 7 8 9 10 11 12 13 14 15 16 17 (Next)

Physical F1	Mon 6 December 2004, 07:12 AM	196.2.20.25	resource view	END OF YEAR EXAM. Download, view and p
Physical F1	Mon 6 December 2004, 07:12 AM	196.2.20.25	course view	Foundation 1: Physical science
Physical F1	Mon 6 December 2004, 07:11 AM	196.2.20.25	course view	Foundation 1: Physical science
F1_Maths	Mon 6 December 2004, 07:11 AM	196.2.20.25	course view	Foundation 1: Mathematics
F1_Maths	Mon 6 December 2004, 07:10 AM	196.2.20.25	course view	Foundation 1: Mathematics
HistF1	Mon 6 December 2004, 07:10 AM	196.2.20.25	course view	Foundation 1: History
HistF1	Mon 6 December 2004, 07:08 AM	196.2.20.25	course view	Foundation 1: History
English	Mon 6 December 2004, 07:08 AM	196.2.20.25	course view	Foundation 1: English first language
English	Mon 6 December 2004, 07:07 AM	196.2.20.25	course view	Foundation 1: English first language
Biology	Mon 6 December 2004, 07:06 AM	196.2.20.25	course view	Foundation 1: Biology

Table 30 : Example of the eLearning program logfiles
The figure shows an example of the eLearning program logfiles
(brainONLINE, 2004a)

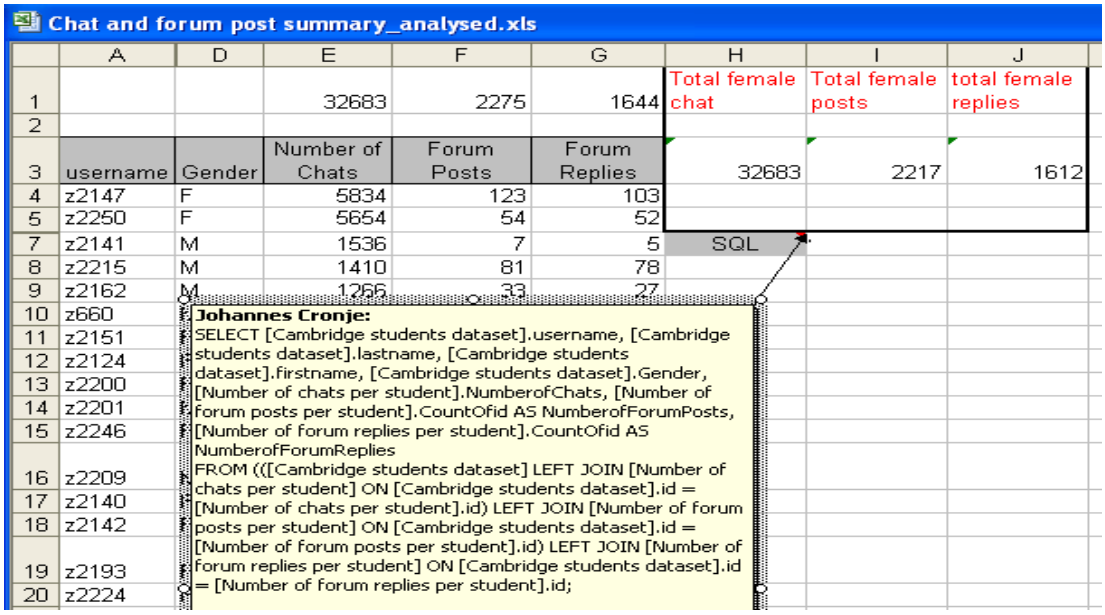
Apart from an analysis of the logfiles, I conducted a detailed investigation of the database and gathered a comprehensive amount of data from it that now forms part of the eLearning resource. I compared the data that I had gathered from the database statistically with the data that I had gathered from the questionnaires.

Acquiring the online data from the eLearning database

Copies were made of the existing database tables of discussions and posts. The tables are named mdl_forum_discussion and mdl_forum_posts. Microsoft Access, with ODBC (Webopedia.com, 2006) drivers were used to view the tables and create the information from SQL statements (SQL.org, 2006), which was saved in Microsoft Excel.

A variety of data extractions were possible. Around 60 different queries in SQL were run. Out of these the data in the following section was extracted.

The complete dataset and the resultant Microsoft Excel files are included on the DVD. An example of data and SQL statements is given below.



Chat and forum post summary_analysed.xls

	A	D	E	F	G	H	I	J
1			32683	2275	1644	Total female chat	Total female posts	total female replies
2								
3	username	Gender	Number of Chats	Forum Posts	Forum Replies	32683	2217	1612
4	z2147	F	5834	123	103			
5	z2250	F	5654	54	52			
7	z2141	M	1536	7	5	SQL		
8	z2215	M	1410	81	78			
9	z2162	M	1266	33	27			
10	z660							
11	z2151							
12	z2124							
13	z2200							
14	z2201							
15	z2246							
16	z2209							
17	z2140							
18	z2142							
19	z2193							
20	z2224							

Johannes Cronje:

```
SELECT [Cambridge students dataset].username, [Cambridge students dataset].lastname, [Cambridge students dataset].firstname, [Cambridge students dataset].Gender, [Number of chats per student].NumberofChats, [Number of forum posts per student].CountOfid AS NumberofForumPosts, [Number of forum replies per student].CountOfid AS NumberofForumReplies
FROM (([Cambridge students dataset] LEFT JOIN [Number of chats per student] ON [Cambridge students dataset].id = [Number of chats per student].id) LEFT JOIN [Number of forum posts per student] ON [Cambridge students dataset].id = [Number of forum posts per student].id) LEFT JOIN [Number of forum replies per student] ON [Cambridge students dataset].id = [Number of forum replies per student].id;
```

Table 31 : An example of data extracted from the eLearning database, with SQL
The figure shows an example of data extracted from the raw eLearning databases, including SQL statements, gathered in a Microsoft Excel file.

3.8.11. Interviews.

Interviews are particularly useful for trying to discover the context of a participant's experiences (McNamara, 2004a). Interviews give a researcher a method for pursuing in-depth information on a particular topic. Interviews can be useful as a follow-up to responses in questionnaires because they enable the researcher to obtain more detailed information about particular responses. Open-ended questions are usually used in interviews because questions of this kind are more likely to elicit the kind of rich, thick and layered descriptions that are sought in qualitative research. I used focus group interviews in this research.

3.8.11.1. Focus groups.

The epistemological implication of a focus group is that it generates meaningful data among people by means of interactions that are stimulated by questions

and answers (Mason, 2002). In a focus group, therefore, a researcher can generate interactions by introducing topics and by letting the group discuss them. The interviewer can take cues from the group as to what to ask next. The focus group discussion in this research provided a good example of how questions and answers can generate data in the hands of a skilful interviewer. It was appropriate to use an external interviewer in a semi-structured interviewing format because the interviewer concerned has no direct interest in the material outcome of the discussions (he was not biased in favour of any particular point of view). Group interactions give participants time to think about the topic and opportunities to take cues from other participants. This provides rich data. Transcripts of focus group interviews were used to corroborate evidence obtained from one with evidence obtained from other focus group interviews.

Although focus groups are a form of group interviewing, it is important to pinpoint the differences. A group interview takes place with a group and an interviewer. The group dynamic in a group interview is generated by questions from the interviewer and responses to these questions on the part of participants. By contrast, the purpose of focus groups is to generate interactions within the group itself as a result of questions that are asked by the interviewer and the moderator. The focus group therefore entails discussions within a group of selected participants with a view to obtaining their opinions about and experience of a specific topic. The data delivered by a focus group will be rather different from the kind of data that a group interview delivers (Gibbs, 1997).

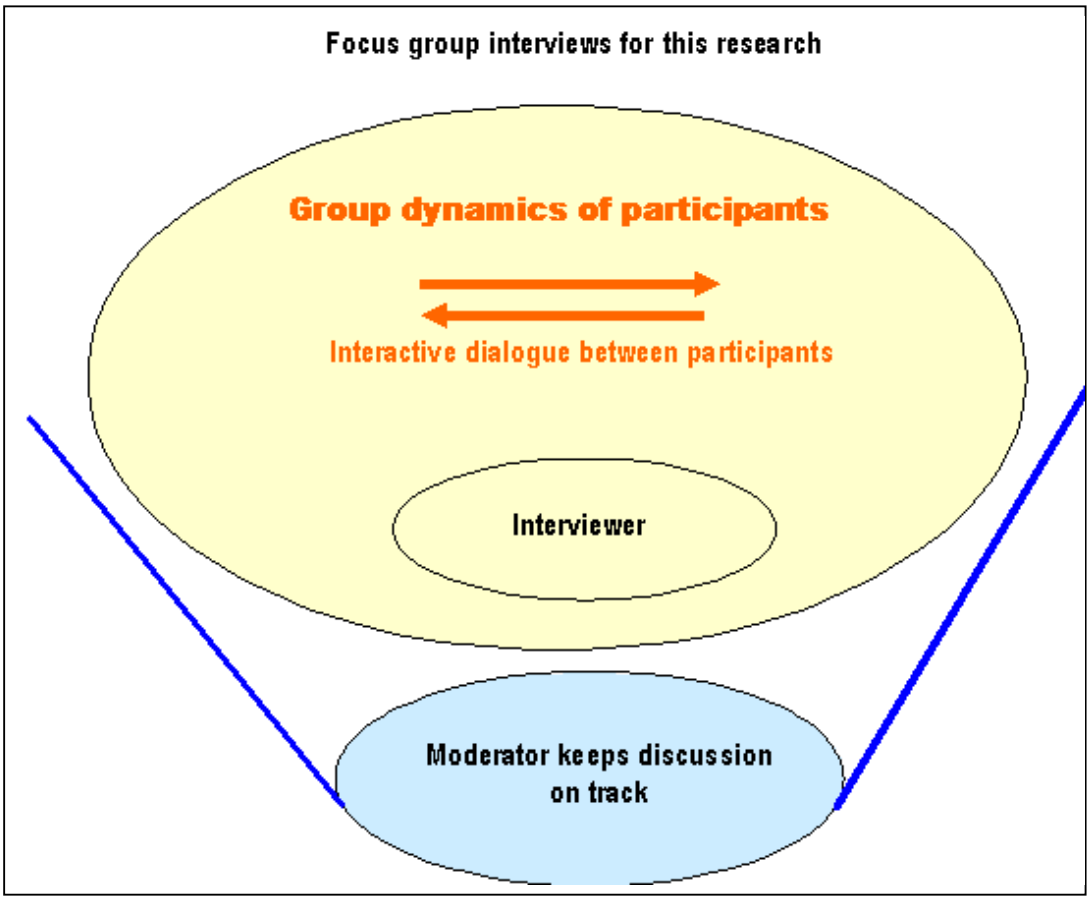


Table 32 : Focus group interviews for this research - a graphical depiction by the researcher
This figure depicts the role of the moderator, interviewer and the group in a focus group dialogue

The complete text and audio files of the focus group interviews are available on the DVD. A summary of the focus group interview analysis is presented in **APPENDIX 13.**

3.9. Implementation of the case study

Various points about the implementation of the case study are presented in the following section.

3.9.1. Setting up the system - Choosing an eLearning interface – objectives.

Platform used

The eLearning platform used is Moodle. The choice is based on information outlined in the literature review.

I investigated eLearning platforms available in the market since 2000. The systems ranged from high-end, expensive systems such as WebCT (WebCT, 2006) and Blackboard (Blackboard, 2006), who merged during 2005, down to open source software since 2000 (OpenSourceInitiative, 2004), which is free, and which includes the source code.

Aims and purpose of implementing the eLearning platform in the researched organisation

In general, it can be said that the aims of implementing the eLearning platform was firstly an administrative supportive decision. Pedagogical objectives per se were not the initial aims. My reasoning was that if similar interfaces worked for universities, they must be important, and the benefits would appear automatically. The assumption was made that the first year may be a year during which everybody would learn and in which technical issues and basic issues would be prevalent. The study shows that it was a year of learning and the benefits took time to transpire. The second year showed an increased acceptance and participation.

Pedagogical and educational aims of the system were taken care of inside each subject.

The overarching aims on the educational side of the system are "analysis and evaluation" which are embedded in the design and content of the course material. This is probably in contrast to "old paradigm" aims of knowledge regurgitation (Cronje, 2006a). Very clear assessment objectives were linked to the syllabus aims (Examinations, 2006). The capabilities and features of the eLearning system supported these.

3.9.2. Implementation the basic hardware and software systems.

Webserver

For software the following was used : LAMP (short for Linux (Linux, 2004), Apache (Apache, 2004), MySql (MySql, 2004) and PHP (PHP, 2004)). Linux is the operating system, specifically RedHat Linux version 9. Apache is webserver software version 1.33. MySql is a database system version 4 and PHP is a scripting language version 4.3. All of the above are free and open source.

Webserver hardware (2004,2005)

The following hardware was implemented: 2.4 Gigaherz processor "PC" compatible webserver (upgraded to 4gig in 2006), 512MB Ram (upgraded to 2Gig in 2006), Two 80GByte hard drives (upgraded with an additional 80Gig in 2006) that are mirrored as a backup(for unforeseen events) with backups being made once a week.

Webhosting

The eLearning resource was placed on a local Internet network (Hetzner, 2004). The service chosen was a dedicated plan where the computer is owned by the company and is just plugged into the Internet service provider's network.

3.9.3. Setting up the system - course materials.

Available materials ported to the eLearning interface

The existing system, before adding the eLearning implementation, utilised a CD, which is distributed to students, with all the course materials on the CD. Porting the courseware to the eLearning interface entailed outputting all the material to pdf format (Adobe_Systems, 2004).

3.9.4. Introducing the eLearning platform to the users, subject advisers and admininstrative staff.

Training session with subject advisers and administrative personnel

Two training sessions were held, one late in December 2003 and another during January 2004. On both occasions, the training sessions were recorded as tutorials and made available on CD. The subject advisers could then replay specific sections of the training sessions as required (brainONLINE, 2004b).

Training session with students

A training session was held for students in January 2004 and 2005. A specific "Open Day" was held early in the year and all parents and students were invited to visit the premises.

Face-to-face meetings

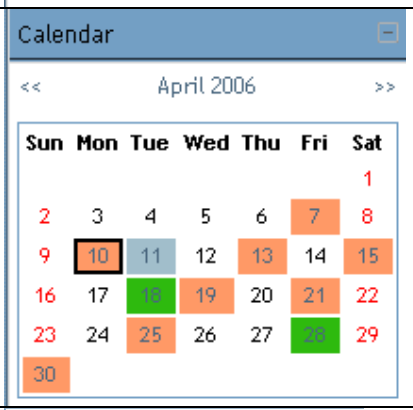
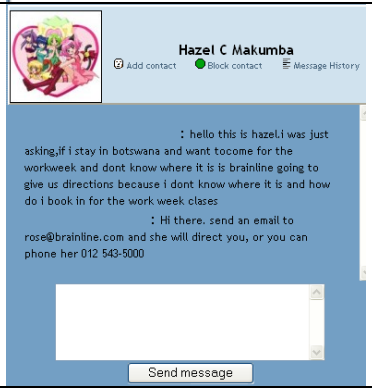
The "Open Day" was also an opportunity for students to meet other students. An effort was made for the students to exchange contact details and socialize. During 2004 and 2005 four workshops were held during which students could live in the institution for the two-week sessions. During their stay they socialised and worked through the content specified for the period.

3.9.5. Accessing course content.

Course content access was not used excessively in the system, mainly because it was provided on CD. Because the cost of Internet access is excessively expensive in South Africa, students used the CD instead. Compared to other systems (Ong, 2003), this study does not provide data on patterns of content access.

3.10. What does the eLearning environment look like.

Some exhibits of the most important features of the eLearning resource are shown. For a complete view, the Moodle website can be visited at www.moodle.org

Description of feature	View of online resource
Allows for unlimited forums to be created and used in courses	
It has an interactive dynamic calender which include user, course and global events	
Instant messaging allows for realtime communication between online users	

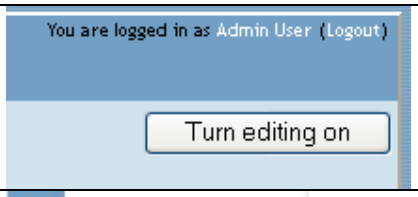
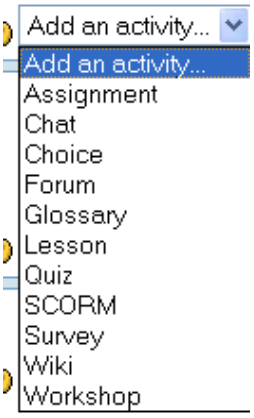
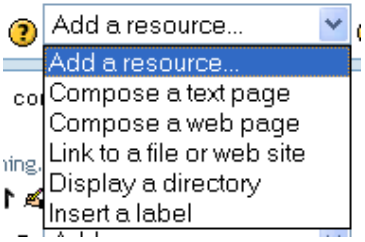
Designing, implementing and maintaining a course is relatively easy, with a WYSIWYG interface	
Unlimited chat-rooms can be created in courses	
A variety of tools are available Including Assignment Chat rooms Choice (voting) Discussion forums Glossary Lesson sequences Quizzes Surveys Workshops	
Resources can be added including Text pages Web pages Links Directory repositories Labels to enhance layout	

Table 33 : Overview of online resource capabilities

The table shows some of the capabilities of the online resource used in this research

3.11. Limitations and delimitations of the study.

Any study has a particular set of assumptions as a point of departure. This

means that other theoretical or philosophical perspectives are excluded.

Input from the field of Educational Psychology into this study is present, but to a limited extent. Future studies may add more insights from this important field.

The study only focused on a single case study. Although that in itself is sufficient, I would have preferred to widen the scope to more than one case.

Questionnaires were only sent out for the groups in 2004 and 2005. In the year 2006, research could not run for a full year. If it had run for that full year, more reliability may have added to the study.

An attempt was made to include all the learners. Due to logistical and administrative factors, this was not possible. However, most of the students in the course participated.

Students who are enrolled were mostly home schoolers. There are, however, some learners who attend micro-schools (Cronje, 2006a). A micro-school is a small private school, usually with just one or more teachers, with students of multiple ages in one room. It is similar to the USA Historic One-Room schools (Bial, 2004) It would be interesting to investigate the differences between home schoolers and microschoolers. Such an investigation is not included in this research, but can be part of future research.

No literature review can purport to be absolutely complete. In a very popular field like eLearning this may even be more true. I had the privilege and benefit of gaining access to the meta-studies by Cavanaugh (Cavanaugh, 2004b) and Bernard (Bernard, 2004). Although I did as thorough a search as possible, there

may be information that has not been included in the study because of the rapid expansion and publication of information about eLearning.

In attempting to answer the research question I have chosen to explore a broad rather than a narrow range of aspects that may be relevant for arriving at answers to the research question. A narrow view may limit the potential for arriving at answers by not allowing the input of the users to cover a wide variety of possibilities. The possibility exists that the range of choices made may still be too narrow.

3.12. Issues of validity, reliability, procedures of authenticity and trustworthiness.

3.12.1.1. Member checking, peer reviews and crystalization.

In qualitative research it is better to talk of crystallization instead of triangulation (Denzin, 2000). Crystallization is a qualitative alternative to triangulation in quantitative research. There is a combination of multiple methodological practices, empirical materials, perspectives and observations in this study because such a strategy adds rigor, breadth, complexity, richness and depth and these constitute crystallization.

Member checking and peer reviews were also used. The story of this research is told from the different points of view of the creators, the students, the facilitators, the administrators, the technical personnel. All of these add up to Richardson's multiple points of view (Richardson, 2000).

Although nothing involving humans is perfectly repeatable, the aim of the

research is to be repeatable to a reasonable extent (Stake, 2000). The vigorous self-reflection and introspection of the researcher (which hopefully becomes visible throughout the research) may also work positively towards more objective analysis and interpretation.

3.13. Summary.

This research attempts to answer the question: "To what extent and why certain [are] features of a high school eLearning resource workable and desirable for sustaining a high school learning community?"

The research is designed to extract information about the eLearning resource and the eLearning community to yield information about the kind of elements in an eLearning resource that will best support a learning community of high school learners.

The intellectual research puzzle set out the main research question, subsidiary questions and objectives. In addition, a research strategy and research design address the research questions.

The methods applied include observation, analysis of written texts, various questionnaires, focus group interviews with an external interviewer, interviews by the researcher, and telephone interviews. The data gathered in the resource repository has also been analysed.

For every method used, the related collection instrument with its concomitant objectives, advantages and disadvantages is explained. Corrective measures to counterbalance the disadvantages are described. Member checks, peer reviews,

crystallization, and investigator triangulation have been used to ascertain levels of trustworthiness and authenticity in the study.

Chapter 1
Introduction, backgroud and research problem

Chapter 2
Literature review

Chapter 3
Research design and methodology

Chapter 4
Analysing the case, evidence and discussions

Chapter 5
Conclusions and recommendations

4. CHAPTER 4 ANALYZING THE CASE, EVIDENCE AND DISCUSSIONS

Introduction

This chapter reports on the results of the various data collection instruments that I used in this study. The instruments concerned were questionnaires, focus group interviews, telephone interviews, postings in the discussion forums, and webserver log files. Various kinds of analysis were made of data collected from these instruments after the data had been transposed into usable form.

Structure of Chapter 4

Chapter 4 presents the results obtained from an analysis of the data for the purpose of answering the main research question and the four subquestions. The questions requiring to be answered were:.

1. To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?

2. Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?

3. In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?

4. How do certain technological aspects and instructional design issues affect a high school e-learning resource?

All the data has been appended to this document in the form of annexures and

an attached data-DVD. Qualitative descriptions of the eLearning interface and the learners have also been provided. These have not been grammatically processed or corrected but have been preserved in their original, authentic form. In order to preserve the confidentiality and anonymity of the participant learners, the learners' names have been deliberately excised from the record.

During the crystallization process (Richardson, 1995), the same story is told by means of data gathered from different sources. I have therefore attempted to look at the data from the perspective supplied by the various data instruments in the study and have tried to find explanations for evident similarities and differences.

4.1.Answering sub-question 1 : To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?

- 4.1.1. The overal academic results were favourable
- 4.1.2. Results from the questionnaires and interviews about pedagogics.

4.2.Answering sub-question 2 : Why d`o certain community elements in an eLearning resource contribute to creating and sustaining high school learning?

- 4.2.1. Results of an analysis of the opinions of learners about various aspects of community in the eLearning resource.
- 4.2.2. The personality type of the learners
- 4.2.3. Patterns of online activity by the learners.
- 4.2.4. Patterns of online activity of the subject advisers.
- 4.2.5. Ratio of subject advisers to learners

4.3.Answering sub-question 3 : In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?

- 4.3.1. Did the learners adequately exploit the opportunities for communication inherent in the eLearning resource?
- 4.3.2. Reachability and preferences of learners in terms of communication?
- 4.3.3. How did the learners use the chat facility of the eLearning resource?
- 4.3.4. How did the learners use the discussion forums facility of the eLearning resource?
- 4.3.5. Learners that were active or were isolated?
- 4.3.6. Learners that “lurked” (i.e. were learners who never chatted or posted replies in forums)?

4.4.Answering sub-question 4 : How and why do certain technological aspects and instructional design issues affect a high school eLearning resource?

- 4.4.1. Computer skills and attitudes of learners and subject advisers
- 4.4.2. What was found in the implementation of the basic hardware and software systems.
- 4.4.3. Setting up the system - course materials
  Setting up the system - Users and Facilitators

List of research findings in this chapter

4.1. Answering sub-question 1 : To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?

Organiser

The following section uses the results obtained from the data analysis to answer the first sub-question of the research – a question about pedagogics. In the first place, the overall academic results are presented. In the second place, the integrated data from the questionnaires and interviews is used to answer question 1.

This question relates to issues about pedagogics and how that impacts on the eLearning resource.

The analyzed results of the **questionnaires** are presented in **ANNEXURES 10,11 and 12.** The summarised results of the various **interviews** are presented separately in **ANNEXURE 13.** The **transcribed interviews** have been written onto the DVD. But in this chapter the results are presented as an integrated whole.

4.1.1. The overal academic results were favourable

Because academic results are relevant to judging the output of the eLearning resource, they are included at this point as evidence for the overall pedagogical

performance of the learners in the system. Since sub-question 1 deals with the pedagogical aspects of a high school eLearning resource, this data is necessary for answering this sub-question.

The Cambridge examinations written by the learners constitute a valid measuring instrument to judge the overall academic performance of the learners. These examinations are externally devised, moderated and controlled examinations under the aegis of Cambridge University International Examinations. The assessment standards of these examinations focus mainly on skills of analysis, synthesis and evaluation and are marked externally by markers authorised by Cambridge University International Examinations. The CIE website contains full details of the assessment standards used in marking (Cambridge International Examinations, 2006).

Research finding 1 : The overall academic performance was favourable

The performance of the learners in the Cambridge external examinations has been good and has continued to improve from year to year, even after the implementation of the eLearning resource in 2005. The annual learner performance from between 2000 and 2005 is indicated by the following figures:

Year of Cambridge examination	Learner performance (pass rate) express as a percentage
2000	76
2001	78
2002	80

2003	85
2004** eLearning resource was first implemented	92
2005	92

Table 34 : Learner performance 2000 to 2005
The table shows the learner performance for the year 2000 to 2005, with year 2004 the first year of implementation of the eLearning resource.
.

I have included the academic results for the five years between 2000 and 2005 (Cronje, 2006b) below because they have a bearing on the research and shed light on the context in which the research takes place. They also put the technological build-up and the introduction of the eLearning interface into the context of academic performance. The table below details the academic results.

Year	Enrolled subjects	Fall-out	Wrote exam	Failed (un-graded)	Passed	Distinctions	University pass
2000	743	197	546	131	415	12	181
		26%	73%	24%	**76%**	2%	33%
2001	995	429	566	122	444	20	230
		43%	57%	21%	**78%**	4%	41%
2002	1298	858	440	87	353	25	199
		66%	34%	20%	80%	5%	45%
2003	1351	1039	312	47	265	24	192
		77%	23%	15%	85%	8%	62%
2004	514	142	357	29	328	39	186
		28%	30%	8%	92%	11%	52%
2005	686	272	414	34	380	42	231
		39%	61%	8%	92%	10%	56%

Table 35 : Data table of academic results of Cambridge students in this research 2000-2005
The chart shows the overall pass rate (as a percentage) of the learners who sat for the Cambridge external examinations between 2000 and 2005. A more detailed presentation of the data is presented in ANNEXURE (4.1.1 percentage pass rate.doc)

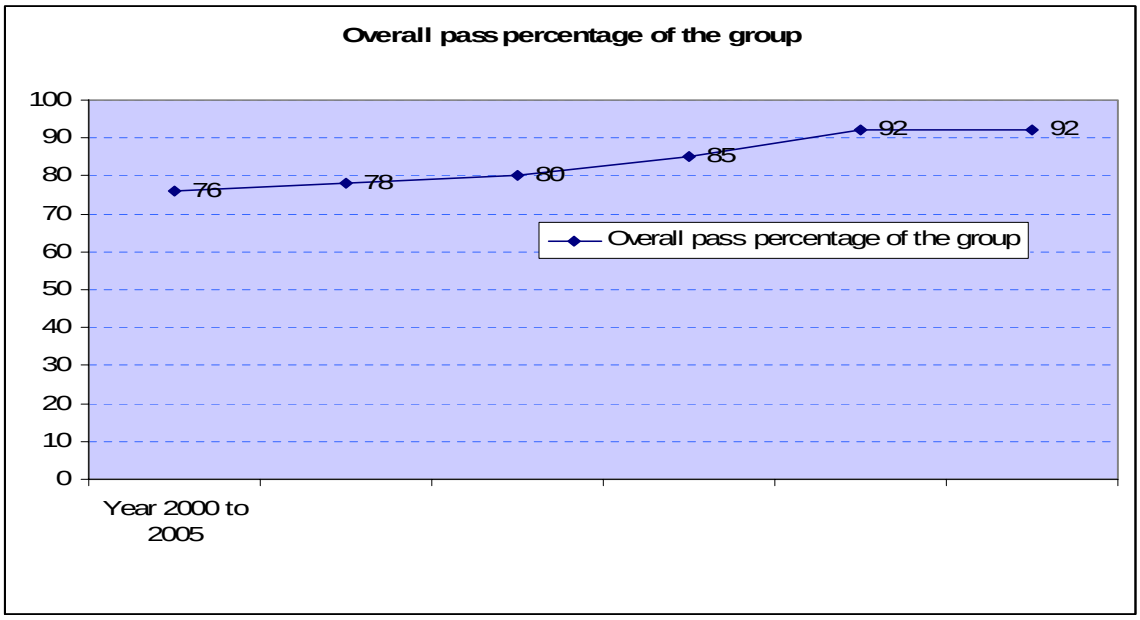


Table 36 : Overall pass percentage of the group 2000 to 2005

The chart shows the overall pass rate (as a percentage) of the learners who sat for the Cambridge external examinations between 2000 and 2005. A more detailed presentation of the data is presented in ANNEXURE ‘’’ 4.1.1 percentage pass rate.doc’’’ .

The most obvious deduction that can be made about academic performance during these five years is that the pass rate shows an overall steady increase from 76% in 2000 to 85% in 2003. The results then reached a plateau at 92% for the years 2004 and 2005, which were the first and second years of implementation of the eLearning resource

Other useful data that can be extracted from the academic results is as follows:

- **The Drop-out rate.** The percentage fall-out (i.e. those who enrolled but never presented themselves for the examinations) increased steadily from 26.5% in 2000 to 77% in 2003, but then dropped down to 28% in 2004 and rose again to 39% in 2005.
- **Learners who sat for all the final examinations.** The percentage of learners who sat for the final examinations steadily declined from around 73% in 2000 to a low of 23% in 2003. It then increased to 30% in 2004, the first year of eLearning implementation, and then rose again to 61% in 2005,

the second year of implementation of the eLearning resource.

- **Learners obtaining university exemption**. This figure indicates the number of learners who obtained at least a C aggregate in all their subjects. The percentage of learners who obtained university exemption steadily increased from 33% in 2000 to around 62% in 2003. It is interesting to note that this figure then dropped to 52% in 2004 (the first year of implementation of the eLearning resource), and then increased marginally to 56% in 2005.

4.1.2. Results from the questionnaires and interviews about pedagogics.

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While this section continues to deal with pedagogics, it will now focus on the data yielded by the various pedagogical theory elements that were used in the research questionnaires. These elements are cognitive science, constructivism, component display theory, customization, creativity, collaboration and companionship.

The findings regarding questionnaires for students are presented in detail in the Research-Question-to-Student-Questionnaire-question table in **ANNEXURE 14 and for subject advisors in ANNEXURE 15.** It is summarised in the following sections.

4.1.2.1. The views of learners and subject advisers about cognitive science in the eLearning resource.

Research finding 2: Cognitive science theory elements are supported by the eLearning resource.

The online interface functioned as an aid. It supported critical thinking and behaviourist-type learning was important.

In general the students reacted positively to the questions concerned with cognitive science (88% 2004 - 80% 2005) (Students Educational Questionnaire 2 - Question 24, 40 and 41. Also see the detailed Research-question-to-Student-Questionnaire-question table in **ANNEXURE 14** which was compiled to arrive at this finding.

Taken together, the subject advisers were very positive (79%) about the eLearning resource and cognitive science. A similarly favourable attitude was discernible in learner responses and is supported by the following facts:

The online interface functioned as an aid. While all the subject advisers agreed (100%) that the online interface was a help, fewer learners did (82%). (See the *Research-question-to-Questionnaire-question table* for the Subject Adviser Questionnaire in **ANNEXURE 15.**

- **Critical thinking was supported.** The subject advisers (80%) were more favourably disposed in their estimation of the extent to which the online interface made critical thinking possible than were the learners (of whom only 64% believed that critical thinking was enhanced by the interface).
- **Opinions about behaviourist-type learning.** Both the subject advisers and the learners were of the opinion that behaviouristic-type learning is important (99% and 89% respectively). There is a twist in the responses to question 40 in the subject advisers questionnaire. Only 57% of the subject

advisers were of the opinion that the eLearning system enabled behaviouristic learning (which, in my opinion, is the correct answer). Thus, even though the learners believed that behaviouristic elements were important, the subject advisers did not think that the resource particularly focused on that.

- **Attitudes toward higher order thinking.** Learners agreed that they enrolled in this system because they were eager to engage in higher order thinking operations and because the learning materials were specifically designed to help them to develop such thinking skills. Learners therefore said that they preferred examples that they could work out and analyse for themselves. One of the outstanding features of the system in the opinion of the learners was the facilitation of learner learning by means of worked examples and by the necessity for them to move beyond theory by applying the knowledge they had gained in practice. The design of this system specifically therefore encouraged learners to put their thoughts into words and to embody their emotions in appropriate responses and statements. They agreed that the information that they were given was relevant to their lives, and that when they discovered new information for themselves by using the system, they tended to remember it because it was obtained as a result of their own initiative. The system also enabled them to learn how to learn. (Data accessed in interviews)
- **The system encourages activities apart from academic pursuits**. The learners felt that the system encouraged and enabled them to devote time to a variety of pursuits such as art and music. This was an advantage in the eyes of the learners because they felt that people performed well in different areas of life. (Data obtained from interviews).

4.1.2.2. The view of learners and subject advisers about constructivism in the

eLearning resource.

> Research finding 3: Constructivist learning theory elements play a crucial role in the eLearning resource.
>
> Attitudes toward constructivist learning with simulated real life situations and discovery learning were altogether favourable. The role that teachers played in propagating this method was highly rated by the learners.

Responses to questions about constructivist learning revealed the following:

- **The extent to which real world learning took place.** The learners experienced the real world through the eLearning resource significantly more favourably (75%) than the subject advisers thought they did (57%).
- **Discovery learning was possible.** Both the subject advisers and the learners were of the opinion that the system enabled discovery learning (71% and 66%).
- While the eLearning resource displayed all the best functions of a school, teachers were regarded as being more valuable than the resource itself. While most of the subject advisers thought that the eLearning system could function just like a school, only 50% thought that it was just as valuable as a teacher. The learners held different opinions about this because only 39% of them thought that the eLearning system was just as valuable as their teachers. This seems to indicate that the teachers were highly regarded and valued by the majority of the learners.
- Learners' opinions about the ability of the eLearning resource to facilitate constructivist learning varied between 2004 and 2005. While the number of learners who regarded the eLearning resource as an aid that encouraged constructivist learning was 61% in 2004, this percentage fell to 44% in 2005

(Learners Educational Questionnaire 2 -Question 24, 40 and 41. Also see the *Research-question*-to-*student-Questionnaire*-question table in ANNEXURE 14.

4.1.2.3. The views of learners and subject advisers about Component Display Theory in the eLearning resource.

> Research finding 4: The learners expressed themselves as being quite certain that the eLearning system was workable and desirable in terms of Component Display Theory elements.
>
> Learning was therefore made easier and adequate information was provided.

The learners were sure that the eLearning system was workable and desirable in terms of Component Display Theory elements. 73% of learners responded positively in 2004 and 78% responded favourably in 2005. The following elements were highlighted:

- **Learning was made easier.** Both the learners and their subject advisers were of the opinion that the system made it easier for them to learn (subject advisers 75% and learners 87%). The subject advisers believed that the system assisted learners to understand new material.
- **Adequate information was provided.** Both groups agreed that the information about what needed to be done during the year was adequate. They also agreed about the adequacy of deadlines and other needed information (an agreement rate of about 75% if taken together).
- **Material ready in advance is a benefit**. The fact that all required material was ready in advance and that learners did not have to wait for a teacher to

supply it was regarded as a benefit. Learners also appreciated the fact that the material was neatly organised into lessons in a structured environment. They felt that the high degree of interactivity built into the system was helpful.

- **Attitudes to the availability of material on CD rather than only on the Internet.** Learners regarded the fact that the core material was available on CD (offline) as helpful because it relieved them of the necessity to spend extra time on the Internet. They agreed that if the CD had not been there, they would have been in difficulties. They also valued the fact that they were able to get updates on their lessons from the Internet.
- **Efficiency in terms of time management.** Learners regarded conventional schooling as a system that utilises time wastefully and inefficiently. The examples they gave of inefficient time utilisation time utilisation in conventional schools were occasions such as assemblies and the time spent moving between classes. In contrast to this, the eLearning system permitted learners to use their time more efficiently, and they felt that they were able to accomplish far more on their own than they had ever been able to accomplish in conventional schools. (Data from interviews).
- **The course content supported learning.** The learners felt that they received most of their subject content support from the system's course material. Then, in descending order of quantity, they also received subject content support kind from their parents, from other learning materials, and from their friends who were also engaged in collaborative learning. (Data assembled from interviews)
- **What features of the system did learners use?** Learners said that they used the system to locate administrative information, to find scheduled events on the calendar, to submit assignments, to view results, to examine feedback and to ask questions. They agreed that the Internet was also

important for their research. (Data assembled from interviews)

- **How learners use books and other resources.** Approximately 80% of learners said that they used text books. While 20% of them said they had a exclusive preference for online materials, the majority of them preferred so to use printed materials. The majority also preferred to use paper-based sources and textbooks rather than online sources, and most of them used sources supplied by the system most of the time. While some learners claimed to have no access to a library, most of them made extensive use of encyclopaedias and other books for research. And they agreed that the system encouraged them to use more than one source of reference to crosscheck facts. They said that they had also been taught never to rely on only one source. (Data assembled from interviews).

4.1.2.4. The views of learners and subject advisers about customization in the eLearning resource.

Research finding 5: While customization was regarded as important, the eLearning resource only permitted a limited amount of customization.

- **Customization did not feature.** In general, the learners were of the opinion that they could not customize their environment. 54% in 2004 and 61% in 2005 indicated that they were simply not able to customize their environment. A quarter of the subject advisers and a majority of learners were of the opinion view that the program did not allow them to customize their learning (25% of the subject advisers and 61% of the learners). 42% of subject advisers felt that the learners had not made use of customisation opportunities. Certain elements of customization were positively regarded by about 80% of respondents. Such elements included

when, where and how quickly learning could take place. 71% of the subject advisers were not enthusiastic about the customization of the interface.

- **The flexibility inherent in being allowed to work at one's own pace.** The learners appreciated the fact that the eLearning system allowed them to pace themselves and work according to their own self-devised schedules. One of the primary benefits of home schooling, in their opinion, was that they could utilise whole days to conduct research or to study if they wished to do so. They regarded the flexibility that allowed them to plan their own schedules and activities as a major benefit of the system. They also appreciated the freedom to choose their times for work and times for taking breaks from working. (Data assembled from interviews).

4.1.2.5. The views of learners and subject advisers about creativity and motivation.

> Research finding 6: The eLearning resource made allowance for personal creativity and provided an environment that challenged learners to develop and nurture their own motivation. This effect of the resource suited those learners who were more independent and mature than the average.
>
> Creativity was encouraged, a challenging working environment was created, and the standard of schooling was high. Learners came to realise that structured work was an important ingredient for success.

An overwhelming majority of the learners (90% in both 2004 and 2005) indicated that they experienced the eLearning interface as an interface that encouraged creativity, stimulated motivation and created a challenging environment. They

also offered the following opinions:

- **The standard of schooling was high**. The subject advisers and the learners indicated that the standard of schooling was higher than it had been in their previous school(s) (90% and 89% respectively), and that the work they were required to do presented a definite challenge (99% and 91%).
- **The environment was academically challenging.** For some of the learners for whom English was a second language, a great deal of adjustment was necessary before they felt it attuned to the system. All agreed that this system was academically far more challenging than the normal public schooling system and that it produced a much higher standard of work than did conventional schools. But even though they experienced the system as being academically more demanding, learners nevertheless still expected that they would perform well. While they received more support from their parents than they had done in conventional schools, they agreed that it seemed to take a long time for their parents to understand that the system was indeed very different in all kinds of ways from other forms of conventional schooling. The learners generally responded with gratitude to parental support as well as their acknowledgement and understanding of the unique academic environment of the college. (Data assembled from interviews)
- **Structured work is important.** While almost everyone agreed that the system offered opportunities for creativity and satisfying curiosity (99%), the consensus of opinion among subject advisers and learners was that structured work was important (87% and 89% respectively).
- **Some learners said they did not need support.** 53% of learners answered positively to the flat statement that they did not need support from anyone and that they were motivated and responsible.
- **Learners understood the need for self-discipline.** Learners understood

that they needed self-discipline to succeed in the system and they claimed that their powers of self-discipline had improved as a result of the kind of learning to which they were exposed by the system. (Data assembled from interviews)

- **Learners felt in control.** Learners felt that they were in control of their studies and they appreciated the fact that they were individually accountable.
- **The kind of learner in the system is set up for success.** While learners in this system felt that they were often regarded as coming from rich homes, they appreciated that this kind of schooling was cheaper in some ways than that provided by conventional schools. Learners felt that in the system of education such as that provided by the system, they had better opportunities of enjoying the benefits of cutting-edge technology in exchange for their parents' investment in the system than they would have had in the conventional schooling system. (Data assembled from interviews).

4.1.2.6. The views of learners and subject advisers about collaboration in the eLearning resource.

> Research finding 7: While learners appreciated the value of collaboration, they preferred to work alone rather than together.

The following opinions emerged from the data:

- **Help was provided for collaboration.** While 63% of subject advisers thought that the system encouraged learners to learn together with other learners, far fewer learners (only 27%) were of the same opinion. This may be attributed to the fact that 66% of learners (see question 61) expressed a

personal preference to be left to get on with their work *alone*. This was corroborated by 100% of the subject advisers (question 68) who strongly supported the view that the kind of learner who enrolled for this kind of education definitely preferred to work alone.

- **Feedback was important.** While these majority of learners (78%) valued the feedback from subject advisers and fellow learners, only 46% of learners said they actually used the eLearning system to "talk" to other learners. 63% of subject advisers thought that a greater number of learners used the system to talk to one another.
- **Face-to-face workshops are valuable.** Most of the learners attended workshops, and the subject advisers also thought that they did so (78% and 71%). Both learners and subject advisers regarded the eLearning programme and the workshops as valuable (89% and 84%). In a question designed to force respondents to choose which they thought was the most valuable, two thirds of respondents chose the eLearning programme over the workshops. The subject advisers said that they felt both were essential (71%) and that they could not choose.
- **Face-to-face meetings should focus on specific issues.** Learners said they wanted the opportunity to be able to ask specific questions in the face-to-face learning situation instead of merely repetitively reviewing content material in workshops. There were complaints about having to pay for inadequate workshops conducted by some teachers who were thought to be unprepared. Learners preferred face-to-face interactions because they stated that it was difficult to explain the intricacies of certain queries through the medium of a computer or over the Internet. They were of the opinion that the recorded videos of the workshops were important for purposes of review and for those who had been unable to attend. (Data assembled from interviews)

- **Friends and peer group pressure did not influence learning.** The need for friends did not feature highly in this system. Most of the learners were strongly averse to peer pressure, and were of the opinion that they were not easily influenced. Because they felt that they could meet challenges on their own and that they did not need any help from "buddies", they did not ask many questions. Because they preferred to help themselves and did not want their progress to be hampered by others who needed help and assistance, they preferred to work alone. When they did socialize, they did not talk about school matters. Peer pressure seemed to play an insignificant role in the lives of these learners. (Data assembled from interviews)
- **Learners in general made little use of the collaborative infrastructure.** It appeared to be generally true that online collaboration did not play any great role in the lives of these learners. Although they recognised the ability of the system to support a collaborative infrastructure and although they appreciated its presence, they made little use of it.

4.1.2.7. The view of learners and subject advisers about companionship.

Research finding 8: Companionship (i.e. other human beings) is the most important element in the eLearning resource.

- **Companionship was regarded as important.** Just over two thirds of learners (66% in 2004 and 71% in 2005) responded positively to questions about "companionship" as a factor in the eLearning system. 73% in 2004 and 83% in 2005 valued the feedback of the subject advisers.
- **Teachers are very important.** The help of teachers and the role of teachers play was regarded by learners as important. While 79% of learners felt that the role of the subject advisers was very important, 90% of the subjects

advisers were of the opinion that the learners regarded their role as important.

- **While learners valued support from teachers, they felt that it needed to be more quickly delivered.** While learners greatly appreciated the help provided by the subject advisers, there was a general feeling that it needed to be more quickly delivered. Some of the learners felt that they did not need support because they could work by themselves with the support of their parents. This group of learners seemed on the whole to be extremely independent. They did not much "bother" with the subject advisers because they felt they could help themselves and they only used the services of subject advisers when they needed difficult problems to be explained. In general they preferred to be "facilitated" and guided rather than taught. They were of the opinion that some of the subject advisers did not have an altogether clear idea of what was going on in the system or what was expected of them and of the learners. Some learners would have liked an opportunity to comment anonymously on the quality of various subject advisers. Some felt that subject advisers were like parents while others did not think so. The learners felt that the subject advisers were honest because they would say when they were unsure about something but would then come back later with the needed answer or information. Learners wanted more tutoring, not because of poor assistance from the system or because of time pressure. (Data assembled from interviews)
- **Human beings are more important than the resource itself.** Fewer than 50% (i.e. 39% and 37%) of learners, and approximately 50% of the subject advisers, regarded the eLearning resource as a kind of "father or mother" as far as their studies were concerned. But 79% of them felt that the human component of the eLearning resource (i.e. the subject advisers) were more important than the resource itself.

- **It is teachers and support that give the "heart" to the system.** While learners felt that the system made them feel special and that it provided stability and helped learners not to feel "messed up", they valued the care and loving attitude that was apparent in the system.
- **Parental support is paramount.** While 90% of learners and 88% of subject advisers felt that parental support was a vital element in the total learning experience, only 30% of learners agreed that their parents actually worked with them. Subject advisers were the opinion that only 12% of parents worked with learners.
- **Administrative support is important.** All the learners and subject advisers agreed that the work of the administrators was very important (100%).
- **Companionship creates confidence.** While learners generally had sufficient confidence to approach various older people in their parental network, they nevertheless trusted their parents' opinions. The parents of the learners encouraged them to question and ask for the reasons why things happened. It became clear that while parents expected their children to perform well, they also gave them the necessary support to do so (except for the very few exceptions mentioned below). Learners asked their parents' friends for information when they needed it and listened to adults while they conversed. They tended to listen and "pick up a lot" in this way. Since they lived in home schooling environments, this featured quite largely in their lives. A lack of parental support would change everything for the participating learners, and even though these learners were extremely independent workers, they valued support from their parents. There were a few cases in which learners coped even though they received no parental support. (Data assembled from interviews)
- **Parents were unaware of the content of courses**. 66% of the learners claimed that their parents were ignorant of the content of their courses.

87% of the subject advisers were of the opinion that the eLearning system made it possible for parents to assist learners, and 63% of them felt that parents would help learners to pass. 78% of learners thought that help from parents would assist them to pass. The bold statement that the learners needed no support received only a 50% agreement rate from the subject advisers. Although the parents were probably unaware of the work that was being done in school, their support was nevertheless very highly rated. While the learners thought very highly of companionship, subject advisers and parental support, only 30% of the learners said their parents knew what was work they were doing. This seems to indicate that when learners referred to "companionship", they were talking less about any familiarity with subject content and more about the general encouragement, motivation and support they received from their parents.

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Chapter 2 Literature review
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Chapter 4 Analyzing the case, evidence and discussions
Chapter 5 Conclusion and recommendations

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4.1.Answering sub-question 1 : To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?

- 4.1.1. The overal academic results were favourable
- 4.1.2. Results from the questionnaires and interviews about pedagogics.

4.2.Answering sub-question 2 : Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?

- 4.2.1. Results of an analysis of the opinions of learners about various aspects of community in the eLearning resource.
- 4.2.2. The personality type of the learners
- 4.2.3. Patterns of online activity by the learners.
- 4.2.4. Patterns of online activity of the subject advisers.
- 4.2.5. Ratio of subject advisers to learners

4.3.Answering sub-question 3 : In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?

- 4.3.1. Did the learners adequately exploit the opportunities for communication inherent in the eLearning resource?
- 4.3.2. Reachability and preferences of learners in terms of communication?
- 4.3.3. How did the learners use the chat facility of the eLearning resource?
- 4.3.4. How did the learners use the discussion forums facility of the eLearning resource?
- 4.3.5. Learners that were active or were isolated?
- 4.3.6. Learners that “lurked” (i.e. were learners who never chatted or posted replies in forums)?

4.4.Answering sub-question 4 : How and why do certain technological aspects and instructional design issues affect a high school eLearning resource?

- 4.4.1. Computer skills and attitudes of learners and subject advisers
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4.2. Answering sub-question 2 : Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?

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The following section presents the results from the data analysis to answer the second sub-question of the research which is about aspects of community. These results are presented firstly from the point of view of the learners and secondly from the point of view of the subject advisers.

This question relates to various aspects of community and why they influence learning in the eLearning resource.

The analysed results of the **questionnaire 2** are presented in ANNEXURES 10,11,12. The summarised results of the various **interviews** are presented separately in ANNEXURE 13. The **transcribed interviews** are included in the DVD. But in this chapter the results are presented as an integrated whole.

4.2.1. Results of an analysis of the opinions of learners about various aspects of community in the eLearning resource.

Research finding 9: Learners experienced an increased sense of community between the first year and the second year.

Research finding 10: The learners have strong individualistic inclinations.

Research finding 11: Peer pressure does not play a role in the lives of these learners.

Research finding 12: Learners do not prefer group work.

Research finding 13: Learners do not like competition.

Research finding 14: The learning community creates a feeling of safety, care and openness.

Research finding 15: This type of community makes it possible for learners to have a wider range of friends.

Research finding 16: Face-to-face meetings enhance a sense of community and serve to bind the community together.

Summary of findings about community

- **There was an increasingly strong sense of community among the learners**. In 2004, 44% of the learners indicated they experienced a sense of community in the system. This increased to 73% in 2005.
- **The learners had very strong individualistic inclinations.**

  Their attitude was that they would ask for something if they needed it. Learners tended to be bold about their needs and opinions. They were never hesitant about asking parents and friends questions and were happy

to listen when they spoke. When they listened to other people speaking, the learners picked up a great deal of useful information. (Data assembled from interviews)

- **Peer pressure** did not play a role in their lives (29% in 2004, 37% in 2005). Some learners were viewed as being "too slow" to help or contribute. "Too slow" here meant that by the time they got an offer of help, the help was no longer needed. While some learners did not regard their peers as an important source of help, others valued them highly for that function.
- **The combined questions showed that learners had no great liking for group work.** Learners felt they could to what they had to do on their own and that they did not need the assistance of their "buddies". While they adviser were aware that their friends had opinions, they did not rely on them for assistance because they realised that their friends might be wrong. But some learners preferred to gather a whole range of opinions. Some of the learners will that friends might offer them "wrong logic" which they would then have to unlearn. If a friend of theirs was knowledgeable, they felt that it was acceptable to listen to that friend, but they required an assurance that the friend concerned possessed specific and correct knowledge. (Data assembled from interviews)
- **Learners did not like competition.** Learners felt that competition did not motivate, but that it was acceptable if it led to self-betterment. They also felt that their friends should *not* be regarded as benchmarks for comparison, and they had a strong aversion to being compared with their friends and exposed as academically incompetent. They felt that there were other forms of intelligence that were neglected in schools but which should be better acknowledged in a system such as that at the college. They were averse to comparisons that exploited "better than this, better than that" type comparisons. They felt that there should be a reward system but that

it should only function as a system to recognise achievement and that it should be "sensitive". They felt that the present system placed no overt emphasis on competition. (Data assembled from interviews)

- **The nature of the learning community in operation.** Learners were in general agreement that the learning community was functioning well. Learners were comforting to one another, they felt safe, and they felt that their friends were important. While they were very comfortable with some of their friends, they felt more distant towards others. They agreed that they would react to emotional calls for help in the community if they were needed, and they observed how the community had responded to such calls during the year. They were sincere when they helped one another. They had seen how friends tended to gather naturally in groups. They appreciated the caring and helping attitude of teachers and administrators in the college. (Data assembled from interviews)
- **Openness in the community.** Because of the atmosphere of friendliness that prevailed in the community, they felt that everyone was able to laugh with everyone else and that it therefore did not matter if someone gave incorrect answers. Some learners nevertheless remain frightened of being laughed at. Since they didn't really know each other that well, they didn't really care and they just expressed their opinions regardless. (Data assembled from interviews)
- **A wider range of friends is possible.** Learners preferred to remain within the school system. They regarded the system as being superior to a "normal" school because of the variety of friends that could be made in the system (in contrast to ordinary public schools where one could make only a limited number of friends). They agreed that in a system such as this it was not possible for some learners to hold back other learners.
- **Face-to-face workshops helped to bind the community.** They felt that the

scheduled workshops made an enormous contribution to building a sense of social community and they felt that the workshops helped to create a sense of closeness in the community. Learners expressed a definite desire for *more* rather than fewer workshops. (Data assembled from interviews).

4.2.2. The personality type of the learners

Research finding 17: The personality types are more or less balanced, with no particular trait dominating. The "Thinking" (71%) and "Perceiving" (68%) traits are the only ones indicated by around two thirds of the learners.

The first questionnaire comprised a set of questions drawn up by the researcher to give the basic personality profile of each Learner.

The questionnaire compiled by the researcher was therefore similar to the MyersBriggs (Myers, 2004) profile. The full questionnaire is included in ANNEXURE 5. It is a self-administered questionnaire consisting entirely of closed-end questions and performed either on paper or online. The results of the questionnaire are attached in ANNEXURE 7, and they do include graphic representations.

Personality profile of learners

Questions 11 to 18 rendered a general personality profile of the learners in 2004. This section repeated ground covered in questionnaire 1 and was member-checked. The member-check showed a reliability factor of around 80% (see Table 4-8 earlier in this chapter).

The broad outline of the personality profile is as follows:

Personality profile results – questions 11 to 18 Learners who corresponded to the following character types					
	2004	2005		2004	2005
Introverts	51%	53%	Extroverts	58%	56%
Sensing	61%	58%	Intuitives	51%	54%
Thinking	71%	66%	Feeling	46%	46%
Judging	53%	37%	Perceiving	59%	68%

Table 37 : Personality profile results of 4 personality types in this research 2004
The table shows the personality profiles of students who were part of the research

The personality types are more or less balanced, with no particular trait dominating. The "Thinking" (71%) and "Perceiving" (68%) traits are the only ones indicated by around two thirds of the learners.

A member-check form was designed for this personality profile and completed by the learners. The member-check form is included in ANNEXURE 6.
In the member-check form the learners were given the results of the personality analysis and were asked to indicate in general if it was a true reflection of themselves.

The percentage of learners who completed the member-check was 92% (37 learners). The complete member-check grid is included in ANNEXURE 6. The member-check rendered an overall reliability rate of 80.91%. A summary is presented here.

Student	Student Reliability mark	Total possible	Percentage Reliability
1	14	16	87.50
Up to			
37	15	16	93.75

		Total	2993.75
		Div 37=	**80.91**
			% reliability

Table 38 : Member-check reliability of personality data indicator 80.91%

The table shows a summary of the results of the member-check done by learners on their personality indicators. It shows a reliability index of 80.91%

4.2.3. Patterns of online activity by the learners.

Research finding 18: The pattern of study activity among learners was similar to patterns found in a "normal" school in 2004 (the first year of implementation), but changed in 2005 to a pattern of more activity in the afternoons and evenings.

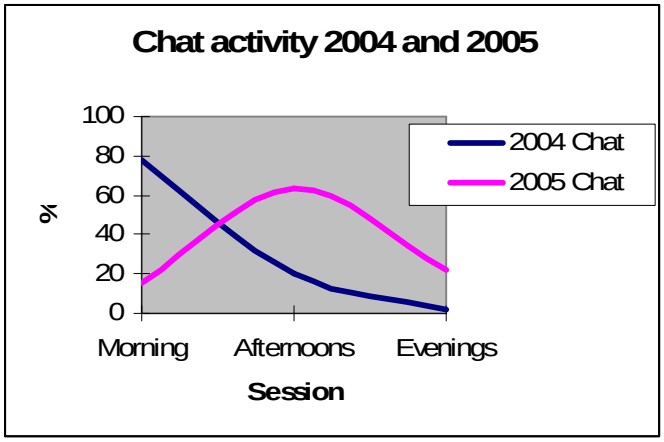
The eLearning resource data allowed me to analyse the times of day at which the learners used the system. The data thus obtained is presented in the table below.

When did the learners use the eLearning resource?				
	Total	Mornings	Afternoons	Evenings
2004 Chat	32 683	25662 (78%)	6535 (20%)	486 (2%)
2004 Forums	2 275	1086 (48%)	836 (37%)	353 (15%)
2005 Chat	35 384	5072 (15%)	22404 (63%)	7900 (22%)
2005 Forums	2 741	944 (34%)	1 382 (50%)	415 (16%)

Table 39 : Patterns of online activity : when the students used the eLearning interface to chat and make forum posts.

The table below shows the times of day when the participating learners in this

research used the eLearning programme. A diagrammatic presentation is given below.



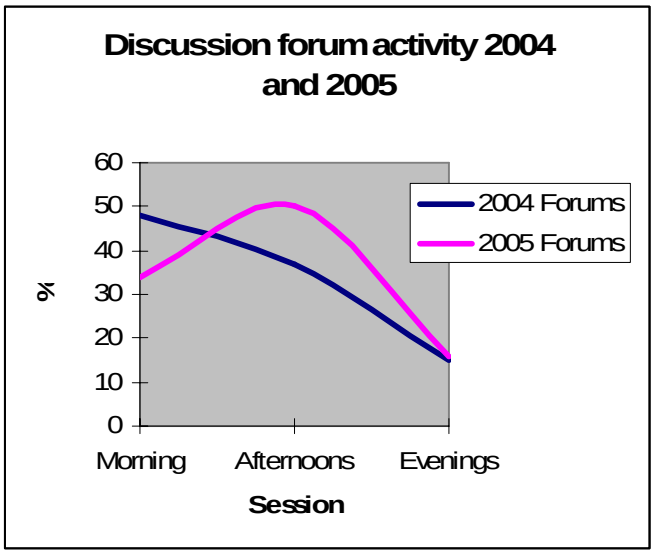


Table 40 : Chat and discussion forum activity 2004 and 2005

The pattern of study of the learners in 2004 seemed to follow the same patterns that one would find in a "normal" school. Most usage therefore occurred in the mornings (78% in 2004), with about 20% of the activity in afternoons, and much less activity in the evenings.

During 2005, however, a surprising change in the pattern occurred. There was a marked increase in activity in the afternoons in both chat and forum posts. In

2005, most of the chats (63%) and forum posts (50%) were occurring in the afternoon. A further surprise in 2005 was that the morning chat activity dropped to 15% in contrast to 2004 when it stood at 78% in the mornings.

Because this is a substantial shift in data, I rechecked the formulas and calculations and discussed the data with the technical staff as well as the subject advisers. We could not come to any definite conclusions about the reasons for online activity moving to the afternoons. There was no change in the type of learner who enrolled from between 2004 and 2005 since approximately 85% of the learners were home schoolers in both these years. The server time was correct as it is synched with international time servers. There were no special Internet discounts offered in the country that may have influenced the learners to log on in the afternoons, and evening usage was in fact cheaper (Telkom, 2006). A content analysis (see below) revealed that most of the chatting (99%) was of a purely social nature. The possible answer may be that more learners were studying in the mornings during 2005 and leaving their socializing for the afternoons. But then the chat and forum activities showed the same patterns (and forum activity is mostly academically orientated). We must simply conclude that we do not know the real reasons for this change in patterns.

4.2.4. Patterns of online activity of the subject advisers.

Research finding 19 : Subject advisers worked mostly in the mornings in the first year of implementation (2004) but then changed to working mostly in the evenings in the second year (2005).

When did the subject advisers use the eLearning resource?				
	Total	Mornings	Afternoons	Evenings

2004 Forums	595	248 (42%)	180 (30%)	167 (28%)
2005 Forums	2494	248 (42%)	180 (30%)	167 (28%)

Table 41 : Patterns of online activity : subject advisers
The table shows the activity times of subject advisers in the mornings, afternoons and evenings.

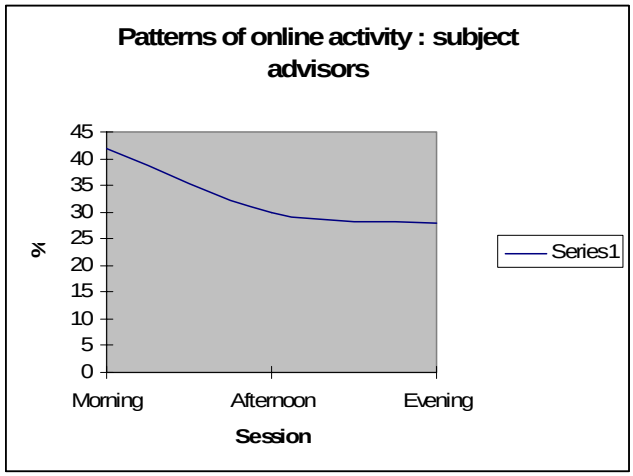


Table 42 : Patterns of online activity : subject advisers
The table shows the patterns of online activity of subject advisors

The pattern of usage of the subject advisers during 2004 was similar to the usage patterns of learners in 2004, with most of the activity occurring in the mornings (42%), followed by a more or less an equal distribution of activity between the afternoons (20%) and evenings (28%).

2005 saw a substantial increase in forum activity for the subject advisers as well: from 595 posts in 2004 to 2494 posts in 2005. The subject advisers were active in the mornings (35%), less so in the afternoons (14%), and most of all in the evenings (51%).

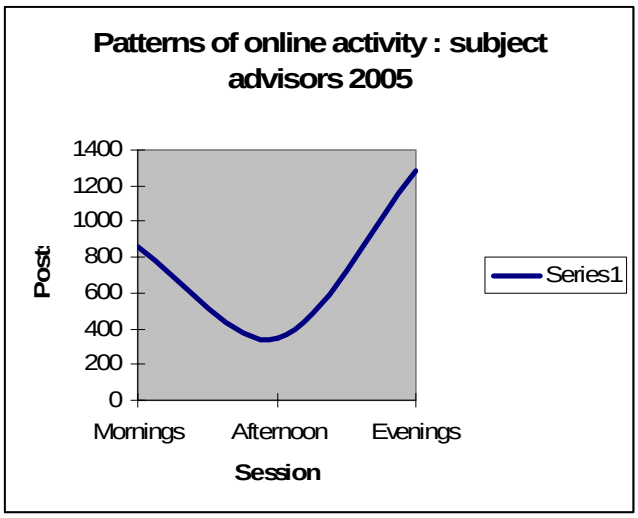


Table 43 : Patterns of online activity : subject advisers : forums 2005
This graph shows the pattern of online participation in forums on the part of the subject advisers during 2005.

The asynchronous communication tools were definitely used constructively by the subject advisers.

If the online activity times of learners and subject advisers for 2005 are compared to each other, one has to conclude that they are clearly asynchronous, that is to say, the learners are either active in the mornings or afternoons while the subject advisers are most active in the evenings. The following table and graph show the differences.

Comparison of online activity times: learners and subject advisers

		Mornings	Afternoon	Evenings
		%	%	%
2005	Students	34	50	16
2005	Subject advisers	35	14	51

Table 44 : Comparison of online activity times : students vs subject advisers 2005
The table below shows the comparative data for learner and subject adviser online activity in the discussion forums.

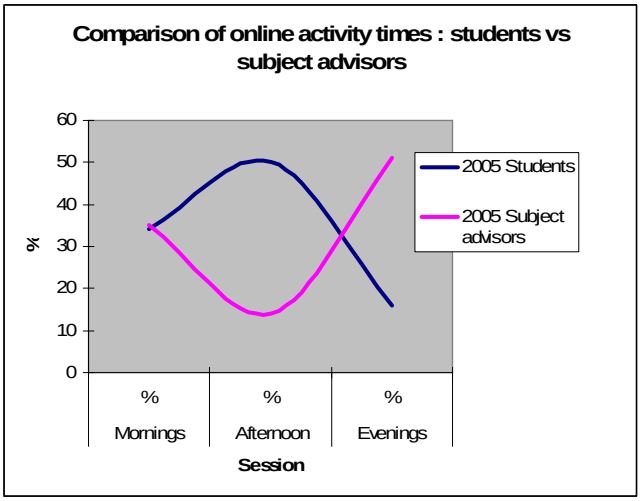


Table 45 : Comparison of online activity times : students vs subject advisers 2005

> Research finding 20: The online activity of learners and subject advisers follows an asynchronous pattern, with the learners either being active in the mornings or afternoons, while subject advisers are most active in the evenings.

4.2.5. Ratio of subject advisers to learners

> Research finding 21: The average class size was 57 and 62 learners per class in 2004 and 2005 respectively.
>
> Research finding 22: The ratio of learners per subject adviser was 223 to 1.

The system was supported with 11 subject advisers in 2004 and 2005. On average, each online facilitator took care of seven courses. The average class size is calculated by taking all 17 courses for which the first year group enrolled and dividing the total by 17. The table below shows the figures.

Calculating average class size (2004 and 2005)	Nov 2004 enrolment	Nov 2005 enrolment
Accounting	61	71
Afrikaans First Language	43	54
Afrikaans Second Language	85	88
Art and Design	24	35
Biology	75	104
Business Studies	79	61
Computer Studies	33	30
Design and Technology	18	12
Development Studies	24	15
Economics	71	70
English First Language	98	110
English Second Language	40	48
Geography	43	52
History	24	36
Information Technology	22	26
Mathematics	142	172
Physical Science	96	93
Number of student enrolment in courses	975	1062
Divided by 17 courses	(17)	(17)
AVERAGE CLASS SIZE	57	62

Table 46 : Calculating average class size
The table shows the calculation of average class sizes in the online system in this research in 2004 and 2005.

The average class size is calculated here as 57 learners in 2004 and 62 learners in 2005.

The subject advisers also supported learners taking courses in the South African syllabus system (these courses were not supported online). There are approximately 3000 learners in the South African system, with an additional seven subject advisers. The ratios are therefore calculated in the following way:

3000 learners divided by 18 subject advisers gives a total of 166 learners per subject adviser. The Cambridge online subject advisers had 166 South African learners plus an average of 57 Cambridge learners each, which gives each subject adviser a total of 223 learners to take care of.

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4.1.Answering sub-question 1 : To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?

- 4.1.1. The overal academic results were favourable
- 4.1.2. Results from the questionnaires and interviews about pedagogics.

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- 4.2.1. Results of an analysis of the opinions of learners about various aspects of community in the eLearning resource.
- 4.2.2. The personality type of the learners
- 4.2.3. Patterns of online activity by the learners.
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4.3.Answering sub-question 3 : In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?

- 4.3.1. Did the learners adequately exploit the opportunities for communication inherent in the eLearning resource?
- 4.3.2. Reachability and preferences of learners in terms of communication?
- 4.3.3. How did the learners use the chat facility of the eLearning resource?
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- 4.3.5. Learners that were active or were isolated?
- 4.3.6. Learners that “lurked” (i.e. were learners who never chatted or posted replies in forums)?

4.4.Answering sub-question 4 : How and why do certain technological aspects and instructional design issues affect a high school eLearning resource?

- 4.4.1. Computer skills and attitudes of learners and subject advisers
- 4.4.2. What was found in the implementation of the basic hardware and software systems.
- 4.4.3. Setting up the system - course materials
- 4.4.4. Setting up the system - Users and Facilitators

4.3. Answering sub-question 3 : In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?

Organiser

The following section presents the results from data analysis to answer the third sub-question of the research which is about *communication*. Firstly, results are presented with regard to the preferences and reachability of learners with different communication media. Secondly, chat data and forum data are analysed.

This question relates to aspects of communication and how they influence learning in the eLearning resource.

The analyzed results of **questionnaire 2** are presented in ANNEXURES 10,11,12. The summarised results of the various **interviews** are presented separately in ANNEXURE 13. The **transcribed interviews** are included in the DVD. In this chapter, however, the results are presented as an integrated whole.

4.3.1. Did the learners adequately exploit the opportunities for communication inherent in the eLearning resource?

Research finding 23: Less than half the learners said that they adequately exploited the possibilities for communication inherent in the eLearning resource.

Only 24% in 2004 and 37% in 2005 of the learners responded that they adequately exploited the possibilities for communication inherent in the eLearning resource.

4.3.2. Reachability and preferences of learners in terms of communication?

4.3.2.1. How do learners prefer to be contacted?

> Research finding 24: Learners mainly preferred to be contacted by means of email for purposes of learning. Fewer preferred to be contacted by means of a conventional (landline) telephone, and an increasing number preferred to be contacted on their mobile telephones.

Contact methods preferred by learners		
	2004	2005
Contact preferred via: Home telephone	17%	7%
Contact preferred via: Email	56%	56%
Contact preferred via: Cellphone	27%	37%

Table 47 : Preferred contact methods of students 2004 2005

The figure above shows the preferred contact methods of learners (2004 and 2005).

There was a definite shift away from a preference to be contacted on a conventional (landline) telephone (preferences decreased from 17% to 7%) towards a preference to be contacted on a mobile phone (preferences increased from 27% to 37%). The preference to be contacted by means of e-mail remained the same (at 56%) in both years. This tendency to make increasing use of mobile

telephones is in line with the general world pattern towards increasing use of such telephones. There were no differences in the pattern of these preferences for preferred contact methods between older users (16 and older) and younger users (users younger than 16). This is depicted in the figure below.

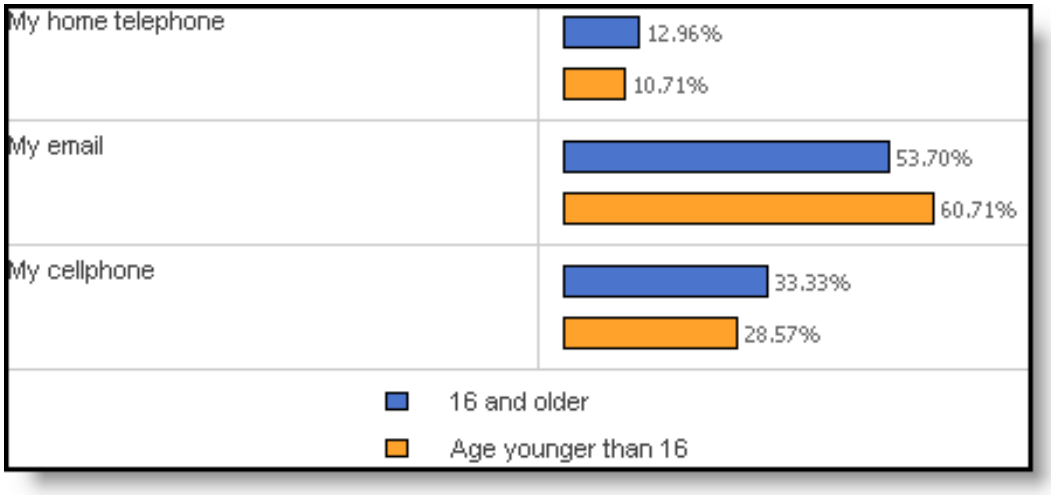


Table 48 : Contact preferences of older and younger students (2004 and 2005)
This figure shows the comparative differences in contact preferences between older and younger learners (older and younger than 16 years) for 2004 and 2005.

4.3.2.2. How reachable were the learners on their cell phones?

> Research finding 25: While 83% of learners had a cell phone, only 56% could be reached by means of an SMS despite the fact that approximately 80% agreed that their numbers had not changed.

Contacting learners on their cell phones by sending SMS messages was investigated. At the most critical time of the year, when learners were waiting for their results, an SMS message was sent to all learners to tell them where their results might be found. The table below summarises the results of this communication initiative. It shows that 83% (172) out of 208 learners indicated that they did possess a cell phone where they could be contacted. 172 SMS

messages were therefore sent out by utilising an SMS service (SMSWhiz SMS Gateway, 2004). The SMS gateway used provided a report on the delivery rate of the SMS messages.

An example positive report was worded: Destination: ------cellnumber---,Date & Time: 2004-12-15 18:52:57 gmt. Reference: 8:50:58_pm, Status: 2, Description: Message Delivered to the Destination Handset. Tokens Used: 2

An example negative report was worded: Destination: ----cell------, Date & Time: 2004-12-15 18:54:57 gmt, Reference: 8:50:58_pm, Status: 3, Description: Message Could not be Delivered to the Handset. Tokens Used: 2

The data shows that 97 messages were successfully delivered while delivery was unsuccessful in 73 cases. 97 out of 172 messages were therefore sent (a 56% success rate) and 44% of these messages were undelivered. This is probably indicative of the very volatile and transitory nature of the cell phone industry in South Africa. Because several cell phone user packages are available at a low cost, it is very easy for users to switch phones. These figures are probably a benchmark for other similar institutions in a similar market. If one wishes to communicate by means of SMSs, one might expect (in such circumstances) to reach about 50% of the target population. Unfortunately I could not find any other study that had included this kind of analysis for comparative reference..

Success rate in sending SMS messages to the learner population (2004)				
	Population	With cellphones	Successful delivery	Unsuccessful delivery
2004	208	172(83%)	97 (56%)	73 (44%)

Table 49 : Success rate in sending SMS messages to students 2004

The table shows the success rate (56%) of reaching learners through the medium of SMS on their mobile phones.

Only approximately half of the SMS messages (56%) were successfully delivered in spite of the fact that (1) 73% of the learners in 2004 indicated that their cell phone number had not changed in 2004, and (2) 80% indicated that their cell phone number had not changed in 2005.

Cell phone number changes by learners in 2004 and 2005	
	Percentage of learners claiming that their cell phone number had remained the same
2004	73%
2005	80%

Table 50 : Cell phone number stability
The table shows the percentage of learners who indicated that their cell phone numbers had remained the same in the relevant year.

4.3.2.3. How reachable are learners by means of email?

> Research finding 26: Almost all emails (92-94%) were successfully mailed. But this high delivery rate does not mean that they were read.

A prerequisite for enrolment in the course was to be in possession of full Internet access and email. As the chief administrator of the system, I made an analysis of returned emails and discussed the issues with the administrative personnel. A system enhancement implemented for the months September, October and November 2004 meant that all posts in discussion forums were immediately sent out to all participants in the discussion group. The system therefore functioned as a listserv. When an e-mail is addressed to a listserv mailing list, it is automatically broadcasted to everyone on the list. This effect is similar to that on

a newsgroup or forum, except that the messages are transmitted as e-mails and are therefore available only to bona fide (registered) members of the list (Listserv-email-lists-newsgroups, 2004). Lists of returned mails were gathered on the server for specific email accounts.

It was found that the e-mails were mostly valid and that the messages could therefore be delivered. An analysis of these emails revealed that between 9 and 12 emails out of a total of 150 learners in the social forum's emails were returned. This amounts to 6-8% of the total e-mail volume. On the positive side it does mean that 92-94% of emails are successfully mailed. But the fact that they were delivered does not mean they were read.

Success rate of email delivery to learners in 2004	
	Percentage of e-mails that were delivered
2004	92-94%

Table 51 : Email delivery success rate in 2004
The table shows the success rate (93%) of e-mail delivery during 2004

4.3.3. How did the learners use the chat facility of the eLearning resource?

4.3.3.1. Chat data is mostly of social nature.

> Research finding 27 : Learners used chat rooms mostly to socialize.

The eLearning system featured a function that kept a log of all chat session data as well as data in discussion forums. It was possible therefore to conduct a content analysis on both.

It soon transpired in the analysis that a detailed analysis was unnecessary because almost all of the chat was of a purely social nature and that the chat rooms were hardly ever used for academic purposes. This was crosschecked with the data from subject advisers. They also did not use chat rooms for academic purposes.

A sample chat room screen capture shows an example of the purely social nature of the content.

Chat messages per student-ANALYSED.xls

	A	D	E	I	J	K	L
9782	z2250	F	nah	1086777638	09-Jun-04	6	Morning
9783	z2165	F	Nadia from above me?	1089711771	13-Jul-04	7	Morning
9784	z2209	M	Naah, It's alright. I'll find it eventually./	1091218427	30-Jul-04	7	Evening
9785	z2162	M	na ur cats just askin 4 food	1098359831	21-Oct-04	10	Morning
9786	z2246	F	NA im joking corn! dont worry!	1078398500	04-Mar-04	3	Morning
9787	z2175	F	na but im gonna	1080117180	24-Mar-04	3	Morning
9788	z2147	F	n?	1080297819	26-Mar-04	3	Morning
9789	z2147	F	n/c	1078479868	05-Mar-04	3	Morning
9790	z2242	F	n...whoa	1078391806	04-Mar-04	3	Morning
9791	z2146	M	N.....SHES FREEKIN ME OUT	1078393372	04-Mar-04	3	Morning
9792	z2242	F	N.....im with u here	1078389703	04-Mar-04	3	Morning
9793	z2250	F	N..... hav we talked before?	1082369757	19-Apr-04	4	Morning
9794	z2250	F	n.. i dunno	1082544555	21-Apr-04	4	Morning

Table 52 : Example of chat room data analysed

The figure above shows an example of data from a 2005 chat room (35 384 chats). It is clearly evident that most of this communication (which was also typical of the other communications) was of a purely social nature. The complete datasets are included in the DVD.

Learners were frustrated when they went online but there was no one there.

The online chatting was more social than educational in content and featured a number of regulars who frequented the chat rooms. It frustrated these individuals if they went online and found that there was no one there. They enjoyed going onto the Internet to chat with their friends, but also wanted to know when their friends would be online. They did not like going online when nobody else was there because, at such times, the facility seemed to them rather like a "haunted, empty house" (quote from learner). While nearly all these chats were more socially orientated than work orientated, some preferred not to

socialise on the Internet and preferred rather to communicate about work-related matters. (Data assembled from interviews)

The learners felt that the chatroom's social forums worked well for casual talking. The learners clearly had a need for interactions with all the learners –and not just with a few of their friends. They found that they could often make new friends online because their personal information was available and they used it. Because the Cambridge and South African matriculant learners were all members of this common forum, they were able to communicate, get to know one another, and make friends. This kind of socializing is therefore useful for creating friendships and ultimately also for furthering the goals of learning by cementing group solidarity, positive social relationships and user (learner) satisfaction. (Data assembled from interviews).

4.3.3.2. Analysis of CHAT data in terms of gender, totals and averages.

Research finding 28: Female learners chatted to a far greater extent than did their male counterparts (approximately 50% more). Averages: Female chat volume was 73% in 2004 and 63% in 2005 – as opposed to male chat volume which was 27% in 2004 and 37% in 2005.

CHAT analysis summary : Female, male, totals and averages : 2004 & 2005

		Number of students	Chats	Chat %
2004	Female	94	23941	73%
	Male	115	8742	27%
	Total	209	32683	

	Average		**156**	
2005	Female	109	22398	63%
	Male	94	12986	37%
	Total	203	35384	
	Average		**174**	

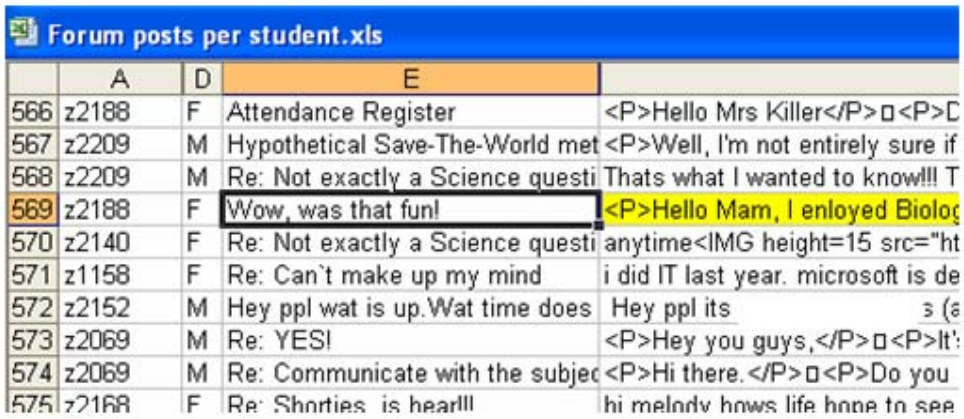
Table 53 : Gender differences in chat summary (2004 and 2005): females, males, total and averages. This table shows an analysis of data gathered from the eLearning system database for the number of chats conducted by females and males (with totals and averages) for the years 2004 and 2005.

During 2004, a total of 32 683 chat lines were typed. In 2005 a total number of 25 384 chat lines were typed (i.e. 8% more than in 2004). Female learners engaged in far more chats than their male counterparts. Thus, 73% (2004) and 63% (2005) of the chat volume was conducted by females while males contributed 27% (2004) and 37% (2005) of the volume.

4.3.4. How did the learners use the discussion forums facility of the eLearning resource?

> Research finding 29: Analysis showed that only about one third of the discussions were about academic-related matters (1008 out of 2741 = 37% in 2005).

Because complete logs of all discussions are kept by the system, it was possible to analyse them in detail. A sample discussion forum analysis is presented below.



Forum posts per student.xls

	A	D	E	
566	z2188	F	Attendance Register	<P>Hello Mrs Killer</P>□<P>D
567	z2209	M	Hypothetical Save-The-World met	<P>Well, I'm not entirely sure if
568	z2209	M	Re: Not exactly a Science questi	Thats what I wanted to know!!! T
569	z2188	F	Wow, was that fun!	<P>Hello Mam, I enloyed Biolog
570	z2140	F	Re: Not exactly a Science questi	anytime<IMG height=15 src="ht
571	z1158	F	Re: Can`t make up my mind	i did IT last year. microsoft is de
572	z2152	M	Hey ppl wat is up.Wat time does	Hey ppl its s (a
573	z2069	M	Re: YES!	<P>Hey you guys,</P>□<P>It's
574	z2069	M	Re: Communicate with the subjec	<P>Hi there.</P>□<P>Do you
575	z2168	F	Re: Shorties, is hear!!!	hi melody hows life hope to see

Table 54 : Example of discussions in a discussion forum

Analysis showed that only about one third of the discussions were about academically related matters (1008 of 2741 = 37% in 2005). This explains the correlation of the chat activity with the discussion forum activity in the question above, and the shift in chat activity to the afternoons (in section above) for 2005.

When academic-related posts have been specifically isolated and analysed, the data still shows a shift in 2005 to more activity in the afternoons (43%), more or less the same amount of activity as in the mornings (39%), and the least amount of activity in the evenings (18%). Discussions were very informal and were interwoven with social responses.

DISCUSSION FORUM POSTS and forum replies summary : 2004 & 2005						
		Number of students	Forum posts	Forum posts %	Forum replies	Forum replies %
2004	Female	94	1441	63%	1089	66%
	Male	115	834	37%	555	34%
	Total	209	2275		1644	
	Average		11		8	
2005	Female	109	1161	42%	755	41%
	Male	94	1580	58%	1104	59%
	Total	203	2741		1859	
	Average		14		9	

Table 55 : Chat, forum posts and forum replies: summaries for 2004 and 2005

This table shows an analysis of the data gathered from the eLearning system database for the number of chats, forum posts and forum post replies for the years 2004 and 2005.

Posts of an academic nature by learners in discussion forums	
	2005
Morning	391 (39%)
Afternoon	435 (43%)
Evening	182 (18%)
Total academic posts	1008 out of 2741

Table 56 : Posts by learners in discussion forums of academic nature 2005

The table shows posts of an academic nature in the discussion forums in 2005. This once again confirmed the shift towards activity in the afternoons.

> Research finding 30: The gender spread in terms of academic discussion participation is about equal (50%-50%) – dissimilar to chat activity where female learners contributed most of the traffic volume.

While female learners contributed 63% of the **forum posts** in 2004, the male learners contributed more forum posts in 2005 (58%). This same pattern was repeated in terms of replies on forum posts in 2005 (i.e. 66% were from female learners and 59% were from male learners).

> Research finding 31: On average, learners contributed 174 chat posts per year, around 14 forum posts per year, and approximately 9 forum replies per year.

The average learner and therefore chatted 156 times in 2004 and a little more (174 times) in 2005. An average of 11 forum posts and 8 replies were made per learner in 2004, and an average of 14 forum posts and 9 replies in 2005.

The learners were able to help one another in the forums. The general

experience of learners was that if someone had a problem with some aspect of the work, others helped them as best they could. This kind of friendly response and service was greatly valued by learners. But others said they did not have "enough time or money" to answer the questions of other learners online. (Data assembled from interviews)

Some learners preferred not to use forums because they found it easier to talk face to face with someone. They found it easier to address their questions to a person in a face-to-face situation rather than online – especially if the question was complex and required a great deal of time to answer. (Data assembled from interviews)

Learners felt that the feedback from subject advisers and on forums should be faster.

Learners felt it teachers were taking too much time to respond to their queries and they wanted swifter feedback. They were also of the opinion that subject advisers were unfamiliar with the technology and that that was the reason why they were slow to respond. They thought that subject advisers should focus on the "big things" (such as compiling summaries) that would benefit all learners rather than deal with one small issue at a time. (Data assembled from interviews)

Private emails and discussions

Some learners used the personal information they found on the net and participated in private conversations outside the community. (Data assembled from interviews)

4.3.5. Learners that were active or were isolated?

Research finding 32: Approximately half of the learners were active contributors and half were isolated learners.

I categorised the learners on the basis of the content of their contributions in accordance with a descriptive typology drawn up by Leionen (Leinonen, 2003) which scrutinises contributions and then identifies learners either as "active contributors" or as "isolated learners". The table below outlines the results of my analysis.

		Total	Active Contributors	Isolated students
			%	%
2004	Students	203	Posts 56% Replies 49% **Average 53%**	No posts 44% No replies 51% **Average 48%**
2005	Students	209	Posts 64% Replies 39% **Average 52%**	No posts 36% No replies 61% **Average 49%**

Table 57 : The categorisation of learners in this research as active contributors or isolated learners according to Leionen's categories

The table shows the percentage of learners who were "active contributors" and those who were "isolated" according to Leionen's (2003) typology

The following learners were active contributors: 117 out of 209 learners (i.e. 56%) in 2004, and 129 out of 203 learners (64%) in 2005. The number of learners who replied to posts were 100 out of 203 (49%) in 2004, and 82 out of 209 (39%) in 2005. More learners posted to the forum in 2005 than in 2004 but fewer replied to posts in 2005 than in 2004. About half of the learners on average were active contributors (53% and 52%) while about half were isolated learners (48% and 49%). Fewer than half the learners posted replies in the course of discussions, and about half of these were "isolated learners" in terms of Leionen's typology.

4.3.6. Learners that "lurked" (i.e. were learners who never chatted or posted replies in forums)?

Research finding 33: The percentage of learners who "lurked" was about 40% initially, but this percentage decreased in the two-year period (42% in 2004 became 32% in 2005)

Incidence of learners who "lurked" (i.e. learners never chatted or posted replies in forums)				
		Learners	Number of learners who did nothing	Percentage of learners who did nothing
2004	Female	94	35	40%
	Male	115	52	60%
	Total	209	87	42%
2005	Female	109	41	63%
	Male	94	24	37%
	Total	203	65	32%

Table 58 : Learners who were "lurkers" (i.e. those who never chatted or posted replies in forums)
This table shows the number and percentage of learners who participated in chats and who never posted replies in the eLearning system in 2004 and 2005.

In 2004 42% of learners neither chatted nor posted any reply. In 2005 this figure decreased to 24% (lower than 32%). Whereas it was male learners who mostly lurked in 2004 (60%), 63% of the female learners in 2005 neither chatted nor used forums. These figures give some indication of the lurking factor in the eLearning system.

A large percentage of learners lurked. These were mainly learners who read discussions but never participated. Because some learners do not like to be exposed to challenge or discussion and possibly laughed at, they remain silent and never participate. Although there is an anonymous function in the system, it

was seldom used. One may hypothesise that those learners who participated more frequently were probably more extrovert and outgoing personalities and were consequently more comfortable with taking risks. (Data assembled from interviews).

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- 4.2.1. Results of an analysis of the opinions of learners about various aspects of community in the eLearning resource.
- 4.2.2. The personality type of the learners
- 4.2.3. Patterns of online activity by the learners.
- 4.2.4. Patterns of online activity of the subject advisers.
- 4.2.5. Ratio of subject advisers to learners

4.3.Answering sub-question 3 : In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?

- 4.3.1. Did the learners adequately exploit the opportunities for communication inherent in the eLearning resource?
- 4.3.2. Reachability and preferences of learners in terms of communication?
- 4.3.3. How did the learners use the chat facility of the eLearning resource?
- 4.3.4. How did the learners use the discussion forums facility of the eLearning resource?
- 4.3.5. Learners that were active or were isolated?
- 4.3.6. Learners that “lurked” (i.e. were learners who never chatted or posted replies in forums)?

4.4.Answering sub-question 4 : How and why do certain technological aspects and instructional design issues affect a high school eLearning resource?

- 4.4.1. Computer skills and attitudes of learners and subject advisers
- 4.4.2. What was found in the implementation of the basic hardware and software systems.
- 4.4.3. Setting up the system - course materials
- 4.4.4. Setting up the system - Users and Facilitators

4.4. Answering sub-question 4 : How and why do certain technological aspects and instructional design issues affect a high school eLearning resource?

Organiser

The following section shows how the results of a data analysis answers the fourth sub-question of the research (which is about technological elements).

The analyzed results of questionnaire 2 are presented in ANNEXURES 10,11,12. The summarised results of the various interviews are presented separately in ANNEXURE 13. The transcribed interviews are included in the DVD. In this chapter, however, the results are presented as an integrated whole.

4.4.1. Computer skills and attitudes of learners and subject advisers

Research finding 34: Both learners and subject advisers were highly computer-literate and displayed positive attitudes towards both the medium itself and the eLearning resource.

Both subject advisers and learners reported very high levels of computer skills (90% and 98%).

The subject advisers were confident that the learners also rated their (i.e. the subject advisers') computer skills very highly (80%).

The responses of the learners (73% in 2004 and 95% in 2005) indicated the strong

positive and favourable attitudes that learners had towards the medium and the resource and towards their own mastery of the technological elements of the eLearning system.

The subject advisers reported that they were getting what they expected from the eLearning resource (60%). Only 55% of the subject advisers thought that the learners were getting what they expected from the resource.

Although all the subject advisers agreed that the eLearning system was easy to master (100%), 90% reported that they had been nervous when they first encountered it (they had wondered at the time whether they would be able to master it). 80% of the subject advisers rated the system's overall usability as good. While 70% of the learners initially found the system easy to use, this number increased over time (84% of them reported, after a longer period of acquaintance, that they found working with the system easy). Only 60% of the subject advisers thought the learners would find the system easy to work with. The larger picture is therefore that, while the subject advisers seemed to have found the system easy to get to know right from the beginning, the learners found it initially more difficult to master, but easier later on. Both these groups therefore found the system easy to work with once they had become acquainted with it.

Almost all the subject advisers (99%) thought that not having access to such a system would have hampered learner's studies, while only 75% of learners were of the same opinion.

The technological elements of the system were therefore viewed positively by both the subject advisers and the learners. But in the opinion of both these

groups, the system could never replace the human beings involved, i.e. teachers and parents. They do not see the eLearning resource as a companion, but rather that the parents and teachers are the companions, and to a lesser extent the fellow learners.

Connectivity, cost and speed

The Internet connection was not exactly a problem, and the speed was deemed to be reasonable. Although the cost of the Internet connection was not a direct personal factor for most learners, parental restrictions on the use of the Internet inhibited most learners. Quite a number of the learners were uncertain about the actual cost of an Internet connection, and most of them did not really bother much about it. It was simply not a factor in their personal lives because their parents paid. Because some of the learners had problems with Internet speed, they utilised special times to access the Internet and their parents got special discounts for connectivity at these times. Most of this group, for example, accessed the Internet after 7 p.m. in evenings. Even though the Internet was a vital resource for learners' research, some of them obtained most of their sources and references (research materials) from the system – and said that they did not rely in any way on libraries or other resource centres.

- **I**nterface issues. The learners expressed a desire to have place where they would be able to see whatever new things were added to the resource (and there is, in fact, a place exactly for seeing that). Some said that they felt that there was too much information on the screens and that the screens were too "busy" (i.e. crowded with information).
- Learners would have preferred ONE page on which they would be able to see (1) everything that was important, and (2) everything that had changed since their last log-in.

- Learners reported that they sometimes could not find things that they were expected to find. While some learners encountered problems in finding updates and reported that they did not know where to look, others reported that they experienced no problems in this regard. And while some learners encountered difficulties in submitting assignments and brought their assignments to workshops with them, the majority of learners experienced no problems in submitting their assignments.
- While some learners felt that they would have liked to have been able to customise their screens, others felt that the screens were "okay" and "balanced". Some learners thought that the interface should have been made easier for the sake of the teachers because they (the teachers) seemed to have more problems in this regard than the learners themselves! They were of the opinion that the subject advisers were unskilled and inept in using technology and that that was the reason why they were "slow".

The learners felt that it was important for course material to be provided on CD and not just on the Internet.

The learners felt that the CD containing vital information was "essential" and that without it they would have had problems. They appreciated the fact that updates on their lessons were posted to the Internet. They also appreciated the fact that the core material of their courses was available on CD because this relieved them of the necessity to spend even more time than they were doing on the Internet. They felt that if the CD was inadequate in any way, they could obtain the necessary information from Internet, and vice versa.

Video clips and videos of face-to-face workshops were important to the learners.

The learners felt that the video clips were very useful. While they felt that the video recording of workshops was very important, they said that they did not have time for "playing with techno-toys like webcam". Skype might therefore be

considered in this regard

4.4.2. What was found in the implementation of the basic hardware and software systems.

The technical "story" of what happened on the resource throughout these two years is told from a technical point of view in the following sections. It is important to include this information because it may be of considerable assistance to other people throughout the world who might wish to implement eLearning systems of this kind for high school learners.

Webserver hardware and software.

Research finding 35: Because constant updating is necessary, it is necessary to have the kind of reliable technical expertise that will enable one to upgrade continuously.

Even within the space of two years, upgrades on basic hardware were needed in terms of RAM memory, processor speed, hard drive and backup capacity. The computer motherboard was also upgraded to accommodate the backup system and a faster processor (2 Ghz was upgraded to 4 Ghz).

Hardware upgrade path for the computer equipment used on the webserver of the eLearning resource		
	Beginning of 2004	End of 2005
RAM	512KB	2Gig
Hard drive	80Gig	2 x 80 Gig
Processor speed	2Ghz	4Ghz

Table 59 : Hardware upgrade path for the computer equipment of the eLearning resource server
This table shows the hardware upgrades that were performed on the eLearning

resource's server between the beginning of 2004 and the end of 2005.

All the operational software on the webserver went through a series of updates in 2004 and 2005. The table below shows the progress between the software versions of the various kinds of software used in the two years of the research period.

Software upgrade path for the software used on the webserver of the eLearning resource		
	Version at the beginning of 2004	Version at the end of 2005
RedHat Linux	Version 9	Upgraded the kernel
PHP	4.1	4.4.1
MySql	3.2.3	4
Apache	1.3.1	1.3.36
Moodle	1.3	1.5

Table 60 : The table shows the various updates performed on the software that drove the eLearning resource in this study
This table shows the various updates that were performed on the software that drove the eLearning resource in this study in the period between the beginning of 2004 and the end of 2005.

Implication**:** Because one will inevitably need constantly to update software, one will need to have access to reliable technical expertise in order to perform such upgrades in a continuous fashion.

Web speed comparison between international and local internet service providers.

Research finding 36: Web servers inside the local country usually provide better speeds.

Working with the system revealed a significant difference in the speed of the Internet between hosting services which place web content on servers outside South Africa and those that operate locally. A comparison was made by using

the command "ping" from the Microsoft Windows (Microsoft Corporation, 2006) environment and the results were as follows.

Comparisons of Internet speeds (by using "ping") between internationally based web hosting and locally based web hosting		
	Internationally based web hosting	Locally based web hosting
Speed in milliseconds (Tested for one week once every day during May 2005 and repeated in July 2006)	700-900 ms	30-50 ms

Table 61 : Internet speed comparison - international vs local web hosting
The table shows a comparison of the relative Internet speeds of international and local web hosting made by using the command "ping". Local web hosting is seen to be around ten times faster.

4.4.3. Setting up the system - course materials

The data about setting up the system with course materials is important for others who would like to implement similar systems.

Available materials ported to the eLearning interface.

> Research finding 37: The average size of a file of course material was 72 kilobytes. It took 5,5 hours to upload 1.1 gigabytes of data in 16 000 lessons in South Africa in 2005.

Around 16 000 lessons were ported from the CD content to Internet format.

Uploading to the eLearning resource – useful information extracted

Once it had been worked out where and how to store the courseware, it was uploaded to the eLearning system. The total file size upload was around 1.1 gigabytes x 1024 = 1126 megabytes x 1024 = 1153433 kilobytes (i.e. around three

and a half normal CDs). The average of a file size is then calculated as follows: 1153433 kilobytes divided by 16000 files = 72 kilobytes. It took approximately five and a half hours to upload the data files. This was calculated in the following way: 1153433 kilobytes divided by 60 kilobytes per second (the ADSL broadband maximum speed) = 19223 seconds = 5.3 hours. This partly explains the peak in bandwidth usage and files uploaded in the web statistics for the system (Webalizer.com, 2004).

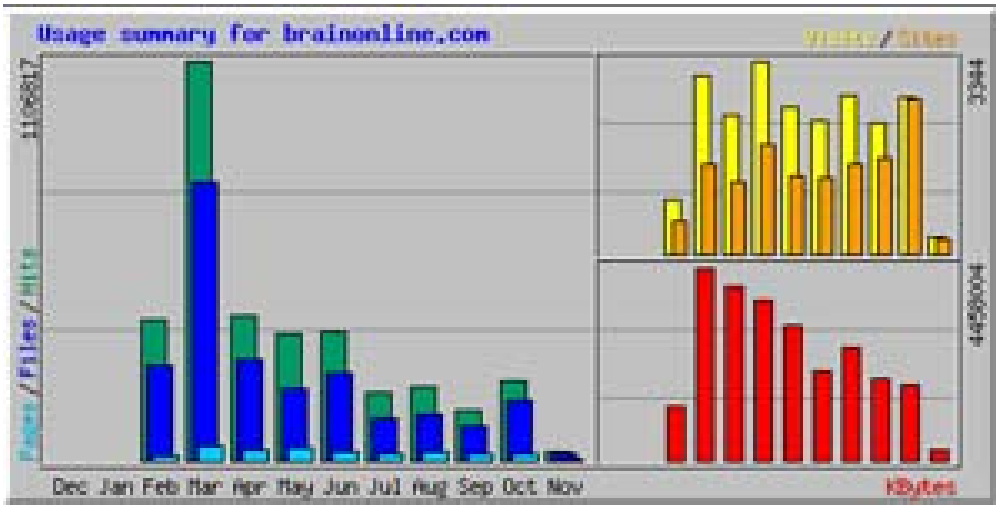

Table 62 : Usage summary for brainonline.com for the year 2004
(Webalizer.com, 2004)

The figures for March 2004 showed the peak caused by the uploading of course material in that month. Crosschecking with other usage data showing bandwidth on all ports shows the wastage caused by a denial-of-service (virus) attack (Symantec.com, 2004) released world-wide and also reflected here. I include information about this attack here because protecting the system against viruses (a.k.a. malware and badware) and malignant attacks constitutes a vital part of the daily maintenance of such a system.

How the denial of service (DoS) attack created abnormal bandwidth usage and disruption

Research finding 38: Hack attacks and viruses can waste large amounts of bandwidth and increase running costs.

This data is included here because it might be of practical importance for system engineers when they set up such systems.

A denial-of-service attack is not a virus but a concerted method that hackers use to prevent or deny legitimate users access to a computer. Denial of service attacks are typically executed by using denial of service tools that send a vast number of request packets to a targeted Internet server (usually a Web, FTP or mail server). These request packets then overextend the server's resources and temporary make the system unusable. Any system that is connected to the Internet and is equipped with TCP-based network services is open to such an attack, and in past years such attacks have been successfully mounted against major corporations such as large banks and even United States government departments.

One may imagine, for example, a hacker who creates a program that automatically telephones a local pizza store. The pizza store would then answer the telephone, but upon learning that it is meaningless call, would hang up. But if the program causes the pizza store's telephoned to be rung continuously and repeatedly, legitimate customers would be prevented from ordering pizzas because the telephone line would be constantly engaged. This is analogous to a denial of service attack, and similar to what a denial of service attack achieves. In a denial of service attack, a very large amount of Internet traffic is created by millions of minute requests and these cause a server to become overextended and so be placed beyond the reach of legitimate clients.

Creating the user interface in the courses

After files have been uploaded, the courses have to be set up. There were 74

different courses offered in 2004, and 65 in 2005. A customised program was developed to set up the courses in a structured and coherent manner. This is probably what every provider will have to do in cases where existing material needs to be ported. The amount of time saved by setting up courses with a customised program is substantial.

Customized course creation

> Research finding 39: Automated course creation of 74 courses saved approximately 1300 hours of human labour and around US$11 000 in South Africa in 2005. The automation used US$500 versus manual creation of US$11 000.

I measured the time that it took me to create the infrastructure for one single lesson (I am, of course, not referring here to the actual creation and design of the lesson content). During my first attempt, the Internet line went down and it took me six extra minutes to get it up again. If I average this out, I estimate that it will take approximately five minutes to set up one lesson. If this figure is multiplied by the number of lessons, the calculation would look like this: 16 000 lessons x 5 minutes = 80 000 minutes, which, if worked back to human-labour hours, equals 1 333 human-labour hours or 16 people working full time for about one month. If one costs this at a low rate of R60 (or $9.2 using an exchange rate of R6.5 to the American dollar) per hour, it works out to approximately R80 000 (US$12 000). One may calculate the real time it took a specialist programmer to write the code and create the courses as follows: 16 hours at a rate of R200 (US$30) per hour = R3 200 (US$500).

See Table: Customized course creation below.

	Time for one lesson (mins)	Number of lessons	Total minutes	Human-labour hours	Costing at R60/$9.2 per hour	Cost in R	Cost in US$
Manual course creation process	5	16000	80 000	1333	9.2	80 000	12 000
Programmatic course creation				16	30	3 200	500

Table 63 : Customized course creation: manual course setup versus programmatic course setup time and costs

This table shows how much time would have been required and how much it would have cost to set up courses manually as opposed to setting them up programmatically in 2004

Development costs of the course material.

> Research finding 40: Course development costs in the researched institution were significantly cheaper than international costs – US$3 000 in South Africa as opposed to US$88 000 in the United States.

The costs mentioned above do not include the cost of developing the actual course material. There are various models for doing this. A search for costing parameters produced about 200 000 entries from Google in 2004, with the Commonwealth of Learning providing a vivid example of an accounting course (Learning, 2004) which cost US$88 500 (or R575 250 @ $6.5 to the Rand at that exchange rate). This, multiplied by 74 courses, would yield development costs of R42 568 500 (US$6 549 000). South African professionals are accustomed to work at much lower rates than these.

My estimate is that, in real terms, the minimum development cost in South Africa would be around R20 000 or (US$3 000) per course.

This would result in direct costs of approximately R1 480 000 (US$230 000). This would exclude the fixed costs of the business (which I would estimate at approximately R1 200 000 (US$180 000) per year). At the top end of the scale, one might expect to pay around R30 000 (US$4 500) per month for 12 months to get **one** very good course developed. That would equate to R360 000 (US$54 000) per course. The totals would then be R360 000 x 74 = R26 640 000 (US$4m)

	Cost per course in USD	Number of courses 2004	Total in USD
Example Accounting Course USA	88 500	74	6 549 000
Lowest Estimate : Researched organisation - Brainline	3000	74	222 000
Highest Estimate : Researched organisation - Brainline	54 000	74	3 996 000

Table 64 : Calculation course development costs
The table shows the estimated cost of developing a course.

4.4.4. Setting up the system - Users and Facilitators

Enrolment prerequisite for learners: the necessity to have both Internet access and email.

> Research finding 41: It is necessary to set certain minimum hardware requirements for those who enrol.

One of the prerequisites for enrolment in the course was to have full Internet access and email. It was assumed in the administration of the system that the Internet data supplied by the learners on their enrolment forms was accurate.

Number of users on the system

208 learners were enrolled for the Cambridge courses at the time of this study in 2004, and 188 learners were enrolled in 2005.

The personal data captured in learners' personal profiles are made up of a number of entries. **These included** name, surname, telephone numbers and town of residence. They also included a place for a photograph, a personal website and an ICQ number. The number of personal photographs and ICQ is used here. Learners were allowed to edit and modify their own profiles (and specifically the photographs of themselves on the system).

The number of learners who added a picture of themselves (customisation).

> Research finding 42: Only about one third of the learners added a photograph or a symbolic image (icon) of themselves to their profiles.

An analysis of user profiles revealed that the number of learners who added a photograph of themselves in 2004 was 9%. The percentage of learners who added symbolic pictures (icons) to represent themselves was 31%. The percentage of learners who added no photograph or symbolic picture (icon) of themselves was 60%. For 2005 the data looked almost the same, with 12% of learners adding photographs of themselves, 23% adding a symbolic picture (icon), and 65% adding no photograph or icon at all. This information may give some additional insight into the kind of learner under scrutiny in this research. The data is tabulated in the table below.

Analysis of learners who supplied representations of themselves (and those who supplied none)

Year	Percentage of learners providing real photographs of themselves	Percentage of learners providing symbolic images (icons) of themselves	Percentage of learners providing no image of themselves
2004	9%	31%	60%
2005	12%	23%	65%

Table 65 : Analysis of learners supplying representations of themselves
The table shows the percentage of learners who supplied photographs, symbolic images (icons) or no representation at all of themselves for their profiles.

Even though a special campaign was mounted in the language courses to get learners who had not already done so to upload photographs of themselves (with extra marks being promised as an incentive for those who did), learner response to this appeal was zero.

Chapter 1
Introduction, backgroud and research problem

Chapter 2
Literature review

Chapter 3
Research design and methodology

Chapter 4
Analysing the case, evidence and discussion

Chapter 5
Conclusions and recommendations

5. CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter begins with a summary of the main and subsidiary research questions, the literature review and the research design. What can be learned from this research will then be presented in the discussion section. At the end, recommendations for further research, policy making and practice will be suggested.

5.2. Summary

This section summarizes the research. The research question and sub-questions together with their results are shown.

The study focuses on the following research question:

To what extent and why are certain features of an eLearning resource workable and desirable for sustaining a high school learning community?

In order to find an answer to this question, the following subsidiary questions were asked :

1. To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?

2. Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?

3. In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?

4. How do certain technological aspects and instructional design issues affect a high school elearning resource?

Chapter 2 explored the literature that is relevant to the question. Throughout the literature review, positive pointers (62) and negative pointers (20) towards answers were indicated. The main themes cover pedagogical, community-, communicative- and technical aspects.

In chapter 3 the detailed research design was presented. The research design took the form of a predominantly qualitative case study because this type of research can contribute to an in-depth understanding of the features of an eLearning resource. The case study on which the research was based was conducted over a period of two years (2004 and 2005) and the subjects were high school learners enrolled for an online eLearning course.

Chapter 4 detailed the findings of the researched case study in a way that was designed to arrive at answers to the subsidiary questions. Forty-two research findings were distilled and presented in sequence throughout the chapter. Together the answers thus obtained contributed to answering the main research question.

5.3. The answers to the subsidiary questions

This section provides the core of each answer.

I agree with Mayer (Mayer, 2003) that while eLearning is a science that is still in its infancy, it has nevertheless become a science in its own right. The answer to the question about how various theories influence an eLearning resource will become apparent with the passing of time because new eLearning models are constantly being devised and tested. After synthesising and extrapolating from existing eLearning definitions in the literature, I created this new definition of high school eLearning:

> ***High school elearning means learning via the Internet through interacting and constructing meaning with others using resources in a learning community specifically attuned to the needs of high school learners***.

The verbs "interacting" and "constructing" point to the most important features of this definition. These activities should take place inside a caring community.

Several eLearning theories offer their own explanations of how one should understand this interacting, constructing and community. I investigated a selection of theories on the basis of their relevance to this study. The most useful of these models were:

- the Design Maturity Model (Maturity Model) by Neuhauser (Neuhauser, 2004) that offers a detailed path that one may follow if one wishes to improve any eLearning project
- the models dealing with the importance of creating an online "community", namely the Community of Inquiry model developed by

Garrison and Anderson (Garrison, 2003), the Community-central model of Palloff and Pratt (Palloff, 2001), the Learner-teacher-content model of Anderson (Anderson, 2004d) that combines and emphasises individual learning and learning with a community as the two most important elements of a learning community

- the Cognitive Theory of Multimedia Learning (Mayer, 2001a) **that** attempts to explain how people learn

The pedagogical learning theories that I investigated fell into three main categories – behaviourist, cognitive, and constructivist – and I focused especially on the latter two. It seemed to me that the best solution lay in merging behavioural and constructivist approaches in accordance with the theory of Cronje (Cronje, 2001, Cronje, 2000) who confirms that it is possible constructively to integrate in practice the apparently diametrically opposed methods of objectivism (including behaviourism) and constructivism. This harmonisation of methods that are traditionally regarded as irreconcilable was pioneered by Bruckman (Bruckman, 2003) when she scaffolded constructionist courses with conventional external (behaviourist) motivation.

De Villiers (De Villiers, 1999) devised a concise model of cognitive instructional theory that she calls the Hexa-C Metamodel of Cognitive Instructional Theory and Design. Her model is constructed from the following six components: cognitive science, constructivism, component-based instruction, customisation, creativity and collaboration.

The eLearning resource implemented in this research, a modified version of Moodle, possesses certain features that more or less resemble those found in most other eLearning resources. The question then becomes how and why such

features can be used to promote high school eLearning.

The first question to be answered is: How did the learners think that this eLearning resource worked in terms of pedagogical theories?.

5.3.1. To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?

The overall academic performance of the subjects was favourable. This means that the particular pedagogical theories and eLearning theories that were implemented in the eLearning resource did contribute in some way to helping the participating students to succeed in their examinations (Research finding 1).

It is the opinion of the learners and subject advisors that Cognitive Science Theory elements, Constructivist Learning Theory elements, and Component Display Theory elements are supported by the eLearning resource. No particular feature stood out as being specifically responsible for this. Features in eLearning resources in general may thus produce the same results (Research finding 2, 3, 4).

While the learners and subject advisors regarded customization as important, the eLearning resource only allowed them to implement a limited amount of customization (Research finding 5). The eLearning environment as a whole might therefore be regarded as making allowance for personal creativity (Research finding 6).

But more important than this was the fact that the eLearning environment provided an environment that challenged learners to develop and nurture their

own motivation (Research finding 6).

The eLearning resource also suited those learners who were more independent and mature than the average (Research finding 6). While learners appreciated the value of collaboration, it emerged that they preferred on the whole to work alone rather than together with other learners (Research finding 7).

Companionship (i.e. presence and support of other human beings) was the most important element in the eLearning resource (Research finding 8). At present I regard companionship in all its forms as the single most important and promising eLearning feature for making an eLearning resource for high school learners desirable and workable.

5.3.2. Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?

The respondents indicated that the feeling of belonging to a community important. The longer learners are exposed to this particular eLearning resource, the better it seems to work for them. Learners experienced an increased sense of community between their first year and second year of enrolment (Research finding 9).

The learning community itself engenders a feeling of safety, care and openness in its users (Research finding 14). These positive emotions are enhanced by face-to-face meetings that promote a sense of community and serve to bind the community together (Research finding 16).

The learners in the sample had strong individualistic inclinations (Research

finding 10). Peer pressure did not play a significant role in the lives of these learners (Research finding 11) and they are averse to competition (Research finding 13). It therefore comes as no surprise then that the learners do not prefer group work (Research finding 12). The structure of the eLearning resource and community made it possible for learners to have a wider range of friends than they could have had in any conventional school (Research finding 15).

The range of personality types among participants is more or less balanced, with no particular traits (such as introversion or extraversion) predominating. The "Thinking" (71%) and "Perceiving" (68%) traits are the only ones indicated by approximately two thirds of the learners (Research finding 17). (This may link this research finding to Research finding 10 which shows that this group of learners had very strong individualistic inclinations.)

While the pattern of study activity that learners followed was similar in 2004 (the first year of implementation) to patterns found in a conventional school, this changed in 2005 to a pattern of increased activity in the afternoons and evenings (Research finding 18). This may show that as learners became more familiar with the facilities of the interface, they were able to adapt their information behaviour patterns to suit their needs and priorities. While the subject advisers worked mostly in the mornings in the first year of implementation (2004), their pattern of usage in the second year (2005) changed to one of work mainly in the evenings (Research finding 19).

The online interaction between learners and subject advisers followed an asynchronous pattern, with the learners either being active in the mornings or afternoons and the subject advisers being active mostly in the evenings (Research finding 20).

The average online class size was 57 and 62 learners per class in 2004 and 2005 respectively (Research finding 21). The ratio of learners per subject adviser was 223 to 1 (Research finding 22). This shows that a substantial increase in economies of scale between regular schooling and "successful" eLearning is possible.

5.3.3. In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?

Fewer than half the learners claimed to be adequately exploiting the possibilities for communication inherent in the eLearning resource (Research finding 23). The implication of this is that the communication features of the eLearning resource were not being used to the full. The reason for this might be that learners need more time to become familiar with the interface or alternatively that they have no need of more interaction and communication.

Analysis showed that only about one third of the discussions related to academic matters (Research finding 29). While this may be explained by the avowed academic individualism of the learners (Research finding 10), it also reveals a strong need for socialising.

The gender spread in terms of academic discussion participation is about equal (50%-50%). This is very different to that which accompanies chat activity – where female learners contributed most of the traffic volume (Research finding 30).

Learners used chat rooms mostly to socialize (Research finding 27) to an even greater extent than they used discussions (Research finding 29) for the same

purpose. Female learners chatted to a far greater extent than did their male counterparts (approximately 50% more) (Research finding 28). On average, learners contributed 174 chat posts per year, approximately 14 forum posts per year, and about nine forum replies per year (Research finding 31).

Approximately half of the learners were active contributors and half were isolated learners will contributed almost nothing (Research finding 32). Also, only about one third of the learners added a photograph or a symbolic image ("icon") of themselves to their profiles (Research finding 42). While the percentage of learners who "lurked" was about 40% initially, this percentage decreased by around 25% in the two-year period (Research finding 33). This seems to indicate that having more time encourages lurkers to contribute.

Learners preferred mainly to be contacted by email for any matter relating to learning. A smaller number preferred to be contacted by means of a conventional (landline) telephone call, and an increasing number preferred to be contacted on their mobile telephones (Research finding 24). While most learners (83%) owned a cellular phone, their reachability rate is only about 50% – despite the fact that approximately 80% agreed that their numbers had not changed (Research finding 25). Almost all emails (92-94%) were successfully mailed. But this high delivery rate does not mean that they were necessarily read (Research finding 26).

5.3.4. To what extent and why do certain technological aspects and instructional design issues affect a high school eLearning resource?

Both learners and subject advisers were highly computer-literate and displayed

positive attitudes towards both the medium itself and the eLearning resource (Research finding 34). In spite of this, it is still necessary to set certain minimum hardware requirements for those who wish to enrol (Research finding 41).

Because any eLearning system of this size and complexity needs constant updating, it is necessary to have access to the services of reliable technical experts who will continuously upgrade and maintain the resource (Research finding 35).

Web servers inside the local country usually offer better connection speeds (Research finding 36).

The average size of a file of course material was 72 kilobytes. It took 5,5 hours to upload 1.1 gigabytes of data in 16 000 lessons in South Africa in 2005 (Research finding 37).

Hack attacks and viruses can waste large amounts of bandwidth and so increase running costs (Research finding 38).

The employment of personnel in an eLearning team who can program is and advantage because the automated course creation of 74 courses saved approximately 1300 hours of human labour and around US$11 000 in South Africa in 2005 (Research finding 39).

Course development costs in the researched institution were significantly lower than would have been abroad (US$3 000 in South Africa, for example, as opposed to US$88 000 in the United States) (Research finding 40).

5.4. Discussion

This section discusses what lessons can be learned from this research. It takes the form of a reflection which one may define as a calm, measured and intense consideration of an object, process or event (in this case, this research). The reflection will deal with methodological, substantive and scientific issues.

5.4.1. Methodological reflection

To what extent has the research approach influenced the results? (What, for example, are the trade-offs of the choices that were made? Did the approach allow for a sufficient number of nuances? Were all relevant matters addressed?)

I am satisfied that I explored the operation of an eLearning in a high school in a way that was most intensive and extensive. In so doing, I utilised a mixed method approach and an instrumental case study to investigate the performance of an eLearning resource as it sustained a high school learning community. While I used mainly qualitative methods, I supplemented them with quantitative methods that involved the administration of a number of questionnaires.

Although a great deal of thought went into rephrasing the pertinent educational jargon so that it would be intelligible to learners of a school-going age, the possibility remains that the some of the participants might simply have been too young to have formed any meaningful opinions about some of issues. In spite of this possibility, their answers revealed the necessary depth of understanding. Their answers in the quantitative side of the research were cross-checked

(crystallized) by data from the qualitative component of the research.

In chapter 3, I considered each data collection instrument used in this study in detail, together with the possible disadvantages of each one. I also described the corrective measures that I put in place to compensate for these deficiencies.

In setting up the research I thought it best not to repeat the frequently used (and my opinion useless) pre-test post-test research approach. The Clark (2000) – Kozma (1994) – Russel (1999) debate is ongoing in this regard. Instead I opted for an in-depth case study.

In answering the research question, I utilised four broad theoretical approaches. Although I might have equally well have made use of various other points of view in this research, the literature showed that most research at present can be located somewhere in the pedagogics, community, communication and technology.

I compared the results of the qualitative methods from the focus group results with the results of the quantitative questionnaires. I used member checks, peer reviews and crystallization to ensure trustworthiness and authenticity.

I strongly doubt whether the results would have been different if I had used more quantitative research. It may nevertheless be true to say that more in-depth qualitative research might have enabled me to answer the WHY questions more persuasively.

5.4.2. Substantive reflection

I compared the results of this research to other research on the same topic and related the outcomes of this study to other available knowledge in this area. I discussed the literature that I found after I had closed the literature review in the conceptualization phase of the study.

In order to aid my substantive reflection on the research, I developed a data collection matrix or intellectual puzzle. This device enables one to tabulate research questions, literature review findings and the research findings (and their implications) in one table. It is presented at the end of this chapter.

I agree with Cavanaugh (Cavanaugh, 2004b) that eLearning may be unique for learners of school-going age and that the principles derived from adult learning may not be directly applicable. An eLearning resource for school-going learners should be different from one used for adult learners – or else one's strategy in implementing the resource should at least be carefully suited to the targeted users. But for learners who are as fiercely independent as are those in this research group, an eLearning resource that is tailor-made for university students may in my opinion be especially appropriate rather than disadvantageous.

The majority of learners in this study indicated that they are very independent and that they do not need much support. Perhaps this fact explains why an eLearning resource like the one employed in this research (Moodle, 2004), which was designed for adult learners, still worked for these learners. It would nevertheless probably be better in most cases to use an eLearning resource that has been especially designed for learners of school-going age.

When it came to eLearning models, I found that The Maturity Model of Neuhauser (Neuhauser, 2004) offered an eLearning development pathway and

stages that I found to be particularly useful. During the two years of implementation, for example, I identified a definite movement along the pathway suggested by Neuhauser. These models all offer important glimpses into what are supposed to be the components of an eLearning resource and how they can be used. It is my personal conviction that the eLearning resource (and its concomitant eLearning) will not become obsolete in the future but that it may mature into an even more effective tool of learning – especially if used in combination with mobile telephones and Personal Digital Assistants.

About pedagogical theories

De Villiers (De Villiers, 2002) investigated current directions and developments in learning theories and presented the information she found in a concise model that she called the Hexa-C Metamodel of Instructional Theory and Design. In this research the learners responded in a mainly positive way to the six components that De Villiers identify in her model, namely cognitive science, constructivism, component-based instruction, customisation, creativity, and collaboration. This meta study therefore provides a concise and compact staging point from which to evaluate the pedagogical components of the research.

In general, the learners and subject advisors reported positively on the importance of the elements of pedagogical theories, and agreed that they were all desirable in an eLearning resource. This may also be deduced from the fact that the learners' overall academic performance in the final examinations, administered externally under the auspices and authority of Cambridge University International Examinations, was favourable (Research finding 1).

Cognitive science

Cassel (Cassel, 2002) found that meta cognition is possible for children, one may

say that cognitive science theory elements are supported by this eLearning resource. I also agree with Scardamalia (Scardamalia, 2004) that higher order thinking is possible. She found that open-ended online assignments resulted in higher order thinking. Just like the learners in this research, Levin (Levin, 2002) found that reflection creates a link between theory and practice that breaks down the isolation of the conventional classroom (Carrager, 2003).

While I agree with Beal (Beal, 2002) on the possibility of obtaining benefits accrued from behaviouristic-style rote learning, I am also in agreement with Huffaker (Huffaker, 2003) who says that when it is applied too lavishly, it is no longer beneficial.

Constructivism

The learners agreed that constructivist learning theory elements (as paraphrased to accommodate their understanding) play an important role in an eLearning resource. I nevertheless agree with Fisher (Fisher, 2002) that it is difficult to implement them because online learning must be anchored, contextualised and useful in practice – and that implies the expenditure of a great deal of planning and time. But constructivist learning also requires an input of effort from learners. Wentzel (Wentzel, 2000) and Henning (Henning, 2002) found, for examples, that students may strongly resist a constructivist approach in favour of being "spoon-fed" by means of the more conventional lecturing approach that offers students predigested units of information that require no critical exertion on the part of the students. It is clear that some students do not like to be disturbed in the familiar "comfort-zones" of conventional face-to-face education. Khine found that the students in his research preferred information acquisition to constructivist engagement (Khine, 2003), and Hendricks found that student discussions centred on sharing and comparing information rather than on constructing knowledge (Hendriks, 2004).

Czerniewic (Czerniewicz, 2001) and Le Roux (Le Roux, 2003) are in all probability correct when they say that bright and independent learners seem to benefit more from constructivist approaches online because designing and using online courses may require more imagination and skill than do traditional courses (Czerniewicz, 2001). The students who have made a success of the courses in this research were from privileged backgrounds and they had a sensitive understanding of what was demanded from them academically.

Creativity – motivation

The learners in this research strongly agreed that the eLearning system was workable and desirable in terms of creativity and motivation and they added that the eLearning resource made allowance for personal creativity and provided an environment that challenged them to develop and nurture their own motivation. I agree with Wagner (Wagner, 1998) that this effect of a resource is better appreciated by learners who are more independent and mature than average learners elsewhere. On the basis of what Wagner also said about good attitudes and stable emotions (namely, that they are indicators of creativity), I am able to say that the resource used by the students facilitated creativity. I also agree with De Villiers (De Villiers, 2002) that if instruction inspires, encourages and motivates learners to take risks and rely on their own resources, abilities and expertise, then that would be good instruction. And I agree with Dreyfus (Dreyfus, 2001) that positive emotions engender higher levels of motivation in online learning and that such levels correlate positively with success in handling the medium effectively. It is nevertheless also logically apparent that the opposite is also likely.

Customization

While I regarded customization to be important, the eLearning resource only

permitted a limited amount of customization. The learners did not indicate that this hindered them in any way. But in future this may be an element of great importance as web-logs, instant messaging and mobile telephone devices become more prominent and are more frequently used in conjunction with learning.

Companionship

The learners in this research indicated that companionship (i.e. with other human beings) is the most important element in the eLearning resource. I concur with Klicka (Klicka, 1995) and Harris (Harris, 1995) who believe that companionship is a significant contributor to success in home schooling (which constituted the learning environment of most of the learners in this research).

Closely related to this concept is the role of facilitators and moderators or mentors, and the literature in general is very clear about the importance of these functions. I agree with the conclusion reached by Cavanaugh (Cavanaugh, 2004a) in her meta study that teacher quality is the one factor that requires special consideration in virtual schooling. I also agree with Darling-Hammond (Darling-Hammond, 2000) who found that teacher effectiveness determines success in eLearning to a far greater extent than do differences in class size and heterogeneity. It is vital in my opinion not to underestimate or overlook the importance of the human element. This is corroborated by implication by Cavanaugh (Cavanaugh, 2004a). When she detected similarities in student outcomes between distance and classroom learning, she drew the conclusion that teacher preparation is critical in distance education. I also support the opinion of Adendorff (Adendorff, 2004), whose view coincides with that of Cavanaugh, when she notes that there is a growing body of knowledge about the new roles that online instructors have to assume. Adendorff delineates the

following five important roles: administrator, social supporter, instructor, guide and mediator (Adendorff, 2004).

Loken's research (Loken, 2004) supports the crucial importance of companionship in virtual schooling. Loken found, for example, that if their progress of students is sympathetically observed by a mentor, students become more active in their studies and devote more time to studying. I concur with Horton (Horton, 2000) that an online companion needs be capable of expressing emotional support and empathy. This in effect means that a mentor needs to be caring and able to listen attentively to others. He or she should also be skilled in understanding the meanings and intentions of other people and be able to endure insults and cope with misunderstandings. A mentor above all needs to be able to deal sympathetically but effectively with emotional and practical problems and difficulties.

Further support for the importance of companionship comes from Dreyfus (Dreyfus, 2001) who writes: "Mastery" (an advanced stage of learning) can only be achieved through apprenticeship, which takes time and a special kind of involvement." (author's emphasis)

Community aspects

The most important finding about community is that the learners in this research experienced the learning community as a community characterised by safety, care and openness. This coincides with the findings in the literature about how an effective learning community should be. In numerous sources such as Jonassen ((Jonassen, 1993b), Scardamalia (Scardamalia, 2004), Pratt (Pratt, 1997), Pallof (Palloff, 1999), Lin (Lin, 2001) and others, we find descriptions of community as places (virtual or otherwise) in which learners take part in lively interactions, in collaboration from an independent base, in discourse and discussion, in the sharing of information and in building quality learning experiences in an atmosphere of openness and involvement. There appeared to be a growth in the sense of community of those using the resource because learners reported an increased sense of community between the first year and the second year (Research finding 9).

The role of the online instructors appears to be a factor of crucial importance in the answer as to why certain elements in an eLearning resource contribute to sustaining high school learning. I agree emphatically with Cavanaugh (Cavanaugh, 2004a) when she writes in her meta-analysis that teachers play a critical role in high school eLearning. I also agree with Darling-Hammond (Cavanaugh, 2004a, Darling-Hammond, 2000) that teacher effectiveness in classrooms is a strong determinant of differences in student learning and that it far outweighs the differences in class size and heterogeneity as determining factors. For the learners in this study, most of whom were engaged in some form of home schooling, parents played an equally crucial role in the absence of conventional school teachers.

I concur with Anderson's (Anderson, 2001) description of the three critical roles of an online instructor. In Anderson's view, an online instructor needs to be a good designer of learning experiences as well as someone one who is able to encourage discourse and give direct instruction. The learners who participated in this research indicated that all these activities were discernible in the online instruction that they received.

The learners in this research were very clear that while they stood and appreciated the value of collaboration, they had no preference for group work (finding 12) but preferred rather to work alone instead of with other learners (finding 7). It also became apparent from the interviews that peer pressure does not play a role in their lives (finding 11), and they have no liking for the kind of competition that one usually finds in group work (finding 13). Yu's (Yu, 2001) research provides evidence that competition does not promote cooperation. I personally suspect that the pitfalls and dangers of collaborative discussions described by Horton (Horton, 2000), which include spamming, e-mail bombing, spoofing (pretending to be somebody else), flaming (abusiveness) and the domination of discussions by particular individuals, may all contribute in various ways to the aversion that most of the pupils felt for group work. While Horton found that collaboration energises learners (Horton, 2000), I am of the opinion that that may be true for learners with specific personality configurations because Flynn (Flynn, 2001) found that learners who expressed a preference for group work (probably those who are energized by others) in discussions indicated that they would like to engage in group work again.

I agree with Czerniewicz (Czerniewicz, 2001) that collaboration is more mere group interaction alone and that for collaboration to work it must have a discernible purpose and be clearly guided. If collaboration is not carefully

planned and guided, collaboration may simply take up too much time and that in itself may discourage this activity.

When a learning community creates a sense and feeling of safety, care and openness (finding 14), it becomes possible for learners to make a wide range of friends (finding 15). It is in such circumstances that face-to-face meetings enhance the sense of community and serve to bind it together (finding 16). This concurs with the research findings of Yuen (Yuen, 2003), Hiltz (Hiltz, 1996) and Schulze (Schulze, 2000) who felt that eLearning should include face-to-face encounters where possible. I agree with Engelbrecht (Engelbrecht, 2003) that face-to-face meetings may help online instructors to establish trust in the learning community. Once trust has been established and a sense of community achieved, instructors may find that online discussions become more rewarding than face-to-face discussions. This was what Jonassen (Jonassen, 2001) found.

Niedzwiezka (Niedzwiezka, 2003) is of the opinion that personality characteristics influence choices (a fundamental assertion in information behaviour). While I agree with that I have my doubts about whether this is true of learners of the age of those who were participants. It is possible that particular traits have not yet been set in learners in this early stage of life. If this is so it is not surprising that no particular personality type was found to be predominant in the research (Finding 17). Although Ellis (Ellis, 2003) found that Introvert-type learners are more willing to contribute in discussion forums, it is in my opinion difficult to isolate personality characteristics even though a number of studies reported positive effects when they took perceptual modalities such as learning styles into account (Ghaoui, 2004). I have to agree with with Jelfs (Jelfs, 2002) and in particular with Mayer (Mayer, 2005) who has been involved in research in educational psychology for two decades when he concludes that at the present

moment, learning styles research has not yet produced any noteworthy results. Like Mayer, I also found no positive indication in my research that learning styles made any difference.

Gender differences only produced relevant results in communication patterns in this study. Female learners chatted to a far greater extent (approximately 50% more) than their male counterparts (Finding 28). In the literature, gender differences are already detectable in the different kinds of games that boys and girls built (Kafai, 1996) and in their manner of searching the web (Roy, 2003).

Motivation in children is increased when they are allowed to develop their own learning environments (Kafai, 1996). Attention and motivation should be deciding factors in the design of intrinsically interesting learning environments for children (Malone, 1987).

I agree with Murnane that the successful facilitation of discourse requires hard work (Murnane, 2003) and with Wiggings when he writes that teachers feel that their hard work goes unnoticed (Wiggins, 1993). This is clearly illustrated in the pattern of study activities among learners and teachers in this studies. In the first year of implementation (2004), activity patterns were similar to those of conventional school learners. But in 2005 these patterns changed to a pattern of more activity in the afternoons and evenings (finding 18). Subject advisers worked mostly in the mornings in the first year of implementation (2004) but then changed to working mostly in the evenings in the second year (2005) (finding 19). While the online activity of learners and subject advisers followed an asynchronous pattern with learners either being active in the mornings or afternoons, subject advisers were most active in the evenings (finding 20). This shows the extent to which the increased workload of part-time teachers forced

them to use their evening time to sustain the learning community. If one adds to this the fact that the average class size in this study was around 60 learners per class and the ratio of learners per subject adviser was 223 to 1 (finding 22), one can understand Fisher when he says that group size should be limited and an emphasis should be placed upon facilitation rather than control (Fisher, 2002). Pallof (Palloff, 1999) recommends that class sizes be limited to no more than 20 to 30 even though Jung (Jung, 2000) has found that class sizes are as high as 1100 are still manageable. When I take all these factors into account, I agree with Galusha when he writes that the inadequate interaction and feedback are common problems in eLearning resources (Galusha, 1997).

Communication

I agree with Scardamalia (Scardamalia, 2004) and Heydenrych (Heydenrych, 2001) that the communicative capacity of eLearning resource is supremely important, and with Anderson when he says that facilitating discourse is a key task of the facilitator (Anderson, 2004c). One may expect to see a developing maturity in the quality of discourse among learners using an eLearning resource over a period of time.

Learners did not utilise the communication potential of the elearning resource to the full.

In view of the supreme importance of communication, it is surprising to note that less than half the learners claimed to have adequately exploited the possibilities for communication inherent in the eLearning resource (Research finding 23). The implication of this is that the communication features of the eLearning resource were not used to the full by the participating learners. It is possible that the learners needed more time to become accustomed to the interface or that they needed more time to develop the art of sophisticated discussion, which is what Graddy found (Graddy, 2003). It is also quite possible

that learners simply do not actually need more interaction and communication than they are already getting.

Other researchers have also identified levels of zero usage on the part of learners. Hughes, for instance, found that some learners do not develop real discussions, no matter what the input from their teachers (Hughes, 2002). Ferdig (Ferdig, 2003-2004) replicated Hughes's finding and added that learners do not automatically take to discussions and communication just because the tools for them are there. It is clear that one should not rely too much on learner initiative in this matter. If the exploitation of the possibilities of eLearning is left to at the learners themselves, then, as Ng (Ng, 2001) and Hughes (2002) have found, learners may never actually get round to investigating the elearning resource's potential. On the other hand, Sorensen's finding, which I think deserves careful consideration, is that that when students are forced to participate in discussion forums, a great deal of unneeded communications are generated (Sorensen, 2002). And when too many new topics are introduced into a communication forum, attention becomes scattered and is diverted away from really important online discussion topics (Hewitt, 2003).

It is my opinion that communication should arise out of an intrinsic motivation and need to participate. Tu, for example, found that a where there is a strong feeling of community in an online course, one may expect to see increased levels of interaction (Tu, 2002). If what Collins (Collins, 2004) says is true, namely that the level of online writing is an indicator of success in an online course, then many online courses may be judged to be failures. If the only online components that made a difference in learning were lesson notes, the online calendar, quizzes and tests, as Sain reports (Sain, 2003), then I strongly agree with Le Blanc that eLearning desperately needs an infusion of new ideas to give life to threaded

discussions (Le Blanc, 2004). I also agree with Brett that because patterns of engagement seem to be persistent, it is necessary to intervene earlier rather than later when promoting desirable features (Brett, 2004).

One of the unique features of online discussions has been seen to function to its advantage. Thus, for instance, the time lapse that is a feature of online discussions gives discussions of this kind a unique character and leads to important changes in communication patterns (Hudson, 2000). It is also important to take into account the fact that text-based discussion has its own specific dialect and colloquialisms (Fisher, 2002) that are more closely related to the styles of youth culture than is formal academic writing. Emoticons, for example, need to be used wherever possible (Fisher, 2002). Online communication couched in a semi-colloquial conversational style has been found to be more effective than formal text (Mayer, 2004).

There are number of ways in which online communication can be made more effective. These include:

- Online teachers should include scaffolding aids in their online discussions (Land, 2001-2002).
- Social and communication cues should be built into the system because a lack of social and communication cues may lead to online conflict (Zafeiriou, 2003).
- Media-rich messaging may compensate for the lack of visual clues in online discussions (Bellamy, 1998).
- Because of the lack of non-verbal clues, specific attention must be given to problems of expression in online environments (Fisher, 2002).
- Online tutors should take advantage of research that shows that there is an optimal way to prompt student discussion and it is that the controller

should summarise a few postings and then ask a question (Haavind, 2000). Feedback also plays a critical role in dialogue between online tutors and learners (Hyland, 2001).

The substance of learner communications

Analysis showed that only about one third of the discussions was about academic-related matters and that the remaining two thirds were devoted to socialising (Research finding 29). While this tends to prove how individualistic learners are in pursuing their own ends (research finding 10), it also shows the great need that online learners have for socialising. The learners in this research used the communication facilities of the eLearning resource to pursue their own academic and social needs, with social needs having a strong edge over academic needs, which is exactly what Pena-Shaff (Pena-Shaff, 2001) found. The learners who used the chat rooms to socialize (Research finding 27) were predominantly female (50% more than males, finding 28), and text traffic was largely social rather than academic (Research finding 29). Im (Im, 2003-2004) also found that female learners dominated discussions and these discussions were also mostly social in nature. The gender spread in terms of academic discussion participation was about equal (50%-50 (Research finding 30).

Active and isolated learners and the phenomenon of lurking

Approximately half of the learners were active contributors and half were isolated learners who contributed almost nothing (Research finding 32). Only about one third of the learners added a photograph of themselves or a symbolic image (icon) that represented themselves to their profiles (Research finding 42). While the percentage of learners who "lurked" was about 40% initially, this percentage decreased to around 25% during the two-year period (Research finding 33). This suggests that if lurkers are given more time to become

accustomed to the facilities, some of them do eventually venture out to communicate.

Preece (Preece, 2004) also found that lurking is an ever-present phenomenon in eLearning. He states top five reasons for lurking are:

- Lurkers felt no need to respond.
- Lurkers were inhibited by the fact that they did not know the group.
- Lurkers obtained the help they needed without resorting to postings.
- Lurkers were prevented from communicating by software problems.
- Lurkers very often disliked the group so much that they referred to lurk.

Wenger (Wenger, 2004) suggests that small but active core groups within larger groups might well solve the problem. But Scardamalia (Scardamalia, 2004) shows that lurkers feel more comfortable with asking questions online because discussion forums allow them to ask questions that (for whatever reason) they would not or could not ask in class. Spears (Spears, 2001) also found that the Internet lowered inhibitions among those that participated and that this may be an advantage in some circumstances.

Modes of communication and preferences

Although most learners preferred to be contacted by means of an email for academic purposes, I believe, along with Farmer (Farmer, 2004), that the use of mobile telephones for communication will increase dramatically in the future.

Technological considerations

There are a number of findings from the research that may be valuable in the implementation of new eLearning resources. They may be summarised as follows:

- The average size of a file of course material was 72 kilobytes. It took 5,5 hours to upload 1.1 gigabytes of data in 16 000 lessons in South Africa in 2005 (finding 37).
- Hack attacks and viruses can waste large amounts of bandwidth and increase running costs (finding 38).
- The automated course creation of the 74 courses saved approximately 1300 hours of human labour and around US$11 000 in South Africa in 2005 (finding 39).
- Course development costs in the researched institution were significantly cheaper than they would have been if they had been developed outside South Africa. Thus, while course development for one course cost US$3 000 in South Africa, it would have cost US$88 000 in the United States (finding 40).
- Because it is necessary constantly to upgrade and maintain an elearning resource such as that used in the research, it is necessary to have the reliable and appropriate technical experts on hand to perform these operations continuously (finding 35).
- Web servers inside the local country usually offer better speeds (finding 36).

eLearning resources tend to have a common toolset. Leslie's (Leslie, 2003) synopsis of the findings of the Edutools.info project summarises the most important characteristics common to the 45 course management systems that he evaluated. The top 15 important characteristics of these researched resources occur in the eLearning resource used in this study.

In the following table the intellectual puzzle for this study is presented, together with findings in the literature review, the findings of this research, links to the

data, as well as implications for the resource.

The intellectual puzzle for this study together with findings, links to data, and implications

Main question : To what extent and why are certain features of an eLearning resource workable and desirable for sustaining a high school learning community?

Research Objectives	**Subsidiary Questions**	**Findings in Lit review**	**Findings in this research**	**Source**	**Implications for the eLearning resouce**
Find out to what extent the eLearning resource allowed students to engage in learning.	Question 1 To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource?	eLearning models are constantly emerging. Several were discussed. Community is prominent in all these models. eLearning must build on pedagogical learning theories. The merging of behavioural and constructive theories is advisable. The Hexa-C Meta model and Companionship provide a neat summary. They include cognitive science, constructivism, component-based instruction, customisation, creativity and	1 Overall academic performance was good. 2 Cognitive science theory elements are supported by the eLearning resource. 3 Constructivist learning theory elements play a crucial role in the eLearning resource. 4 The learners expressed themselves as being quite certain that the eLearning system was workable and desirable in terms of Component Display Theory elements. 5 While customization was regarded as important, the eLearning resource only permitted a limited amount of customization. 6 The eLearning resource made allowance for personal creativity and provided an environment that challenged learners to develop and nurture their own motivation. This feature of the resource suited those learners who were more independent and mature than the average. 7 While learners appreciated the value of collaboration, they preferred to work alone rather than together. 8 Companionship (i.e. contact with other human beings) is the most important element in the eLearning resource.	Questionnaire questions on pedagogical issues. But because they were only high school learners, I am not sure that they always understood the questions correctly. Nevertheless, the results show that in their opinion the resource did help them to learn. The focus groups confirm this.	There are many suggestions from the Lit. Review for improvement so that the resource becomes more social constructionist. The wording used for high school learners must be simpler than that used for tertiary students.

		collaboration. Companionship is an additional important component.			
Research Objectives	**Subsidiary Questions**	**Findings in Lit review**	**Findings in this research**	**Source**	**Implications for the eLearning resouce**
Find out to what extent the eLearning resource facilitated the creation and maintenance of an eLearning community.	Question 2 Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning?	A taxonomy of an eLearning community is presented and summarised in seven main themes. These themes are active interaction, collaboration from an independent base, lively discourse and discussions, a sense of community, information sharing, real quality learning and an attitude of open involvement. The role of the online instructors appear to be paramount. The personality and character of individual users affect a learning community.	9 Learners experienced an increased sense of community between the first year and the second year. 10 These learners are strongly individualistic. 11 Peer pressure plays no significant part in the lives of these learners. 12 Learners do not prefer working in groups to working alone. 13 Learners do not like competition. 14 The learning community creates a feeling of safety, care and openness. 15 This type of community makes it possible for learners to have a wider range of friends. 16 Face-to-face meetings enhance a sense of community and serve to bind the community together. 17 Personality types are more or less balanced and no particular trait dominates. The “Thinking” (71%) and “Perceiving” (68%) traits are the only ones indicated by around two thirds of the learners. 18 While the pattern of study activity among learners was similar to patterns found in a conventional school in 2004 (the first year of implementation), this changed in 2005 to a pattern of more activity in the afternoons and evenings.	Various questions in questionnaires, focus groups.	It must have an interface that can be customized. Groupwork activities should be avoided It must have a personal page where preferences can be set. Learners must be able to choose whether to be anonymous or not. If possible, it must accommodate different learning styles by incorporating different modes. It must accommodate synchronous and asynchronous

			19 While subject advisers worked mostly in the mornings in the first year of implementation (2004), this changed to a pattern of working mostly in the evenings in the second year (2005). 20 The online activity of learners and subject advisers follows an asynchronous pattern with the learners being active either in the mornings or afternoons,. But subject advisers are active mostly in the evenings. 21 The average class size was 57 with 62 learners per class in 2004 and 2005 respectively.		communication
3 Find out to what extent the eLearning resource enabled students to communicative and collaborate.	**Question 3** In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource?	Literature on communication is extensive. Various positive and negative pointers were grouped in the literature review.	22 The ratio of learners to subject adviser was 223 to 1. 23 Fewer than half the learners said that they had adequately exploited the possibilities for communication inherent in the eLearning resource. 24 Learners mainly preferred to be contacted by means of email for academic purposes. The smaller number preferred to be contacted on a conventional (landline) telephone, and an increasing number preferred to be contacted on their mobile telephones. 25 While 83% of learners owned mobile telephones, only 56% could be reached by means of an SMS – despite the fact that approximately 80% agreed that their numbers had not changed. 26 Almost all emails (92-94%) were successfully mailed. But this high delivery rate does not mean that the emails were read. 27 Learners used chat rooms mostly to	Questionnaires focus groups	From Lit review Interface should accommodate discussion flow, and if it is already there, ways must be implemented to use it. Ingenious ways to improve communication should be researched and developed

			socialize. 28 Female learners chatted to a far greater extent than did their male counterparts (approximately 50% more). Averages: Female chat volume was 73% in 2004 and 63% in 2005 – as opposed to male chat volume which was 27% in 2004 and 37% in 2005. 29 Analysis showed that only about one third of the discussions concerned academic matters (1008 out of 2741 = 37% in 2005). 30 The gender spread in terms of academic discussion participation is about equal (50%-50%). This is different from the pattern of chat activity where female learners contributed most of the traffic volume. 31 On average, learners contributed 174 chat posts per year, approximately 14 forum posts per year, and about nine forum replies per year. 32 Approximately half of the learners were active contributors and half were “isolated” learners who did not actively contribute. 33 While the percentage of learners who “lurked” was about 40% initially, this percentage decreased in the two-year period (42% in 2004 became 32% in 2005)		

Research Objectives	Subsidiary Questions	Findings in Lit review	Findings in this research	Source	Implications for the eLearning resouce
Find out what technological contraints and opportunities were imposed by the resource on the students and vice versa	Question 4 How do certain technological aspects and instructional design issues affect a high school eLearning resource?	The open source program, Moodle, provides a cost effective, stable and fully functional eLearning platform that contains most of the features found in expensive commercial programs. Since the emphasis of Moodle is on social constructivist pedagogics, it proved to be extremely supportive of this research. Hosting a service with an appropriate hosting service is critical to the speed and functionality of the resource. The limited capacity of the human working memory circumscribes the way in which content can be presented in an eLearning environment.	34 Both learners and subject advisers were highly computer-literate and displayed positive attitudes towards both the medium itself and to the eLearning resource. 35 Because constant updating is necessary, it is necessary to keep reliable technical experts on hand continuously to upgrade the resource. 36 Web servers inside the local country usually provide better speeds. 37 The average size of a file of course material was 72 kilobytes. It took 5,5 hours to upload 1.1 gigabytes of data in 16 000 lessons in South Africa in 2005. 38 Hack attacks and viruses can waste large amounts of bandwidth and increase running costs. 39 Automated course creation of 74 courses saved approximately 1300 hours of human labour and around US$11 000 in South Africa in 2005. 40 Course development costs in the researched institution were significantly cheaper than they would have been if they had been developed abroad. The costs involved were US$3000 in South Africa as opposed to US$88000 in the United States.	Various questions in questionnaires and focus group interviews with both staff and students	Bandwidth usage is generated with more and more features. The cost effectiveness of every implemented feature should be carefully considered. Each implemented feature should be justified on the basis of what whether or not it makes an important difference and what it achieves. Expertise is needed to setup and maintain a cost-effective system. eLearning in South Africa is not a cheap option..

		Merrill suggests five principles that are common to effective instruction: being engaged in real-world problems, activating previous experiences, demonstrating what is to be learned, and applying new skills. The main challenge for eLearning lies in getting instructional design right. Effective design takes into account working with problems, the use of realistic materials, the identification of good information resources and cognitive tools, and the need for conversational and collaboration tools and social support.	41 It is necessary to set certain minimum hardware requirements for those who enrol. 42 Only about one third of the learners added a photograph of themselves or a symbolic image (“icon”) to their profiles.		

Table 66 : The intellectual puzzle for this study together with findings, links to data, and implications

This table shows the intellectual puzzle for this study together with findings, links to data, and implications

5.4.3. Scientific reflection

The scientific reflection focuses on what this research has contributed to the scientific body of knowledge in this field.

I have extracted the most important findings from this research and have presented them in the table below.

Findings in this research	Research sub-question 1 (Pedagogics)
7	While learners appreciated the value of collaboration, they preferred to work alone rather than together.
8	Companionship (i.e. other human beings) is the most important element in the eLearning resource.
	Research Sub-question 2 (Community)
9	Learners experienced an increased sense of community between the first year and the second year.
10	The learners have strong individualistic inclinations.
11	Peer pressure does not play a role in the lives of these learners.
12	Learners do not prefer group work.
13	Learners do not like competition.
14	The learning community creates a feeling of safety, care and openness.
15	This type of community makes it possible for learners to have a wider range of friends.
16	Face-to-face meetings enhance a sense of community and serve to bind the community together.
18	The pattern of study activity among learners followed was similar to patterns found in a normal school in 2004 (the first year of implementation), but changed in 2005 to a pattern of more activity in the afternoons and evenings.
19	Subject advisers worked mostly in the mornings in the first year of implementation (2004) but then changed to working mostly in the evenings in the second year (2005).
20	The online activity of learners and subject advisers follows an asynchronous pattern, with the learners either being active in the mornings or afternoons, while subject advisers are most active in the evenings.
21	The average class size was 57 and 62 learners per class in 2004 and 2005 respectively.
22	The ratio of learners per subject adviser was 223 to 1.
	Research Sub-question 3 (Communication-Collaboration)
23	Less than half the learners said that they adequately exploited the possibilities for communication inherent in the eLearning resource.
27	Learners used chat rooms mostly to socialize.
28	Female learners chatted to a far greater extent than did their male counterparts (approximately 50% more). Averages: Female chat volume was 73% in 2004 and 63% in 2005 – as opposed to male chat volume which was 27% in 2004 and 37% in 2005.

29	Analysis showed that only about one third of the discussions were about academic-related matters (1008 out of 2741 = 37% in 2005).
30	The gender spread in terms of academic discussion participation is about equal (50%-50%) - dissimilar to chat activity where female learners contributed most of the traffic volume.
33	The percentage of learners who "lurked" was about 40% initially, but this percentage decreased in the two-year period (42% in 2004 became 32% in 2005)
	Research Sub-question 4 (Technological)
34	Both learners and subject advisers were highly computer-literate and displayed positive attitudes towards both the medium itself and the eLearning resource.
36	Web servers inside the local country usually provide better speeds.
37	The average size of a file of course material was 72 kilobytes. It took 5,5 hours to upload 1.1 gigabytes of data in 16 000 lessons in South Africa in 2005.
39	Automated course creation of 74 courses saved approximately 1300 hours of human labour and around US$11 000 in South Africa in 2005.
40	Course development costs in the researched institution were significantly cheaper than international costs – US$3 000 in South Africa as opposed to US$88 000 in the United States.

Table 67: Summary of Research findings
The table shows the research findings for this research

Recapitulation: the highlights and main findings of the research

This research shows that it is possible for a group of high school learners to co-create and experience an online learning community by using an eLearning resource that is similar in its functions to ones that have been designed for older students in a university setting. The standard features that are currently being used in this eLearning resource are both workable and desirable.

The proper engagement and involvement of companions is absolutely necessary if on hopes to facilitate an learning community by using an eLearning resource. Parents and teachers are the most obvious companions. The features of an eLearning resource that support interaction between companions and learners are desirable. The actual features of the eLearning resource are currently being underutilised. All current features may be regarded as workable.

What is immediately apparent about the composition of this group is their independence, their strong individualism and their aversion to group work and

competition. One could reinforce these characteristics in e-learners by designing the elearning resource in such a way that it makes special provision for these characteristics and so becomes even more desirable. Unless group work is absolutely necessary for academic success of learners, it should be avoided because it appears to annoy learners such as those who participated in this research.

The eLearning resource permits learners to create ("customise") a lifestyle for themselves that suits their needs. In the second year of implementation, more learner activity was detected in the afternoons and evenings. Teachers also changed their pattern of working hours during the same period so that they worked more in the evenings. There was a definite asynchronous pattern of interaction between students and teachers during the period of the research. Teachers who teach these learners have to cope with bigger class sizes and a higher ratio of learners to teachers than one would find in a conventional school. Teachers would be deeply appreciative of any resource features that would ease their workload.

Economies of scale can be achieved in practice by permitting teacher to learner ratios that would not be workable in a conventional school environment but that seem to function reasonably well in an online environment.

The communication facilities in this eLearning resource were underutilised for academic purposes. Most of the chatting related to the social interests of the students while only one third of discussions were concerned with academic matters. More than one third of the learners were "lurkers" – silent online observers and listeners who made no contributions at all. This tendency might be explained by the fierce individualism of the students in this research who had

a strong preference for working alone rather than in groups such as chat rooms. It is possible that such students preferred to solve their own academic problems without reference to their fellow students. It is apparent that teachers also do not spend enough time in preparing collaborative tasks. Enhancements of communication facilities will presumably always be a priority for those who want to create more desirable features in an eLearning resource.

Both the learners and the subject advisors were sufficiently technically skilled to find their way around the resource and both groups were highly computer literate. The enthusiasm of both the learners and teachers for this online medium of instruction and their ability to manipulate it effectively contributed largely to the establishment and success of this online eLearning community. It was critical to have the eLearning resource supported by a knowledgeable team with good programming skills. Downtime was almost zero during the two years of the research. One can therefore say that both the computer and network hardware were able to perform the tasks required of them adequately and efficiently. In spite of the ever-present threat of hackers and distributors of viruses in cyberspace, the eLearning system was only brought down for two days because of a worldwide denial of service attack by organised international hackers.

5.5. Recommendations:

5.5.1. For policy & practice

The following is recommended.

Strategic

In making decisions and taking actions that will determine the long-run performance of an eLearning resource for learners of schoolgoing age, recommends that the policies on which to base an eLearning strategy should

always be founded on the pedagogical theories and models accumulated by mankind thus far.

This study reiterates the importance of the role of companions in the success of any eLearning endeavour for schoolgoing learners. In a medium-, long term strategy for an eLearning resource for learners of schoolgoing age, the human support structure, including parents, teachers, mentors etc cannot be overemphasized.

Tactical

In planning and maneuvering to operate an eLearning resource, one should get a clear picture of the make-up of the participants. For instance, in this research, the learners reported that they are independent learners, and that they do not prefer group work. The eLearning implementation should then work with the learners and not enforce many group activities.

Operational (functional)

On a functional level, operating an eLearning resource for high school learners, synchronous and asynchronous demands must be met. This study showed a very definite asynchronous activity pattern between teachers and learners. Thus, expectations about response and feedback should be managed. For example : learners should know that their teachers will probably only answer their posts in the evenings.

At high school level, one should expect that most communication from learners will have a "social" nature. A very high level of seemingly "useless" data needs to be managed.

A technical team, with programming capability, with very specific expert internet and network knowledge is to be employed or outsourced. In "cyberspace" an eLearning can easily be taken of air or be constantly paralyzed by malicious acts. The technical team must be on constant alert for areas that needs attention, ie, adding or removing certain features to improve the learning experience or making support easier for the teachers. The technical team should also manage high volume data created by interaction and do load-balancing between computer hardware so as to always allow the users to experience a responsive resource. A slow resource is bound to discourage the use of such a resource.

5.5.2. Recommendations for further research

Fundamental research

Even though eLearning appears to be acquiring the status and dignity of a science in its own right, it can never divorce itself from being an activity that is central to progressive modern education. Because of this, it will always have to take account of the accumulated knowledge and research that has been conducted over the years in the various fields of learning theory.

I have presented some of the findings about the operation of the Hexa-C Metamodel (Cognitive science, Constructivism, Component Display Theory, Customization, Creativity, Collaboration), together with the important element of Companionship. In spite of the research that has already been done, a great deal more still needs to be done to refine the theory of eLearning – specifically eLearning as it applies to school-going learners.

Applied research

Because of the centrality of community in eLearning, the communication tools of

an eLearning resource are critically important for the success of an eLearning resource. Much more research into the use, design and functionality of communication tools needs to be undertaken if communication models are to be improved. (This recommendation is dealt at more length in the next section.)

The critical role that companions (parents, teachers, mentors) play in the success of high school eLearners also needs much more research.

5.5.3. Recommendations for further development work

Communication tools also need to be developed, refined and made more sophisticated before the overall quality of eLearning resources can be made more desirable and workable. There is an urgent need for innovation to be applied in the development of interactional tools so that they will be more serviceable, workable and desirable in eLearning resources.

Because of the importance of mobile phones in the lives of high school learners, it might be a workable and desirable innovation to link the use of mobile telephonic devices to eLearning resources.

The ability to customize a personal page with academic and personal elements would also make an eLearning resources far more desirable and alluring to the high school users of such resources.

Since such vast quantities of information are available to users, sophisticated tools to manage information would also make an eLearning resource far more workable and desirable.

The potential of the personal computer and the Internet to assist learners and co-participate as an intelligent agent in all stages of learning process is especially underutilized.

There are, for example, a large number of creative precedents for desirable and workable interpersonal features that are already well established on various websites such as Facebook, MySpace, Flickr, Second Life and YouTube (to name but a few). Any number of these features might easily be adapted to enrich eLearning resources without any breach of copyright. If the websites mentioned above are anything to go by, then the tools that learners have to present themselves socially and academically to other eLearners on the resource are woefully inadequate and unappetising by comparison.

The more effective, creative and challenging the tools for social and academic self-presentation are, the richer, more memorable and more affirming will be the experience that learners have in online education. In fact, many learners who are designated as "lurkers" or as "shy" participants may simply be bored by the feebleness of the customisable tools and resource-linked opportunities for imaginative self-presentation available in many eLearning resources. It will be as well for developers of eLearning resources remember that whatever design features they incorporate, these will automatically be competing with the large number of entertaining social websites with which the majority of learners are already familiar.

Unless an eLearning resource is able to make a strong appeal to the imagination and creativity of learners, it will be in all likelihood be *tolerated* rather than *enjoyed*. A great deal of developmental work still needs to be done on the interface between entertainment and learning and on how to make learning

more alluring, challenging and exciting in a world already saturated with high-class online entertainment and socialising software. One of the greatest challenges of eLearning resource developers in the 21st century is how to make learning at least *to some degree* as interesting and challenging as entertainment software. So long as tools for self-presentation by learners in an elearning resource remain uninspiring and unimaginative, learners will only take what they can from the resource and find their entertainment and socialising elsewhere.

One needs to be cautious about condemning socialising on the grounds that it excludes more serious academic matters. Socialising may well be a necessary prelude to serious academic interaction in an online eLearning resource. If that is the case, then an eLearning resource can only be enriched by providing more imaginative tools for social self-presentation by users of eLearning resources. Academic engagement may paradoxically depend on the ability of learners to feel *that they actually matter as individuals* in the cyber world of the online eLearning resource. And one of the ways in which learners are able to feel that they do matter and are important is through imaginative self-presentation. While this happens all the time on highly popular websites such as Flickr and Facebook, there is hardly any scope and all for creative self presentation on the average eLearning resource. This may be a serious defect in current online eLearning resources. Whether it is or not can only be answered by further research into the dynamics of online communication and self-presentation.

It might be instructive in this regard to draw appropriate conclusions from the experiences of Czerniewicz (2001), who experienced participation in an online learning forum as destructive rather than affirming of her personal identity. As one participant in Czerniewicz's course (Czerniewicz, 2001) commented, “When

you have a small group of what are essentially strangers trying to work together without any common sense of association it might provide with a very negative experience."

I therefore draw the conclusion that unless an online eLearning resource is able to enhance and strengthen the sense of personal identity and uniqueness in participants, it will be experienced as depressing and undermining (which is what happened to Czerniewicz). Since one of the key features of constructivist learning is the construction of personal meaning *in cooperation with other learners*, eLearning resources *need* as many features as possible to strengthen each learner's sense of personal identity. This is an area that requires urgent research and development.

While modern computer-literate young people are prepared to work hard, it would be unwise to assume that they will always be infinitely intolerant of eLearning resources that are simply conduits for information. Unless high-school learners are given opportunities to constellate a definite self-affirming online cyber *identity* in the context of the eLearning resource, they may well only use the barest features of the resource and reject other opportunities for personal online engagement with their co-learners. While they may then be regarded as lurkers or "shy", they may merely be bored and uninspired by the resource 's potential.

It is important for all designers of online learning resources to be familiar with the most popular features of the kind of websites that I mentioned above. These websites are currently patronised by millions of users because they have the power to entertain, inspire and satisfy participants and because they appeal to the imagination and social instincts of their users. Like it or not, eLearning

resources are constantly being judged (albeit unconsciously) by the high standards set by most successful pioneers in participatory websites such as those that we have mentioned. It is important for present and future designers of elearning resources to understand why these websites are as popular as they are.

There is currently unlimited scope for those who are passionate about education to apply the lessons that can be learned from the science and engineering of intelligent machines to eLearning resources. Since online learning appears to be the wave of the future in progressive education, it is necessary for designers and developers to incorporate as many successful features of popular websites as might be feasible into the design and development of future eLearning resources. If one considers how the average online resource compares to some of the best popular sites, then it becomes apparent that there are innumerable ways in which eLearning resources can be improved and made more meaningful, exciting, relevant, desirable and workable to high school users..

5.6. Conclusion

It is my belief that the research question "To what extent and why are certain features of an eLearning resource workable and desirable for sustaining a high school learning community?" has been answered in this thesis to such an extent that other stakeholders in high school education will be encouraged to use the information provided to guide them in implementing an eLearning resource that will support a learning community.

Investigations on the subsidiary questions, about pedagogical-, community-, communication- and technological aspects, paint a reasonably comprehensive and descriptive picture, derived from a natural setting, about desirable and

workable features for an eLearning resource for high school learners.

Most functionalities of eLearning resources, as prevalent in the world in 2004/5/6, are desirable and workable in terms of pedagogical-, community-, communication- and technological aspects. Those features that support interaction with companions, teachers or mentors are extremely important in the success of an eLearning resource with learners that are as fiercely independent and individualistic as the subjects in this research. Huge scope for further research and development, and the development of models, exists in almost every feature of existing eLearning resources.

Economies of scale can be achieved, but a competent technical team is essential.

It is my belief that the research has been ethically done and the findings are valid and authentic.

eLearning strategists can benefit from findings in this research.

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7. APPENDICES

High School eLearning:
An investigation into the desirable and workable features of an Internet eLearning resource to sustain high school learning communities

by

Johannes Cronje

Submitted in partial fulfilment of the requirements for the degree
Doctor Philosophiae
in the
Faculty of Engineering, the Built Environment and Information Technology
UNIVERSITY OF PRETORIA
Supervisor : Prof. J.C. Cronje,
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APPENDICES

APPENDICES

Appendix 1: Analysis of international and South African research relevant to this study

International Research			
Researcher	**Research title: Degree**	**Year**	**Output**
Range covered : The international degrees covered the effect of conferencing on outcomes, online experiences and factors associated with successful high school educational prograns			
Cain DL	The explained effects of computer mediated conferencing on student learning outcomes and engagement	2005	PhD
Ma H	Interpreting middle school students' online experiences: A phenomenological approach	2005	PhD
Murphy K	Factors associated with successful high school distance education programs	2005	PhD
Implications : Cain found that computer mediated communication did make a difference in outcomes. Ma reported that learners view computer use at schools as limited and that more constructivst elements are needed. Murphy focused on implementation of elearning projects in Tennesee and made implementation recommendations. None of these studies provided substantial material that could be used in this research.			

SA Theses			
Researcher	**Research title: Degree**	**Year**	**Output**
Range covered : The South African theses covered social networking, business applications, quality assurance, online facilitators, communication, Maths and language teaching on the web, instructional systems design, a virtual campus and asynchronous tools.			
Giladi M	Windows of culture: An analysis of Israeli ORT school websites	2005	MEd
Du Plessis AS	Travel information exchanges in a computer-mediated environment: A social network analysis of the Africa category on the departure lounge branch of the "Thorn Tree"	2005	PhD
Korpel IR	Identifying a leverage point to improve business performance through e-learning: A case study in a financial institution	2004	PhD
Fresen JW	Quality assurance practice in online (web-supported) learning in higher education: An exploratory study	2004	PhD
Adendorf DE	An investigation into the roles and competencies of an online facilitator	2004	PhD
Miller PA	How South African Further Educational and Training learners acquire, recall, process and present information in a digitally enabled environment	2003	PhD

Delport R	Computer-mediated communication in undergraduate Mathematics courses	2003	Med
Carr A	Information, knowledge and learning: Is the web effective as a medium for Mathematics teaching?	2002	PhD
Heyns D	Providing a web-based information resource for Afrikaans First Language teachers	2002	MA
De Villiers MR	The dynamics of theory and practice in instructional systems design	2002	PhD
Lazenby K	Technology and educational innovation: A case study of the virtual campus of the University of Pretoria	2002	PhD
De Villiers G	Asynchronous web-based technologies to support learning	2001	MA
Implications : Although only Giladi covered school eLearning, I was able to extract valuable information from all the research especially from instructional systems design information (De Villiers).			

SA research articles			
Researcher	**Research title : article**	**Year**	**Output**
Range covered : A wide range of topics are covered including administrative matters, evaluations, effectiveness, comparisons with conventional learning, social factors, learning theories, practical implementations, trends and delivery.			
Rauscher WJ	Online with Krathwohl: affective aspects of learning in an online environment	2005	Article
Molefe NPJ	Comparison of the learning effectiveness of computer-based and conventional experiments in science education	2005	Article
Lamprecht S	The effectiveness of WebCT as a progress-assessment tool in English studies	2005	Article
Labuschagne M	A case study of factors influencing choice between print and on-line delivery methods in a distance education institution	2005	Article
Kajee L	Sites of struggle, sites of opportunity: constructions of identity, relationships and participation in online communities of practice: research: information and communication technologies	2005	Article
Henning E	Knowledge ecologies in fragile online learning environments: research: information and communication technologies	2005	Article
De Villiers MR	Six learning theory perspectives on a Web-based learning environment	2005	Article

Le Roux A	Evaluating Unisa course material using a Course Evaluation Instrument ICE	2004	Article
Van Niekerk D	Research visit to several universities in Texas, in the United States and the information technology in Distance Education Conference – 4-19 May 2003	2004	Article
Engelbrecht E	A look at e-learning models: investigating their value for developing an e-learning strategy	2003	Article
Kizito R	A personal experience of learning with print and learning with electronic media in open and distance education	2003	Article
Le Roux A Unisa	European trends in the Internet delivery of education	2003	Article
Van der Spuy M Wocke A	The effectiveness of technology based (interactive) distance learning methods in a large South African financial services organisation	2003	Article
Engelbrecht E	e-Learning – from hype to reality	2003	Article
Blignaut S Knoetze J	first-line evaluation of just-in-time JIT online support system for training in information communication technology ICT	2002	Article
Henning E Van Rensburg W	'Re-zoning' proximal development in a parallel e-learning course	2002	Article
Kizito R	Barriers to the adoption of computer-mediated collaborative learning practices in open and distance education	2002	Article
Makin V	Trends and needs in distance education research: the death of distance	2001	Article
Heydenrych J	Avoiding a tired and stale pedagogy: activating on-line learning	2001	Article
Daweti M	Getting the best out of online courses	2001	Article
Wentzel A	Tapping the potential of the Internet in the classroom	2000	Article
Heydenrych J	A critical appraisal of the implementation of online learning technologies: society, higher education and business	2000	Article
Heydenrych J	Online learning: strategic considerations for university management	2000	Article
Heydenrych J	The role of government in planning for the implementation of online distance education technologies in South African higher education	2000	Article
Heydenrych J	The development and delivery of courses via online technologies at Unisa	2000	Article

Implications : Although none of the material covered high school eLearning in particular, I was able to extract valuable information from all the research especially from the article on learning theory perspectives.

Appendix 2: Communication tools outlined by Heydenrych

Heydenrych (Heydenrych, 2001) outlines the following synchronous communication tools.

- Desktop video conferencing - A desktop video system is basically a chat system that uses video images instead of text messages. The video images and audio are captured by a small digital camera that is connected to the PC. But this requires rather more powerful technology and ISDN lines or wider bandwidth. Group conversations are also difficult for a larger number here and a very strong moderator is needed.
- Audio conferencing - Here the Internet connection is used as a telephone line to communicate with others in real time.
- Audiographics - Another possibility is audiographics which allows audio interaction and shared graphic images or applications. Participants in the conference can hear what the others are saying and see the graphic images or program screens. This is also called shared whiteboards.
- Chat rooms. These tools are also called real-time conferencing or synchronous conferencing. The simplest form of real-time conference is a chat session, in which participants exchange typed messages and everyone sees the message as soon as it is sent. Each message is preceded by the name of the sender so identification is possible all the time. Because the interaction is in real time, it is spontaneous and dynamic. Discussion in a chat session is often difficult to follow because many people are attempting to contribute at the same time. Once a chat session has more than three or four participants, it is desirable to have a moderator who controls when people speak. These tools are usually left for small groups of learners to use should they prefer it to prepare for on-line presentations.

Asynchronous tools described by Heydenrych (Heydenrych, 2001).

Groupware - Kearsley (Kearsley, 2000) highlights the primary focus of most groupware as problem-solving and decision-making tasks and it is more used in business and management training.

File transfers - This is used to upload documents and is a general purpose tool.

Simulations - Computer simulations can help learners to learn through practice.

E-mail - is the foundation for all forms of on-line learning and teaching (Kearsley, 2000). Email is a very cost-effective application in terms of computing and network resources needed - it works with a minimum of equipment, software and facilities. In most cases, in a course setup the response is sent as a private message to the instructor who then provides feedback directly to the student via e-mail if a more public threaded discussion is not appropriate for the issue at hand. An e-mail distribution can be used to ensure that everyone in the course receives messages. Assignments can be e-mailed to instructors as attachments, and e-mail can also be used informally by students to interact with instructors and fellow students. But this will not be a successful communication tool if not all participants access their mail regularly - this is a fundamental condition for on-line education (Kearsley, 2000) A reasonable expectation for turnaround is between 24 and 48 hours.

Newsgroups - Newsgroups can be created in on-line spaces where visitors can post messages relevant to the subject of the newsgroups. Automatic notification via e-mail is a very valuable feature of this tool.

Discussion forums - A threaded discussion is usually created in a discussion forum. This form of group communication is the second most popular form in on-line education (Kearsley, 2000) This is also called asynchronous conferencing, or a bulletin board. Topics and subtopics are created, and learners post messages under any topic/subtopic desired - messages include the sender's name, a subtitle for the message, and the text of the message. To read messages, one selects the topic/subtopic of

interest and clicks on the messages available. In the context of a course, each topic on the discussion board corresponds to a topic in the class - the instructor posts a question, issue or problem as the discussion topic, and students post their responses as subtopics. A discussion evolves over time as participants post their comments - since everyone sees all the responses, this is a more public form of interaction than using e-mail

Appendix 3: Positioning this research in Burrel's research paradigm

Burrel (Burrel, 1979) points out that many social scientists tend to believe that they can be objective and understand realities by means of observation without ever having been participants in the processes that the study.

They believe that because they are conducting "scientific" research, their assessment of empirical situations cannot be influenced by their own interests and positions. They consequently believe that that the data that emerges in education research is value-neutral and "objective", and that, as such, it "reflects the attempt, par excellence, to apply the models and methods of the natural sciences to the study of human affairs" (Burrel, 1979). The functionalist approach to the social sciences (represented by the bottom-right quadrant in the diagram above) tends to assume that the social world is composed of relatively concrete empirical artefacts and relationships that can be identified, studied and measured by means of approaches and methods derived from the natural sciences (Burrel, 1979). This study cannot be positioned in this quadrant

The radical humanist approach to the social sciences (represented in the top-left quadrant) emphasizes the importance of transcending the limitations of existing social structures. Such limitations they believe distort true human consciousness (Burrel, 1979). The major concern of theorists who study the human situation on these terms is the power of the constraints that existing social arrangements exert on human development. The radical humanist in such circumstances would typically suggest ways for human beings to rise above the limitations of existing social structures. This research does **not** fit into this quadrant.

The radical structuralist (represented in the top-right quadrant), like the radical

humanist, would advocate change. But whereas radical humanists are concerned with ideological structures and individual consciousness, radical structuralists focus their critique on material structures and are concerned with the consciousness of entire categories of individuals such as those represented by races, genders, and socioeconomic classes. Radical structuralism, like radical humanism, is concerned with changing consciousness. But it advocates a sociology of radical change that supports the view that change in society must be accompanied by change in the structure of society (Naicker, 2000). This study does **not** fit into this quadrant either.

The interpretivist paradigm (represented in the bottom-left quadrant) maintains that social scientists are concerned with understanding the social construction of reality or the ways in which people create and share meaning. According to Burrel and Morgan (Burrel, 1979), the interpretivist paradigm is informed by a concern to understand the world as it is at the level of subjective human experience. The interpretivist researcher attempt to understand and analyse this reality.

Although this present research falls into the interpretivist-interactionist quadrant, it also reveals characteristics of the functionalist quadrant because it analyses data in a quantitative manner as a prelude to making suggestions about how elearning for the learners under consideration could be improved

Appendix 4: Placing this study as a case study versus other qualitative studies

The study is not ethnography. Ethnography, (Creswell, 1998) studies the behaviours of a discrete cultural groups in terms of anthropological concepts such as rituals, myths, stories, and so on. This study is not phenomenological. It does not attempt to understand how phenomena are reflected by the uniqueness of individual experiences (Creswell, 1998). This study does not offer biography. It does not focus on the life or understanding of a specific person. It is not a grounded theoretical study because the researcher was not attempting to develop any kind of theory. It rather reflects on theory in the context of the understandings and meanings of the participants.

Appendix 5: Student Questionnnaire 1 – PERSONALITY

Mr. J Cronje is requesting the permission of parents and students to conduct research with students in Brainline Cambridge

Mr J Cronje is currently completing a Dphil degree with the University of Pretoria, , and requests your consent to involve your child/children in the research.

The aim of the research is to evaluate the implementation of the e-learning interface used by Brainline in ……..

The following research methods will be employed :Structured interviews, Unstructured interviews, Telephone interviews, Focus groups, Questionnaires, Observation, Analysis of data on brainonline.

The research is privately funded by Mr. J Cronje. Declaration of interests : Mr J Cronje is the CEO of Brainline.

The anticipated benefits of the study is improved educational elements of the e-learning interface and the learning community, specifically in the area of collaborative learning, social learning.

Results will be published by the University of Pretoria if the thesis is successful.

The researcher anticipates no discomfort to the students, and subscribes to an ethical code of conduct, prescribed by the University of Pretoria. (The code is listed below)

Students and parents have the right to abstain from participation, and have the right to withdraw their consent at any time.

Complaint**s** : any complaints can be made to the researcher at ……and to the researchers supervisor at ……..

……

Consent

Parent name and surname ……
the parent / guardian of the following student :

Student name and surname :……

Student number with Brainline : ……

Hereby give my consent to the research outlined in this document

_____ _____
Signature of parent Date

RESEARCH ETHICS: CODE

I undertake to maintain the highest standard of research excellence, professionalism and ethics in all research in which I may become involved or may have to supervise. I am also committed to the following:

- Putting the personal well-being, dignity and interests of participants in research first, respecting them as individuals, treating them fairly and justly, and ensuring that their well-being and interests enjoy preference in the event of a conflict of interests.

- Doing everything in my power to safeguard the interests of participants in research, being specifically sensitive with respect to minors, the handicapped, the aged and those who are dependent on me.

- Notifying participants about the objectives, nature and extent of the research as well as their envisaged involvement and the potential risk of participation, enabling them or their proxies to make informed decisions about voluntary participation in the research or to withdraw at any time.

- Ensuring the privacy and anonymity of participants and guaranteeing the confidentiality of their personal details, not keeping their personal research results from them if they should ask for these results.

- Using recording equipment such as audio and video tapes openly where appropriate, with the knowledge and approval of participants, and handling and storing the information with due attention to confidentiality.

- Eliminating any risk that could harm the participants physically, psychologically, economically or financially, or protecting them against such harm, or limiting such risks, with their informed consent, to those that are unavoidable in realising the objectives of the research.

- Handling all information obtained in the course of research in a manner that would not put the legal or financial position of the participants at risk or harm their reputation, employment possibilities, personal or business relationships.

* * * * * * * * *

The text of the introductory protocol for questionnaires

You are invited to participate in our survey about eLearning with Brainline. In this survey, you will be asked to complete a survey that asks questions about the use of brainONLINE. It will take approximately 20 minutes to complete the questionnaire.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. It is very important for us to learn your opinions.

Your survey responses will be stricly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. If you have questions at any time about the survey or the procedures, you may contact Johannes Cronje at …. or by email at the email address specified below.

Thank you very much for your time and support

Name and Surname:	
Z – Number:	Cell number:
E- Mail:	

1. At a party do you
   (a) Interact with many, including strangers
   (b) Interact with a few, known to you

2. Are you more
   (a) realistic than speculative (make guesses)
   (b) speculative than realistic

3. Is it worse to
   (a) have your 'head in the clouds' (be happy)
   (b) be 'in a rut' (be sad)

4. Are you more impressed by
   (a) principles (beliefs) (b) emotions (feelings)

5. Are you more drawn towards the
   (a) convincing (people that reason with you) (b) touching (people with emotions)

6. Do you prefer to work
   (a) to deadlines (must be finished dates) (b) just "whenever"

7. Do you tend to choose
   (a) rather carefully (take time) (b) somewhat impulsively (without thinking)

8. At parties do you
   (a) stay late, with increasing energy
   (b) leave early, with decreased energy

9. Are you more attracted to
   (a) sensible people (serious) (b) imaginative people (with many Ideas)

10. Are you more interested in
    (a) what is actual (for certain) (b) what is possible (can be)

11. In judging others are you more swayed by
(when you "examine" someone do you focus on)

(a) Laws and not by circumstances – the laws or more important
(b) Circumstances and not by laws – other details are more important than laws

12. In approaching others are you inclination to be somewhat
(when you make contact with people and work with them, are you more…..)
(a) objective (impersonal, just look at facts)
(b) personal (like to talk about personal things)

13. Are you more
(a) punctual (always on time)
(b) leisurely (casual about time)

14. Does it bother you more to have things
(a) incomplete
(b) complete

15. In your social groups do you
(a) keep abreast (ahead) of other's happenings
(b) get behind on the news (always hear the news late)

16. In doing ordinary things, are you more likely to
(a) do it the usual way
(b) do it you own way

17. In your opinion, writers should
(a) "say what they mean and mean what they say"
(b) Express things more by use of analogy (nice way of saying something eg: as sweet as…)

18. Which appeals to you more (which do you prefer)
(a) consistency of thought (thinking the same way all the time)
(b) harmonious human relationships (good relations with others)

19. Are you more comfortable in making
(a) logical judgments (straight thinking)
(b) value judgments (think with the "heart")

20. Do you want things
(a) settled and decided (cool and calm)
(b) unsettled and undecided (I like it when things are not always cool & calm)

21. Would you say you are more
(a) serious and determined
(b) easy-going

22. When you phone someone….
(a) don't plan what you are going to say
(b) rehearse what you'll say – plan what you are going to say

23. Facts – Like a “cow is a cow” or “ the earth is round”
    a) “speak for themselves”
    (b) illustrate principles (show us basic rules)

24. Are visionaries (people that can think ahead)
    (a) somewhat annoying (I don’t like them)
    (b) rather fascinating (I like them)

25. Are you more often
    (a) a cool-headed person (emotional)
    (b) a warm-hearted person

26. It is worse to be (Which is the worst)
    (a) unjust (NOT seeing both sides
    (b) merciless (just be bad/cruel) of an argument)

27. Should one usually let events occur
    (a) by careful selection and choice (think about it long and hard)
    (b) randomly and by chance (just let it happen)

28. Do you feel better about
    (a) having purchased (buy something)
    (b) having the **option** to buy (just to know that you can buy)

29. In company do you (when with others, do you.)
    (a) initiate conversation (start a conversation)
    (b) await conversation (wait for others to talk)

30. Common sense is
    (a) rarely questionable (is always right)
    (b) frequently questionable (common sense may not be right.. Frequently)

31. Children often do not
    (a) make themselves useful enough
    (b) exercise their fantasy enough

32. In the making decisions do you feel more comfortable with
    (a) standards
    (b) feelings (the way thing should be done)

33. Are you more
    (a) firm than gentle (immovable hard than soft)
    (b) gentle than firm (more soft than immovable hard)

34. Which is more admirable (likeable … wonderful)
    (a) the ability to organize and be methodical (full of methods to do things)
    (b) the ability to adapt and make do (change easily and make plans with what you have)

35. Do you put more value on the

(a) definite (that which is certain) (b) open-ended(uncertain – and can be anything)

36. Does new and non-routine interaction with others
(when you interact with others that you do not know, and are outside you work/school)
(a) stimulate and energise you (I like it)
(b) tax your reserves (make you tired)

37. Are you more frequently
(a) a practical sort of person (make a plan)
(b) a fanciful sort of person ("over the top" … unrealistic)

38. Are you more likely to
(a) see how others are useful
(b) see how others see

39. Which is more satisfying
(a) to discuss an issue thoroughly
(b) to arrive at agreement on an issue

40. which rules you more
(a) You head (my head rules me) (b) your heart (my heart rules me – feelings)

41. are you more comfortable with work that is
(a) contracted (you know for certain about it) (b) done on a casual basis (just do some work every now and then)

42. Do you tend to look for
(a) the orderly (things that are neatly set out) (b) whatever turns up

43. Do you prefer
(a) many friends with brief (little) contact
(b) a few friends with more lengthy (long) contact

44. Do you go more by
(a) facts (b) principles (briefs)

45. Are you more interested in
(a) production and distribution (making things and moving things)
(b) design and research (design things and find out about things)

46. Which is more of a compliment
(a) "There is a very logical (reasoning) person."
(b) "there is a very sentimental (emotional/feeling) person"

47. Do you value in yourself more that you are….. (which do you think is better)

(a) unwavering (cannot be moved (loyal) (b) devoted (Keep to my views)

48. Do you more often prefer the
    (a) final and unalterable statement (a statement that says something and it's final
    (b) tentative and preliminary statement (a statement that can be changed in the end)

49. Are you more comfortable

    (a) after decision (b) before a decision

50. Do you
    (a) speak easily and at length with strangers
    (b) find little to say to strangers

51. Are you more likely to trust your
    (a) experience (that which you know) (b) hunch (feeling/guess)

52. Do you feel
    (a) more **practical** than ingenious (original/crafty)
    (b) more **ingenious** than practical (crafty/original)

53. Which person is more to be complimented (praised): one of
    (a) clear reason (b) strong feeling (thinking)

54. Are you inclined more to be (tend to be)
    (a) fair-minded (be fair towards everyone) (b) sympathetic (compassion/feeling)

55. Is it preferable mostly to / better to
    (a) make sure things are arranged/ in order
    (b) just let things happen

56. In relationships should most things be
    (a) renegotiable (let us talk about it again) (b) random and circumstantial (let everything happen and let go)

57. When the phone rings do you
    (a) hasten to get to it first
    (b) hope someone else will answer

58. Do you prize more in yourself
    (a) a strong sense off reality (seeing things as they are) (b) a vivid imagination (a good imagination/dreaming)

59. Are you drawn more to
    (a) fundamentals (b) overtones

(basic laws, essential things) (ideas about it)

60. Which seems the greater error
    (a) to be too passionate (full of feelings) (b) to be too objective (look and analyze things without Feelings)

61. Do you see yourself as basically
    (a) hard-headed (b) soft-hearted

62. Which situation appeals to you more

    (a) the structured and scheduled
    (b) the unstructured and unscheduled

63. Are you a person that is more
    (a) routinised than whimsical (routinised – love to work in a certain set times)
    (b) whimsical than routinised (do NOT like routines, just go with the flow)

64. Are you more inclined to be
    (a) easy to approach (easy to talk) (b) somewhat reserved (I hold back)

65. In writing do you prefer (when you write something, what do you prefer…)
    (a) the more literal (just talk about facts) (b) the more figurative (poetic)

66. It is harder for you to
    (a) identify with others (put myself in their shoes) (b) utilize others (use others)

67. Which do you wish more for yourself
    (a) clarity of reasons (clear thinking) (b) strength to compassion (more feelings)

68. Which is the greater fault
    (a) being indiscriminate (never questioning things) (b) being critical (always questioning things)

69. Do you prefer the
    (a) planned event (b) unplanned event

70. Do you tend to be more
    (a) **Planned** than spontaneous (just do things)
    (b) **Spontaneous** than deliberate

Appendix 6: Student Questionnnaire 1 – PERSONALITY MEMBER CHECKING

MEMBER CHECKING FORM - MB

PERSONALITY QUESTIONNAIRE

According to the answers you provided in the "personality" questions, the following things that are **marked**, can be said about you. Please read it, and give me your comments next to each section, whether you think it is accurate or not.

(remember that you are still young and may be in the process of making your mind up about many things. This instrument is also just a vague indicator, and does not claim to be the absolute truth about everything)

Name and Surname	
I Introverts are rested and energized by solitude (being alone), and very effective in solitary pursuits (things that can be done alone). An introvert (I) is a person who prefers to process thoughts internally. Introverts tend to think before they speak. The word is also used informally to refer to somebody who prefers solitary activities (alone activities) to social ones. Introverts tend to be seen as quiet and reserved, which is often confused with a lack of confidence by louder, more extroverted people. They often perform well in analytical roles (investigating things) that require intelligence or logic, but place less emphasis on social interactions and "people skills". Introverts are usually a minority in the general population, and they can often be sidelined by culture and society which in many cases favours the more common extroverted style of behaviour.	How closely does it describe you. (Make a circle) 1.Not even close 2.Tends to be inaccurate 3.Tends to be correct 4.It is a very good description of me More comments:
E Extroverts appear outgoing and are energized by people, and are very effective in pursuits that involve	How closely does it describe you. (Make a circle) 1.Not even close 2.Tends to be inaccurate

people. Extroverts tend to be sensation-seeking, spontaneous and sociable. They enjoy crowds, noise and stimulation.	3.Tends to be correct 4.It is a very good description of me More comments:
S "Sensors" want, trust and remember facts, and usually describe themselves as "practical." For a Sensor, intuition (feeling) is untrustworthy, and might seem like mental static. They like reality. Guardians (carers) share the combination SJ, while Artisans share the combination SP.	How closely does it describe you. (Make a circle) 1.Not even close 2.Tends to be inaccurate 3.Tends to be correct 4.It is a very good description of me More comments:
N "Intuitives" prefer metaphor, analogy and logic, and tend to reason from first principles and hunches (feelings). Sensors pride themselves on living in the real world. Intuitives pride themselves on seeing possibilities. This can cause conflict. Intuition, filters experience through the unconscious mind. Intuition focuses on possibilities rather than realities.	How closely does it describe you. (Make a circle) 1.Not even close 2.Tends to be inaccurate 3.Tends to be correct 4.It is a very good description of me More comments:
T "Thinkers" use impersonal means of reasoning: logic, and verifiable experience. They use their minds, and like to think things through.	How closely does it describe you. (Make a circle) 1.Not even close 2.Tends to be inaccurate 3.Tends to be correct 4.It is a very good description of me More comments:
F "Feelers" prefer personal reasoning: value judgements and emotions. Thinkers often find Feelers muddle-headed. Feelers often find Thinkers cold and inhuman.	How closely does it describe you. (Make a circle) 1.Not even close 2.Tends to be inaccurate 3.Tends to be correct 4.It is a very good description of me More comments:
J "Judgers" prefer to come to decisions, and move on. They can	How closely does it describe you. (Make a circle)

feel betrayed if a decision that has already been taken is "reopened." They are prone to hastiness, but get things done.	1.Not even close 2.Tends to be inaccurate 3.Tends to be correct 4.It is a very good description of me More comments:
P "Perceivers" prefer to leave their options open to perceive new possibilities and processes as long as possible. They tend to mourn opportunities lost to premature decisions. They are prone to analysis paralysis but rarely make permanent mistakes.	How closely does it describe you. (Make a circle) 1.Not even close 2.Tends to be inaccurate 3.Tends to be correct 4.It is a very good description of me More comments:

Quite often any particular person *can* act in any way, but *prefers* particular ways.

I Introverts are rested and energized by solitude, and very effective in solitary pursuits. An introvert (I) is a person who prefers to process thoughts internally. Introverts tend to think before they speak. The word is also used informally to refer to somebody who prefers solitary activities to social ones, which is more of a behavioural than cognitive definition. Introverts tend to be seen as quiet and reserved, which is often confused with a lack of confidence by louder, more extroverted people. They often perform well in analytical roles that require intelligence or logic, but place less emphasis on social interactions and "people skills". Introverts are usually a minority in the general population, and they can often be sidelined by culture and society which in many cases favours the more common extroverted style of behaviour.

E Extroverts appear outgoing and are energized by people, and are very effective in pursuits that involve people. Extroverts tend to be sensation-seeking, spontaneous and gregarious. They enjoy crowds, noise and stimulation.

S "Sensors" want, trust and remember facts, and usually describe themselves as "practical." For a Sensor, intuition is untrustworthy, and might seem like mental static. Sensation, as a perceiving mode of consciousness, focuses on heightening reality. Guardians share the combination SJ, while Artisans share the combination SP.

N "Intuitives" prefer metaphor, analogy and logic, and tend to reason from first principles and hunches. Sensors pride themselves on living in the real world. Intuitives pride themselves on seeing possibilities. This can cause conflict. Intuition, as a perceiving mode of consciousness, filters experience through the unconscious mind. Intuition focuses on possibilities rather than realities. Idealists share the combination NF, while Rationals share the combination NT.

T "Thinkers" use impersonal means of reasoning: logic, and verifiable experience.

F "Feelers" prefer personal reasoning: value judgements and emotions. Thinkers often find Feelers muddle-headed. Feelers often find Thinkers cold and inhuman.

J "Judgers" prefer to come to decisions, and move on. They can feel betrayed if a decision is "reopened." They are prone to hastiness, but get things done.

P "Perceivers" prefer to leave their options open to perceive new possibilities and processes as long as possible. They tend to mourn opportunities lost to premature decisions. They are prone to analysis paralysis, but rarely make permanent mistakes.

Member-check detail on questionnaire 1 – Personality indicator - Inherent trustworthiness check

Member-check detail on Questionnaire 1- Personality indicator

Student	I	E	S	N	T	F	J	P	Student Reliability mark	Total possible	Percentage Reliability
1	3		3		4		4		14	16	87.50
2	2		3		3	2	4		14	16	87.50
3	2			4	2			4	12	16	75.00
4		4	4			4	3		15	16	93.75
5		4	4		4		4		16	16	100.00
6		3		4		3	3		13	16	81.25
7		3		4		3	4		14	16	87.50
8	3		3		3			3	12	16	75.00
9			3		3		4		10	16	62.50
10		3		4		3		4	14	16	87.50
11	1	1		3		2		2	9	16	56.25
12	1	1		4		4	2		12	16	75.00
13	3		4			3	3		13	16	81.25
14		3	3		4			3	13	16	81.25
15		3	3		4		4		14	16	87.50
16	2	1		2		2			7	16	43.75
17		4		3		3	3		13	16	81.25
18		4		4	1	1	3		13	16	81.25
19		4		4		4		4	16	16	100.00
20	4		1	1	3		3		12	16	75.00
21	3		3		4		3		13	16	81.25
22		2		3		4	3		12	16	75.00
23		3		3		3	4		13	16	81.25
24		3	3		3		2		11	16	68.75
25		4		3		4		4	15	16	93.75
26	3		4		4			3	14	16	87.50
27		4		4	1	1	4		14	16	87.50
28		3		3		3	1	1	11	16	68.75
29		4	1	1	4		4		14	16	87.50
30	4			2	3		3	3	15	16	93.75
31		3		3		2		2	10	16	62.50
32		4		4		3		2	13	16	81.25
33		4		3		2		4	13	16	81.25
34	4			4	4			3	15	16	93.75
35	1	1	4			3	2		11	16	68.75
36		4		3		3		4	14	16	87.50
37		3	4		4		4		15	16	93.75
								Total	479	37	
								Average		Total	2993.75
										Div 37	**80.91** % reliability

Appendix 7: Student Questionnnaire 2 Educational

Research questionnaire

High School eLearning

Hello: You are invited to participate in this research survey : High School e-Learning by Johannes Cronje. In this survey, approximately 200 people will be asked to complete a survey that asks questions about the online system that you have worked with in Brainline.

It will take approximately 20 minutes to complete the questionnaire. Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point.

It is very important for us to learn your opinions.Your survey responses will be stricly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential.

If you have questions at any time about the survey or the procedures, you may contact Johannes Cronje at ……. or by email at the email address specified below.Thank you very much for your time and support. Please start with the survey now by clicking on the Continue button below.

email ……..

March 2006

Example…

Make a circle around your choice

a) NO, not even close
b) Towards NO
c) Towards YES
d) YES,It is a very good description of me

1. My Z-number with Brainline is

2. Name and Surname

3. Cell number

4. I am
   a) male
   b) female

5. My age this year is
   a) 13
   b) 14
   c) 15
   d) 16
   e) 17
   f) 18

6. My home language is
   a) English
   b) Afrikaans
   c) Other

7. Have you completed any other Brainonline questionnaire recently
   d) No
   e) Yes

8. I have been in Brainline for .....years including this year
   a) 1 year
   b) 2 years
   c) 3 years
   d) 4 years
   e) More than 4

9. Private school or home school.
   a) I am a home school pupil
   b) I am in a private school

10. My average grade last year, or in my previous school, in all my subjects were
    a) I normally score D symbols on average (Below 50%)
    b) I normally score C symbols on average (50%-64%)
    c) I normally score B symbols on average (65to74%)
    d) I normally score A symbols on average (75%

……Question 11 and 12 are opposites

11. Read the paragraph and decide if it describes you (Introvert.....)
    I am a calm and quiet type of person, energized by solitude (being alone), I like being alone, and very effective in solitary pursuits (things that can be done alone). I prefer to process thoughts internally. and to think before I speak. I tend to be seen as quiet and reserved, which is often confused with a lack of confidence by louder, more extroverted people. I often perform well in analytical roles (investigating things) that require intelligence or logic. I place less emphasis on social interactions and people skills.
    a) NO, not even close by far
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES,It is a very good description of me

12. Read the following paragraph and decide if it describes you (Extrovert.....)
    (The opposite of the previous question) I am outgoing and amenergized by people, and are very effective in pursuits that involve people. I feel alive when I am with lots of people. I tend to be sensation-seeking, spontaneous and sociable. I enjoy crowds, noise and stimulation.
    a) NO, not even close
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES,It is a very good description of me

……Question 13 and 14 are opposites

13. Read the following paragraph and decide if it describes you. I am a practical type of person. I like to work with facts and figures. I reason logically and NOT with feelings. I pride myself in living in the real world, and NOT in a dream world. (Sensing)
    a) NO, not even close
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES,It is a very good description of me

14. Read the following paragraph and decide if it describes you.The opposite of the previous question.
    I tend to reason from hunches (feelings), and logic and facts are NOT that important when I reason. I normally see possibilities rather than realities. (Intuitives)
    a) NO, not even close
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES,It is a very good description of me

……Question 15 and 16 are opposites

15. Read the following paragraph and decide if it describes you.I am a thinker, more than I am a feeler.
    I prefer to think and use facts and logic when I reason, true facts and not feelings. I use my mind and think things through. (Thinker)
    a) NO, not even close
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES,It is a very good description of me

16. Read the following paragraph and decide if it describes you.I am a feeler more than I am a thinker. (The opposite of the previous question) I prefer to use emotions when reasoning rather than facts. Thinkers often find Feelers muddle-headed. Feelers often find Thinkers cold and inhuman. (feeler)
    a) NO, not even close
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES,It is a very good description of me

……Question 17 and 18 are opposites

17. Read the following paragraph and decide if it describes you. I prefer to come to a decision about things and move on. I feel betrayed if a decision that has already been taken is reopened. I tend to be in a hurry, but get things done. (judge)
    a) NO, not even close

b) I am thinking towards NO
c) I am thinking towards Yes
d) YES,It is a very good description of me

18. Read the following paragraph and decide if it describes you. (The opposite of the previous question).
When I have to make a decision, I prefer to leave all my options open as long as possible without coming to a decision quickly. I tend to think about new possibilities as long as possible. I often feel a loss because of opportunities that I have missed. I tend to analyze things in detail, but rarely make permanent mistakes. They anlalyse things too much.
a) NO, not even close
b) I am thinking towards NO
c) I am thinking towards Yes
d) YES,It is a very good description of me

19. When it comes to working my computer…..
a) I do not know computers well, and struggle a lot working on them
b) Tend to struggle with computers
c) Tend to be quite ok with computers
d) I am an expert in computers, and have no problems working them at all

20. I have my own computer
a) No
b) Yes

21. I have Internet access on my own
a) No
b) Yes, but from someone elses computer
c) Yes, mostly, but share it in our home or school
d) I have full access on my own computer

22. My parents (or school) restrict the use of Internet
a) I am restricted and cannot surf when I want to
b) Sometimes I am restricted
c) I am NOT restricted and have access whenever I want

23. Type of Internet access
a) Normal dial-up with a modem
b) I am not sure what we have but it is slow
c) ISDN
d) I am not sure what we have but it seems to be fast.
e) ADSL broadband

24. Do you think the online system used by Brainline (brainONLINE) helped you in your studies
a) NO, not at all
b) I am thinking towards NO
c) I am thinking towards Yes
d) YES, it was definitely a great help

25. How do you rate the work of the subject advisors in online system, the Internet program.
    a) NO, I feel their presence did NOT help me at all
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, their help was definitely very important to me

26. Do you feel that the online teachers supported you?
    a) NO, they definitely did not support me at all
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, They supported me a lot

27. The teachers were almost like a study-father or a study-mother to me.
    a) NO, they definitely were NOT like that to me
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, they definitely were like that to me

28. How important were the teachers to you?
    a) NO, they were definitly NOT important to have teachers
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, they were VERY important for me to have

29. Overall, I am satisfied with the online system, the Internet program
    a) No, NOT at all
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, I am very satisfied

30. The standard of schooling in THIS system was weak or high compared to my previous school
    a) This system was definitely weak compared to my previous school
    b) I am thinking towards weak
    c) I am thinking towards high
    d) This system has a very high standard compared to my previous school

31. Getting to know the online system interface. When I started out with online system,
    a) It was VERY difficult to learn
    b) I am thinking towards “difficult”
    c) I am thinking towards “easy”
    d) It was VERY easy to learn

32. How easy was it to work with the online system?
    a) It was VERY difficult to work with
    b) I am thinking towards “difficult”
    c) I am thinking towards “easy”
    d) It was VERY easy to work

33. Connecting to the Internet and working on the Internet.
    a) I usually could not connect to the Internet, we have a very bad line
    b) I tended to have problems connecting (towards no)
    c) My connection was just satisfactorily (towards yes)
    d) I was able to connect and work without problems

34. If you were NOT to have access to the Internet and online system, do you think it would have made a difference in your learning
    a) NO it would definitely NOT have made a difference
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) Yes, it would definitely have affected my learning very badly if I did not have it

35. Costs of Internet use. What is your own opinion.
    a) Internet costs and telephone costs are very high
    b) It tends to be high
    c) The costs are reasonable
    d) It is cheap

36. Please give your estimate of your Internet and telephone costs per month
    1. a) Between R100 - R200
    2. b) Between R300 - R500
    3. c) Between R600 - R800
    4. d) More then R800
    5. e) I am not sure

37. E-mail address changes
    a) I have changed my email address during the year
    b) My email address stayed the same for the year

38. Cellphone number
    a) I do not have a cell phone
    b) My number has changed during the year
    c) My number did not change during the year

39. I prefer to be contacted through
    a) My home telephone
    b) My email
    c) My cellphone

……

40. Did the online system challenge you to think about things differently and how other people think about it. (critical thinking)
    a) NO, it did not challenge me to think
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, it definitely did challenge me to think
    e) I am unsure and cannot think of anything

41. Do you think it is useful to you to repeat things until you have mastered it. Do you agree with the statement "repetition is the mother of learning" (behaviorism)
    a) NO definitely not
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, it is definitely very useful

42. Was the work that you did a challenge to you, or was it too easy for you? (challenge)
    a) NO, it was definitely no challenge, it was too easy
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, it was definitely a big challenge

43. Did you benefit from the way that some of the work was fixed (highly structured) In other words : do you think it is good for you to have a fixed structure, deadlines etc in some work with marked out fixed content.
    a) NO, I did not benefit, I wanted flexible work
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, I definitely liked to work in something that was structured.

44. Did the online system allow you to learn about things that you could recognise in the real world? (real world situations), in other words : were there things that you think you could apply in the real world?
    a) NO, it was all unknown things that did not connect to the real world
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, I could definitly see a lot of things from the real world in the work

45. Did the online system system help you to learn by discovering things? In other words : you had to go out and find out things (discovery learning)
    a) NO, I never felt that I learned by discovering things
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, I definitely learned by discovering things frequently

46. In working with the online system, did you feel as if it was just like a teacher? (opp-discovery)
    a) YES, it was just like a teacher in a class
    b) I am thinking towards Yes
    c) I am thinking towards NO
    d) NO, it was definity NOT like a teacher

47. Do you feel the online system was just as valuable as a teacher
    a) No, it definitely was not
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) Yes, it definitely was just as valuable as a teacher

48. Did the online system allow you to choose WHEN you wanted to learn
    a) No, it never did. It did NOT allow me to work WHEN I wanted.
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, I could definitely choose WHEN I wanted to learn

49. Did the online system enable you to choose WHERE (the place) you wanted to learn?
    a) NO, it never allowed me to choose WHERE I wanted to learn
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, the system definitely enabled me to learn WHERE I wanted to learn

50. Did the online system enable you to choose how FAST you wanted to go through the work?
    a) NO, it never enabled me to choose how fast I wanted to work.
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, it definitely enabled me to choose how fast I wanted to go through the work

51. Did the online system allow you to CHANGE the program the way it suits you?
    a) NO, it never allowed me to change the program to suit me
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, I think it definitely allowed me to change it so suit me

52. Did the online system make make it easier for you to learn
    a) NO, it definitely did NOT make it easier to learn
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, it definitely made it a lot easier to learn

53. Did the online system help you to know exactly what lessons and work you were supposed to do for the year
    a) NO, it NEVER helped me to know what to do
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, it definitely did help me to know what to do

54. Did the online system help you to learn together with others
    a) NO, it never helped me to learn togerther with others
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, it definitely did help me to learn together with others

55. Did you attend the workshops
    a) NO, I did not attend any
    b) I attended some
    c) YES, I attended most of them

56. How valuable was the online program to you?
    a) NO, it was definitely NOT valuable at all
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, it was DEFINITELY very valuable

57. How valuable were the workshops to you?
    a) NO, it was definitely NOT valuable at all
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, it was DEFINITELY very valuable

58. What do you find more useful, the online system or workshops
    a) The online system
    b) The workshops
    c) They were both essential, I cannot choose.

59. Did you make use of online system to talk to other students
    a) NO, I never talked to anyone online
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, I definitely used it a lot to talk

60. How do you value the feedback (replies) that you got from the teachers and students, and in your assignments
    a) NO, it was of absolutely NO value to me
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, it definitely helped me a lot

61. Do you prefer to work alone?
    a) YES, I definitely prefer to work alone
    b) I am thinking towards YES
    c) I am thinking towards NO
    d) No, I never want to work alone, I always want to work with others

62. Did your parents suppport and encourage you
    a) NO, they did not support and encourage me
    b) I am thinking towards NO
    c) I am thinking towards Yes
    d) YES, they definitely did support and encourage me

63. Did your parents work with you
    a) NO, they never worked with me
    b) They usually did not work with me
    c) They usually worked with me
    d) YES, they worked with me a lot

64. Do you think that if parents helped their children, it will be easier to them to pass their exams.
    a) NO, it will not help them to pass at all
    b) I am thinking towards NO
    c) I am thinking towards YES
    d) YES, it will definitely will be easier for children to pass

65. What do your parents know about the content of your courses?
    a) My parents know ABSOLUTELY NOTHING about the content of my courses
    b) I am thinking towards “they know nothing”
    c) I am thinking towards “they know something”
    d) My parents KNOW A LOT about the content of my courses

66. I do not need to get support from anyone. I am motivated and responsible.
    a) NO, I completely disagree
    b) I am thinking towards NO
    c) I am thinking towards YES
    d) YES, I definitely agree with the statement

67. Even though I am motivated, I still think I needed a lot of help to get used to the system, and to get used to the type of work
    a) I stronly DISAGREE, I did not need any help at all
    b) I am thinking towards “disagree”
    c) I am thinking towards “agree”
    d) I STRONGLY agree, I needed a lot of help

68. In a system like this, I need to have a lot of instructions and information to be successful.
    a) No, I STRONGLY DISAGREE, I do not need a lot of instructions and information
    b) I tend to disagree, I do not need a lot of instructions and information
    c) I tend to agree. I need a lot of instructions and information
    d) I STONGLY AGREE. I need a lot of instructions and information

69. The lessons in a system like this should be small byte-sized lessons.
    a) I STRONGLY DISAGREE, too many short lessons just clog up the system, I prefer long lessons
    b) I am leaning towards disagreeing, I prefer long lessons
    c) I am leaning towards agreeing with short lessons
    d) I STRONGLY AGREE, I definitely prefer short lessons

70. Did the online system somehow act as a COMPANION to you, like a digital teacher, or a digital-friend.
    a) NO, it was definitely NOT like a companion
    b) I am thinking towards NO
    c) I am thinking towards YES
    d) YES, it definitely did act as a companion, just like a friend

71. Do you feel like you belong to a group now that you are in this system (like a school or a community)? Do you feel that you have a group identity.

a) NO, I definitly do NOT feel like I belong to a group or a community in the system
b) I am thinking towards NO
c) I am thinking towards YES
d) YES, I definity feel like I belong to a group or a community in the system

72. Do you like to work in groups?
    a) NO, I definitely DO NOT like working in groups at all
    b) I am thinking towards NO
    c) I am thinking towards YES
    d) YES, I definitely LIKE working in groups a lot

73. Do you like to social online, talking and chatting about things that are not related to the work?
    a) NO, I definitely DO NOT like to social online
    b) I am thinking towards NO
    c) I am thinking towards YES
    d) YES, I DEFINITELY like it a lot to social online

74. How much did you social online?
    a) NO, I NEVER socialized online
    b) I am thinking towards no
    c) I am thinking towards YES
    d) YES, I definitely socialized a lot online

75. I felt isolated (alone) even if there was an online system.
    a) NO, I stronly DISAGREE, I never felt isolated
    b) I am thinking towards no
    c) I am thinking towards YES
    d) I DEFINITELY AGREE, I felt ISOLATED FREQUENTLY

76. How much did you talk to teachers online?
    a) NO, I never talked to teachers online
    b) I am thinking towards no
    c) I am thinking towards YES
    d) YES, I talked to teachers online a lot

77. I work hard because I want to impress and please my parents.
    a) No, I NEVER want to impress my parents
    b) No, I do not want to impress them
    c) Yes, sometimes I work hard to impress them
    d) Yes, I ALWAYS want to impress my parents

78. I may work hard because I want to impress and please my friends.
    a) NO, I never worked hard to impress my friends
    b) Sometimes I may work hard to impress them
    c) YES, I think I always work hard to impress my friends

79. I like to be rewarded for good work. I like the fact that there is a Hall of fame in the system.
    a) I STONGLY DISAGREE. The Hall of Fame, where high scorers are listed, does not serve any purpose

b) I tend to disagree
c) I tend to agree
d) I DEFINITELY think the Hall of Fame, where high scorers are listed, is a good thing

80. I feel uncomfortable (shy) to discuss things online
    a) I am definitely very uncomfortable to talk online
    b) I tend to be uncomfortable to talk online
    c) I tend to be at ease (frank) to talk online
    d) I am definitely VERY FRANK and can talk online freely

81. Some people are afraid to talk online because they are scared that the others may laugh at their questions.
    a) No, I totally disagree with the statement, people do not care to be laughed at
    b) I am thinking towards no
    c) I am thinking towards YES
    d) Yes, I DEFINITELY AGREE strongly with the statement, people are scrared to be laughed at

82. If I could talk online and be anonymous, so that nobody knows who I am, I may talk more.
    a) NO, I strongly disagree with the statement, it will not make a difference, I will not talk more
    b) I am thinking towards no
    c) I am thinking towards YES
    d) YES, I DEFINITELY AGREE with the statement, I will talk more if I can be anonymous

83. The teachers are important in such an online system. Without them it will not work.
    a) NO, I strongly disagree. Teachers are definitely NOT needed online
    b) I am thinking towards no
    c) I am thinking towards YES
    d) YES, I strongly AGREE, without teachers, the system will definitely not work

84. If an online system like this is done properly, it is just as good as a normal school
    a) NO, I strongly DISAGREE, this system is far worse than a school
    b) I am thinking towards no
    c) I am thinking towards YES
    d) YES, I strongly AGREE, it can be just as good as a school and even much better

Appendix 8: Summary of questionnaire questions sequenced in terms of research subsidiary questions

Biographical and general information

- 1.My Z-number with Brainline is
- 2.Name and Surname
- 3.Cell number
- 4.I am male or female
- 5.My age this year is (today)
- 6.My home language is
- 7.Have you completed any other Brainonline questionnaire recently
- 8.I have been in Brainline for .....years including this year
- 9.Private school or home school.
- 10.My average grade last year, or in my previous school, in all my subjects were

Personality indicator questions

11.Intovert indicator
12.Extrovert indicator
13.Sensing indicator
14.Intuitive indicator
15.Thinker indicator
16.Feeler indicator
17.Judging indicator
18.Perceiver indicator

Overall satisfaction questions

29.Overall, I am satisfied with the online system, the Internet program
84.If an online system like this is done properly, it is just as good as a normal school

Subsidiary question 1 – Pedagogical – Cognitive

24. Do you think the online system used by Brainline (brainONLINE) helped you in your studies
40. Did the online system challenge you to think about things differently and how other people think about it.
41. Do you think it is useful to you to repeat things until you have mastered it. Do you agree with the statement “repetition is the mother of learning”

Subsidiary question 1 – Pedagogical – Constructivist

44. Did the online system allow you to learn about things that you could recognise in the real world? (real world situations), in other words : were there things that you think you could apply in the real world?
45. Did the online system system help you to learn by discovering things? In other words : you had to go out and find out things (discovery learning)
46. In working with the online system, did you feel as if it was just like a teacher? (opp-discovery)
47. Do you feel the online system was just as valuable as a teacher
67. Even though I am motivated, I still think I needed a lot of help to get used to the system, and to get used to the type of work (scaffolding)

Subsidiary question 1 – Pedagogical – Component Display

52. Did the online system make make it easier for you to learn
53. Did the online system help you to know exactly what lessons and work you were supposed to do for the year
68. In a system like this, I need to have a lot of instructions and information to be successful.
69. The lessons in a system like this should be small byte-sized lessons.

Subsidiary question 1 – Pedagogical – Customization

48. Did the online system allow you to choose WHEN you wanted to learn
49. Did the online system enable you to choose WHERE (the place) you wanted to learn?
50. Did the online system enable you to choose how FAST you wanted to go

through the work?

51. Did the online system allow you to CHANGE the program the way it suits you?

Subsidiary question 1 – Pedagogical – challenge – Creativity and Motivation

30. The standard of schooling in THIS system was weak or high compared to my previous school
42. Was the work that you did a challenge to you, or was it too easy for you? (challenge)
43. Did you benefit from the way that some of the work was fixed (highly structured)

    In other words : do you think it is good for you to have a fixed structure, deadlines etc in some work with marked out fixed content.
66. I do not need to get support from anyone. I am motivated and responsible.

Subsidiary question 1 – Pedagogical – Collaborative

54. Did the online system help you to learn together with others
55. Did you attend the workshops
56. How valuable was the online program to you?
57. How valuable were the workshops to you?
58. What do you find more useful, the online system or workshops
59. Did you make use of online system to talk to other students
60. How do you value the feedback (replies) that you got from the teachers and students, and in your assignments
61. Do you prefer to work alone?

Subsidiary question 1 – Pedagogical – Companionship

25. How do you rate the work of the subject advisors in online system, the Internet program.
26. Do you feel that the online teachers supported you?
27. The teachers were almost like a study-father or a study-mother to me.
28. How important were the teachers to you?
62. Did your parents suppport and encourage you

63.Did your parents work with you

64.Do you think that if parents helped their children, it will be easier to them to pass their exams.

65.What do your parents know about the content of your courses?

70.Did the online system somehow act as a COMPANION to you, like a digital teacher, or a digital-friend.

83.The teachers are important in such an online system. Without them it will not work.

Subsidiary question 2 – Community aspect

71.Do you feel like you belong to a group now that you are in this system (like a school or a community)? Do you feel that you have a group identity.

72.Do you like to work in groups?

77.I work hard because I want to impress and please my parents. (this versus friends – question 78)

78.I may work hard because I want to impress and please my friends. (this versus impressing parents question 77)

79.I like to be rewarded for good work. I like the fact that there is a Hall of fame in the system.

Subsidiary question 3 – Communication aspect

73.Do you like to social online, talking and chatting about things that are not related to the work?

74.How much did you social online?

75.I felt isolated (alone) even if there was an online system.

76.How much did you talk to teachers online?

80.I feel uncomfortable (shy) to discuss things online

81.Some people are afraid to talk online because they are scared that the others may laugh at their questions.

82.If I could talk online and be anonymous, so that nobody knows who I am, I may talk more.

Research question 4 - Technological

19 When it comes to working my computer…..

20.I have my own computer

21.I have Internet access on my own

22.My parents (or school) restrict the use of Internet

23.Type of Internet access

31.Getting to know the online system interface. When I started out with online system,

32.How easy was it to work with the online system?

33.Connecting to the Internet and working on the Internet.

34.If you were NOT to have access to the Internet and online system, do you think it would have made a difference in your learning

35.Costs of Internet use. What is your own opinion.

36.Please give your estimate of your Internet and telephone costs per month

37.E-mail address changes

38.Cellphone number

39.I prefer to be contacted through

Appendix 9: Subject Advisor's Questionnnaire 3

You are invited to participate in our survey about **e-Learning with Brainline**. In this survey, you will be asked to complete a survey that asks questions about the use of brainONLINE. It will take approximately 20 minutes to complete the questionnaire.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. It is very important for us to learn your opinions.

Your survey responses will be stricly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. If you have questions at any time about the survey or the procedures, you may contact Johannes Cronje at …….. or by email at the email address specified below.

Thank you very much for your time and support.

SUBJECT ADVISORS BRAINLINE

Questionnaire to evaluate e-learning with Brainline 2004

Name and Surname ……

Student number : ……Male or Female : ……Cell number :

e-mail :……Your age now: ……

Home language : ……..Years in Brainline (including this year) :…….

List your field of support :
…….

1. When it comes to working my computer…..
    a. I do not know computers well, and struggle a lot working on them
    b. I tend to struggle with computers
    c. I tend to be quite ok with computers
    d. I am an expert in computers, and have no problems working them at all

2. I think the STUDENTS rate the average subject advisors computer skills as
    a. Very poor
    b. Tend to be poor
    c. Tend to be sufficient
    d. Very good

3. Do you think students have their own computer
    a. No
    b. They tend NOT to have
    c. They tend to HAVE
    d. Yes they definitely all have

4. Do you think students have Internet access on their own
    a. No
    b. Yes, but from someone elses computer
    c. Yes, mostly, but share it
    d. They have full access on their computer

5. Do you think parents (or school) restrict the students' use of Internet
    a. Yes
    b. I tend to think they do
    c. I am NOT restricted and have access whenever I want

6. Type of Internet access YOU have
    a. Normal dial-up with a modem
    b. I am not sure what I have but it is slow
    c. ISDN
    d. I am not sure what I have but it seems to be fast.
    e. ADSL broadband

7. Type of Internet access that you think that STUDENTS HAVE
    a. Normal dial-up with a modem
    b. I am not sure what we have but it is slow
    c. ISDN
    d. I am not sure what I have but it seems to be fast.
    e. ADSL broadband

8. Do you think the Internet was of use for you to support students
    a. No, not at all
    b. It tended NOT to be of use
    c. It tended to be of use somehow
    d. It was definitely a great help

9. Do you think the INTERNET helped students with their studies
    a. No, not at all
    b. It tended NOT to be of use
    c. It tended to be of use somehow
    d. It was definitely a great help

10. Do you think brainONLINE, the online interface used by Brainline helped you to support the students
    a. No, not at all
    b. It tended NOT to be of use
    c. It tended to be of use somehow
    d. It was definitely a great help

11. Do you think brainONLINE, the online interface used by Brainline helped THE STUDENTS in their studies
    a. No, not at all

b. It tended NOT to be of use
c. It tended to be of use somehow
d. It was definitely a great help

12. When YOU started out with the brainONLINE program, you had certain expectations. Was your support with the brainONLINE program what you expected?
    a. No, not at all
    b. It tended NOT to be what I expected
    c. It tended to be what I expected
    d. It was definitely just what I expected

13. When the STUDENTS started out with the brainONLINE program, THEY had certain expectations. Do you think they got what THEY EXPECTED
    a. No, not at all
    b. Tend NOT to be what THEY expected
    c. Tend to be what THEY expected
    d. It was definitely just what THEY expected

14. How do you think the STUDENTS rate the help the subject advisors gave in general
    a. They feel MY presence did NOT help them at all
    b. My help tend NOT to help them
    c. My help tend to help them somewhat
    d. My help was definitely very important to them

15. Rate the work of the ADMINISTRATORS the brainONLINE system (Eg, Gaetano, Hannes, Johannes, Regardt)
    a. I feel their presence did NOT help me at all
    b. Their help tend NOT to help me
    c. Their help tend to help me somewhat
    d. Their help was definitely very important to me

16. Overall, I, as a subject advisor, am satisfied with the whole Brainline system
    a. No, not at all
    b. I tend to be UNsatisfied
    c. I tend to be satisfied
    d. I am very satisfied

17. Overall, do you think the STUDENTS are satisfied with the Brainline system in general
    a. No, not at all
    b. I tend to be UNsatisfied
    c. I tend to be satisfied
    d. I am very satisfied

18. Overall, I am satisfied with brainONLINE, the Internet program

a. No, NOT at all
b. I tend to be UNsatisfied
c. I tend to be satisfied
d. I am very satisfied

19. Overall, I do you think STUDENTS are satisfied with brainONLINE, the Internet program
    a. No, NOT at all
    b. I tend to be UNsatisfied
    c. I tend to be satisfied
    d. I am very satisfied

20. The standard of schooling in the system
    a. was weak compared to my previous school
    b. tend to be weak compared to my previous school
    c. tend to be high compared to my previous school
    d. is very high compared to my previous school

21. What do you think the STUDENTS think of the standard of schooling in the system
    a. was weak compared to their previous school
    b. tend to be weak compared to their previous school
    c. tend to be high compared to their previous school
    d. Is very high compared to their previous school

----------interface

22. Getting to know the brainONLINE interface. When I started out with brainONLINE,
    a. It was difficult to learn
    b. It tended to be difficult to learn
    c. It tended to be easy to learn
    d. It was very easy to learn

23. When I started out using brainONLINE, I was nervous and anxious
    a. Yes
    b. I tended to be nervous and anxious
    c. I tended NOT to be nervous and anxious
    d. No, I was NOT nervous and anxious at all

24. The usability of the interface of brainONLINE
    a. It is difficult for me to work with the interface of brainONLINE
    b. It tends to be difficult
    c. It tends to be easy to work with the interface
    d. It is very easy to work with the interface

25. What do you think that the STUDENTS feel about the usability of the

interface of brainONLINE
e. It is difficult for them to work with the interface of brainONLINE
f. It tends to be difficult
g. It tends to be easy to work with the interface
h. It is very easy to work with the interface

---------- access and costs

26. Connecting to the Internet and working on the Internet.
    a. I usually cannot connect to the Internet, we have a very bad line
    b. I tend to have problems connecting
    c. Usually I get connected easily.
    d. I am able to connect and work without problems

27. If you were NOT to have access to the Internet and brainONLINE, do you think it would have made a difference in your learning
    a. No it would NOT have made a difference
    b. I tend to think it would NOT have made a difference
    c. I tend to think the it would have made a difference
    d. Yes, it would definitely have affected my learning

28. Costs of Internet use. What is your own opinion.
    a. Internet costs and telephone costs are very high
    b. It tends to be high
    c. The costs are reasonable
    d. It is cheap

29. Please give your estimate of your Internet and telephone costs per month

……

30. E-mail address
    a. I have changed my email address during the year (how many times…….)
    b. My email address stayed the same for the year

31. Cellphone number
    a. I do not have a cell phone
    b. My number has changed during the year
    c. My number did not change during the year

32. I prefer to be contacted through
    a. My home telephone
    b. My email
    c. My cellphone

----------pedagogics - cognitive

33. Did the brainONLINE interface give STUDENTS opportunities to think, to use THEIR brain to solve problems (not the content, but the interface itself) (higher order thinking)
    a. No
    b. Tend NOT to be opportunities to use their brain
    c. Tend to be opportunities to use their brain
    d. Yes, definitely
    e. I am unsure and cannot think of anything

34. Did the brainONLINE interface help them to start from things that they know, working up to things that they don't know (linking)
    a. No, it did not
    b. Tend NOT to
    c. Tend to do that
    d. Yes, definitely
    e. I am unsure and cannot think of anything

35. Did the brainONLINE interface challenge them to think about things the way other people think about it. (critical thinking)
    a. No, it did not
    b. Tend NOT to
    c. Tend to do that
    d. Yes, definitely
    e. I am unsure and cannot think of anything

36. Did the brainONLINE interface make it possible for them to analyze things. In other words - Investigate, break down, Evaluate, dissect etc. (critical thinking)
    a. No, I did not
    b. Tend NOT to
    c. Tend to make it possible
    d. Yes, definitely
    e. I am unsure and cannot think of anything

37. Did the brainONLINE program allow them to draw conclusions from various things, making sense of it (synthesis)
    a.No, I could not
    b. Tend not to be able
    c. Tend to be able
    d. Yes definitely
    e. I am unsure and cannot think of anything

38. Did the brainONLINE system help them to compare different ideas and evaluate it. (evaluation)
    a. No, I did NOT

b. Tend NOT to help
c. Tend to help
d. Yes, definitely
e. I am unsure and cannot think of anything

39. Did the brainONLINE interface help them to learn to remember things in a different way (mnemonics)
    a. No, I did not
    b. Tend NOT to
    c. Tend to do that
    d. Yes, definitely
    e. I am unsure and cannot think of anything

40. Did the brainONLINE interface give them a chance to repeat some things until you mastered it? (Behaviousist)
    a. No, I did not
    b. Tend NOT to
    c. Tend to do that
    d. Yes, definitely
    e. I am unsure and cannot think of anything

41. Do you think it is useful to them to repeat things until them have mastered it (behav)
    a. No
    b. Tend to think that it is NOT useful
    c. Tend to think that it IS useful
    d. Yes, definitely

----------pedagogics – creativity

42. Was the work that they did a challenge to them, or was it too easy for them?

    (challenge)
    a. No,it was no challenge, it was too easy
    b. I tend to think it was NOT a challenge
    c. I tend to think that it WAS a challenge
    d. Yes, it was definitely a challenge

43. Did the brainONLINE system make it possible for them to be curious about things and satisfy their curiosity? (curiosity)
    a. No
    b. Tend to think that it did't
    c. Tend to think that it did
    d. Yes, definitely.

44. Was the brainONLINE system what they expected or did they expect something completely different?
    a. No, it was not what they expected
    b. Tend to think that it wasn't
    c. Tend to think that it was
    d. Yes, it was definitely what they expected

45. They course structure was highly structures.
    Did they benefit from the way that the work was fixed (highly structured)
    a. No, they did not benefit, they wanted flexible work
    b. I tend to think they did NOT benefit from fixed structures
    c. I tend to think they benefited from structured work
    d. Yes, they definitely liked to work in something that was structured.

----------pedagogics – constructivist

46. Did the brainONLINE system allow them to encounter things that they could recognise in the real world? (real world situations)
    a. No, it was all foreign unknown things
    b. They tended NOT to recognise things from the real world
    c. I tended to recognise things from the real world
    b. Yes, I could see a lot of the real world in the work

47. Did the brainONLINE system help them to learn by discovering things? (discovery learning)
    a. They never felt that they learned by discovering things
    b. They seldom felt that they learned by discovering things
    c. They tend to think that they learned by discovering things
    d. They definitely learned by discovering things frequently

48. Did the brainONLINE system make it possible for them to set their own goals?
    a. It never gave them an opportunity to set goals
    b. I tend to think that they DID NOT have the opportunity to set goals
    c. I tend to think that they DID get opportunities to set goals
    d. They definity had opportunity to set goals.

49. In going through the brainONLINE system, did you feel as if they system was just like a teacher, in other words, it was just another way of doing the same class routine? (Opposite)
    a. Yes, it was just like a teacher in a class
    b. I tend to think that it was almost like a teacher
    c. I tend to think it was NOT like a teacher
    d. It was definity NOT like a teacher

50. In going through the brainONLINE system, do you feel that the system is just as valuable as a teacher

a. No
b. I tend Not to think so
c. I tend to think so
d. Yes, definitely

----------customization

51. Did the system allow them to choose WHEN they wanted to learn
    a. No
    b. I tend to think that they could not choose
    c. I tend to think that they could well choose when I wanted to learn
    d. Yes, they could definitely choose when they wanted to learn

52. Could they choose WHERE (the place) they wanted to learn?
    a. No
    b. I tend to think that they could not choose
    c. I tend to think that they could well choose where they wanted to learn
    d. Yes, they could definitely choose the place they wanted to learn

53. Did the brainONLINE system allow them to choose how fast they want to go through the work?
    a. No
    b. I tend to think that they could not choose
    c. I tend to think that they could well choose how fast to go
    d. Yes, they could definitely choose how fast they wanted to go

54. Did the brainONLINE program allow them to customise the program the way it suits you?
    a. No
    b. I tend to think that they did not change the program
    c. I tend to think that they did change the program to suit me.
    d. Yes, they definitely did change aspects of the program to suit me
    e. I am unsure and cannot think of anything

55. Did they adjust the system to fit the way that you learn?
    a. No
    b. I tend to think that they did not adjust it for the way they learn
    c. I tend to think that they did change the program to suit the way they learn
    d. Yes, they definitely did change aspects of the program to suit the way they learn

56. Did the brainONLINE system help them to take initiative in learning with the system, eg start things, think of new ways to do things?
    a. No
    b. I tend to think that they did not
    c. I tend to think that they did
    d. Yes, they definitely did take initiative

57. Did the brainONLINE system help them ask for help from the teachers.?
    a. No
    b. I tend to think that they did not
    c. I tend to think that they did
    d. Yes, they definitely did

58. Sometimes the work is presented in a fixed structure, and the system does not allow you to change it. Did you think this is beneficial to the students?
    a. No
    b. I tend to think that it is NOT
    c. I tend to think that it IS useful
    d. Yes, it definitely is

59. What do the students think. Sometimes the work is presented in a fixed structure, and the system does not allow you to change it. Did you think they found find it usefull?
    a. No
    b. I tend to think that they do NOT
    c. I tend to think that they did
    d. Yes, they definitely did

----------Control (component display)

60. Did the brainONLINE system make make it easier for them to learn
    a. No
    b. I tend to think that It did NOT
    c. I tend to think that It did
    d. Yes, It definitely did

61. Did the brainONLINE system help them when they came across something that they do not understand
    a. No
    b. I tend to think that It did NOT
    c. I tend to think that It did
    d. Yes, It definitely did

62. Did the brainONLINE system help them to know exactly what lessons and work they were supposed to do for the year
    (Opposite)
    a. No
    b. I tend to think that It did NOT
    c. I tend to think that It DID
    d. Yes, It definitely did

63. Did the brainONLINE system support them sufficiently with Assignment dates and deadlines, and the submission of assignments.
    a. No

b. I tend to think that It did NOT
c. I tend to think that It DID
d. Yes, It definitely did

----------pedagogics – collaborative

64. Did the brainONLINE system help them to learn together with others
    a. No
    b. I tend to think that It did NOT
    c. I tend to think that It DID
    d. Yes, It definitely did

65. Did they attend the workshops
    a. No
    b. They attended some
    c. Yes, they attended most of them
    d. Yes, they did attended all of them
    comment :
……

66. What do you find more useful, the online interface or workshops
    a. the brainONLINE interface
    b. workshops
    c. They were both essential, I cannot choose.

67. Did they make use of brainONLINE system to talk to other students
    a. No
    b. I tend to think that they do NOT
    c. I tend to think that they did
    d. Yes, they definitely did

68. Do they prefer to work alone?
    a. Yes,most of the time
    b. I tend to think that they prefer to work alone
    d. I tend to think that they prefer NOT to work with others
    e. No, they never want to work alone

----------pedagogics – Companionship

69. Did their parents suppport and encourage them
    a. No
    b. I tend to think that they do NOT
    c. I tend to think that they did
    d. Yes, they definitely did

70. Did their parents work with them
    a. No,
    b. I tend to think they did NOT work with them

c. I tend to think that they almost always DID work with them
d. Yes, they definitely did work with them

71. Did the brainONLINE system make it possible for their parents to work with them
    a. No
    b. I tend to think that It did NOT
    c. I tend to think that it did
    d. Yes, It definitely did

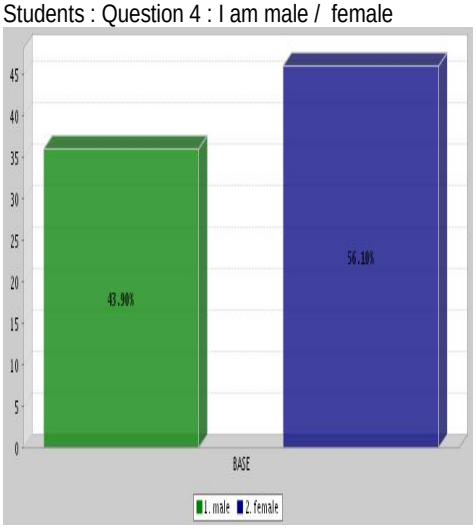
72. Do you think that if parents helped their children, it will be easier to them to pass their exams.
    a. No
    b. I tend to think that It will NOT be easier
    c. I tend to think that I WILL be easier
    d. Yes, It will definitely will be easier

73. They got no support from anyone, and worked on their own, and motivated themselves. They would not have wanted it any other way.
    a. No, I disagree
    b. I tend to disagree
    c. I tend to agree
    d. Yes, It definitely agree

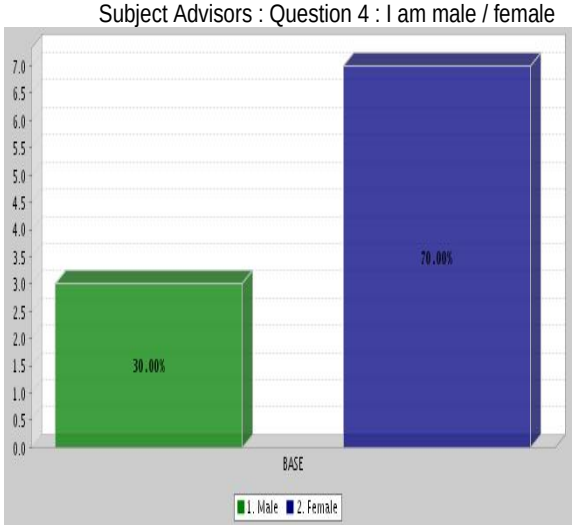
74. Did the brainONLINE system somehow act as a COMPANION to them, like a surrogate mentor.
    a. No
    b. I tend to think that It did NOT
    c. I tend to think that it did
    d. Yes, It definitely did

Appendix 10: Questionnaire results - students

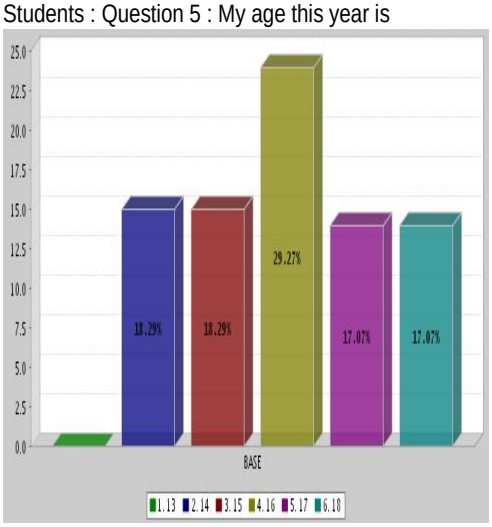
Students : Question 4 : I am male / female

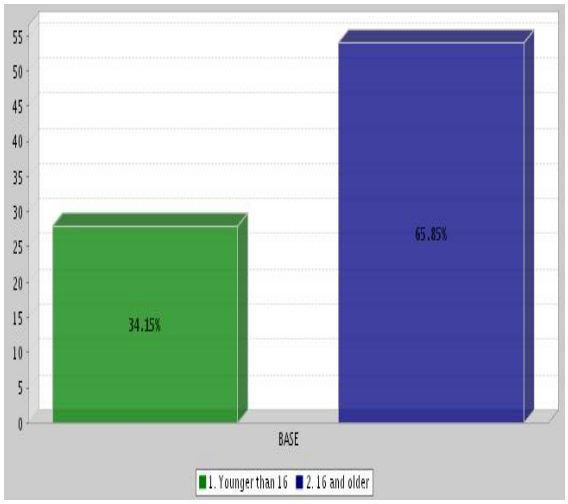


Subject Advisors : Question 4 : I am male / female

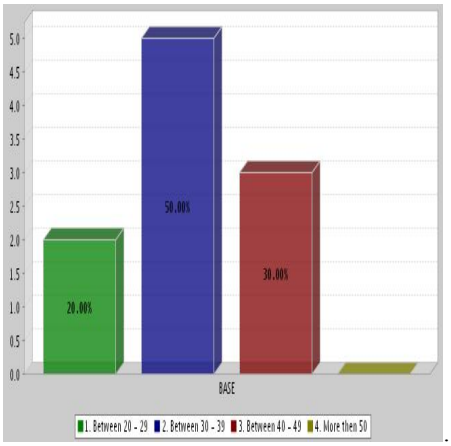


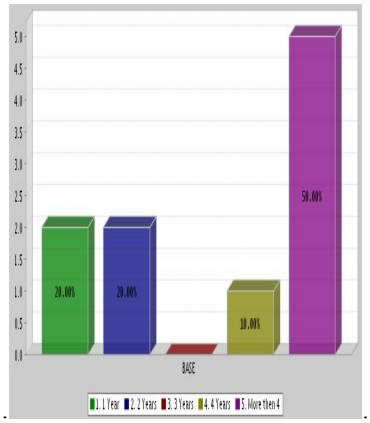
Students : Question 5 : My age this year is



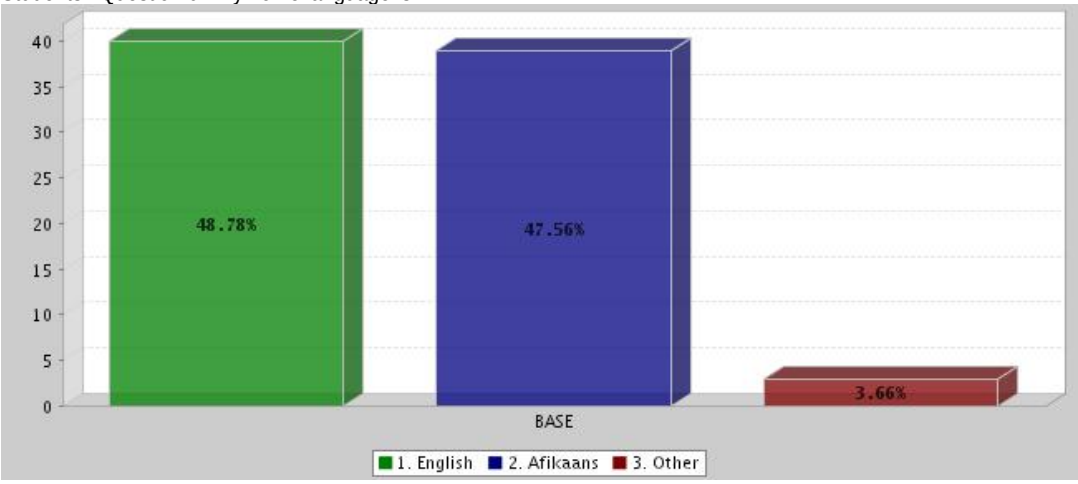


Subject Advisors : Question 5 : My age this year is

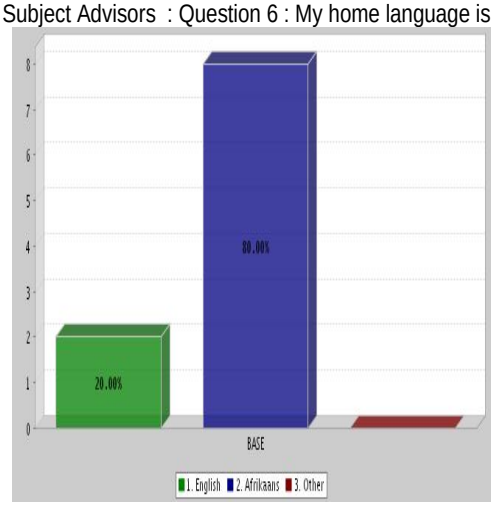




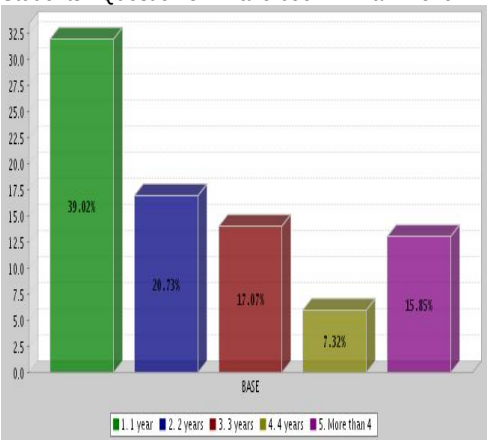
Students : Question 6 : My home language is

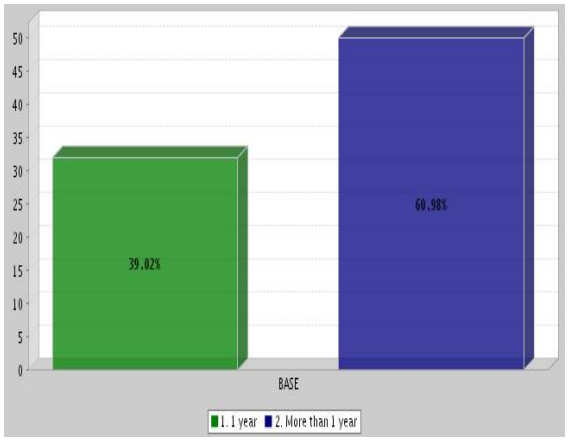


Subject Advisors : Question 6 : My home language is



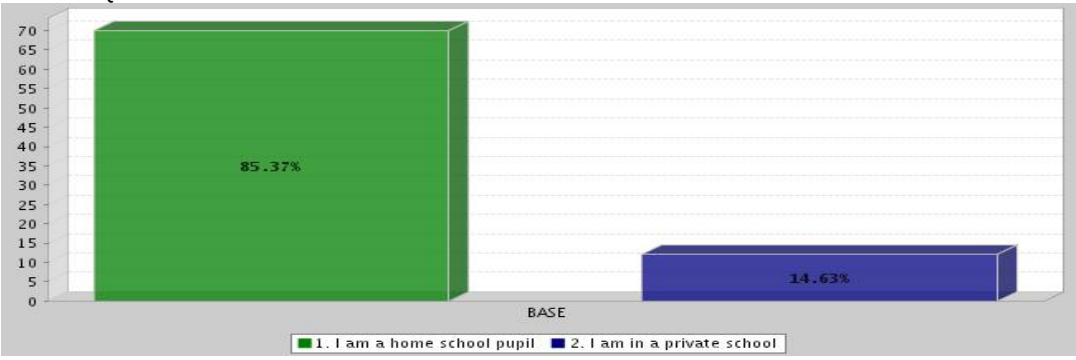
Students : Question 8 : I have been in Brainline for .....years



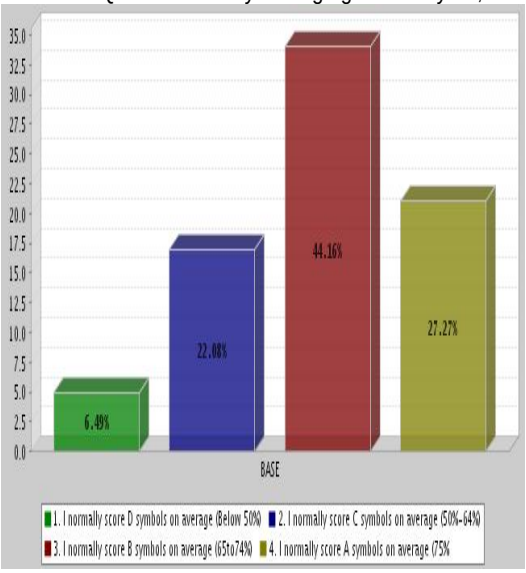


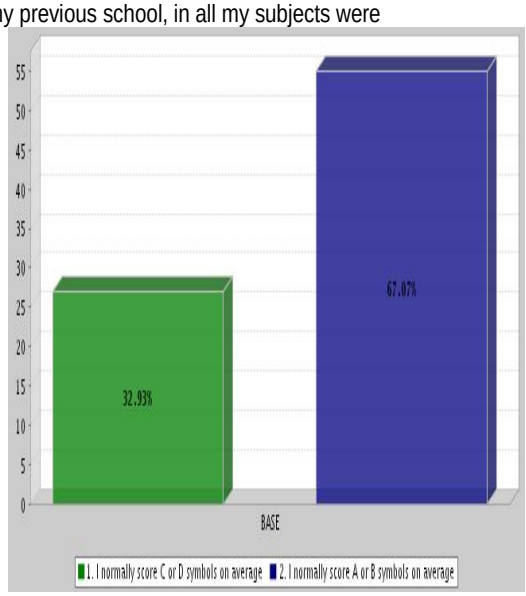
Subject Advisors :I have been in Brainline for ... years

Students : Question 9 : Private school or home school.

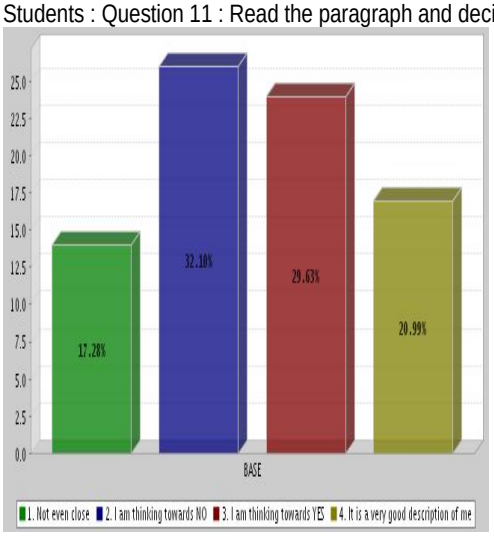


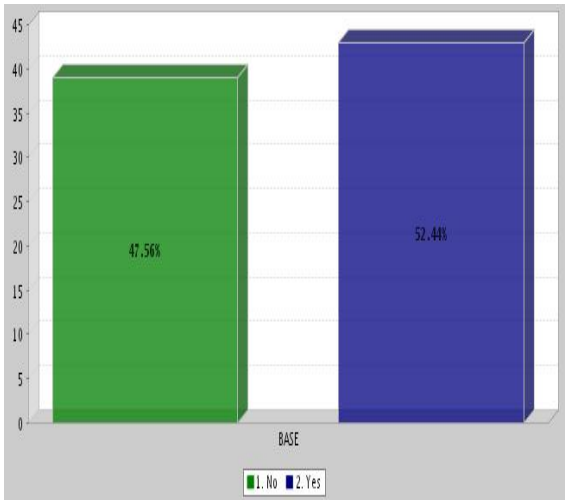
Students : Question 10 : My average grade last year, or in my previous school, in all my subjects were



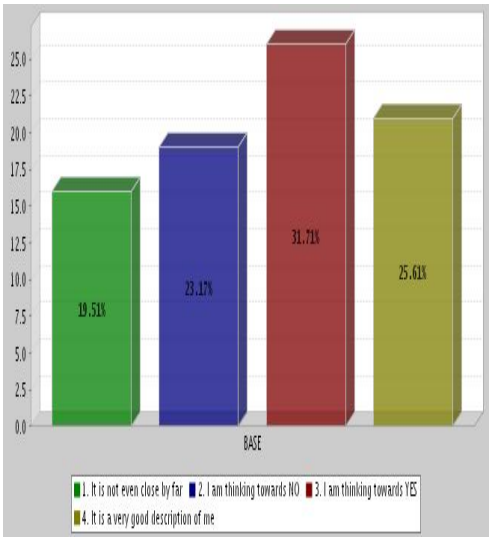


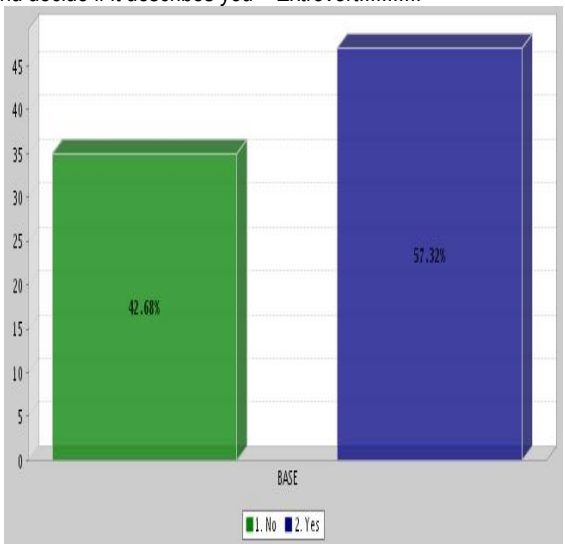
Students : Question 11 : Read the paragraph and decide if it describes you .....Introvert.....



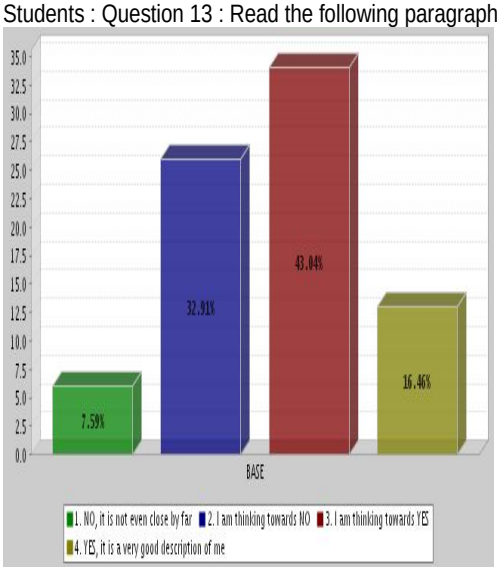


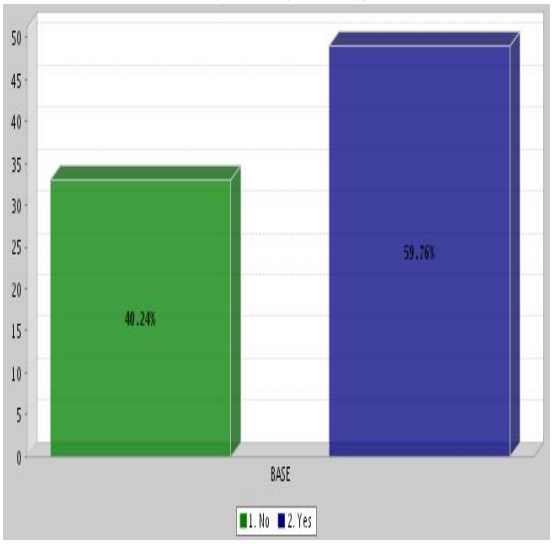
Students : Question 12 : Read the following paragraph and decide if it describes you Extrovert.....



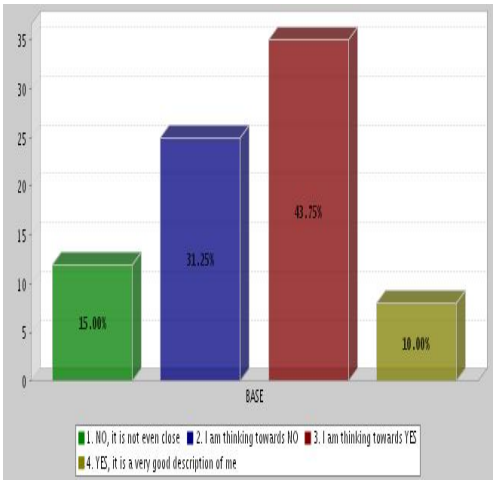


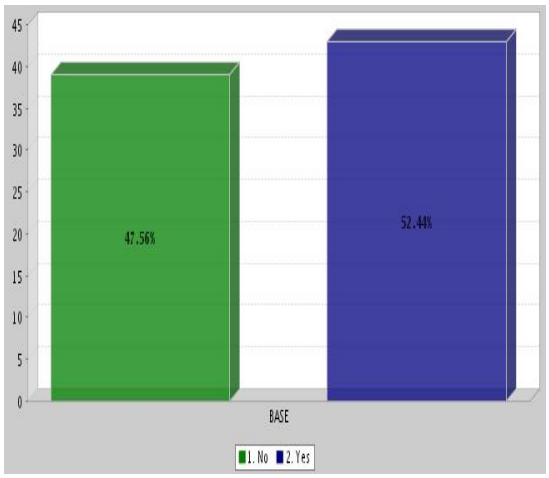
Students : Question 13 : Read the following paragraph and decide if it describes you. (Sensing)



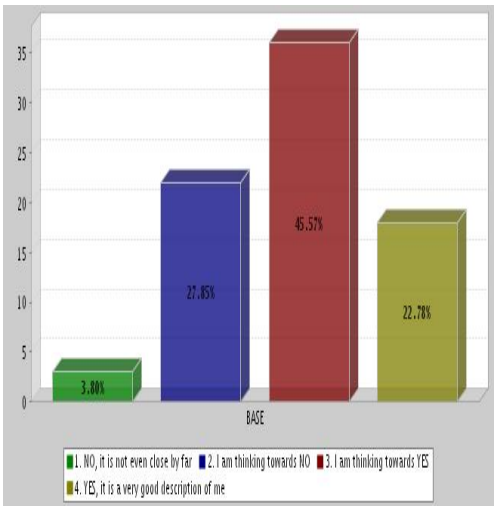


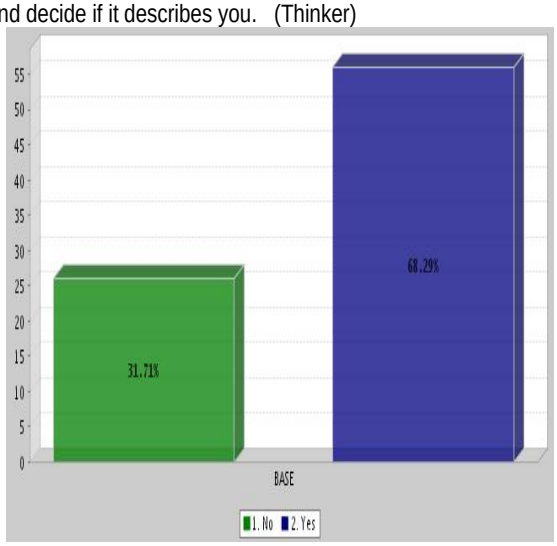
Students : Question 14 : Read the following paragraph and decide if it describes you. (Intuitives)



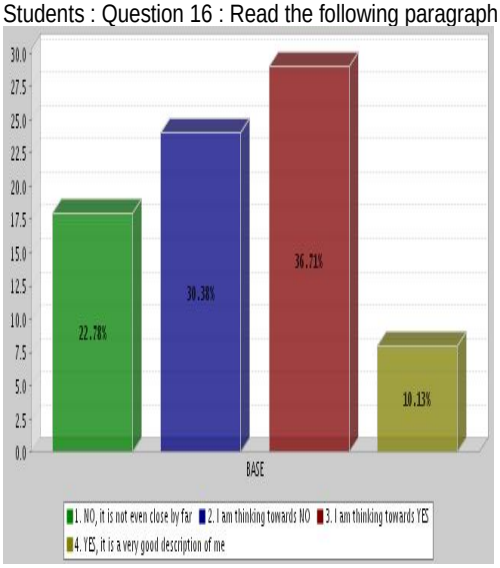


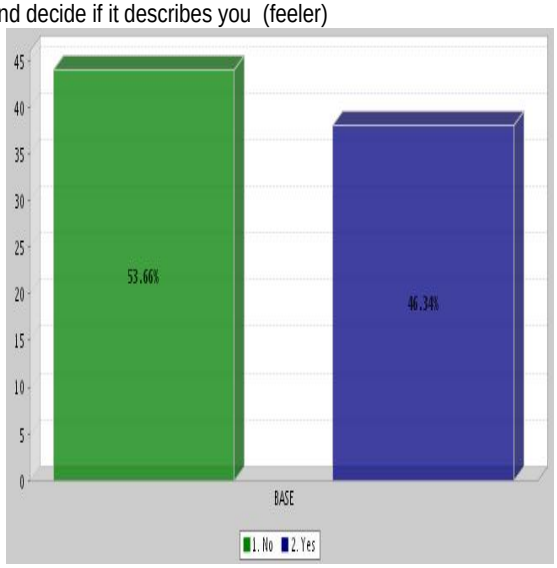
Students : Question 15 : Read the following paragraph and decide if it describes you. (Thinker)



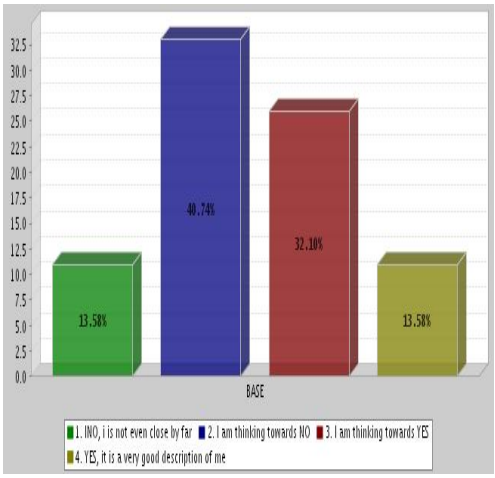


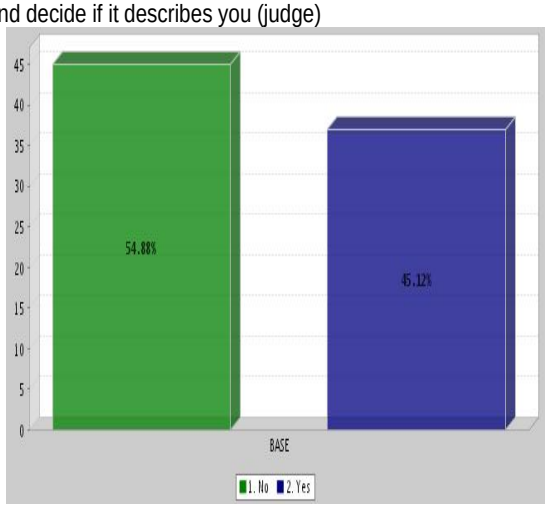
Students : Question 16 : Read the following paragraph and decide if it describes you (feeler)



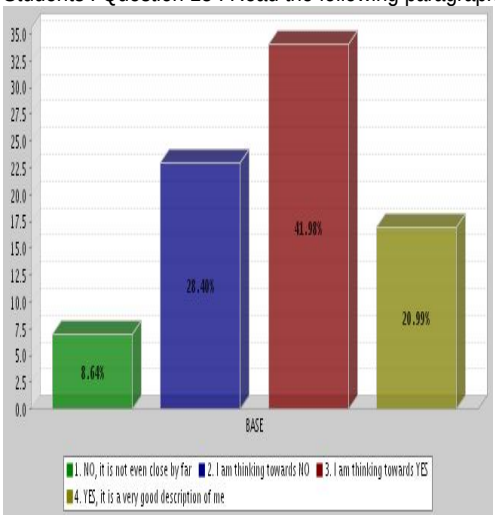


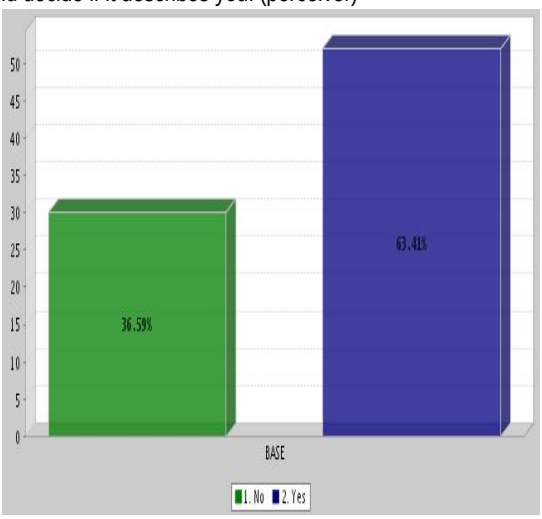
Students : Question 17 : Read the following paragraph and decide if it describes you (judge)



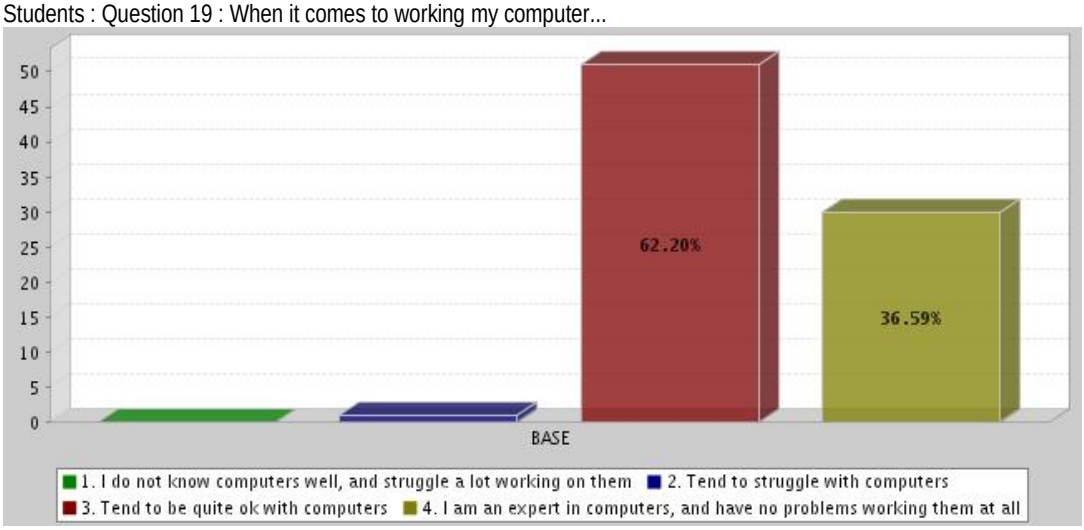


Students : Question 18 : Read the following paragraph and decide if it describes you. (perceiver)

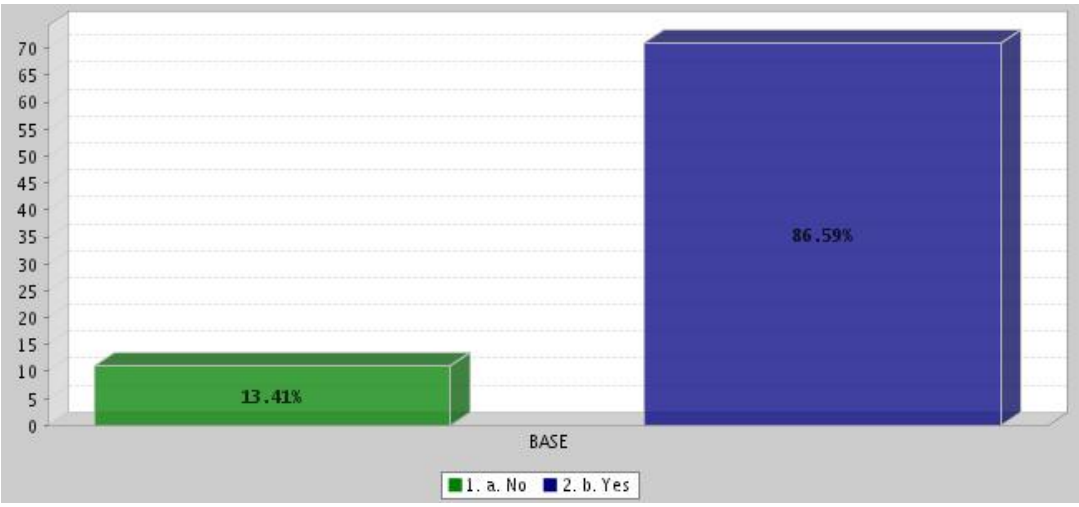




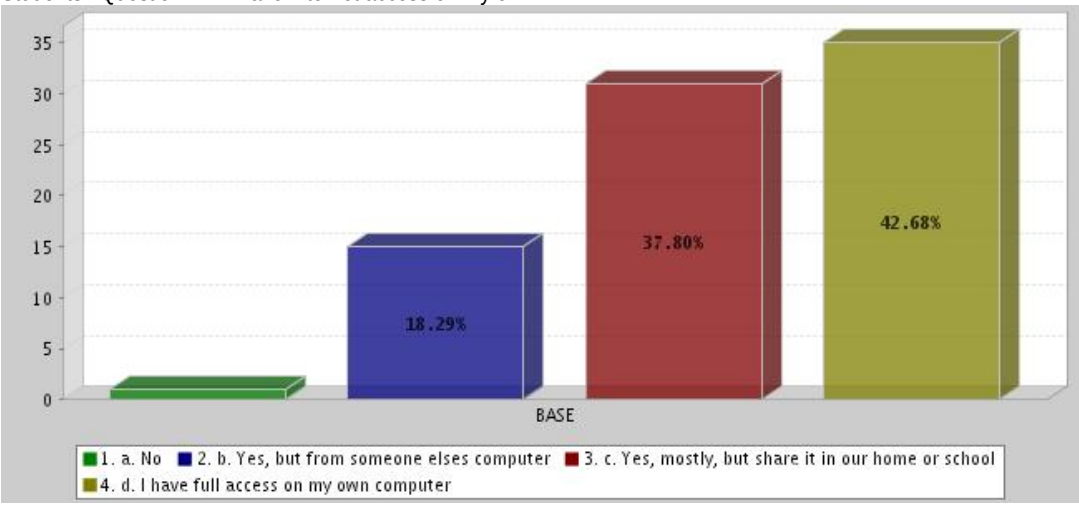
Students : Question 19 : When it comes to working my computer...



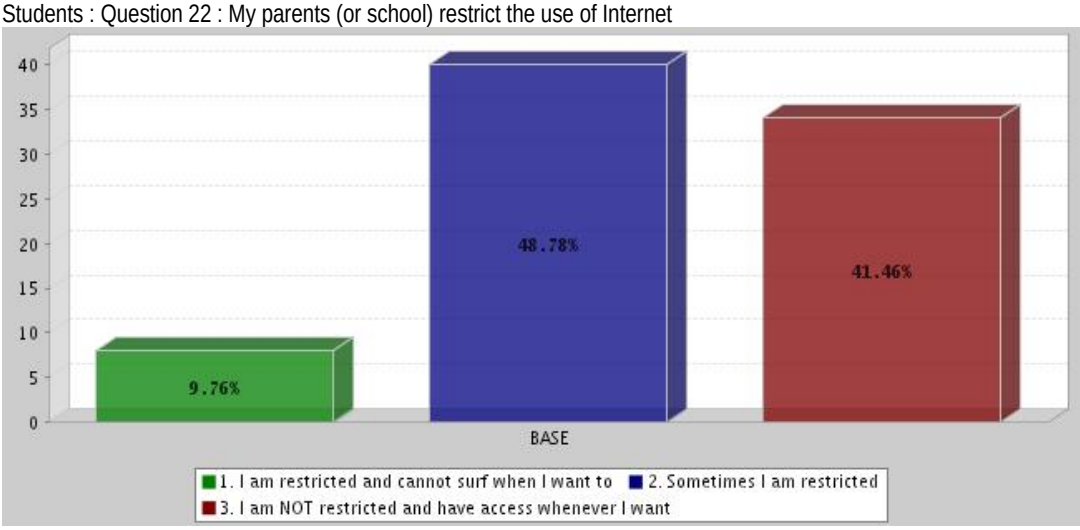
Students : Question 20 : I have my own computer



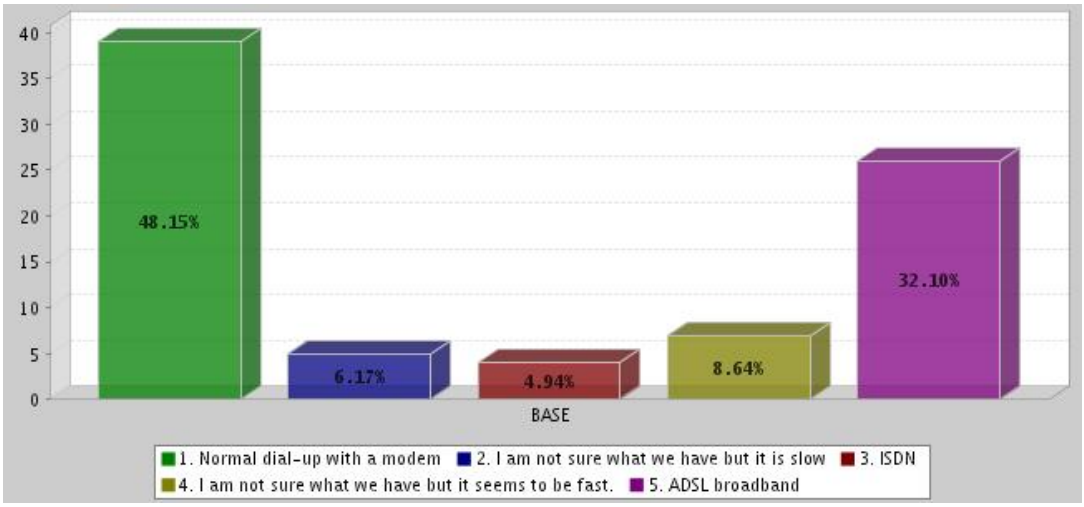
Students : Question 21 : I have Internet access on my own



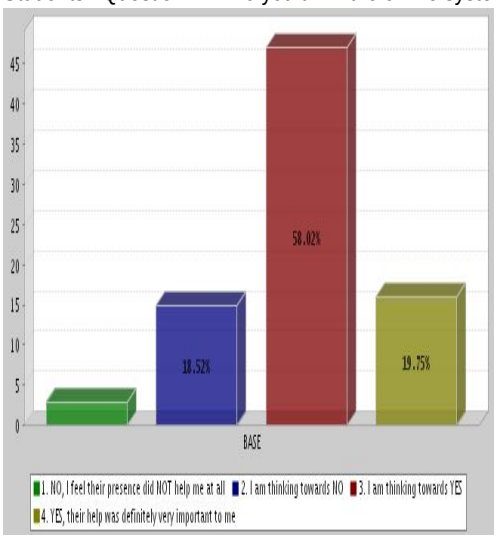
Students : Question 22 : My parents (or school) restrict the use of Internet

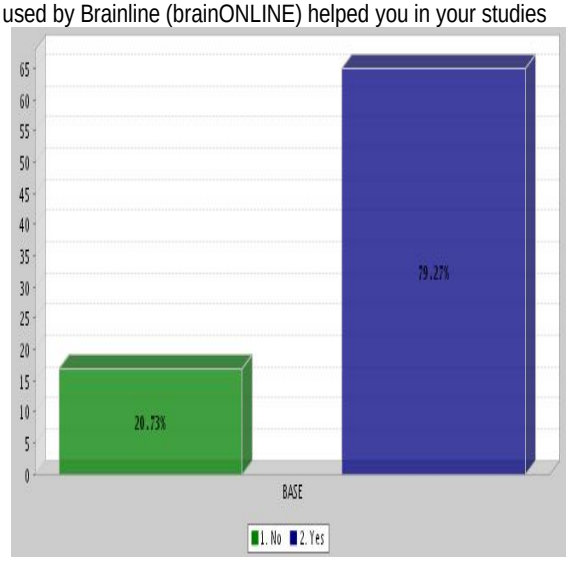


Students : Question 23 : Type of Internet access

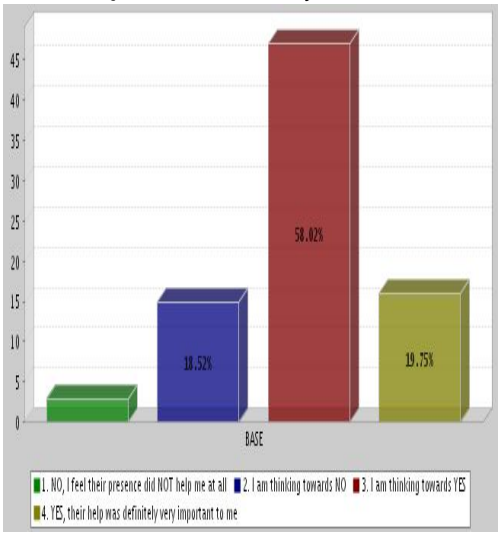


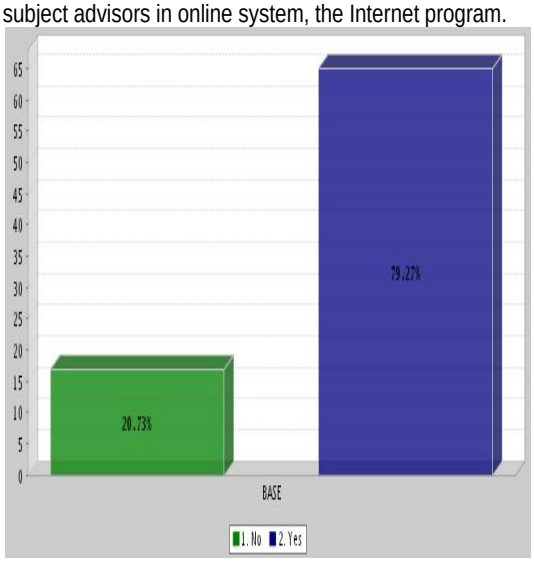
Students : Question 24 : Do you think the online system used by Brainline (brainONLINE) helped you in your studies



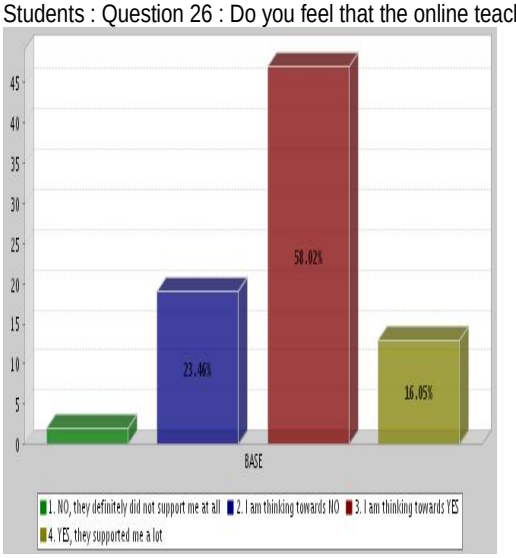


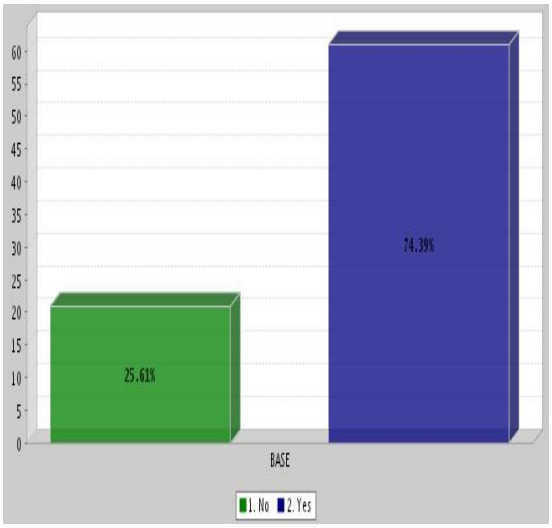
Students : Question 25 : How do you rate the work of the subject advisors in online system, the Internet program.



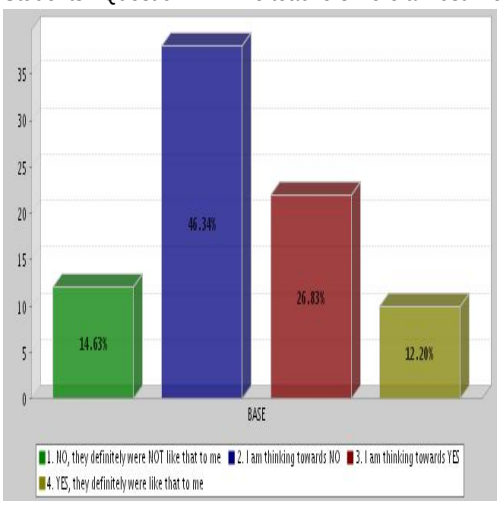


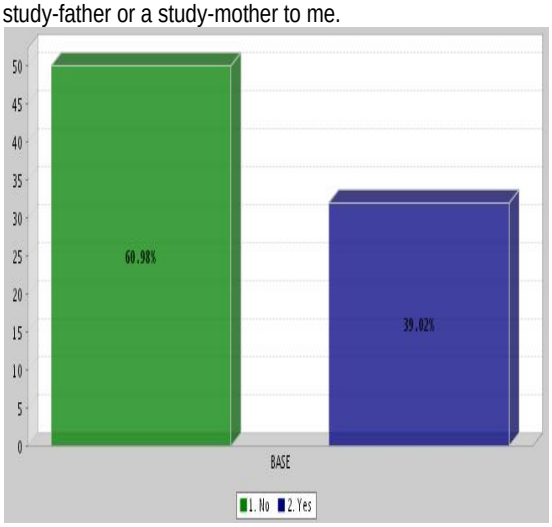
Students : Question 26 : Do you feel that the online teachers supported you?



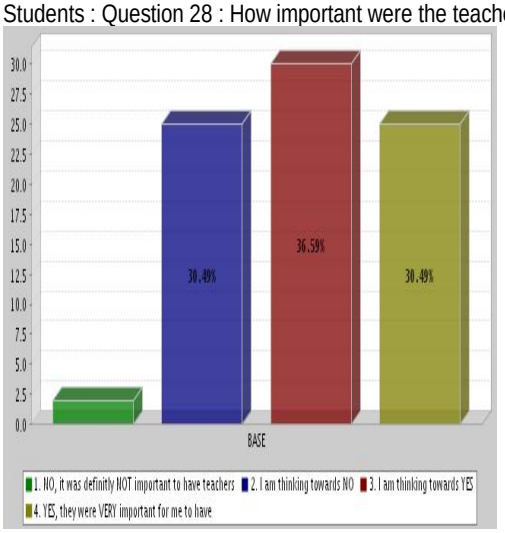


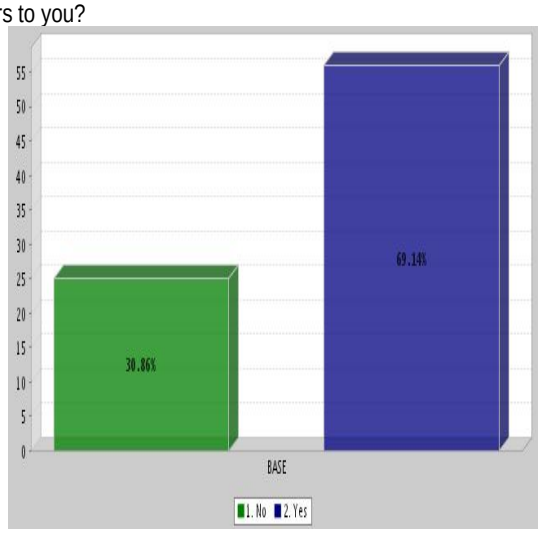
Students : Question 27 : The teachers were almost like a study-father or a study-mother to me.



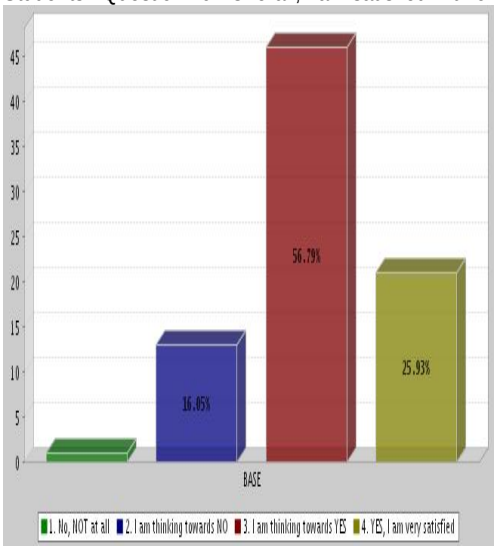


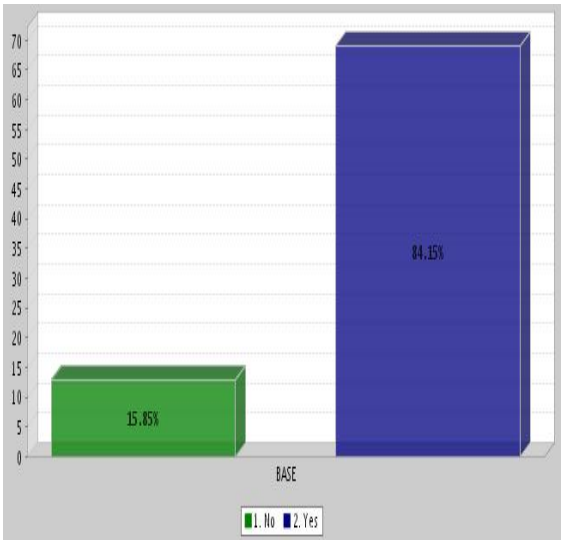
Students : Question 28 : How important were the teachers to you?



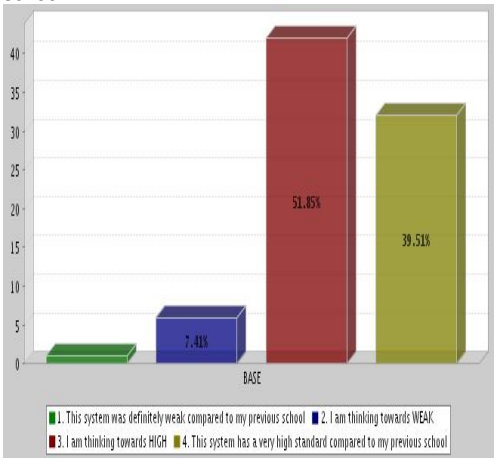


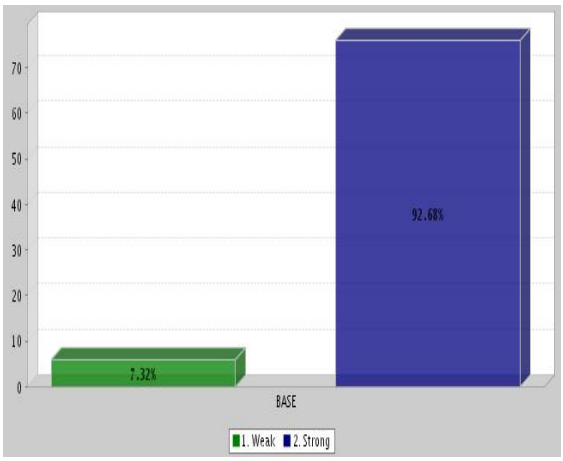
Students : Question 29 : Overall, I am satisfied with online system, the Internet program



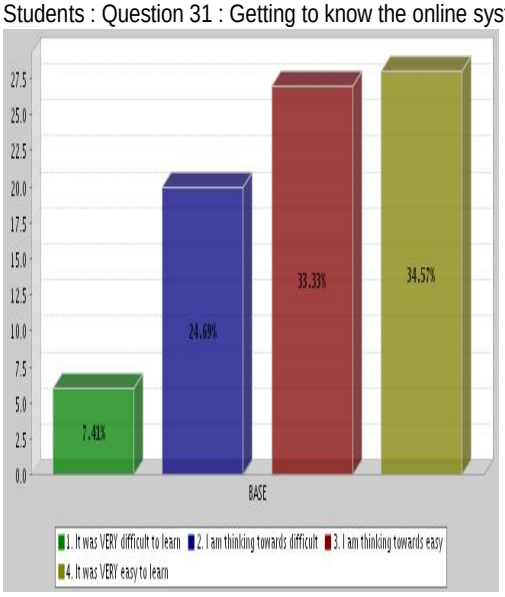


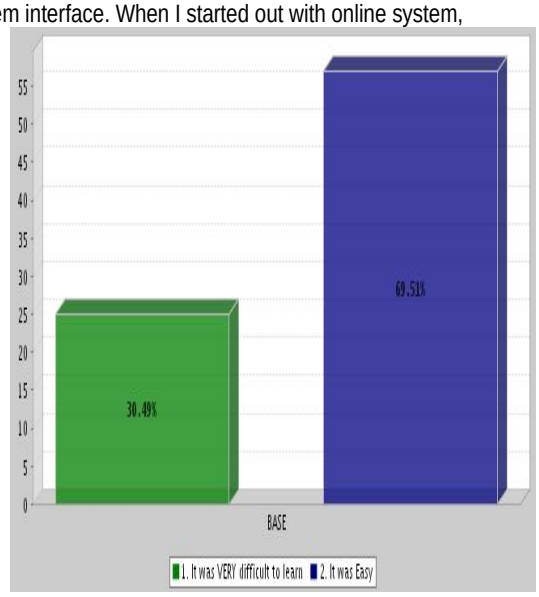
Students : Question 30 : The standard of schooling in THIS system was weak or high compared to my previous school.



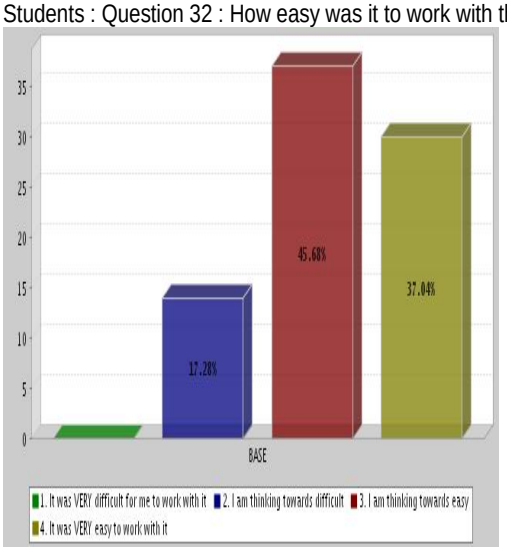


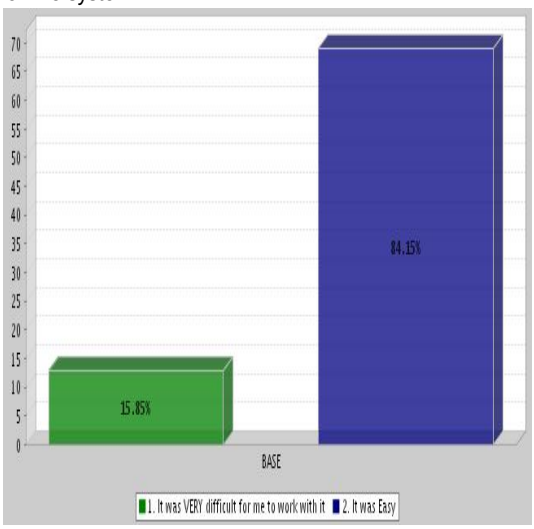
Students : Question 31 : Getting to know the online system interface. When I started out with online system,



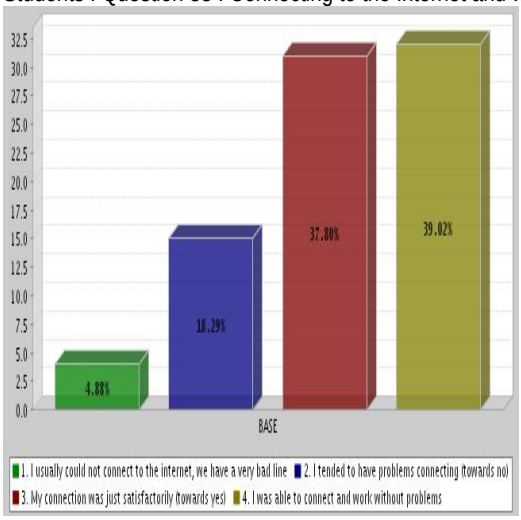


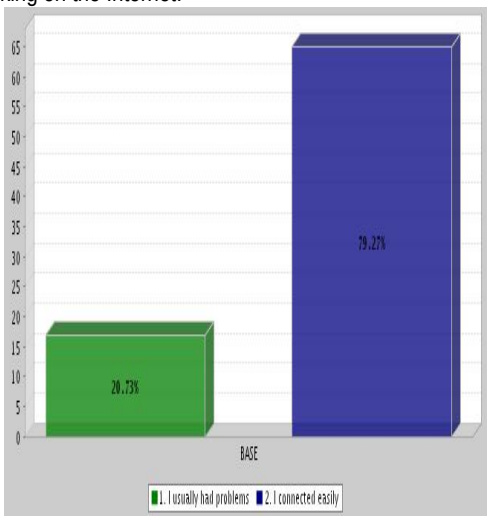
Students : Question 32 : How easy was it to work with the online system?



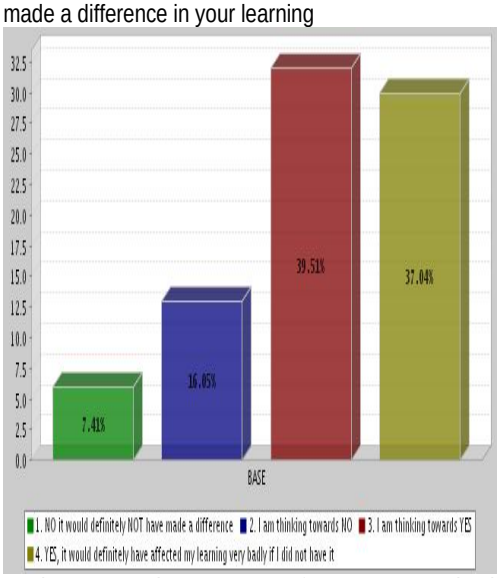


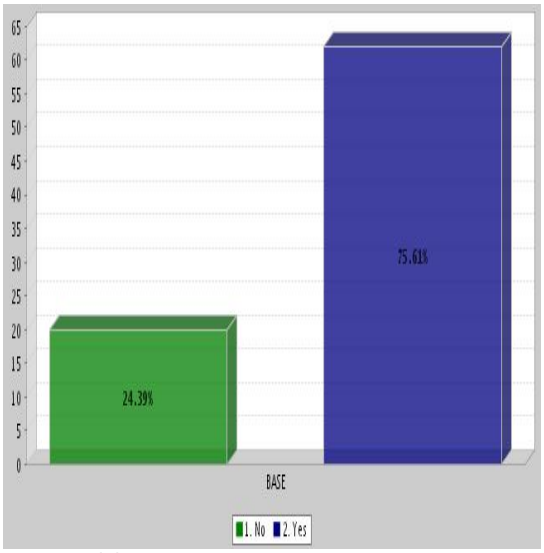
Students : Question 33 : Connecting to the Internet and working on the Internet.



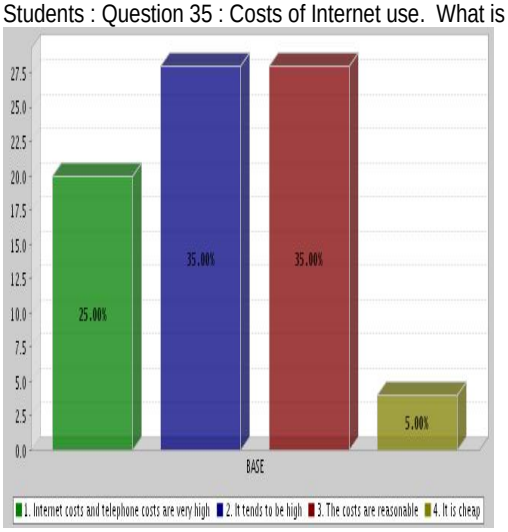


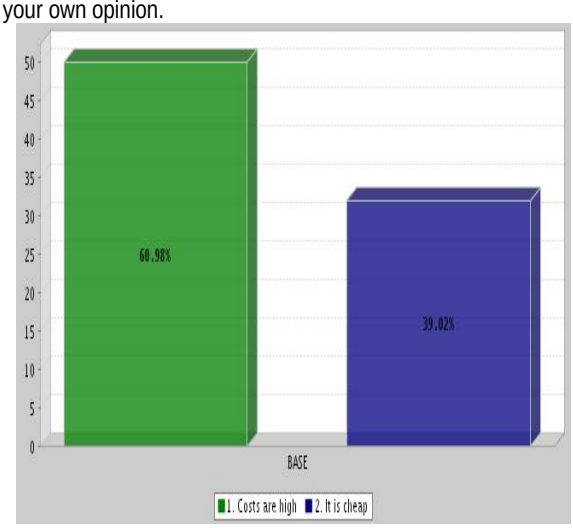
Students : Question 34 : If you were NOT to have access to the Internet and online system, do you think it would have made a difference in your learning



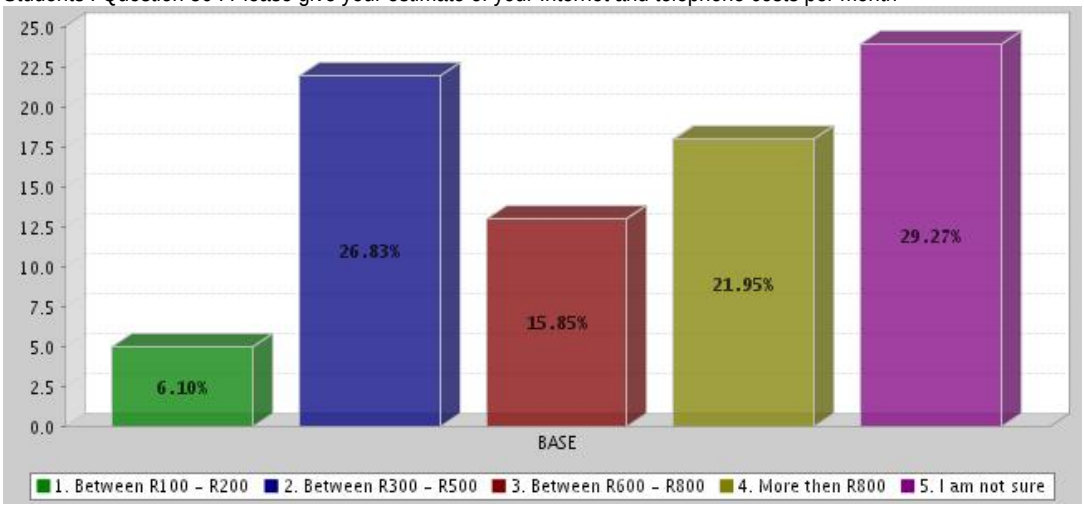


Students : Question 35 : Costs of Internet use. What is your own opinion.

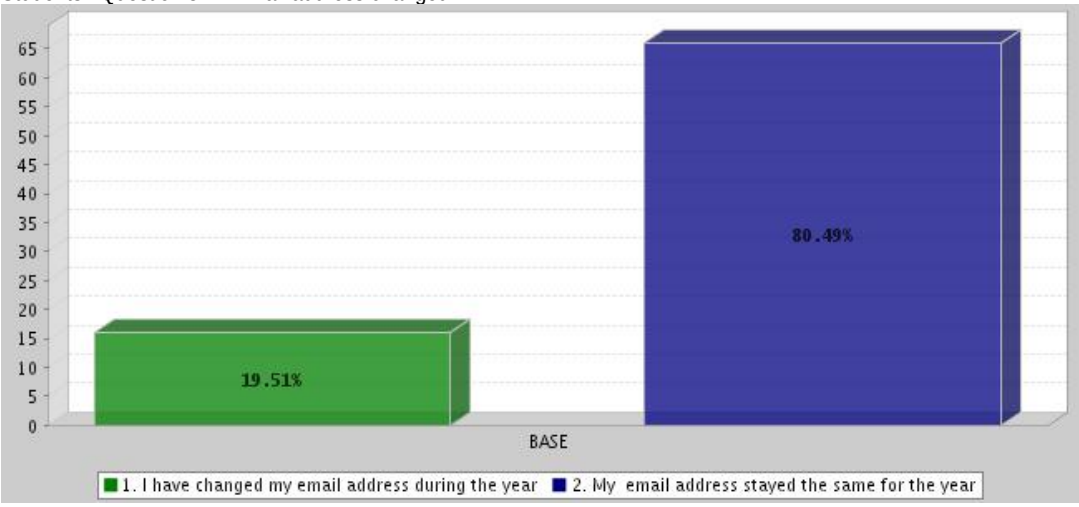




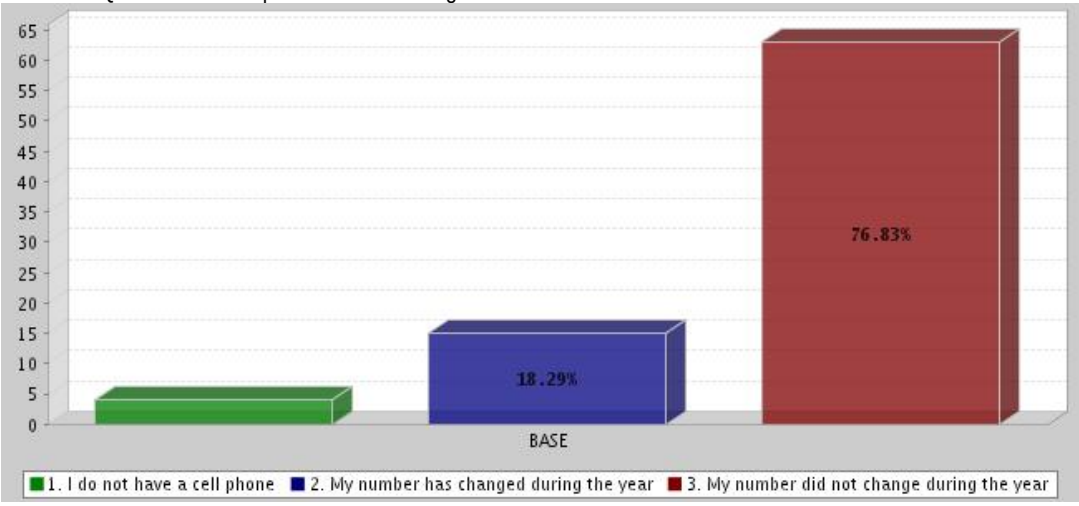
Students : Question 36 : Please give your estimate of your Internet and telephone costs per month



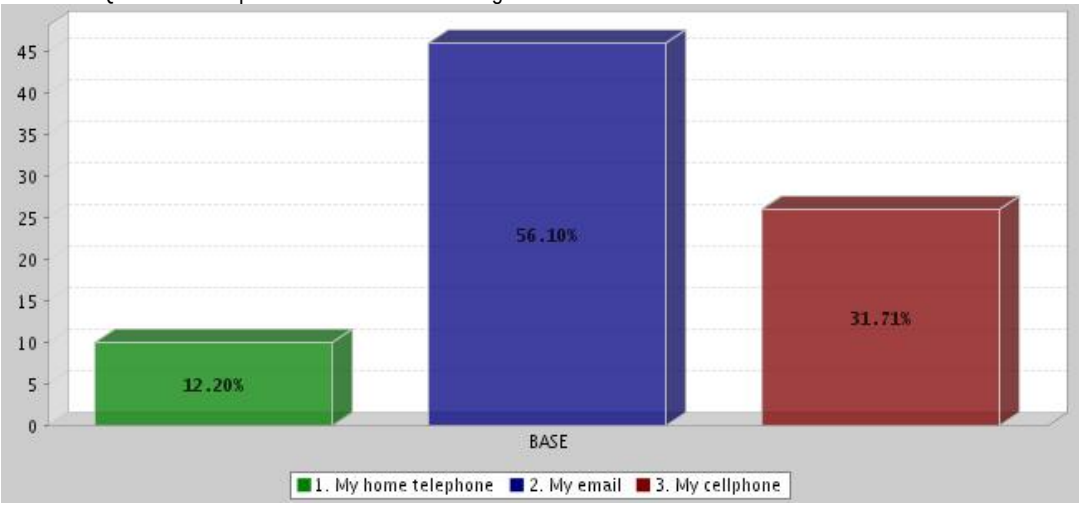
Students : Question 37 : E-mail address changed?



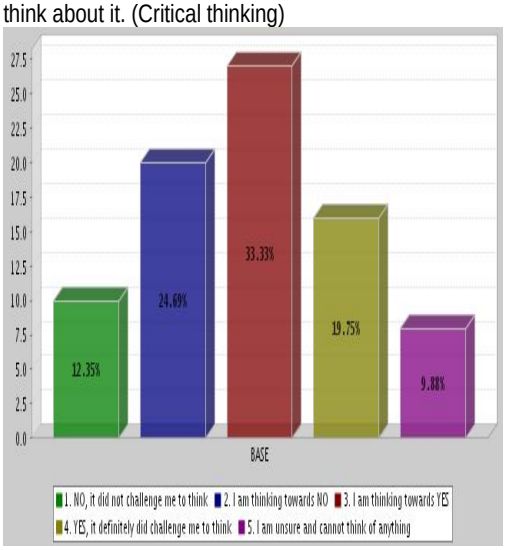
Students : Question 38 : Cellphone number changed?

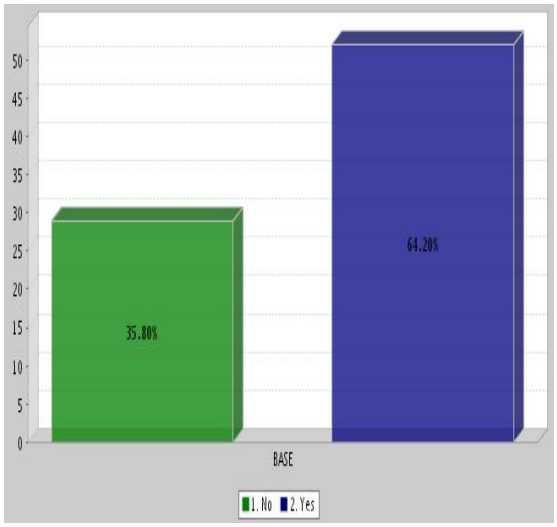


Students : Question 39 : I prefer to be contacted through

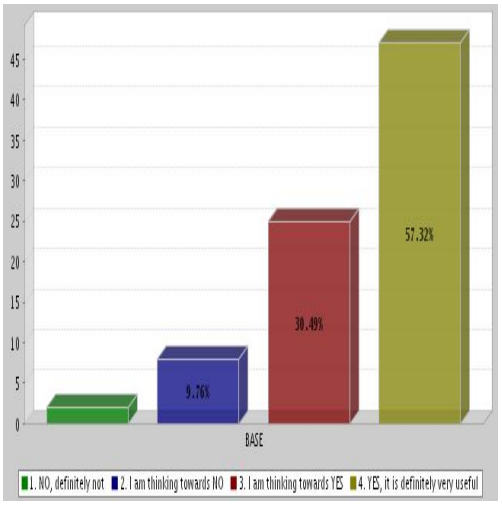


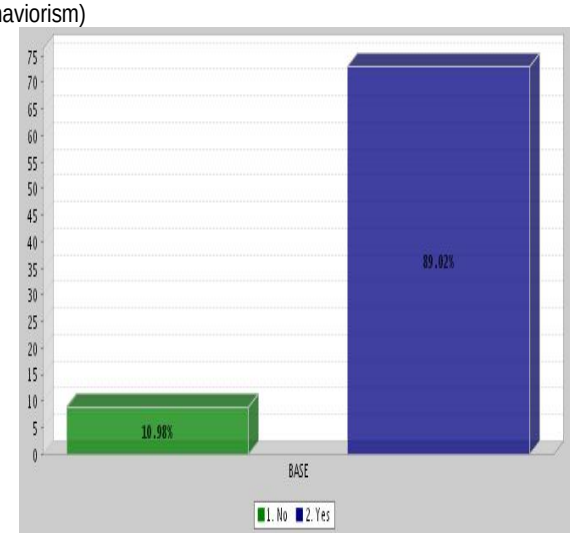
Students : Question 40 : Did the online system challenge you to think about things differently and how other people think about it. (Critical thinking)



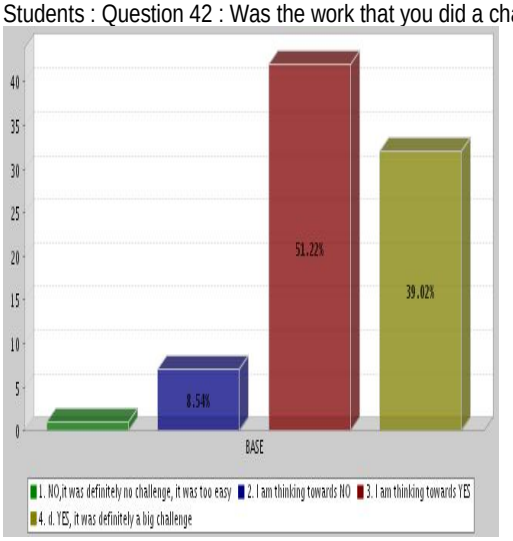


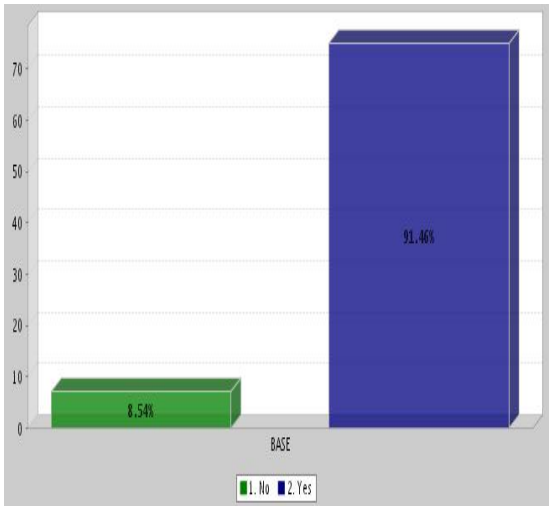
Students : Question 41 : Do you think it is useful to you to repeat things until you have mastered it. Do you agree with the statement "repetition is the mother of learning" (behaviorism)



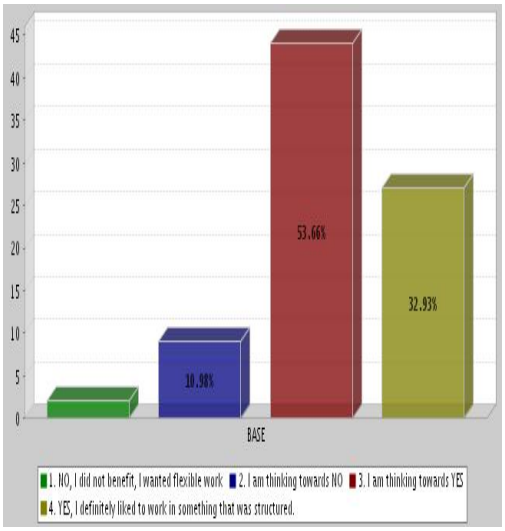


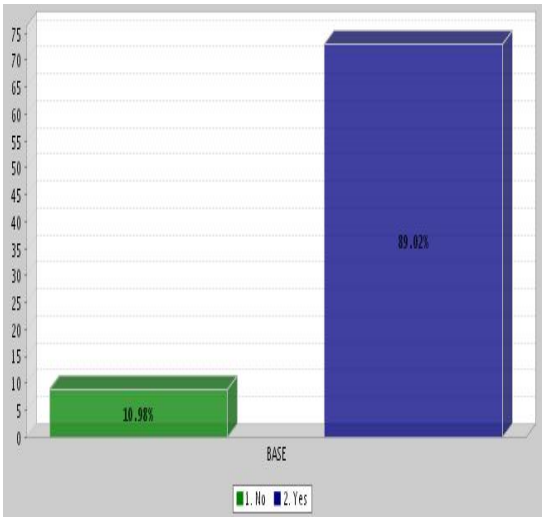
Students : Question 42 : Was the work that you did a challenge to you, or was it too easy for you? (challenge)



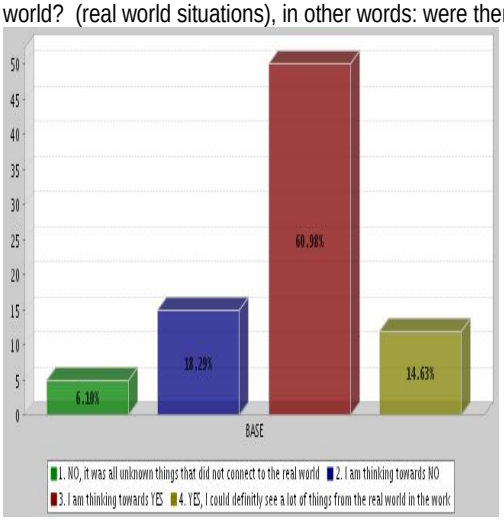


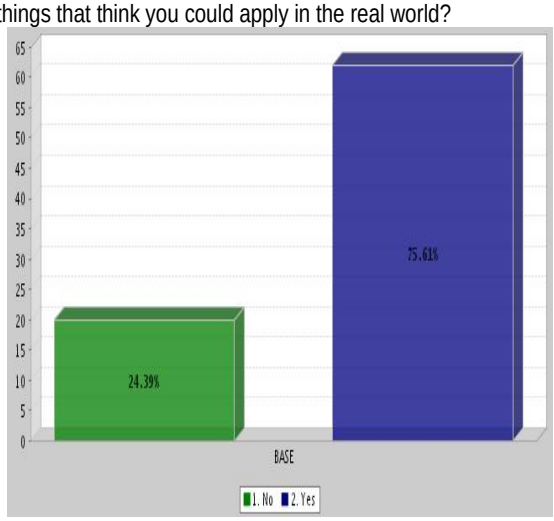
Students : Question 43 : Did you benefit from the way that some of the work was fixed (highly structured)
In other words: do you think it is good for you to have a fixed structure, deadlines etc in some work with marked out fixed content.



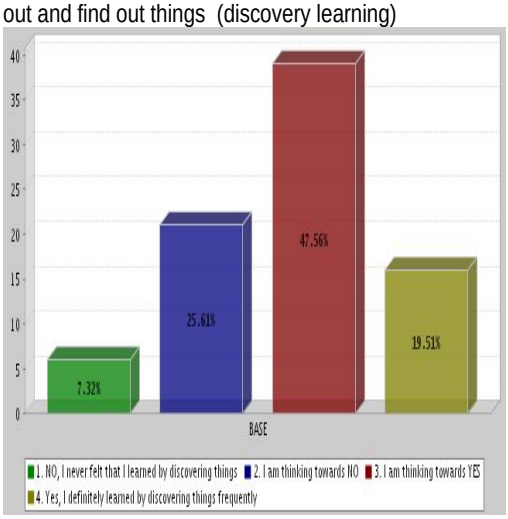


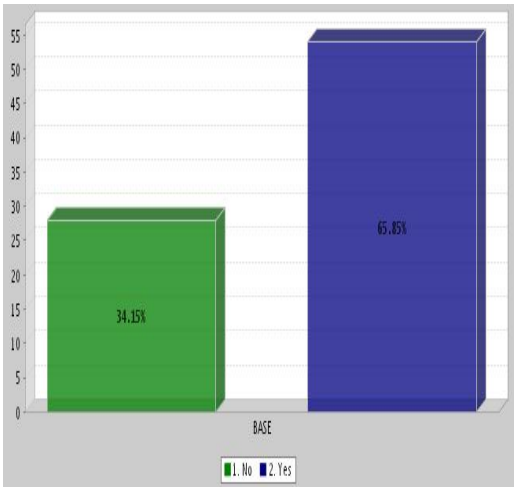
Students : Question 44 : Did the online system allow you to learn about things that you could recognise in the real world? (real world situations), in other words: were there things that think you could apply in the real world?



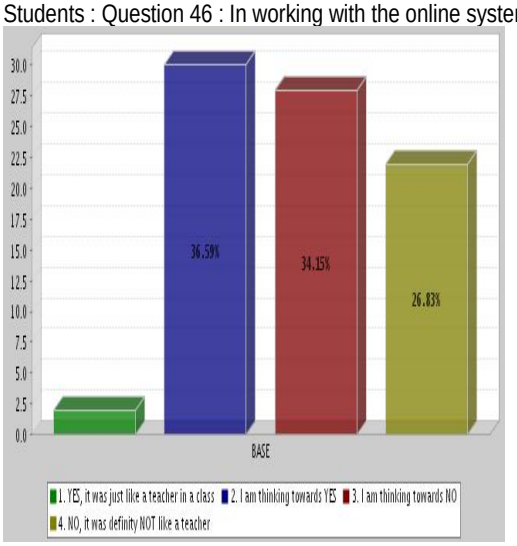


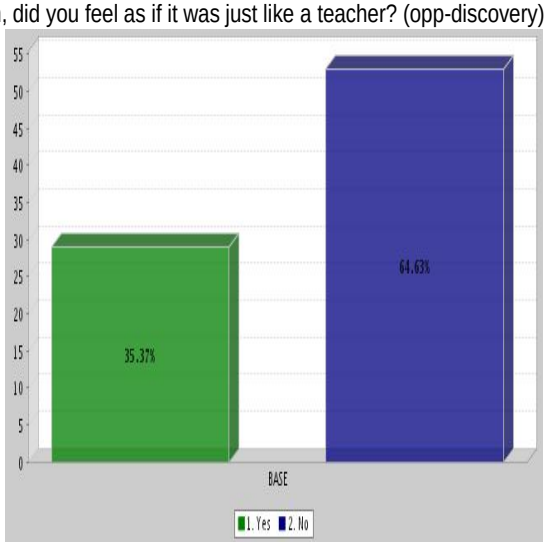
Students : Question 45 : Did the online system help you to learn by discovering things? In other words: you had to go out and find out things (discovery learning)



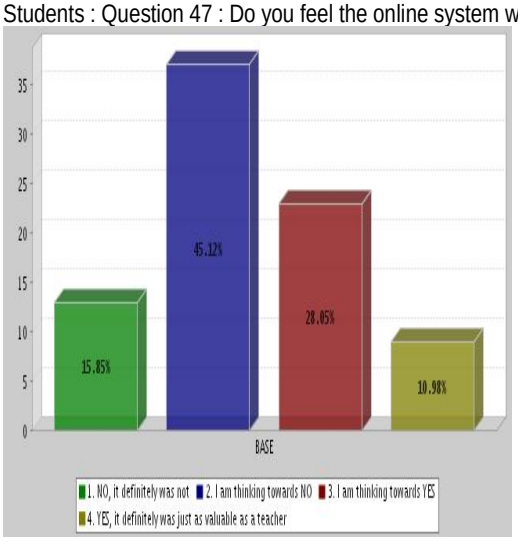


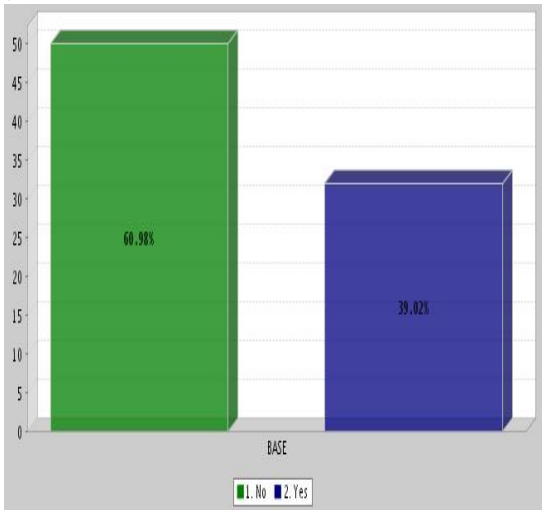
Students : Question 46 : In working with the online system, did you feel as if it was just like a teacher? (opp-discovery)



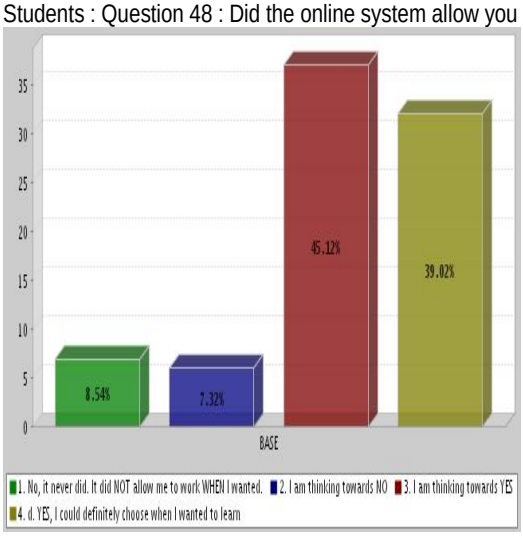


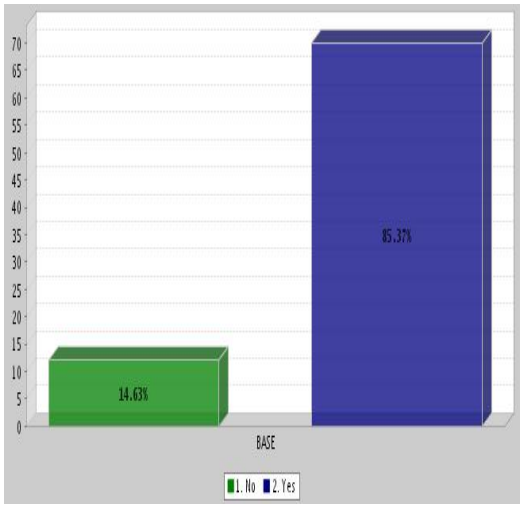
Students : Question 47 : Do you feel the online system was just as valuable as a teacher



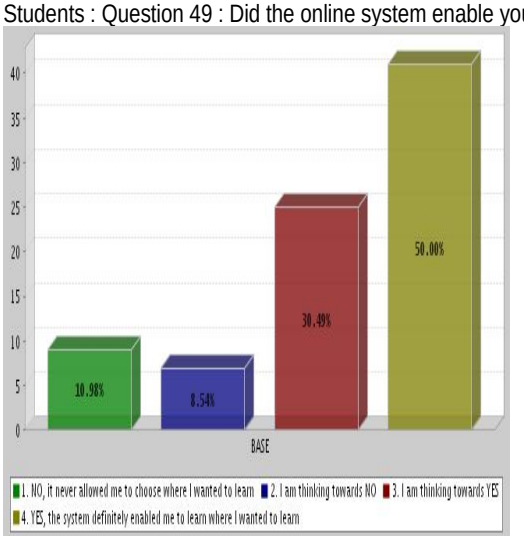


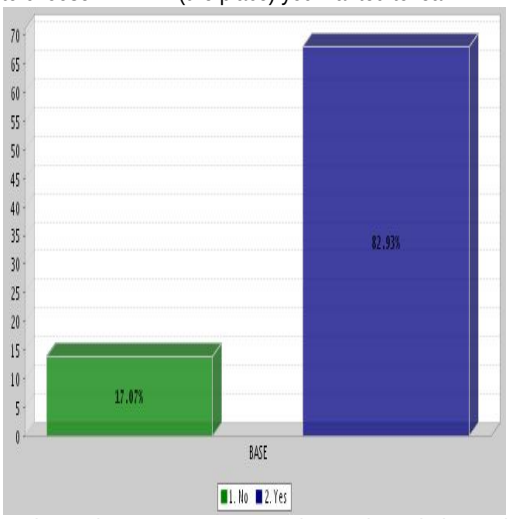
Students : Question 48 : Did the online system allow you to choose WHEN you wanted to learn



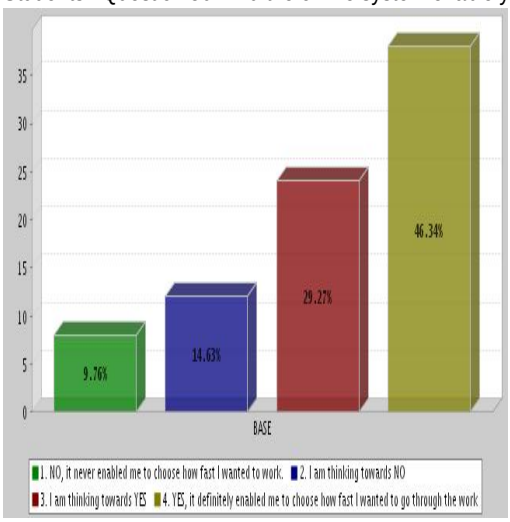


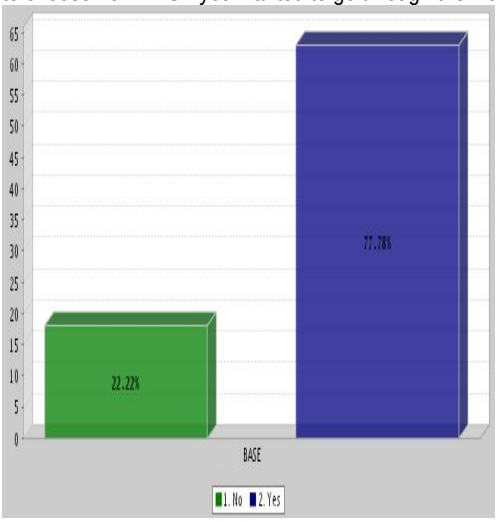
Students : Question 49 : Did the online system enable you to choose WHERE (the place) you wanted to learn?



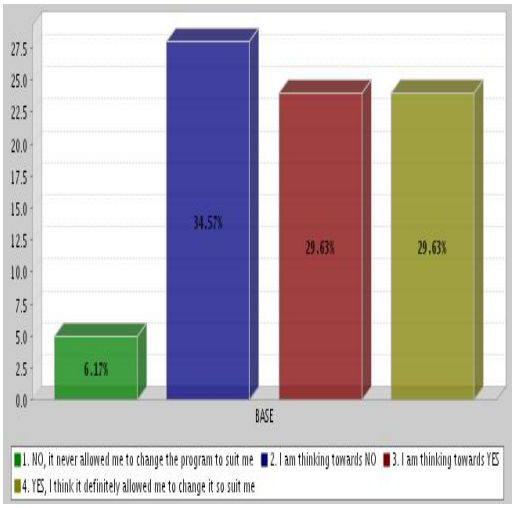


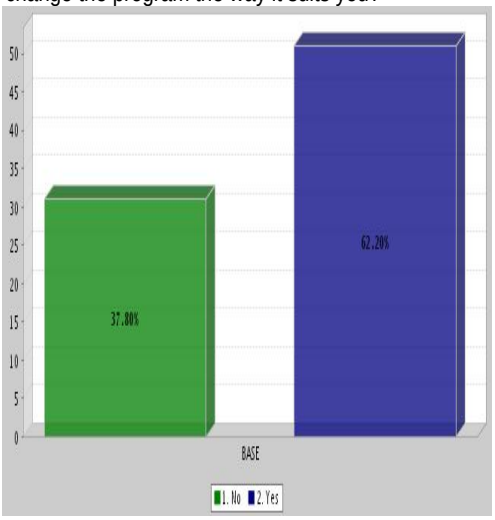
Students : Question 50 : Did the online system enable you to choose how FAST you wanted to go through the work?



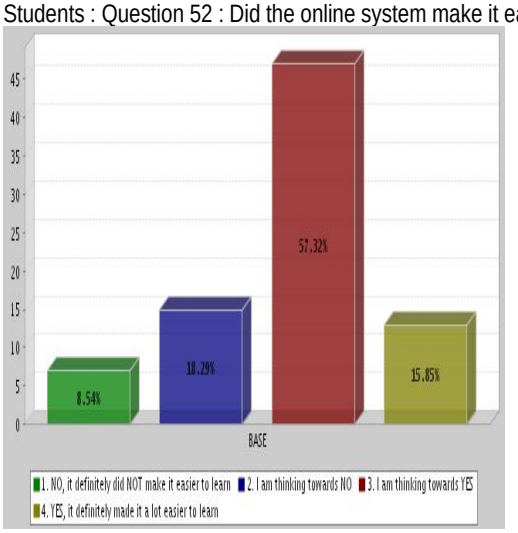


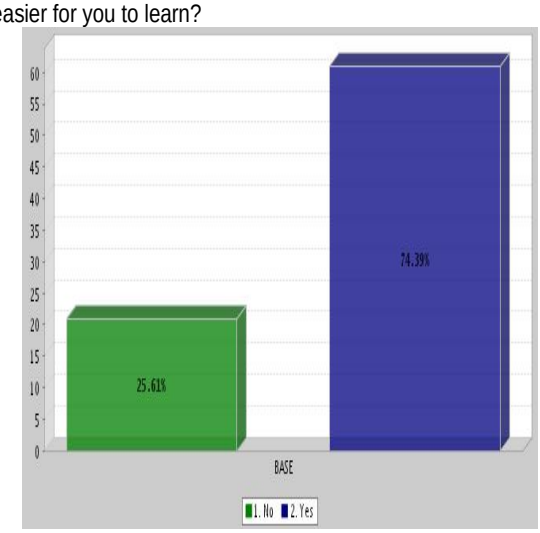
Students : Question 51 : Did the online system allow you to change the program the way it suits you?



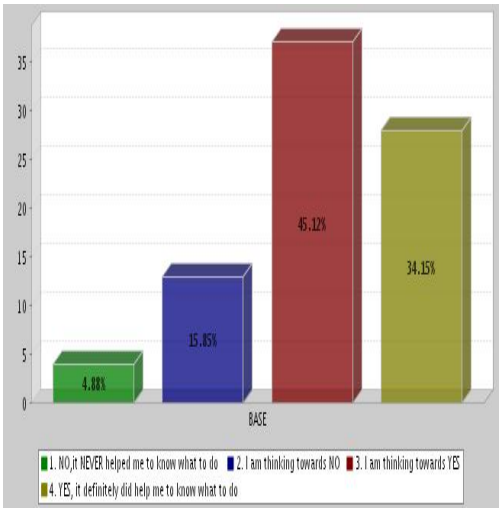


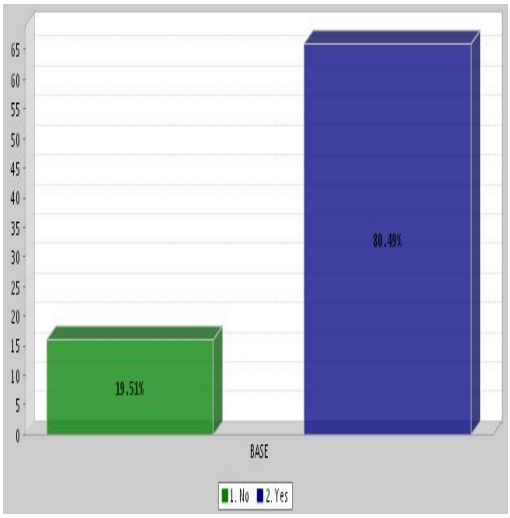
Students : Question 52 : Did the online system make it easier for you to learn?



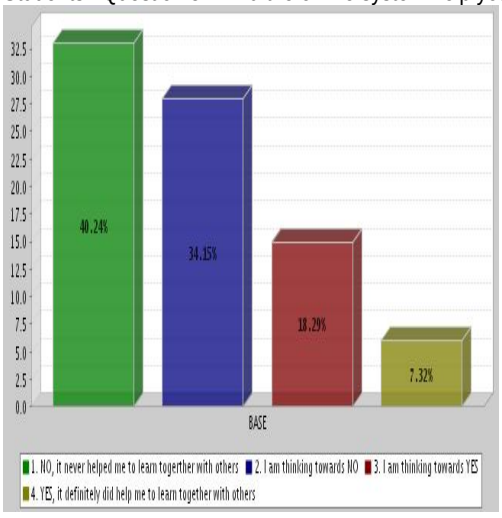


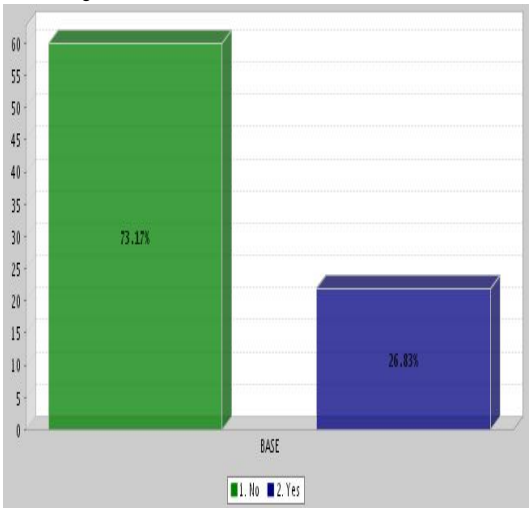
Students : Question 53 : Did the online system help you to know exactly what lessons and work you were supposed to do for the year?



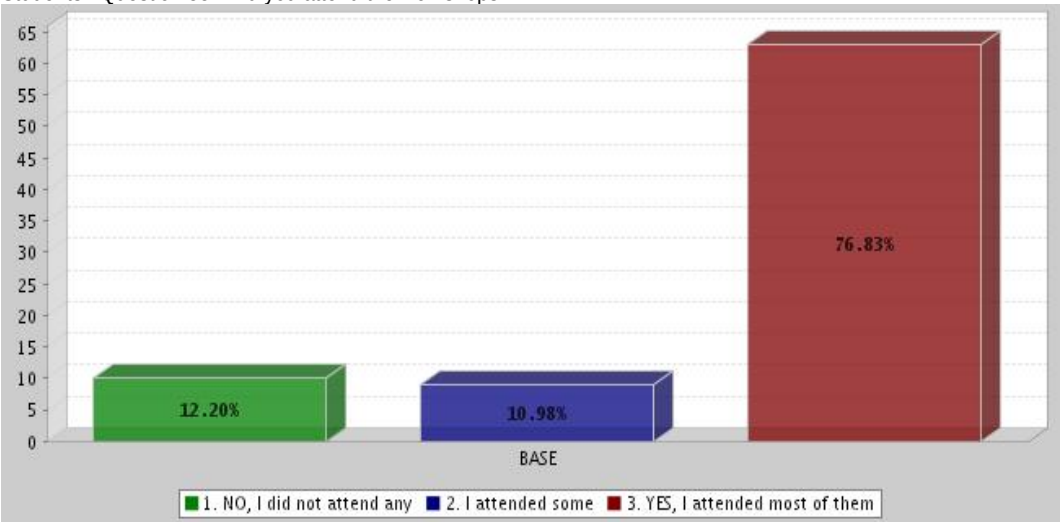


Students : Question 54 : Did the online system help you to learn together with others?

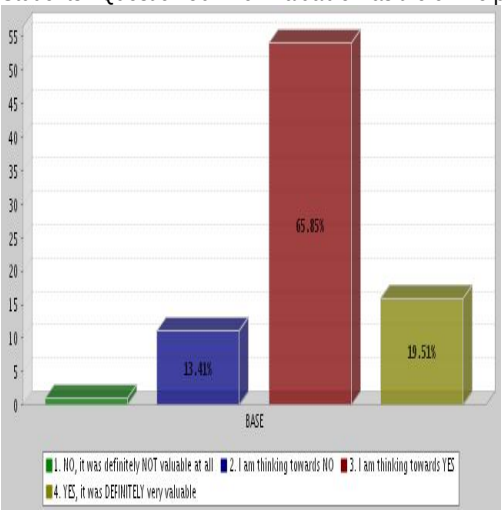


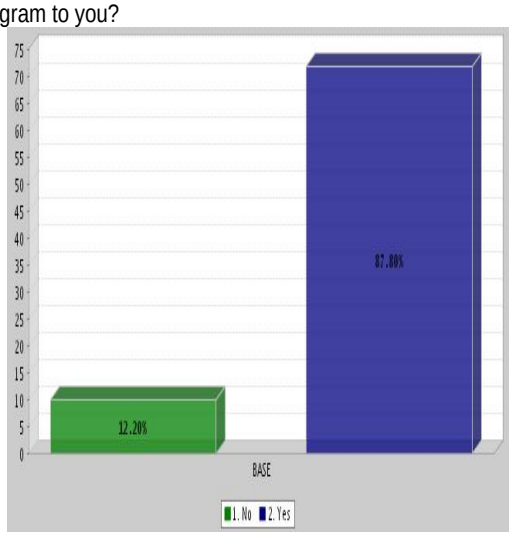


Students : Question 55 : Did you attend the workshops?

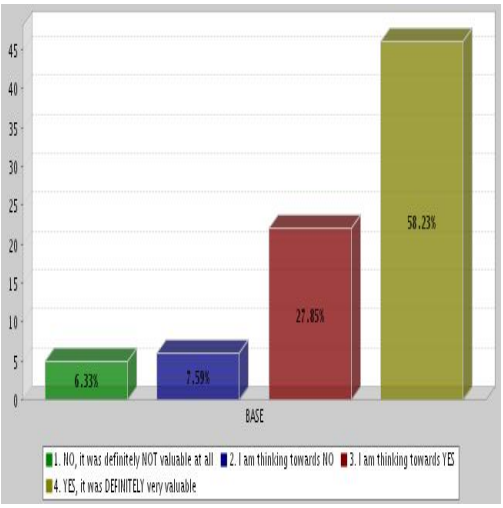


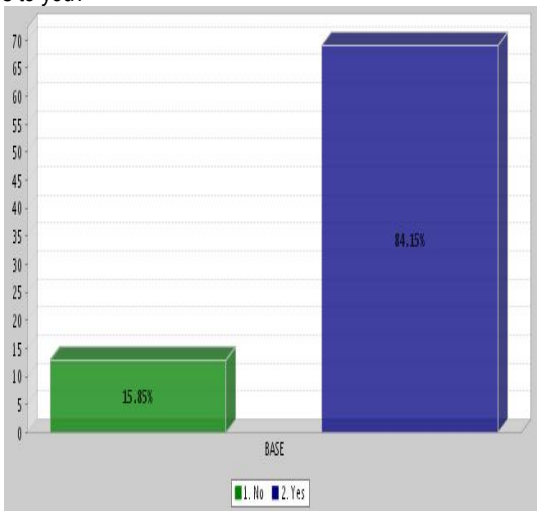
Students : Question 56 : How valuable was the online program to you?



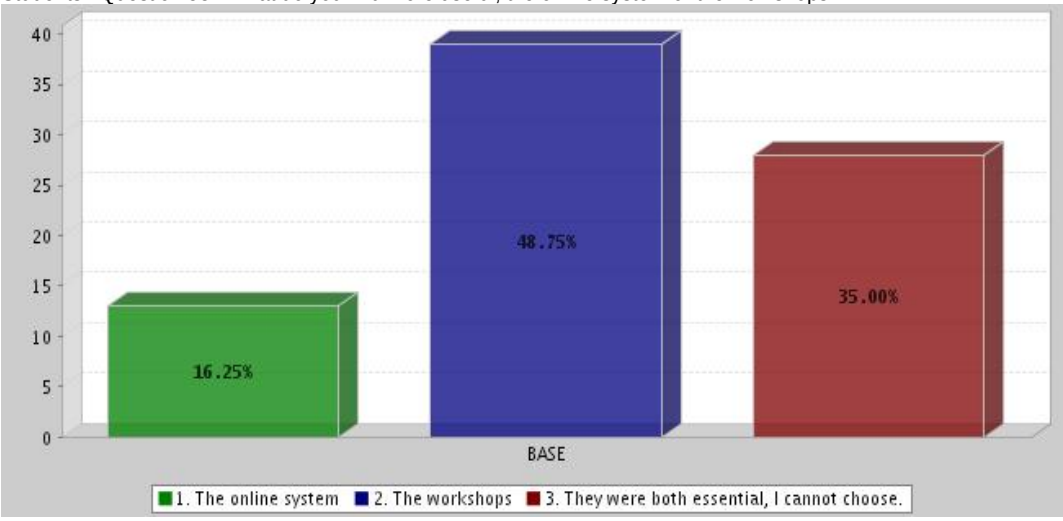


Students : Question 57 : How valuable were the workshops to you?

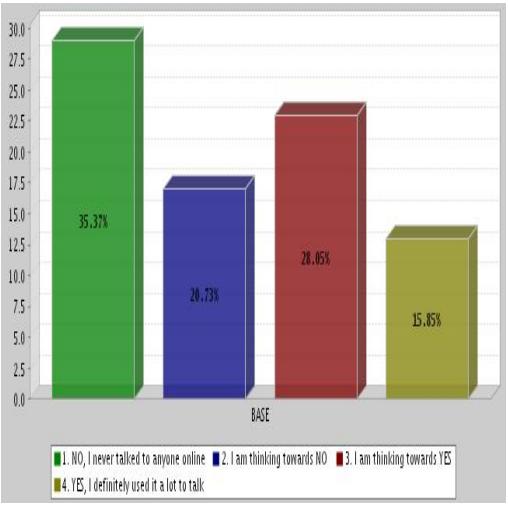


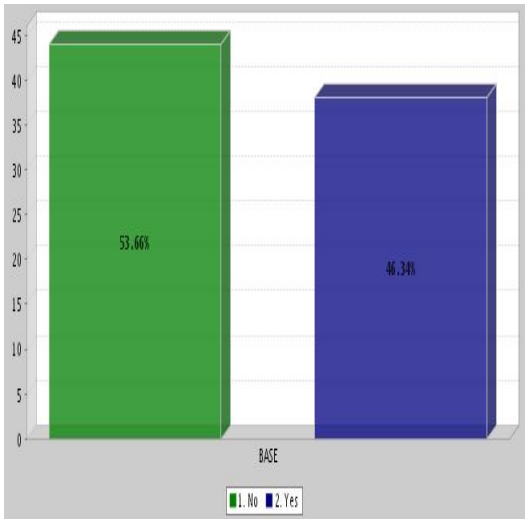


Students : Question 58 : What do you find more useful, the online system or the workshops

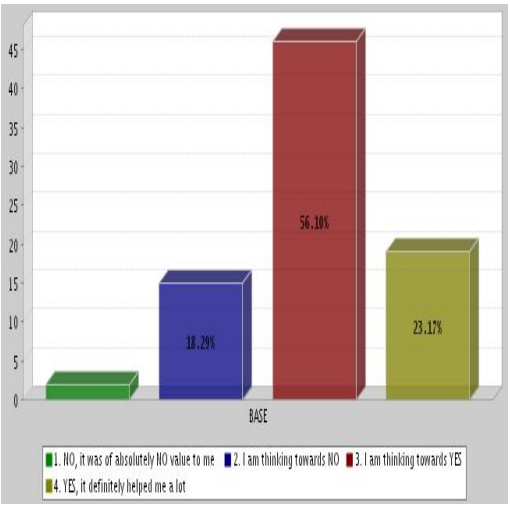


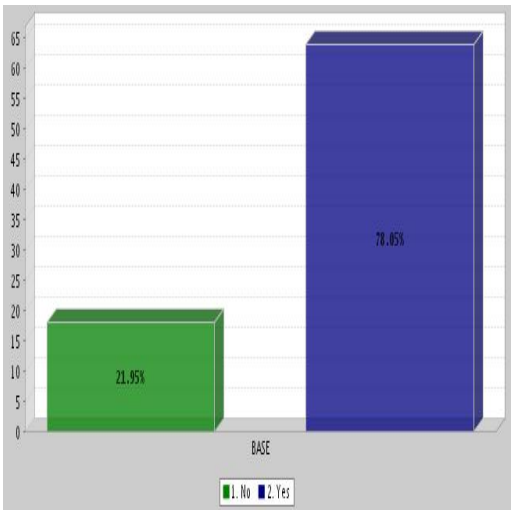
Students : Question 59 : Did you make use of online system to talk to other students?



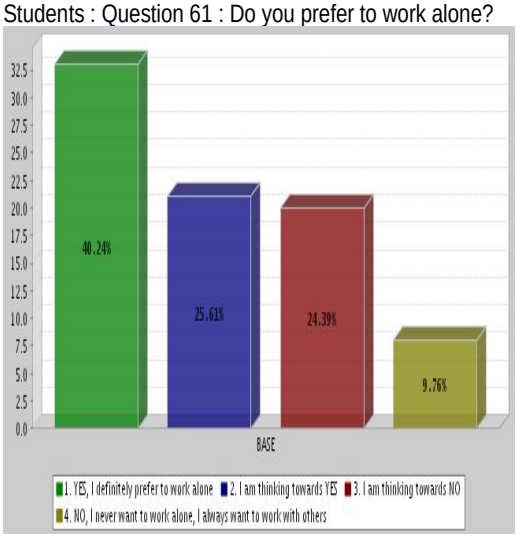


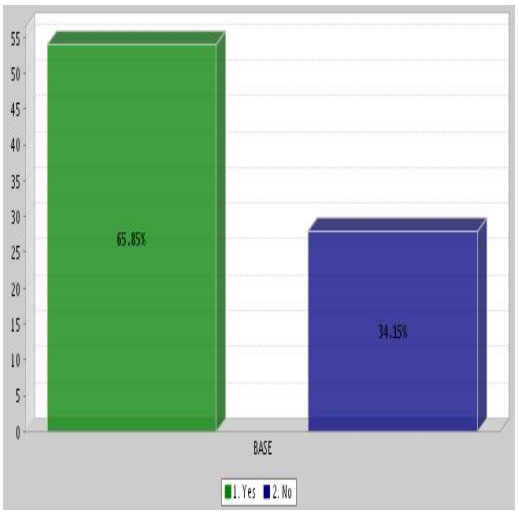
Students : Question 60 : How do you value the feedback (replies) that you got from the teachers and students, and in your assignments?



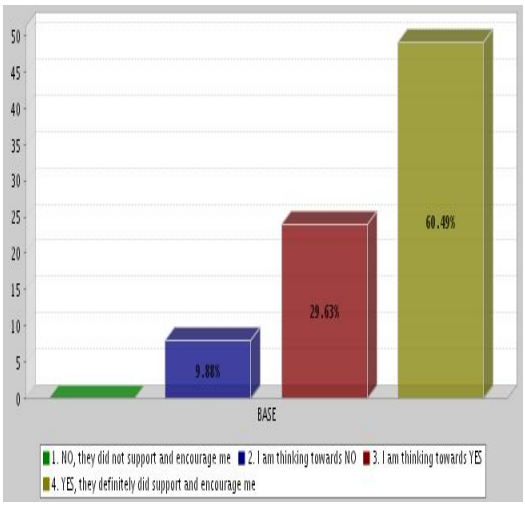


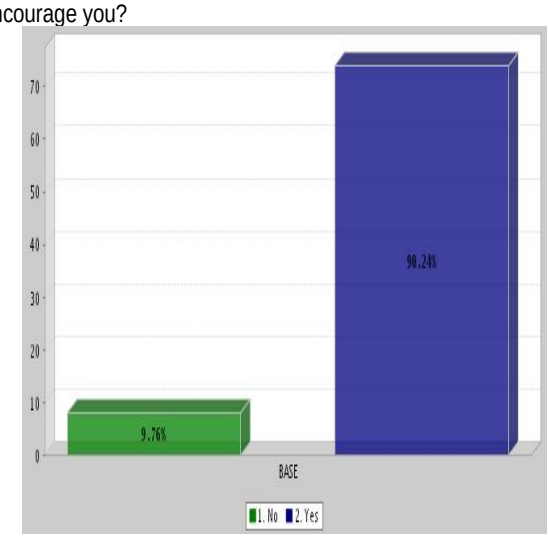
Students : Question 61 : Do you prefer to work alone?



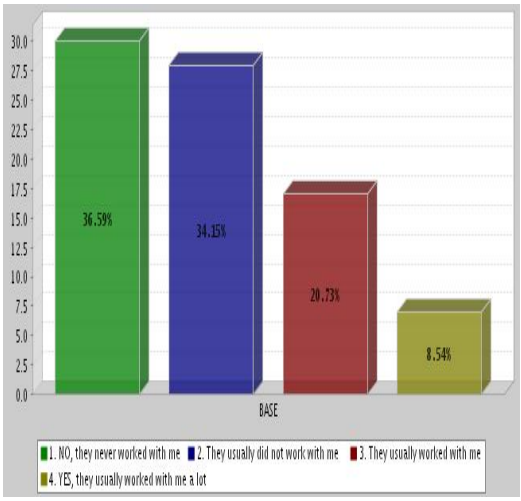


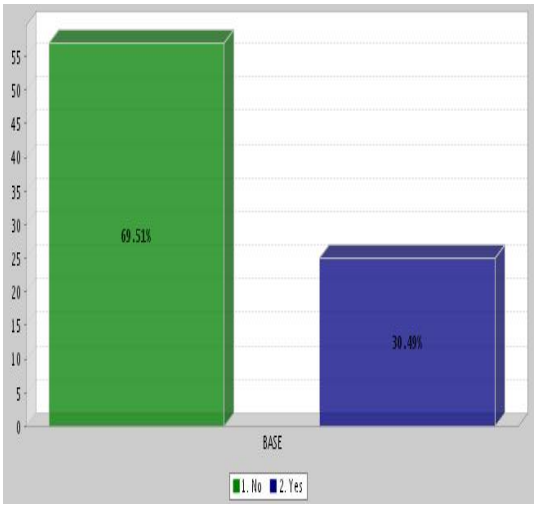
Students : Question 62 : Did your parents suppport and encourage you?



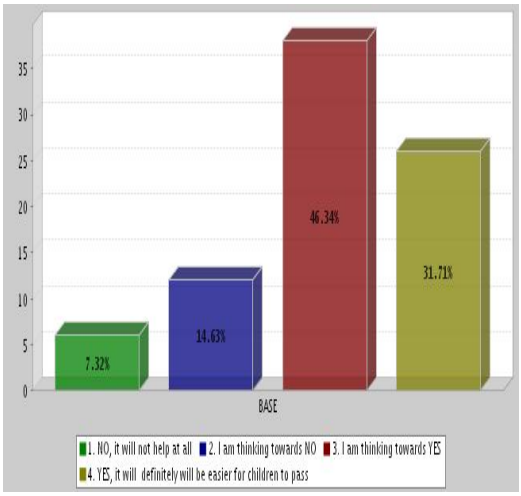


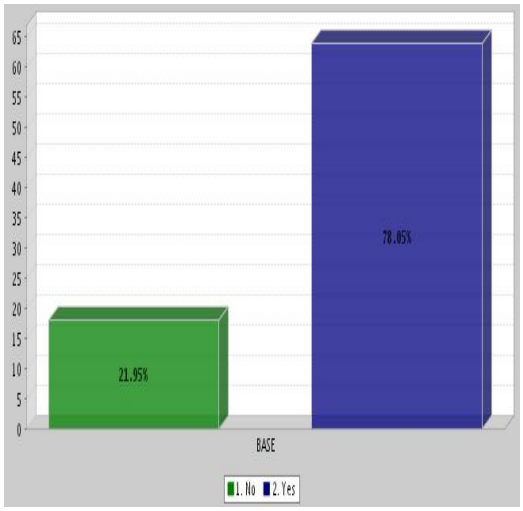
Students : Question 63 : Did your parents work with you?



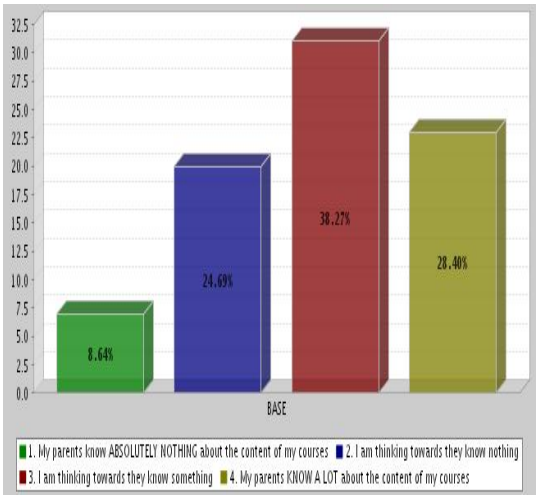


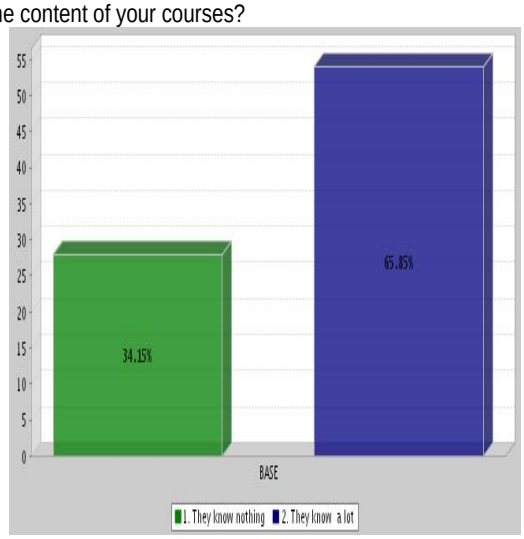
Students : Question 64 : Do you think that if parents helped their children, it will be easier for them to pass their exams?



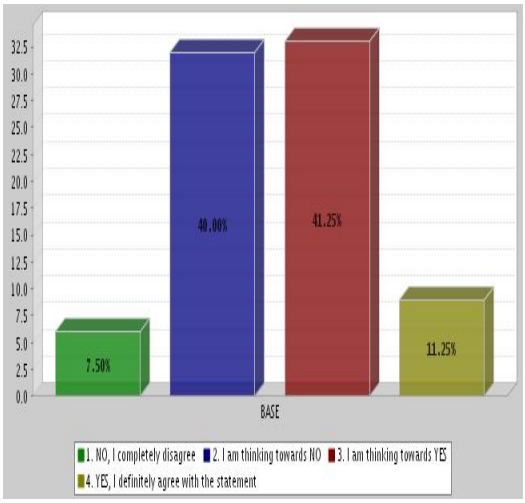


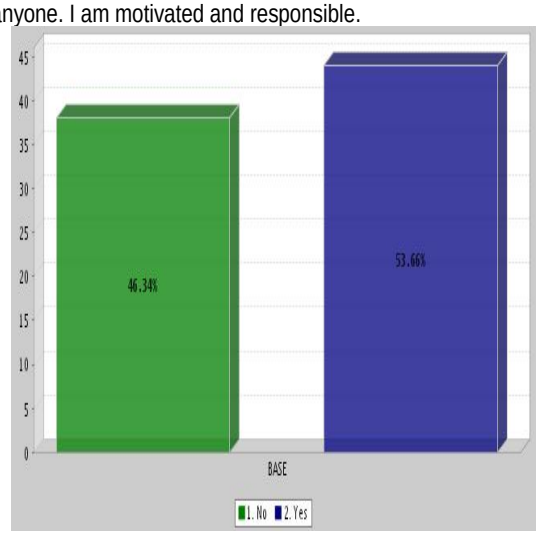
Students : Question 65 : What do your parents know about the content of your courses?



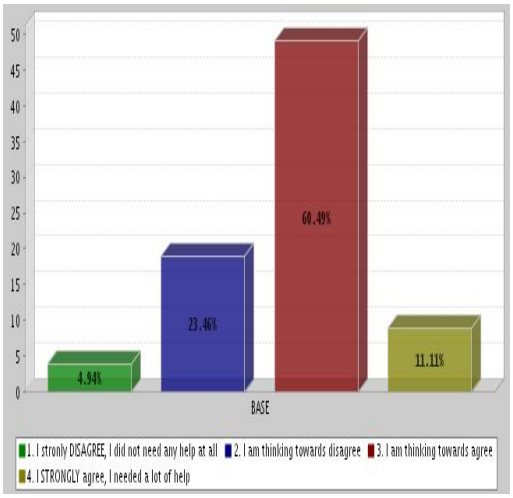


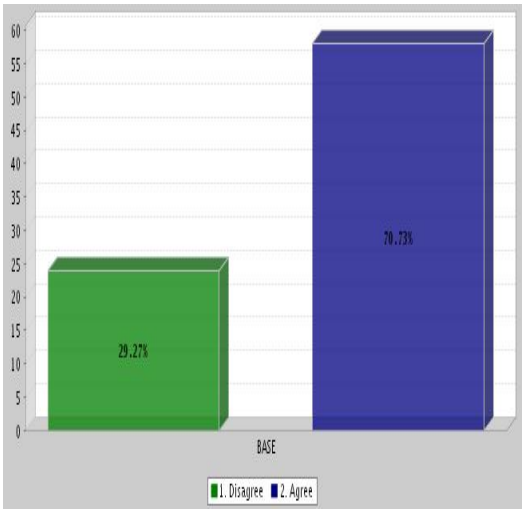
Students : Question 66 : I do not need to get support from anyone. I am motivated and responsible.



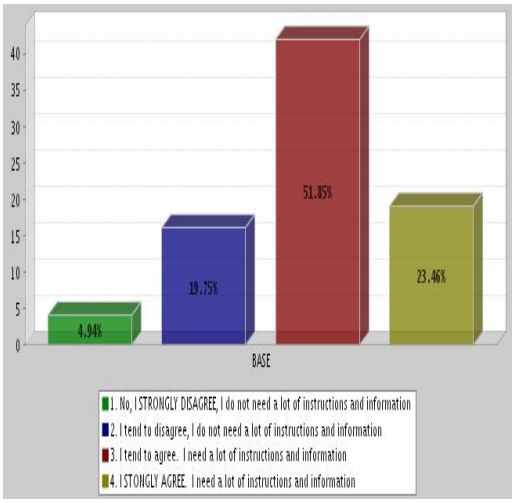


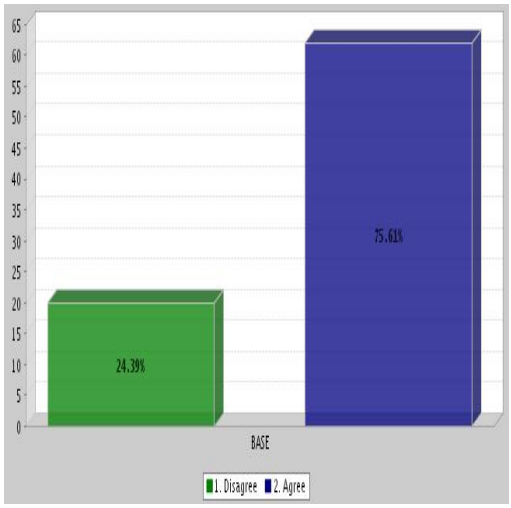
Students : Question 67 : Even though I am motivated, I still think I needed a lot of help to get used to the system, and to get used to the type of work



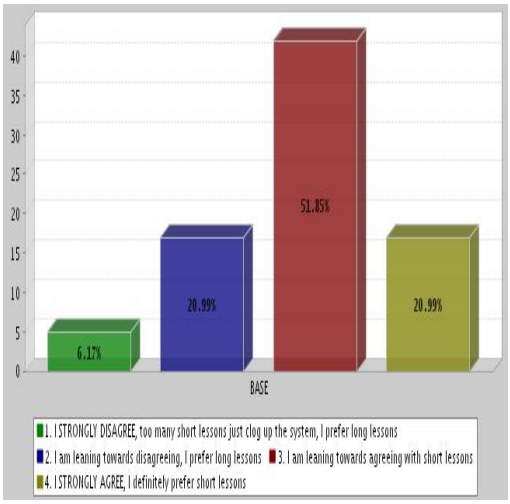


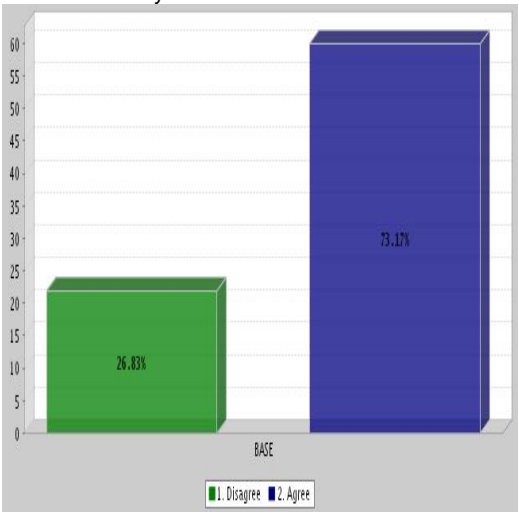
Students : Question 68 : In a system like this, I need to have a lot of instructions and information to be successful.



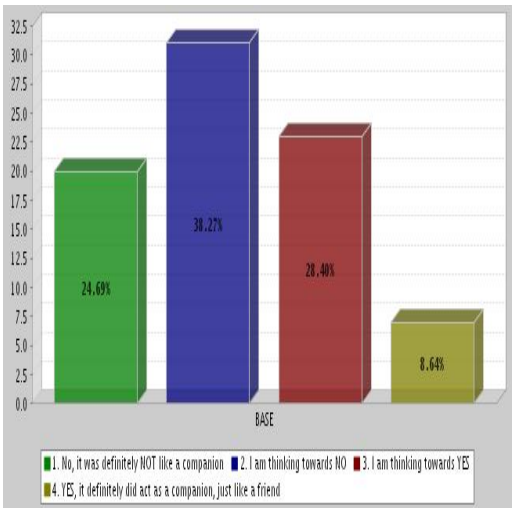


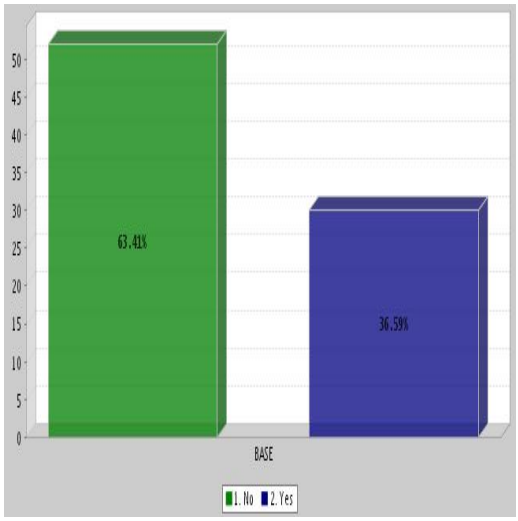
Students : Question 69 : The lessons in a system like this should be small byte-sized lessons.



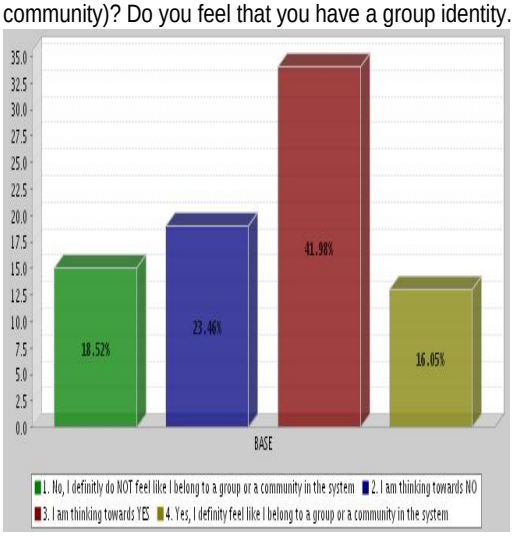


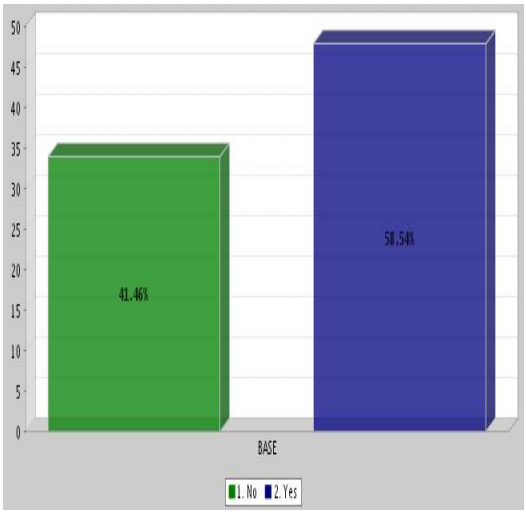
Students : Question 70 : Did the online system somehow act as a COMPANION to you, like a digital teacher, or a digital-friend.



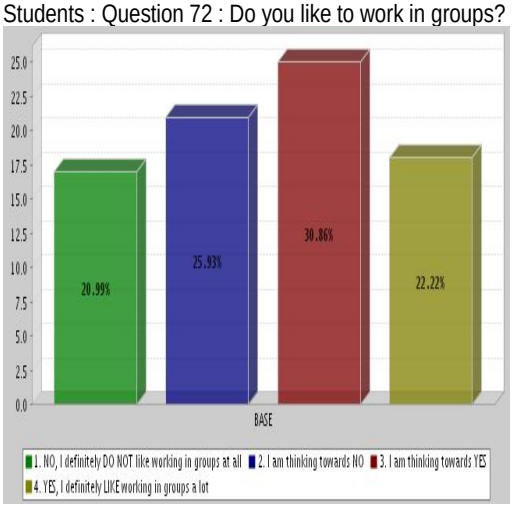


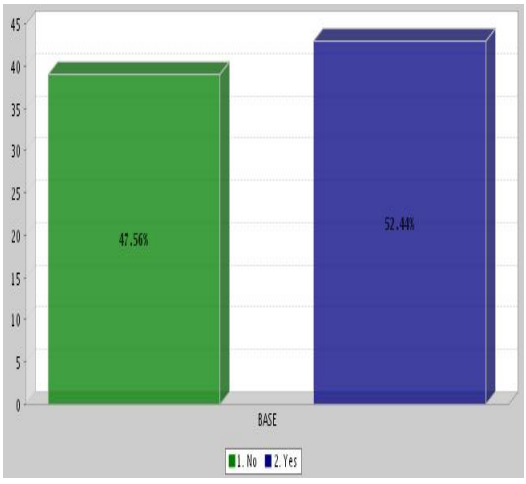
Students : Question 71 : Do you feel like you belong to a group now that you are in this system (like a school or a community)? Do you feel that you have a group identity.



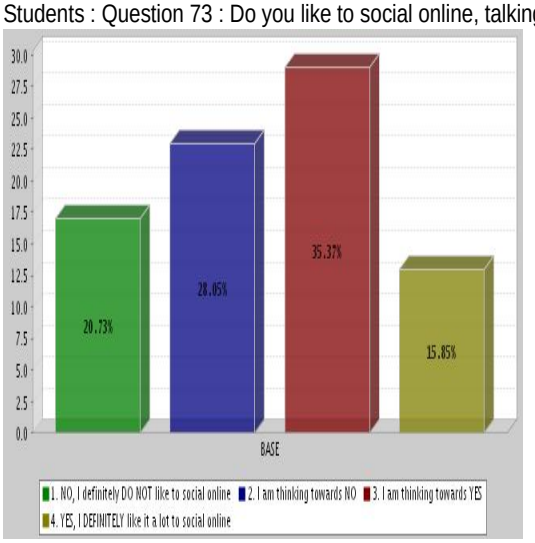


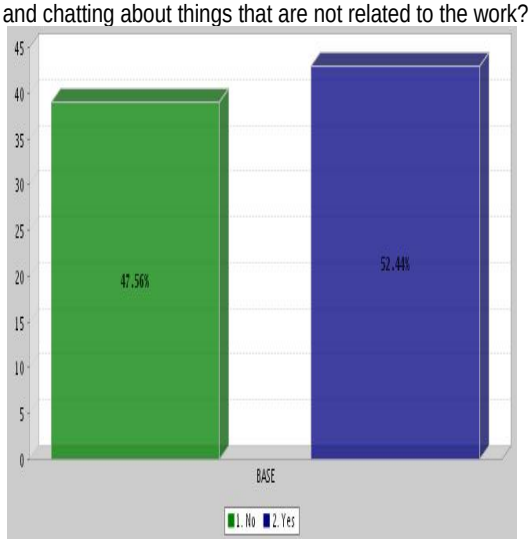
Students : Question 72 : Do you like to work in groups?



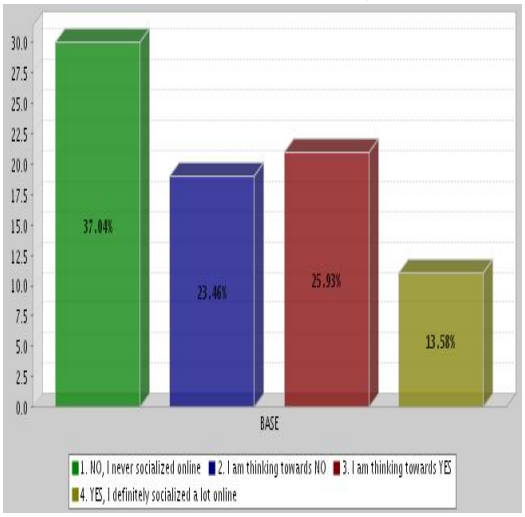


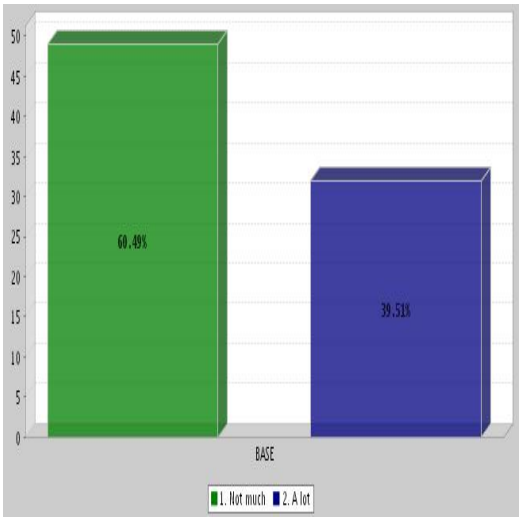
Students : Question 73 : Do you like to social online, talking and chatting about things that are not related to the work?



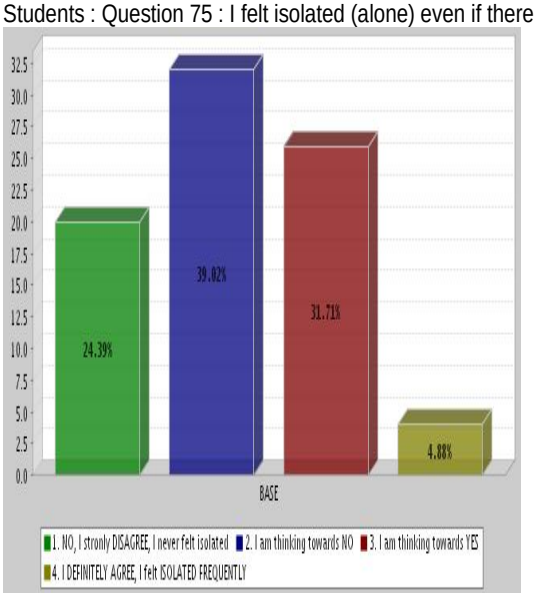


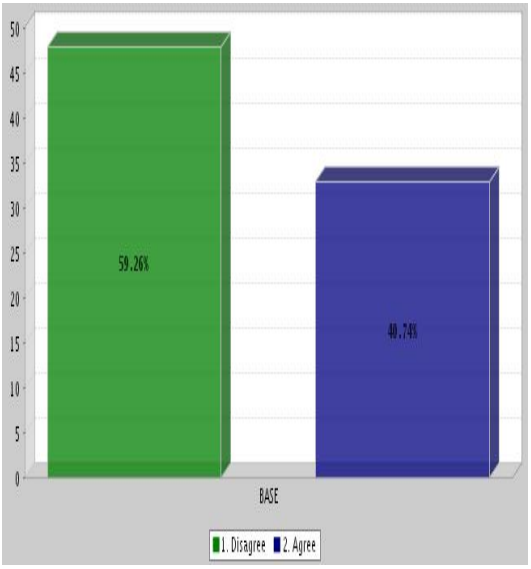
Students : Question 74 : How much did you social online?



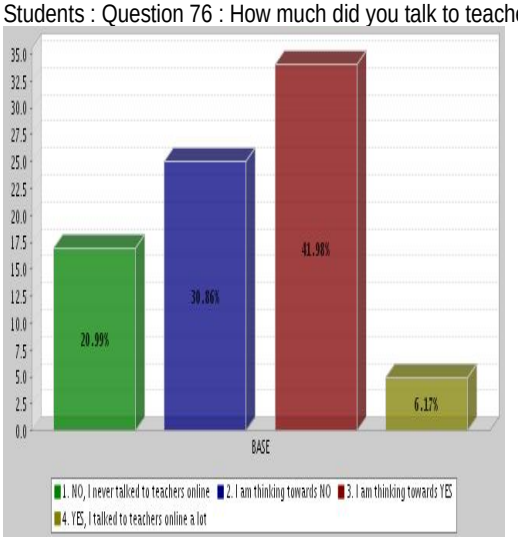


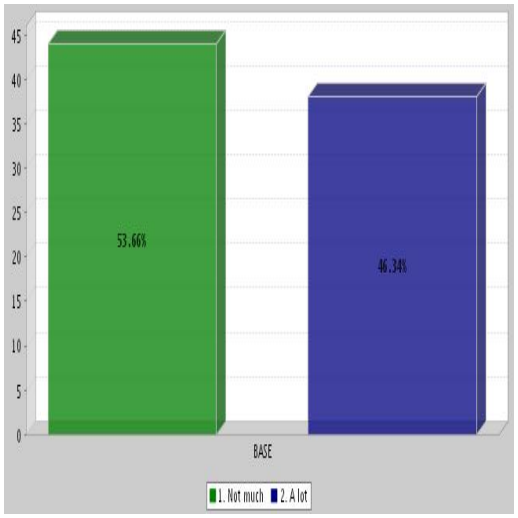
Students : Question 75 : I felt isolated (alone) even if there was an online system.



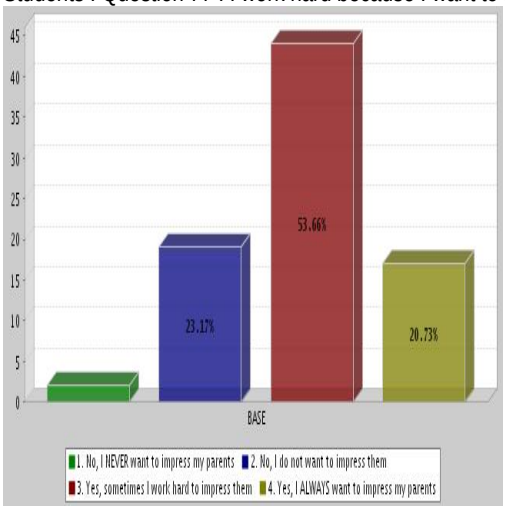


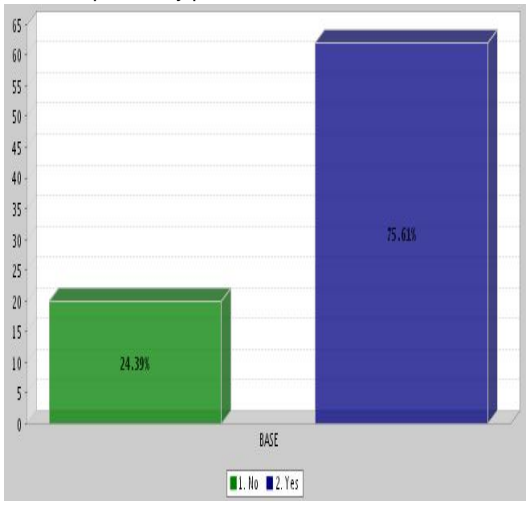
Students : Question 76 : How much did you talk to teachers online?



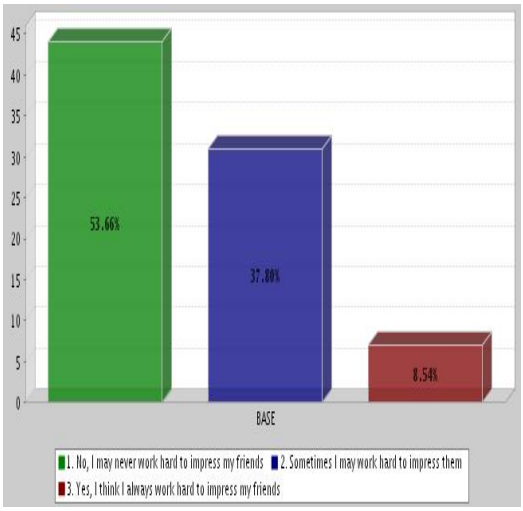


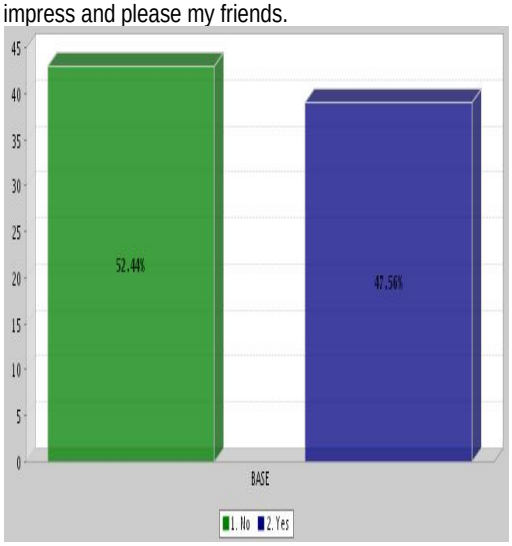
Students : Question 77 : I work hard because I want to impress and please my parents.



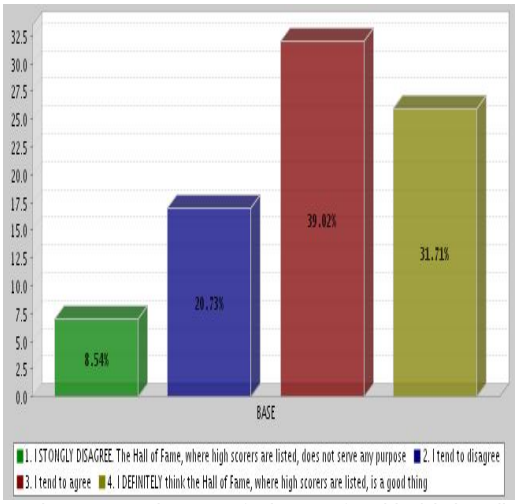


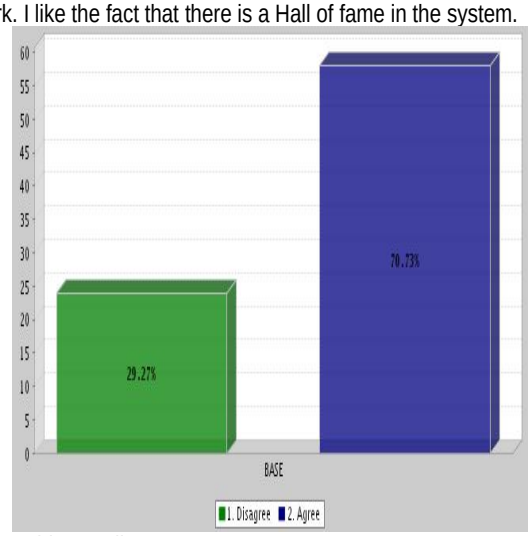
Students : Question 78 : I may work hard because I want to impress and please my friends.



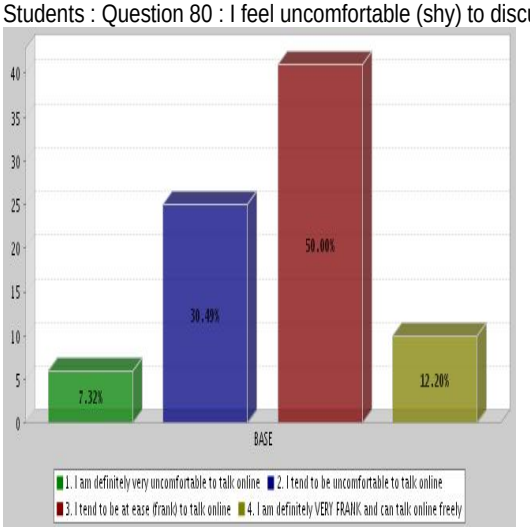


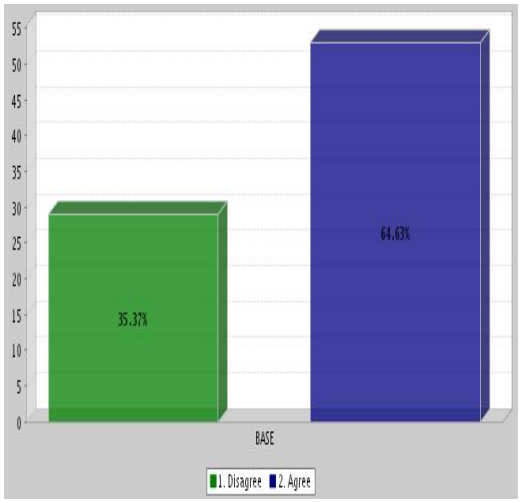
Students : Question 79 : I like to be rewarded for good work. I like the fact that there is a Hall of fame in the system.



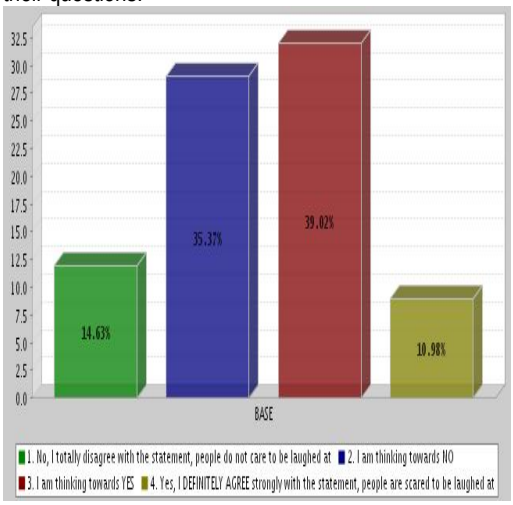


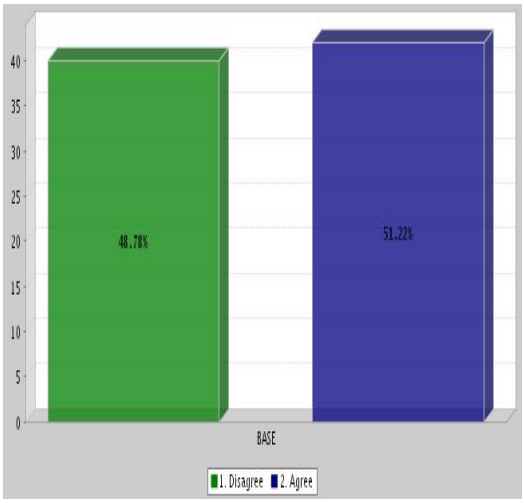
Students : Question 80 : I feel uncomfortable (shy) to discuss things online



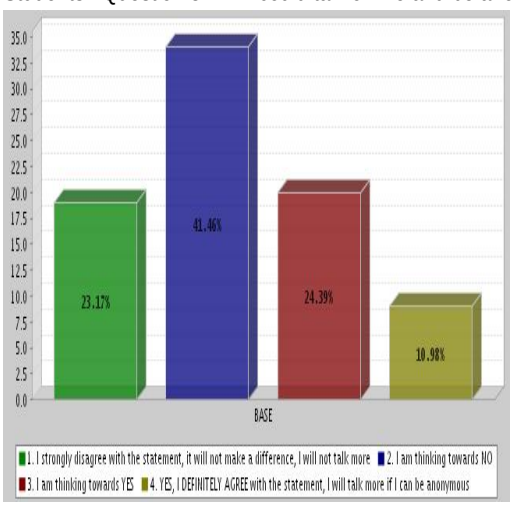


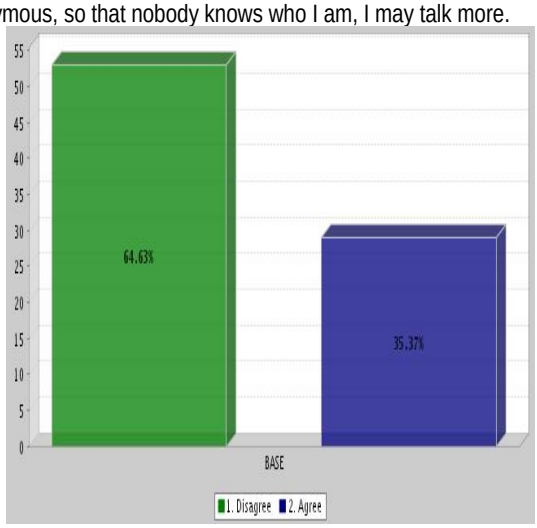
Students : Question 81 : Some people are afraid to talk online because they are scared that the others may laugh at their questions.



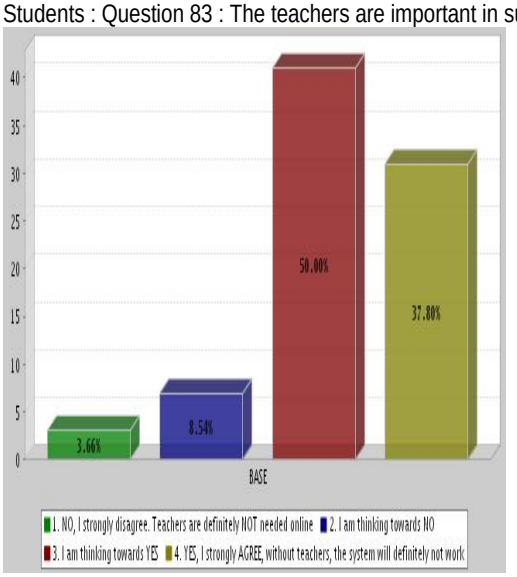


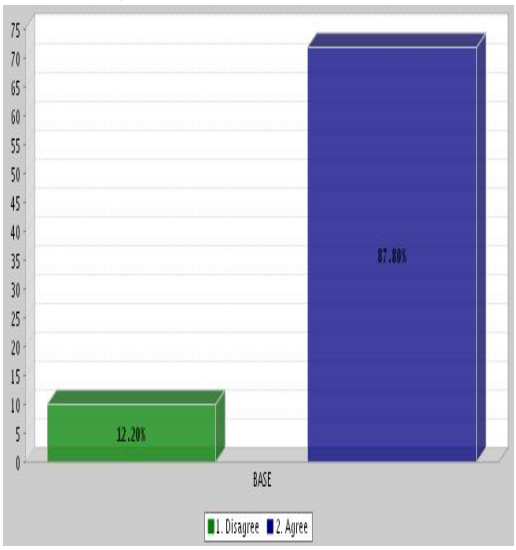
Students : Question 82 : If I could talk online and be anonymous, so that nobody knows who I am, I may talk more.



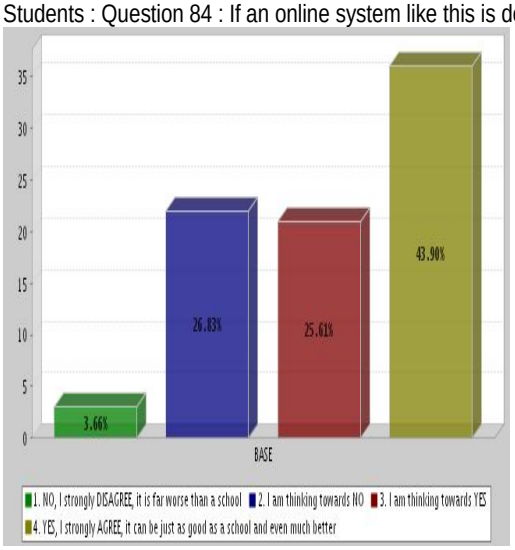


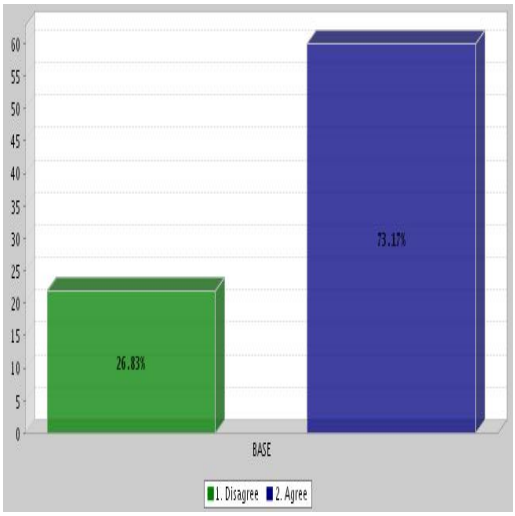
Students : Question 83 : The teachers are important in such an online system. Without them it will not work.



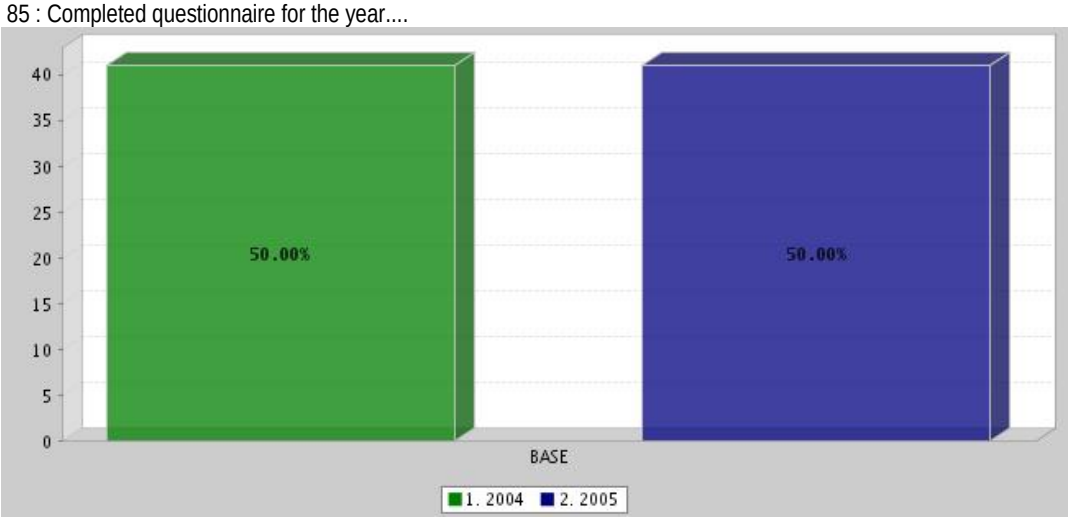


Students : Question 84 : If an online system like this is done properly, it is just as good as a normal school

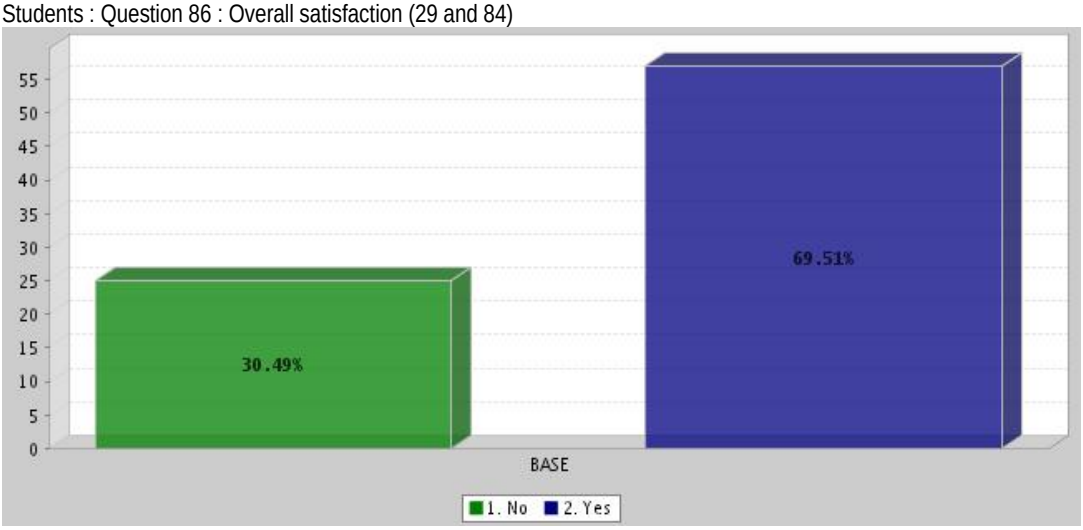




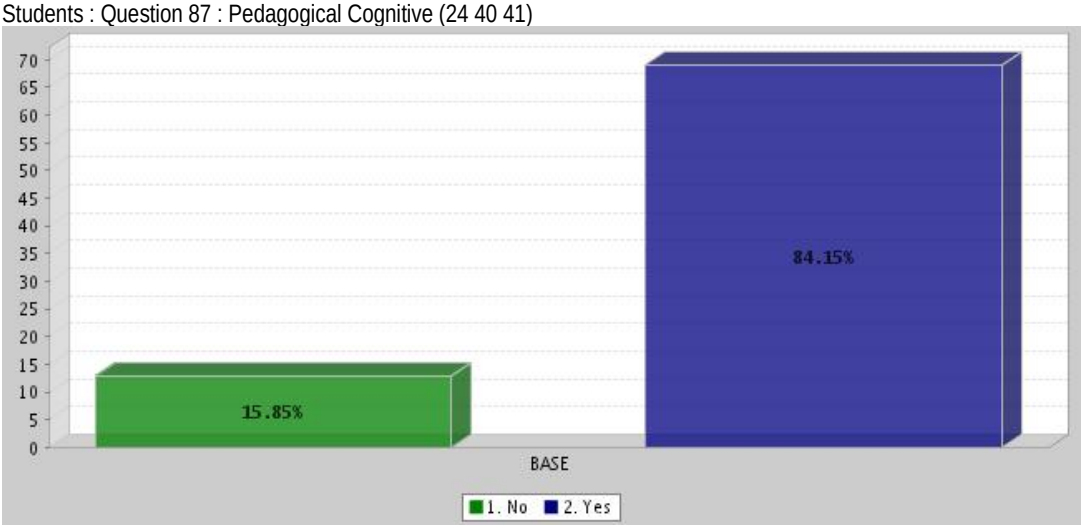
85 : Completed questionnaire for the year....



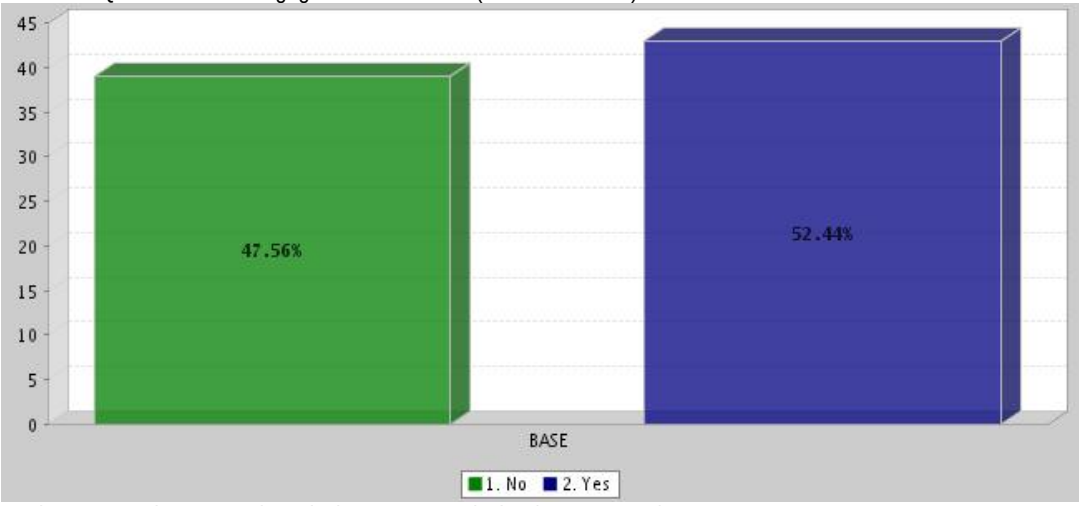
Students : Question 86 : Overall satisfaction (29 and 84)



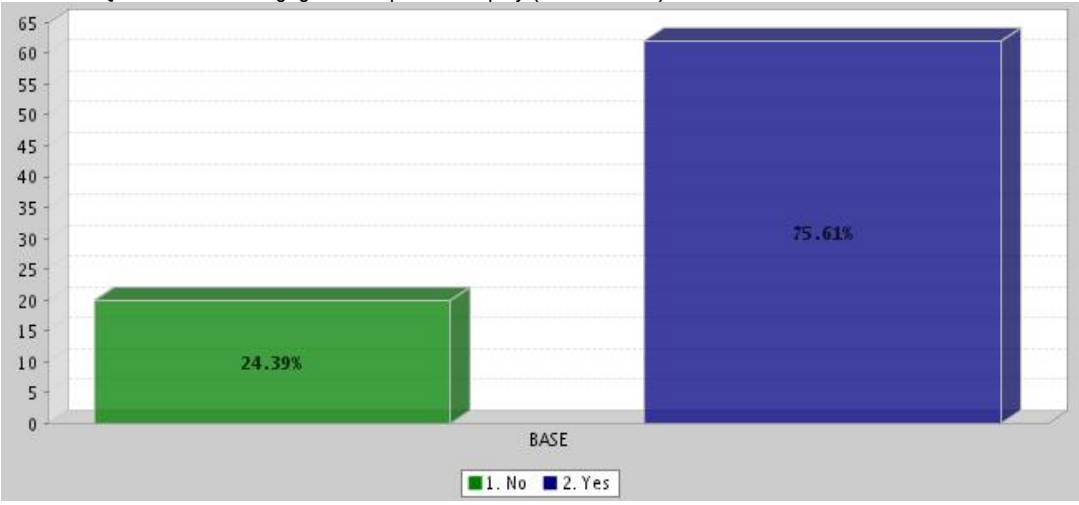
Students : Question 87 : Pedagogical Cognitive (24 40 41)



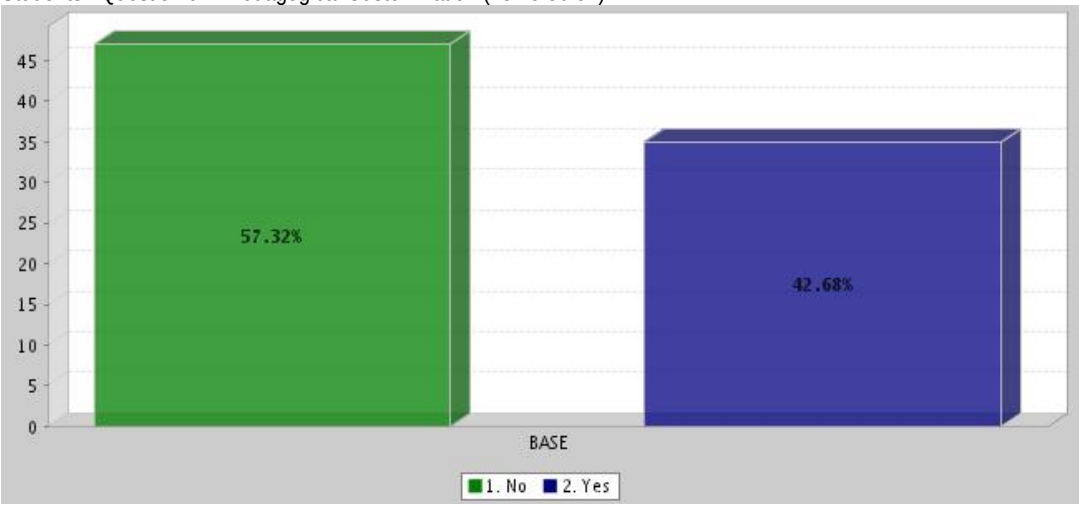
Students : Question 89 : Pedagogical Constructivist (44 45 46 47 67)



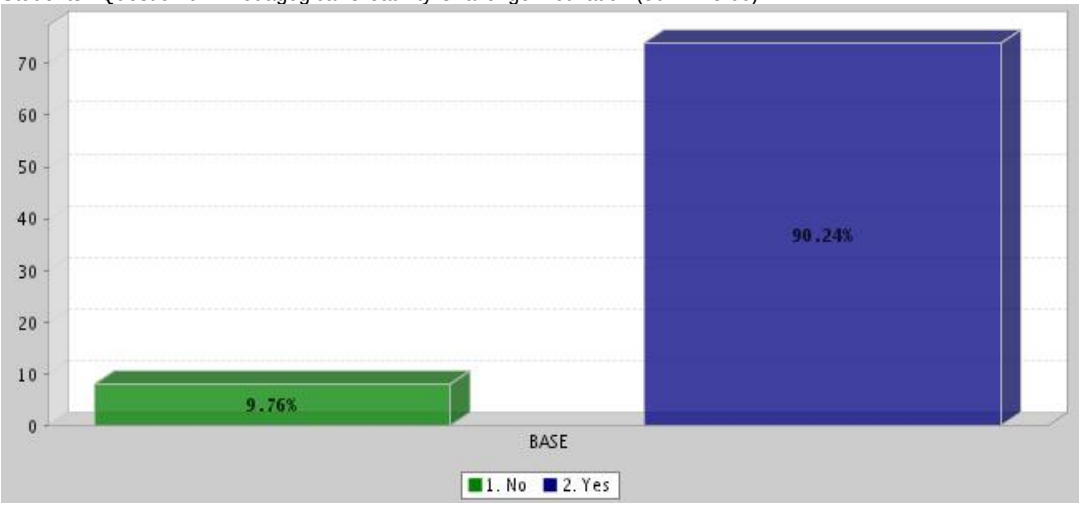
Students : Question 90 : Pedagogical Component Display (52 53 68 69)



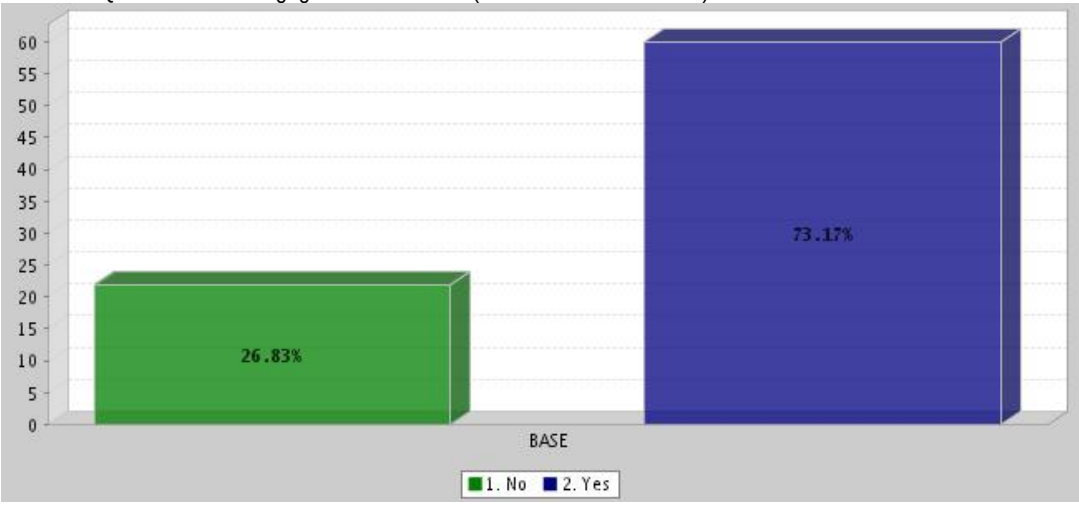
Students : Question 91 : Pedagogical Customization (48 49 50 51)



Students : Question 92 : Pedagogical Creativity Challenge Motivation (30 42 43 66)

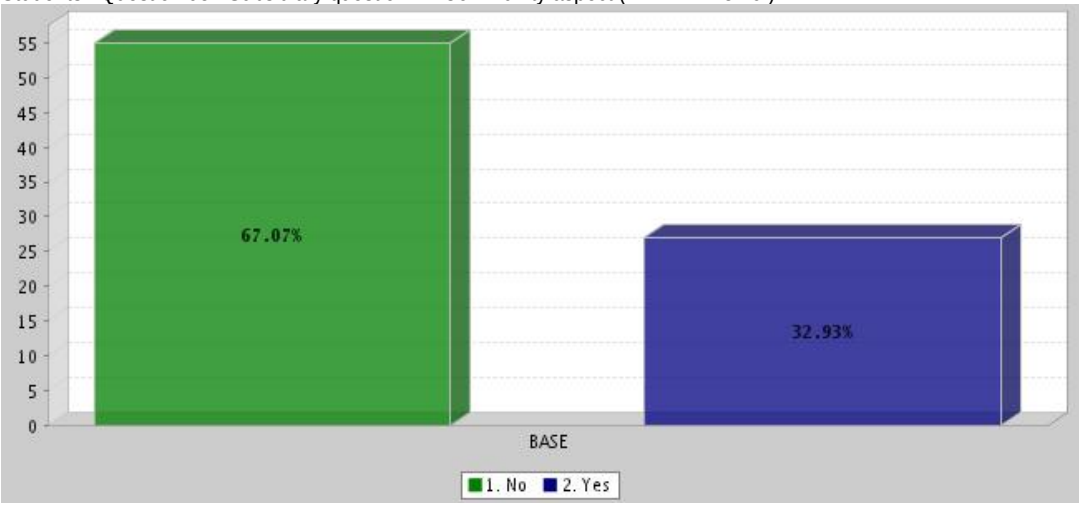


Students : Question 93 : Pedagogical Collaborative (54 55 56 57 58 59 60 61)

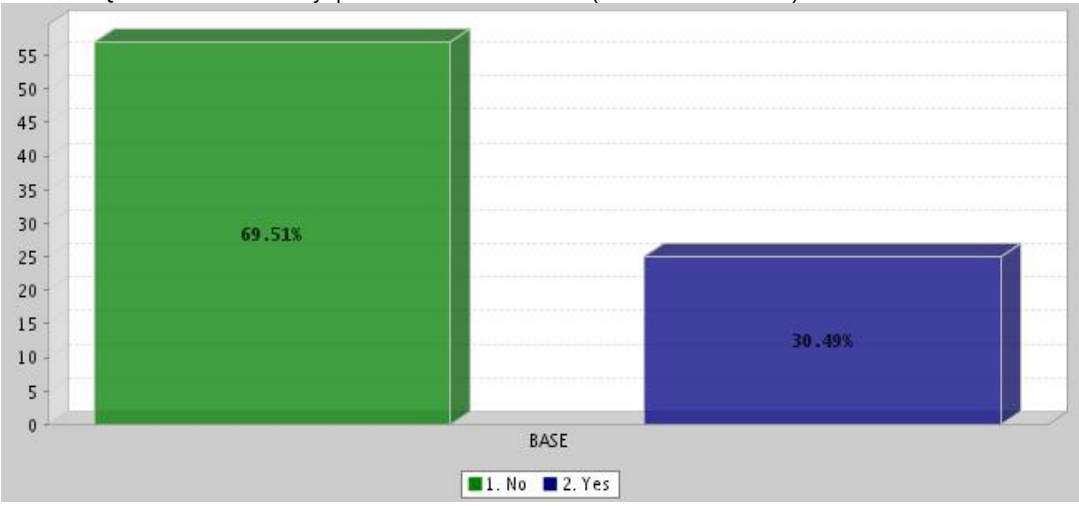


Students : Question 94 : Pedagogical Companionship (25 26 27 28 62 63 64 65 70 83)

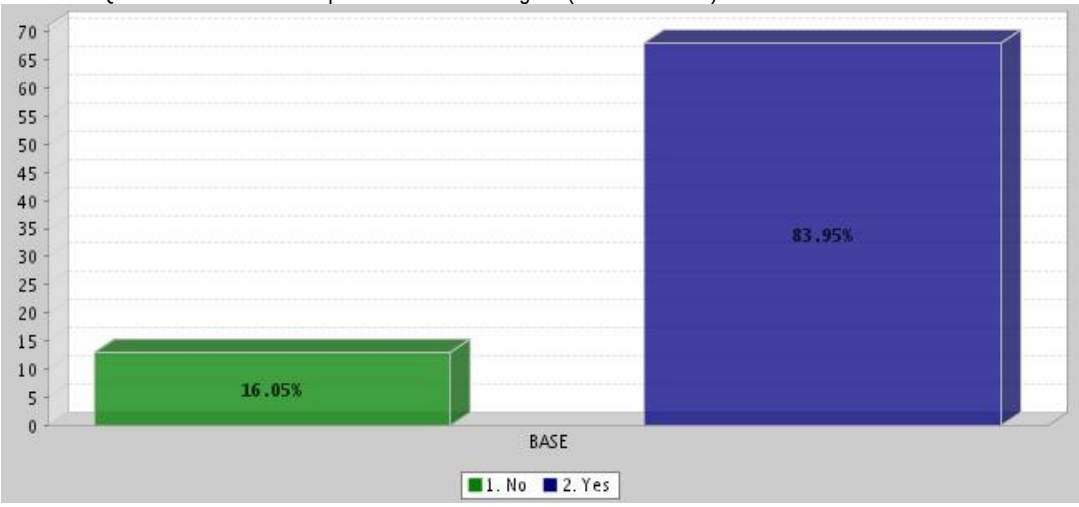
Students : Question 95 : Subsidiary question 2 - Community aspect (71 72 77 78 79)



Students : Question 96 : Subsidiary question 3 - Communication (73 74 75 76 80 81 82)



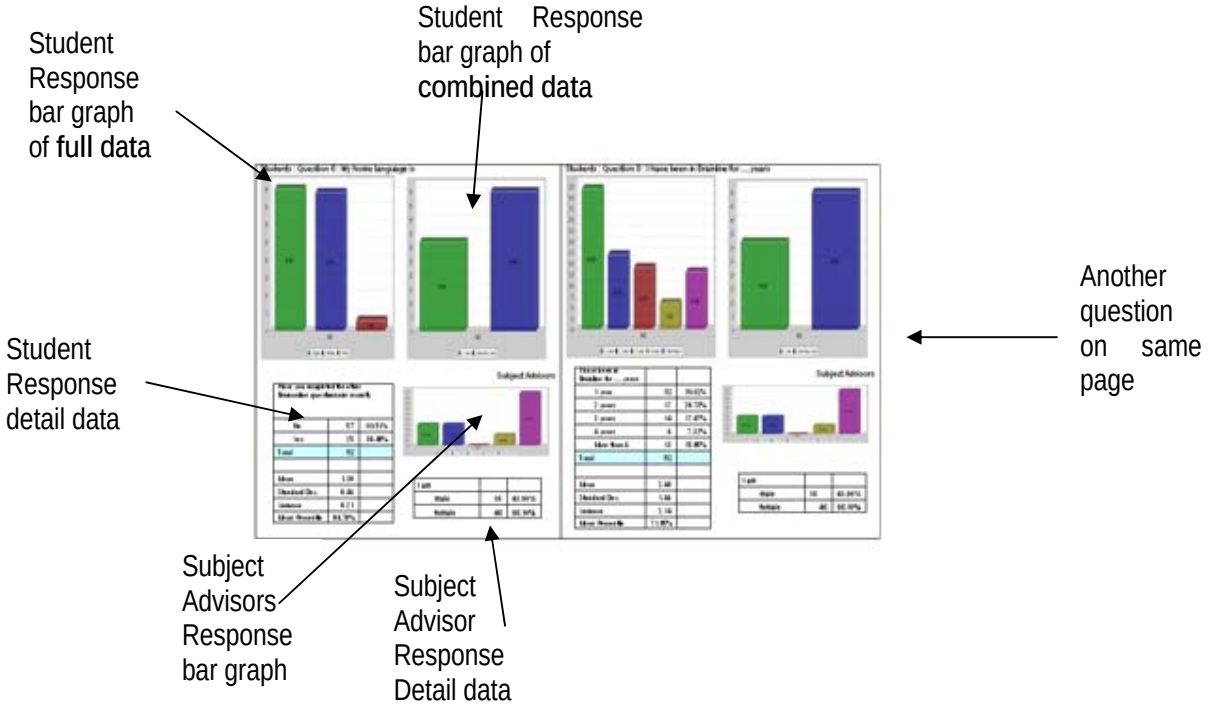
Students : Question 97 : Research question 4 - Technological (19 31 32 33 34)



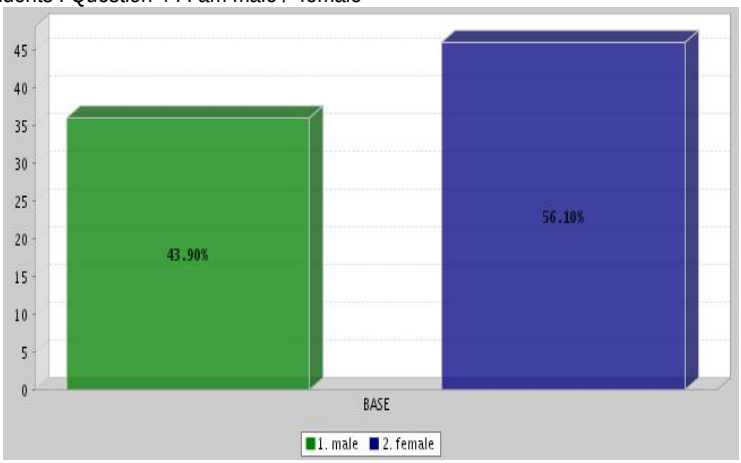
Appendix 11: Questionnaire results - students and subject advisors combined

The Student responses to Questionnnaire 2, as well as the Subject Advisor questionnaire responses are presented here. Computer files are included on the data DVD.

Key :

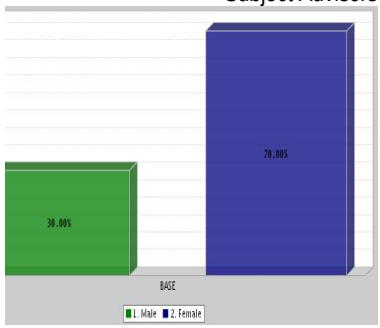


Students : Question 4 : I am male / female



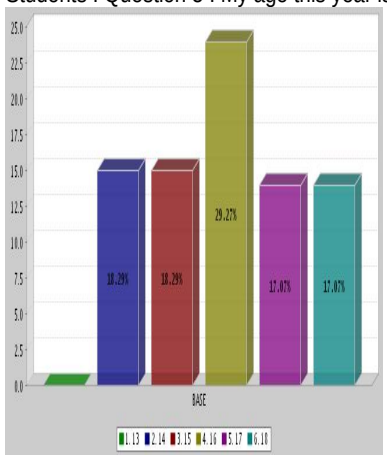
Have you completed the other Brainonline questionnaire recently		
No	57	69.51%
Yes	25	30.49%
Total	82	
Mean	1.30	
Standard Dev.	0.46	
Variance	0.21	
Mean Percentile	84.76%	

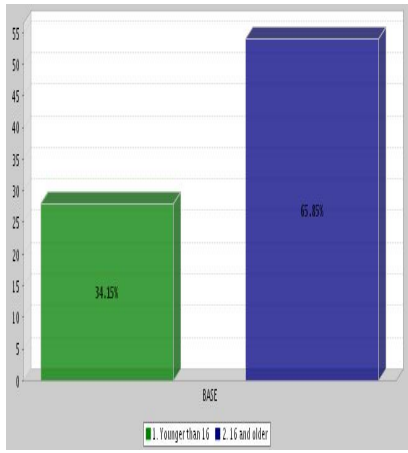
Subject Advisors



I am		
Male	3	30.00%
Female	7	70.00%

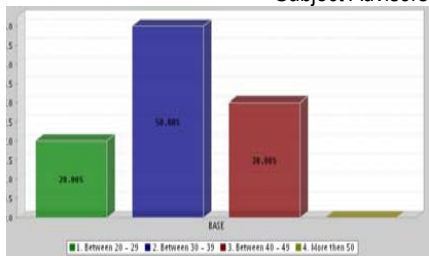
Students : Question 5 : My age this year is





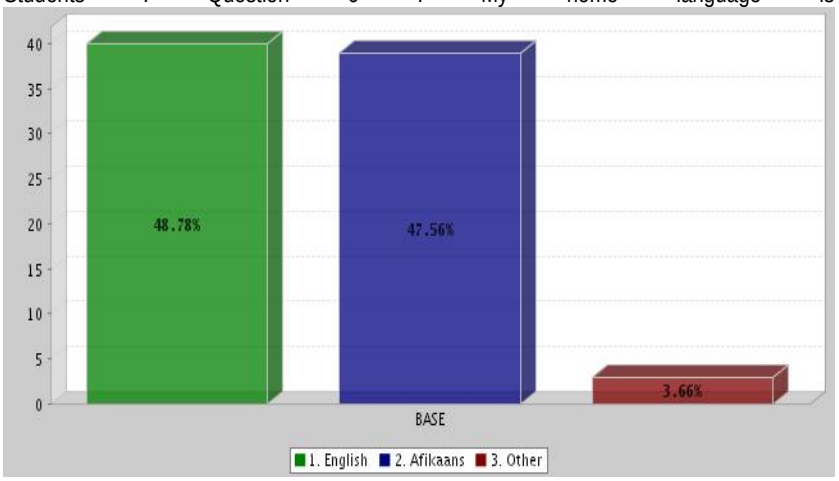
My age this year is		
13	0	0.00%
14	15	18.29%
15	15	18.29%
16	24	29.27%
17	14	17.07%
18	14	17.07%
Total	82	
Mean	3.96	
Standard Dev.	1.34	
Variance	1.79	
Mean Percentile	50.61%	

Subject Advisors



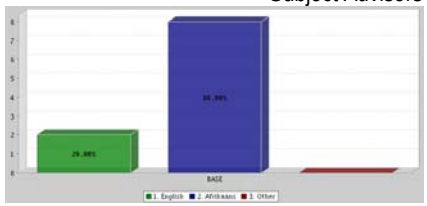
My age this year is		
Between 20 - 29	2	20.00%
Between 30 - 39	5	50.00%
Between 40 - 49	3	30.00%
More then 50	0	0.00%

Students : Question 6 : My home language is



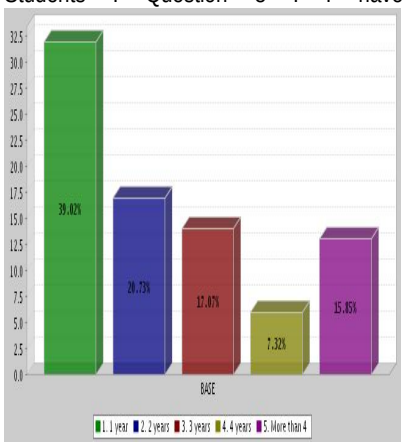
My home language is		
English	40	48.78%
Afikaans	39	47.56%
Other	3	3.66%
Total	82	
Mean	1.55	
Standard Dev.	0.57	
Variance	0.32	
Mean Percentile	81.71%	

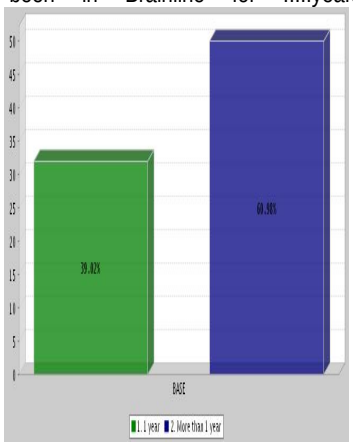
Subject Advisors



My home language is		
English	2	20.00%
Afrikaans	8	80.00%
Other	0	0.00%

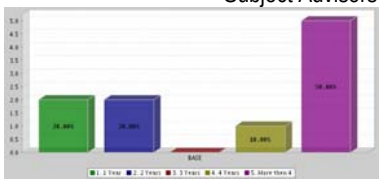
Students : Question 8 : I have been in Brainline for .....years





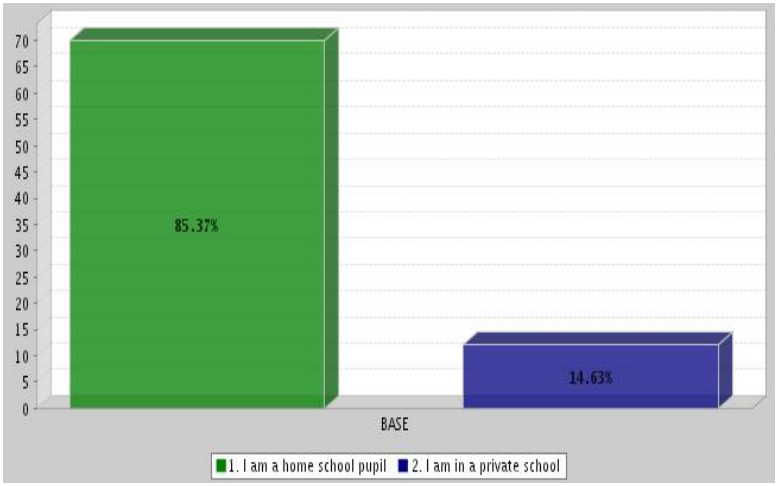
I have been in Brainline for .....years		
1 year	32	39.02%
2 years	17	20.73%
3 years	14	17.07%
4 years	6	7.32%
More than 4	13	15.85%
Total	82	
Mean	2.40	
Standard Dev.	1.46	
Variance	2.14	
Mean Percentile	71.95%	

Subject Advisors



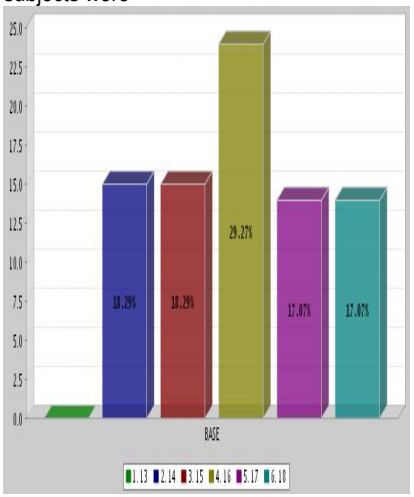
I have been in Brainline for ... years including 2004		
1 Year	2	20.00%
2 Years	2	20.00%
3 Years	0	0.00%
4 Years	1	10.00%
More then 4	5	50.00%

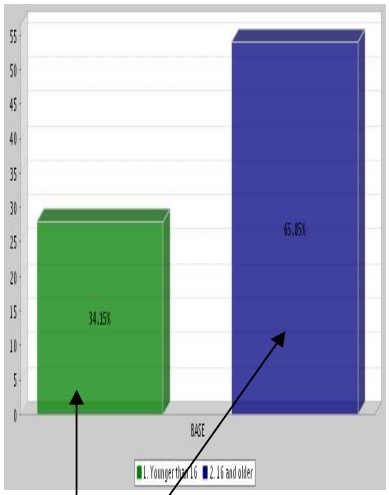
Students : Question 9 : Private school or home school.



Private school or home school.		
I am a home school pupil	70	85.37%
I am in a private school	12	14.63%
Total	82	
Mean	1.15	
Standard Dev.	0.36	
Variance	0.13	
Mean Percentile	92.68%	

Students : Question 10 : My average grade last year, or in my previous school, in all my subjects were

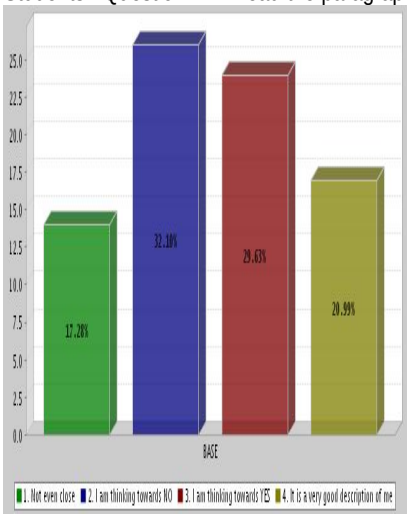


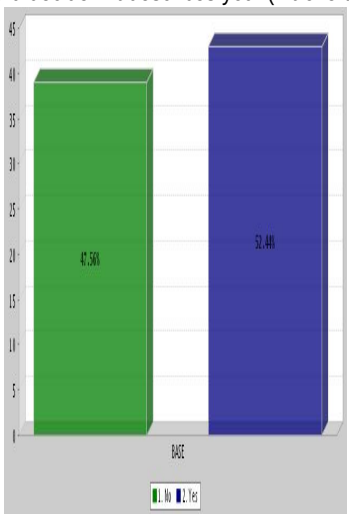


C or D 27 32.93%
A or B 55 67.07%

My average grade last year, or in my previous school, in all my subjects were		
(Below 50%)	5	6.49%
(50%-64%)	17	22.08%
(65to74%)	34	44.16%
(75%)	21	27.27%
Total	77	
Mean	2.92	
Standard Dev.	0.87	
Variance	0.76	
Mean Percentile	51.95%	

Students : Question 11 : Read the paragraph and decide if it describes you (Introvert)

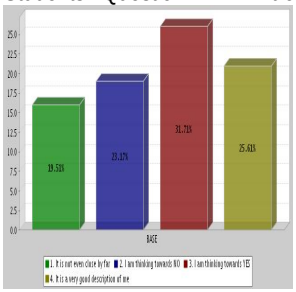


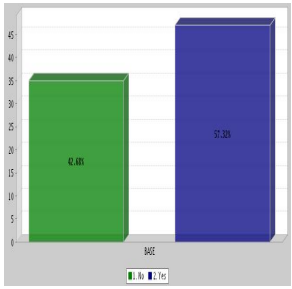


Not even close	14	17.28%
I am thinking towards NO	26	32.10%
I am thinking towards YES	24	29.63%
It is a very good description of me	17	20.99%
Total	81	
Mean	2.54	
Standard Dev.	1.01	
Variance	1.03	
Mean Percentile	61.42%	

No	39	47.56%
Yes	43	52.44%

Students : Question 12 : Extrovert



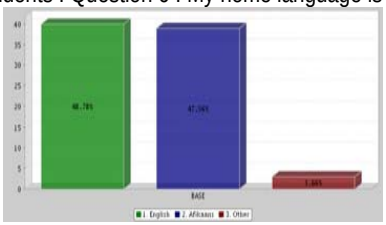


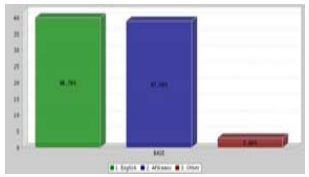
NO, it is not even close by far	6	7.59%
I am thinking towards NO	26	32.91%
I am thinking towards YES	34	43.04%
YES, it is a very good description of me	13	16.46%
Total	79	
Mean	2.68	
Standard Dev.	0.84	
Variance	0.71	
Mean Percentile	57.91%	

My age this year is		
Younger than 16	28	34.15%
16 and older	54	65.85%

NO, it is not even close by far	6	7.59%
I am thinking towards NO	26	32.91%
I am thinking towards YES	34	43.04%

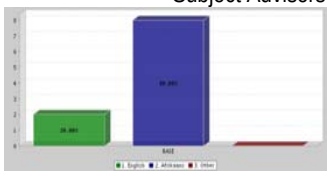
Students : Question 6 : My home language is





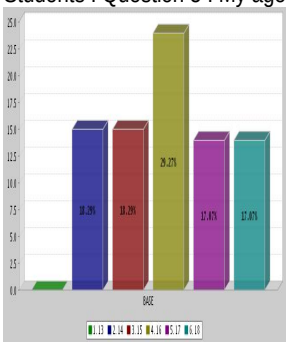
My home language is		
English	40	48.78%
Afikaans	39	47.56%
Other	3	3.66%
Total	82	
Mean	1.55	
Standard Dev.	0.57	
Variance	0.32	
Mean Percentile	81.71%	

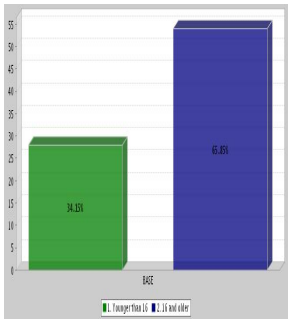
Subject Advisors



My home language is		
English	40	48.78%
Afikaans	39	47.56%
Other	3	3.66%

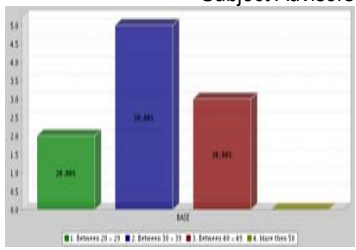
Students : Question 5 : My age this year is





My age this year is		
13	0	0.00%
14	15	18.29%
15	15	18.29%
16	24	29.27%
17	14	17.07%
18	14	17.07%
Total	82	
Mean	3.96	
Standard Dev.	1.34	
Variance	1.79	
Mean Percentile	50.61%	

Subject Advisors



My age this year is		
Younger than 16	28	34.15%
16 and older	54	65.85%

Student questionnaires 1 and 2 - Sampling data of the student questionnaires

The total population of Cambridge enrolled students in 2004 was 208, and 188 in 2005. In 2004, around 79 of these students were in the final phases of study and in 2005 the number of final year students was 69. Thirty seven (90.2%) of the final year students participated in questionnaire in 2004 and thirty eight (92.7%) in 2005.

Sampling data for student questionnaires (1 and 2)		
	2004 questionnaire 1 and 2	2005 Questionnaire 1 and 2
Total Cambridge students	208	188
Number of students who completed questionnaires (% of total in brackets)	41 (19.7%)	41 (21.8%)
Total final year students (% of total in brackets)	79 (38%)	69 (36%)
Number of final year students who completed questionnaire (% of completed questionnaires)	37 (90.2%)	38 (92.7%)

Table 68 : Sampling data
The table shows an outline of the sampling data of the student questionnaires for this study

Instrument 2 – Student Questionnnaire 2 : Educational

Sample of the Research-question-to-Questionnaire-question table for Questionnaire 2		
	Subsidiary question 1 – Pedagogical – Customization	
48	Did the online system allow you to choose WHEN you wanted to learn	
49	Did the online system enable you to choose WHERE (the place) you wanted to learn?	
50	Did the online system enable you to choose how FAST you wanted to go through the work?	
51	Did the online system allow you to CHANGE the program the way it suits you?	

Table 69: Sample of the Research-question-t0-Questionnaire-question table for Questionnaire 2
The table gives an example of how the questionnaire questions relate to the research questions. The complete table is included in ANNEXURE .

Inherent trustworthiness check on questionnaire 2

Some questions ask he same question but in different wording. These questions were grouped together to see if students answered the questions consistently. Question 29 and 84 overall satisfaction. The questions ask about overal

satisfaction and if the school works properly. 62 out of 82 students gave the same choice in both questions, which points to a reliability factor of 76%. Question 61 and 72 relate to group work. Question 61 asks whether the student prefers to work alone, while question 72 asks if the student likes to work in a group. 63 Students answered consistently, which shows a reliability factor of 77%. Question 28 and 83 is about the importance of teachers. Question 28 asks how important teachers were to the students, and question 83 makes a statement that teachers are important and without them the system would not have worked. 60 Students answered consistently in both questions, pointing to a reliability factor of 73%.

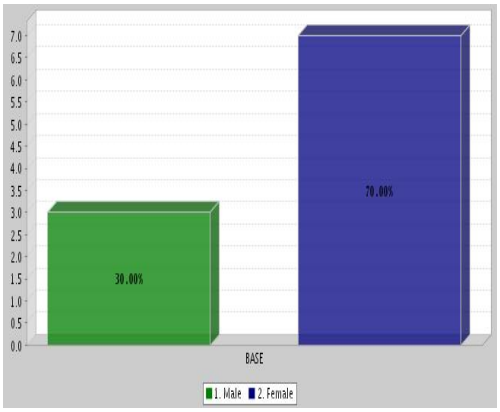
Inherent trustworthiness check on questionnaire 2		
	Questions used	% students who answered consistently
1	Question 29 and 84 about overall satisfaction	76%
2	Question 61 and 72 related to group work	77%
3	Question 28 and 83 about teacher importance	73%

Table 70 : Inherent trustworthiness analysis of questionnaire 2
The table shows the results of trustworthiness investigation conducted on 6 related questions in questionnaire 2

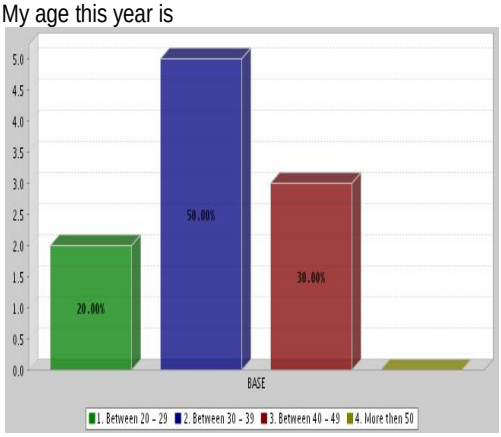
My evaluation of the inherent trustworthiness is positive and much better than I expected, seeing that we are dealing with high school teenage students, who have not made up their mind about many things in life. I would therefore accept some indecision and change of mind from the participants.

Appendix 12: Subject advisor questionnaire results

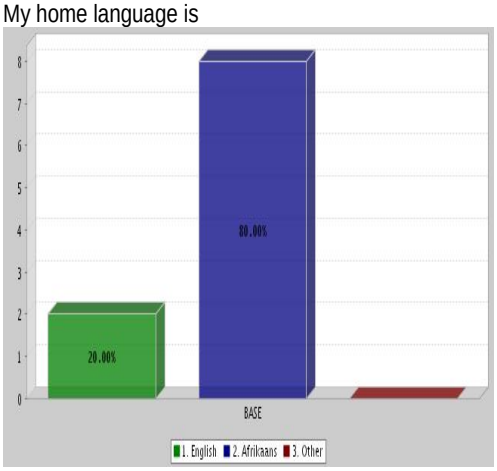
I am



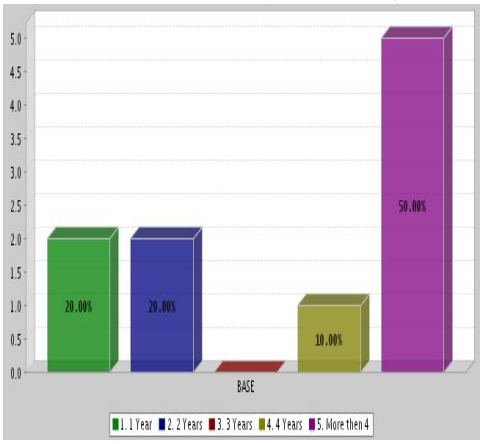
My age this year is



My home language is

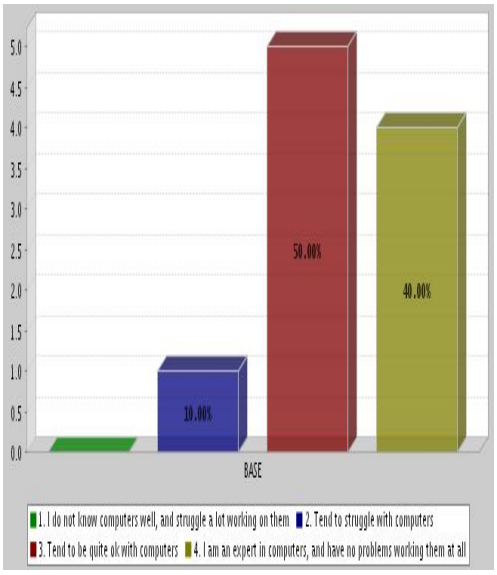


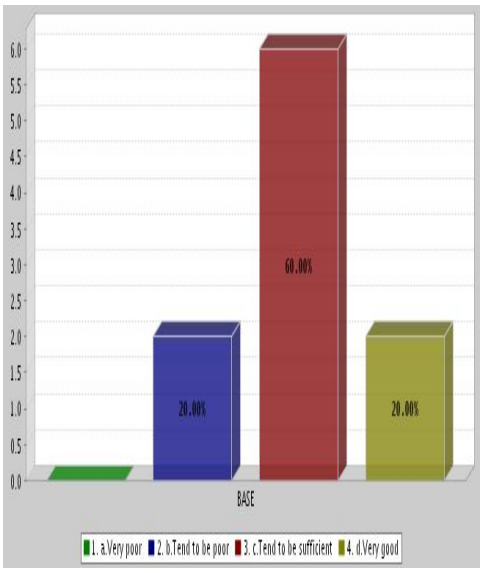
I have been in Brainline for ... years including 2004



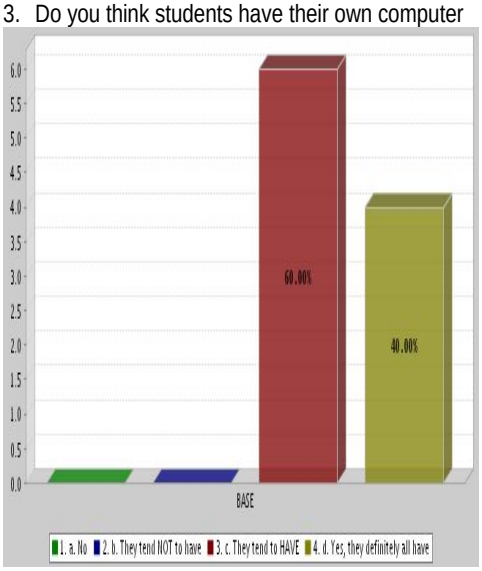
1. When it comes to working my computer?..

2. I think the STUDENTS rate the average subject advisors computer skills as

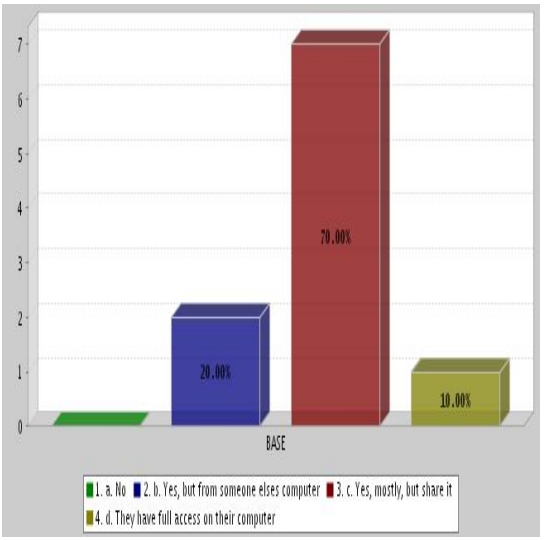

5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
10.00%
50.00%
40.00%
BASE
1. I do not know computers well, and struggle a lot working on them
2. Tend to struggle with computers
3. Tend to be quite ok with computers
4. I am an expert in computers, and have no problems working them at all


6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
20.00%
60.00%
20.00%
BASE
1. a.Very poor
2. b.Tend to be poor
3. c.Tend to be sufficient
4. d.Very good

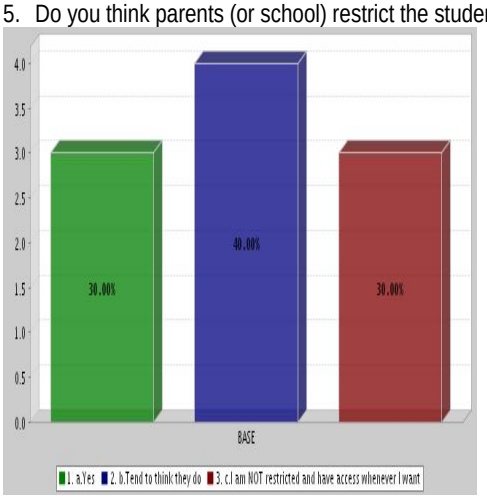
3. Do you think students have their own computer



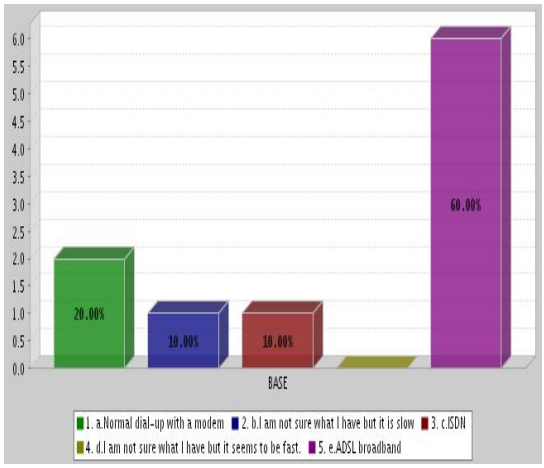
4. Do you think students have Internet access on their own



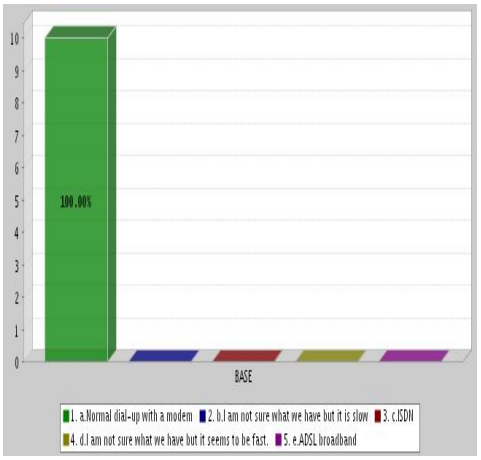
5. Do you think parents (or school) restrict the students?



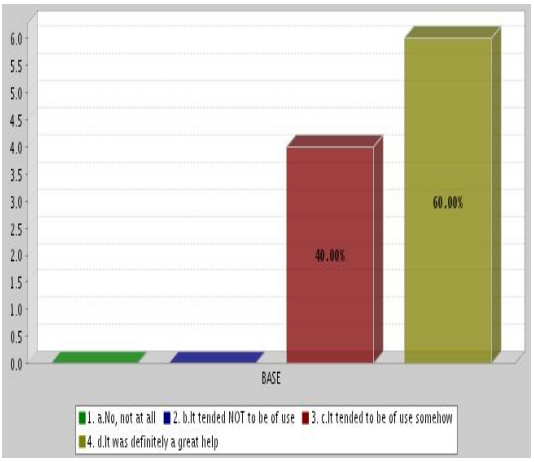
6. Type of Internet access YOU have



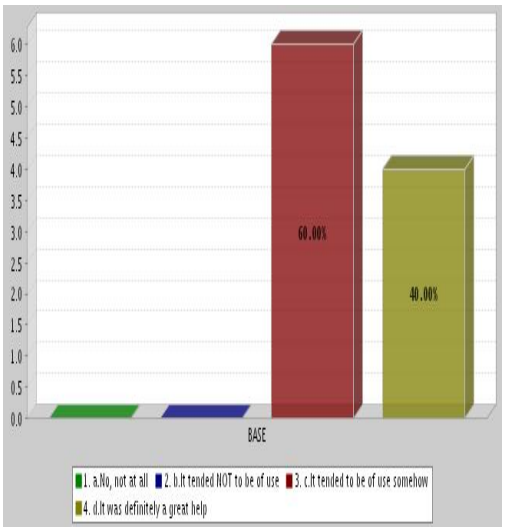
7. Type of Internet access that you think that STUDENTS HAVE



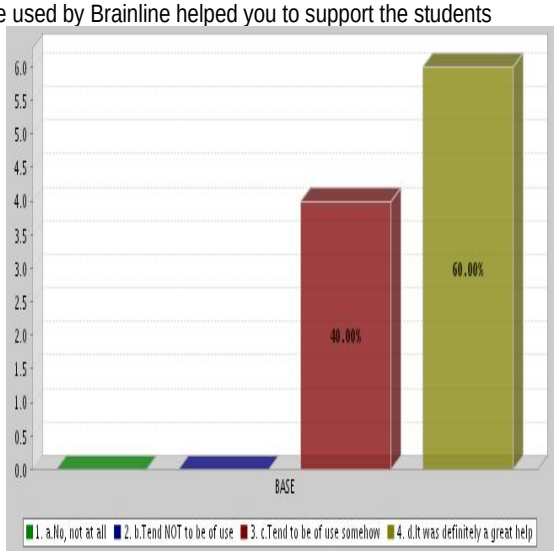
8. Do you think the Internet was of use for you to support students



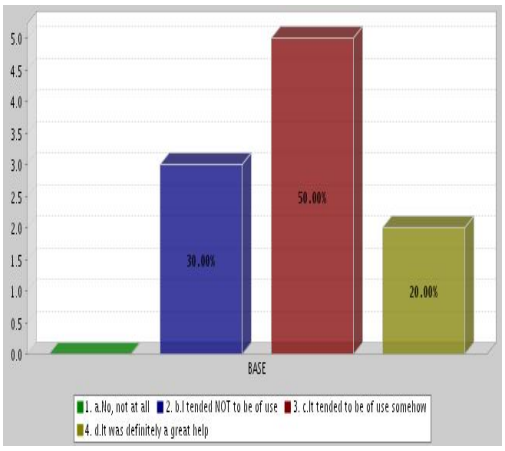
9. Do you think the INTERNET helped students with their studies



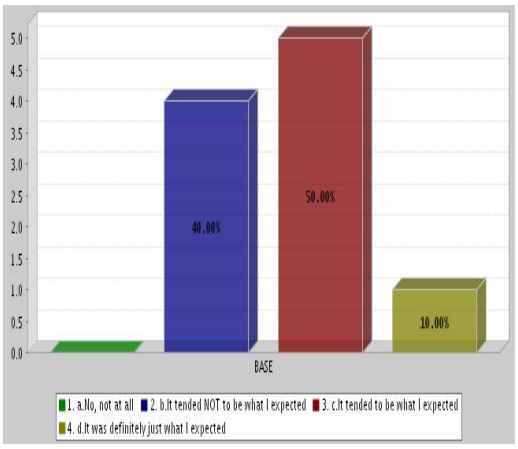
10. Do you think brainONLINE, the online interface used by Brainline helped you to support the students



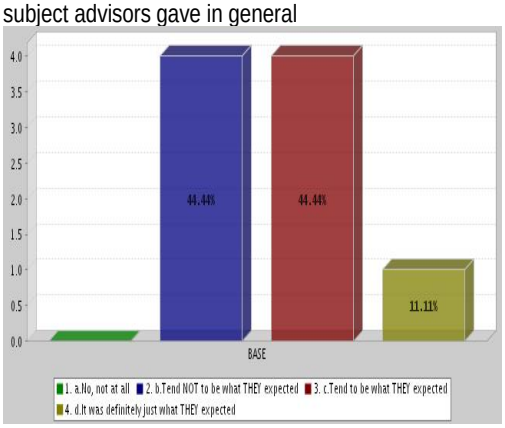
11. Do you think brainONLINE, the online interface used by Brainline helped THE STUDENTS in their studies



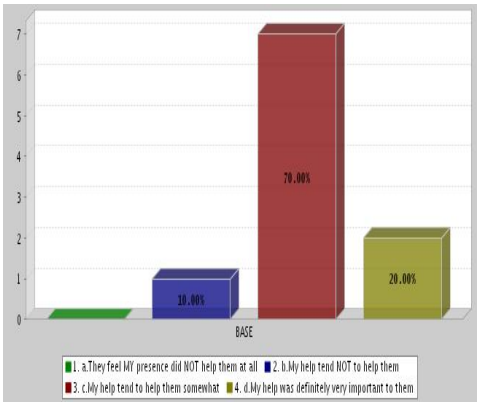
12. When YOU started out with the brainONLINE program, you had certain expectations. Was your support with the brainONLINE program what you expected?



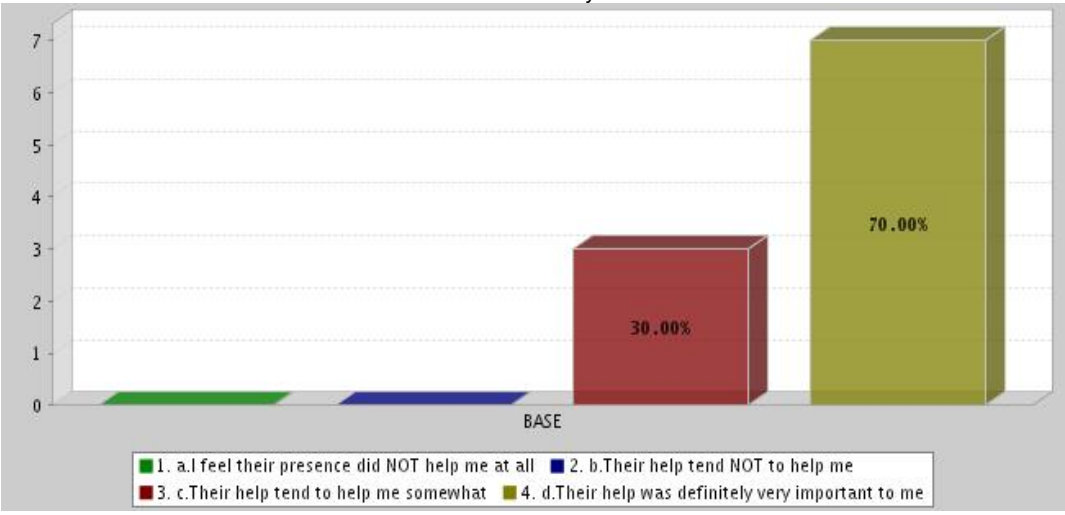
13. When the STUDENTS started out with the brainONLINE program, THEY had certain expectations. Do you think they got what THEY EXPECTED



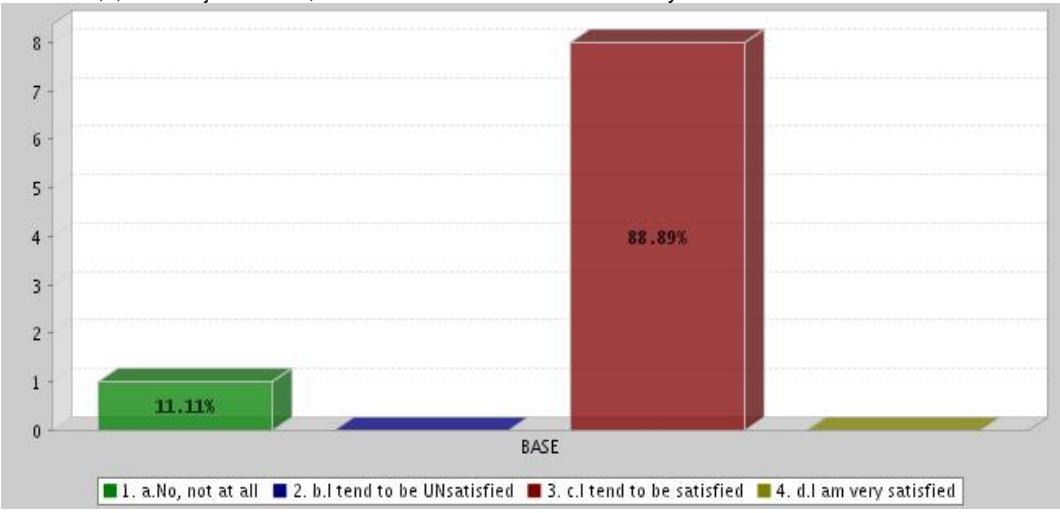
14. How do you think the STUDENTS rate the help the subject advisors gave in general



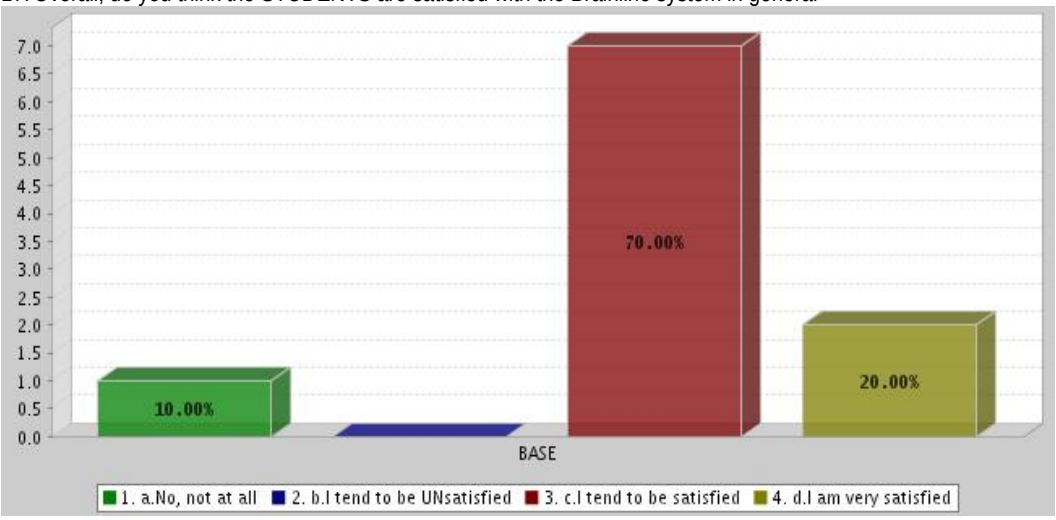
15. Rate the work of the ADMINISTRATORS the brainONLINE system



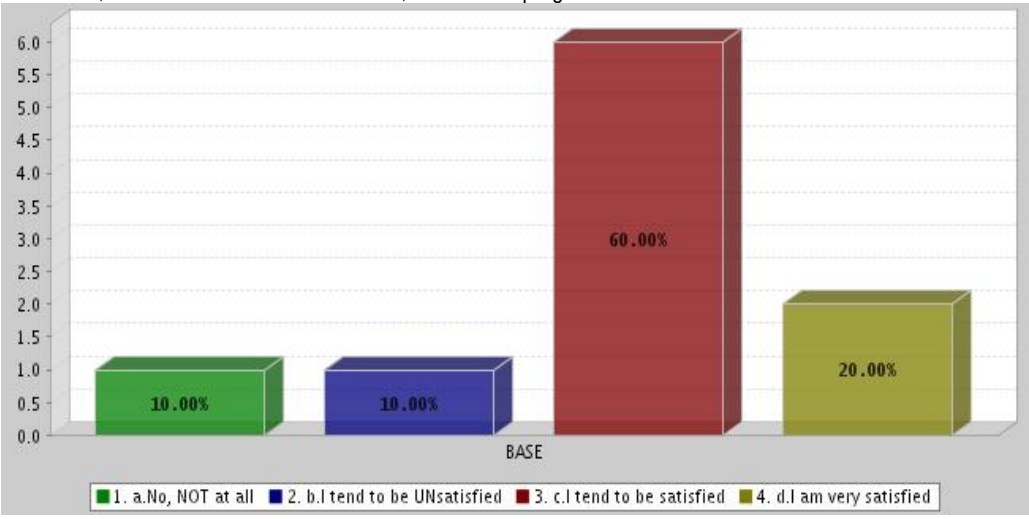
16. Overall, I, as a subject advisor, am satisfied with the whole Brainline system



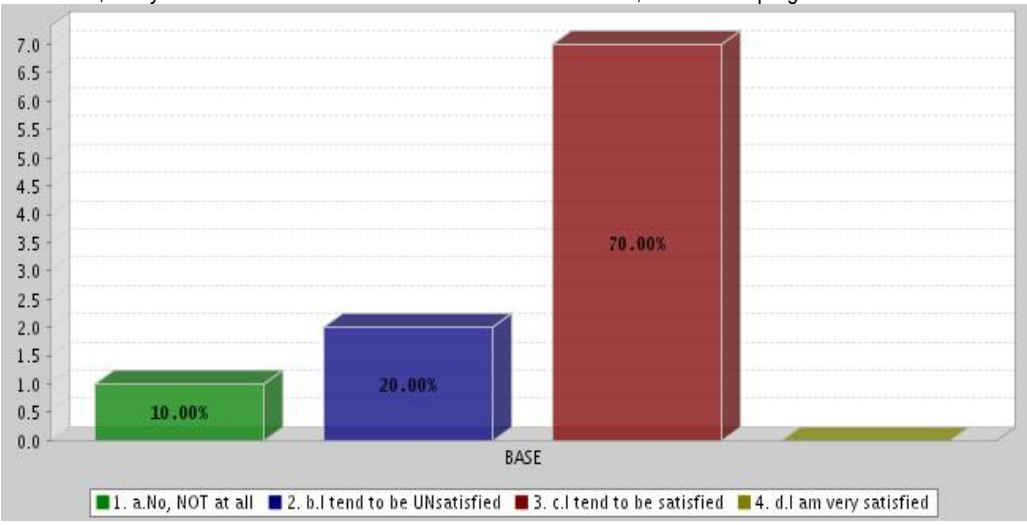
17. Overall, do you think the STUDENTS are satisfied with the Brainline system in general



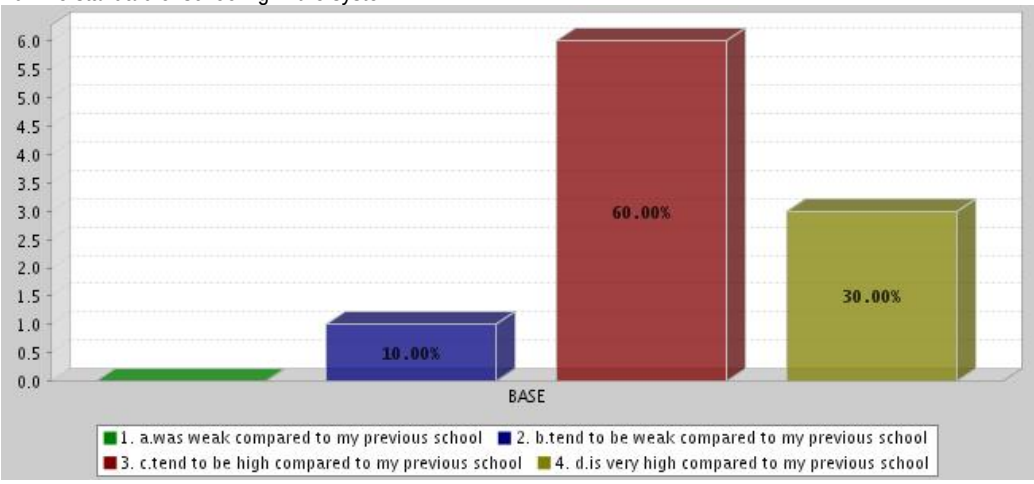
18. Overall, I am satisfied with brainONLINE, the Internet program



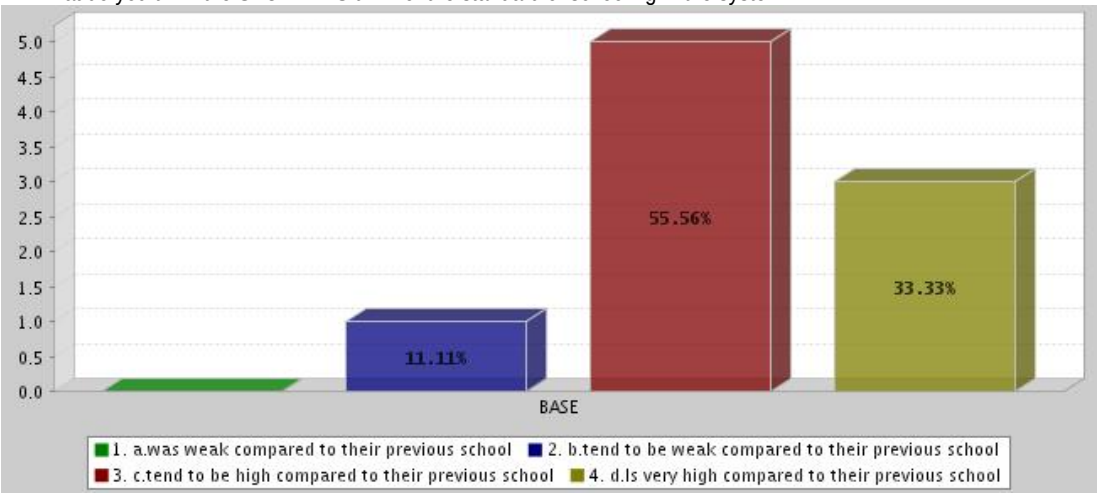
19. Overall, I do you think STUDENTS are satisfied with brainONLINE, the Internet program



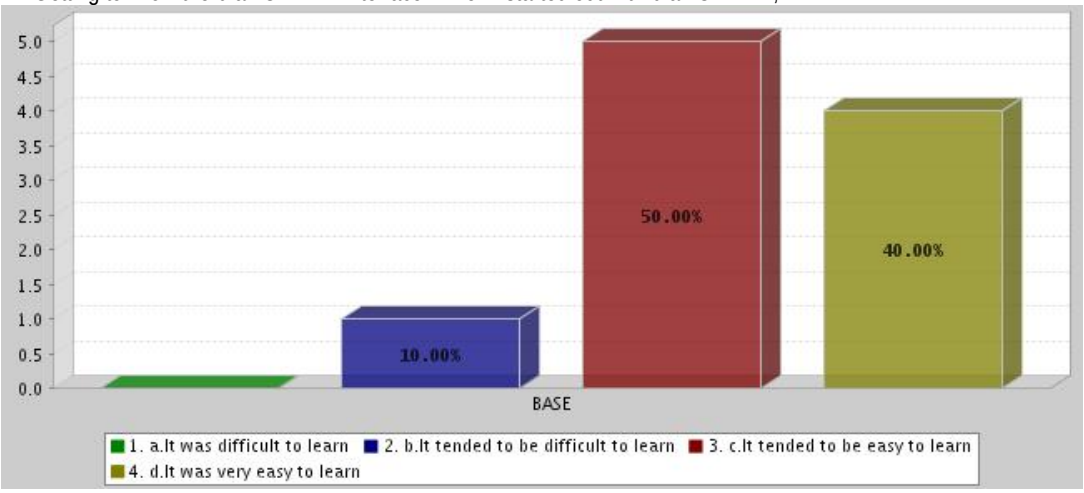
20. The standard of schooling in the system



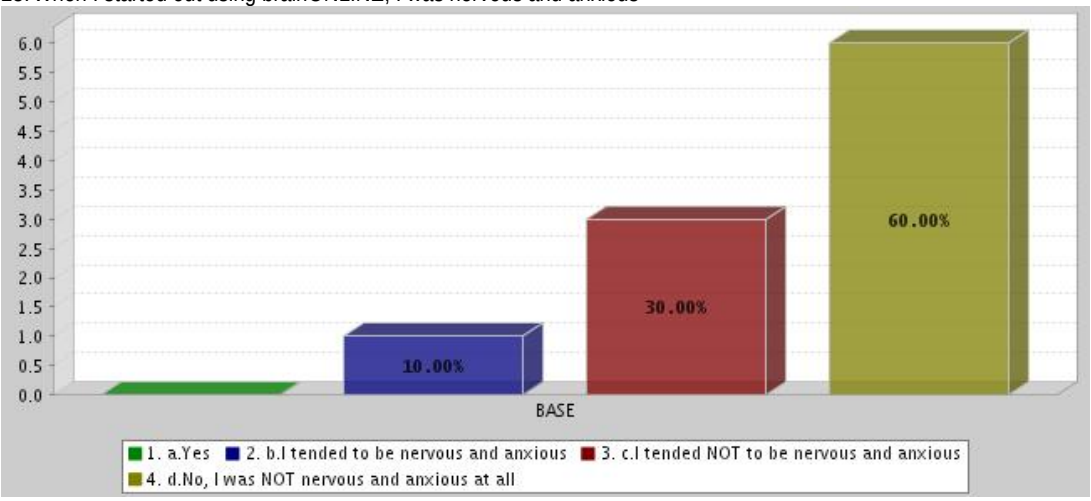
21. What do you think the STUDENTS think of the standard of schooling in the system



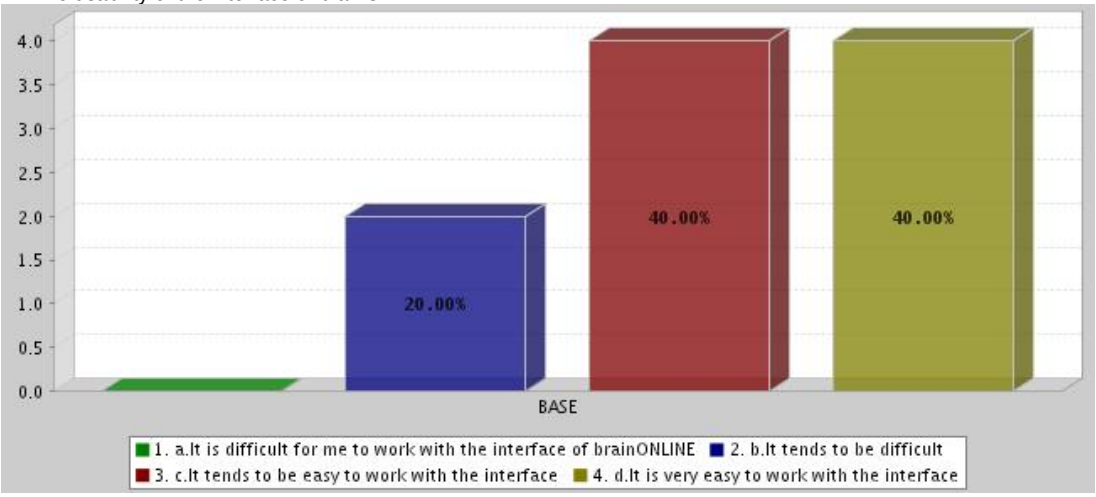
22. Getting to know the brainONLINE interface. When I started out with brainONLINE,



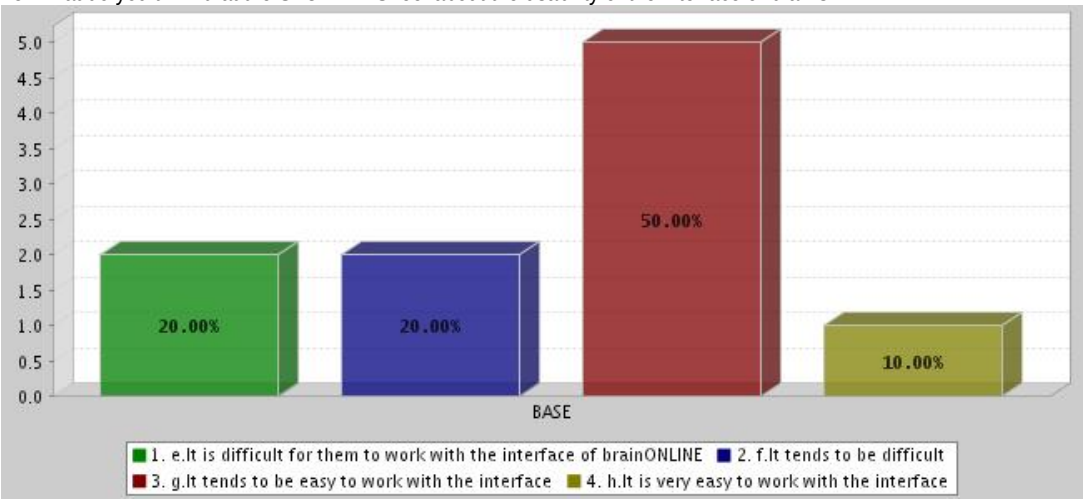
23. When I started out using brainONLINE, I was nervous and anxious



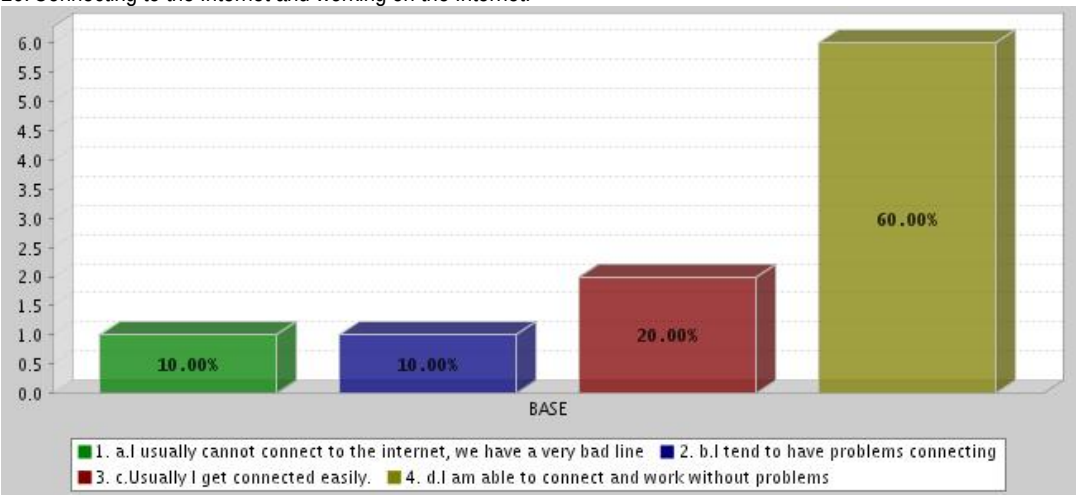
24. The usability of the interface of brainONLINE



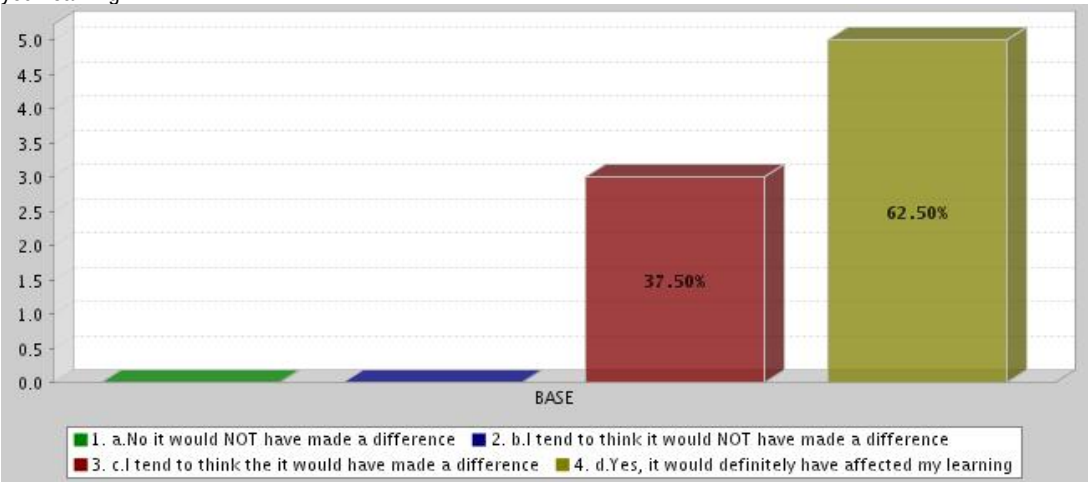
25. What do you think that the STUDENTS feel about the usability of the interface of brainONLINE



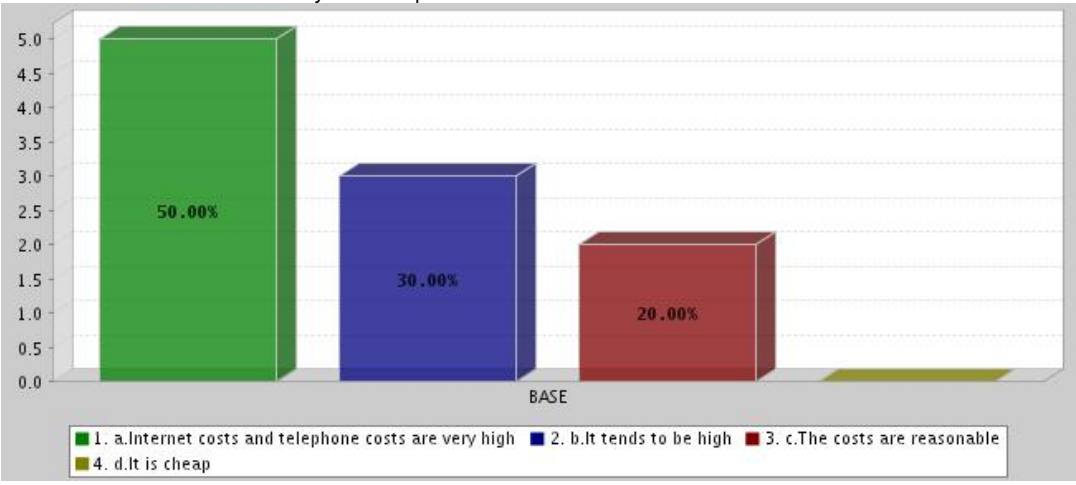
26. Connecting to the Internet and working on the Internet.



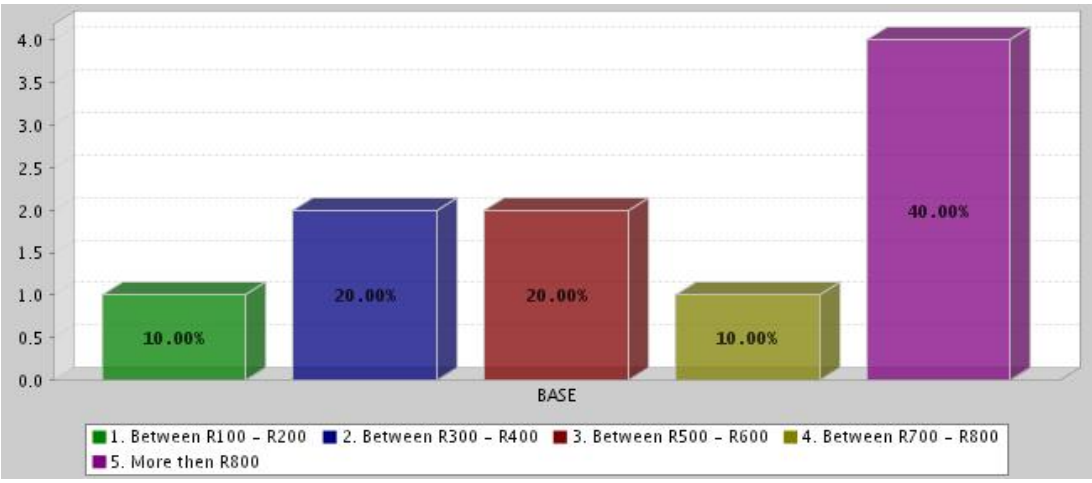
27. If you were NOT to have access to the Internet and brainONLINE, do you think it would have made a difference in your learning



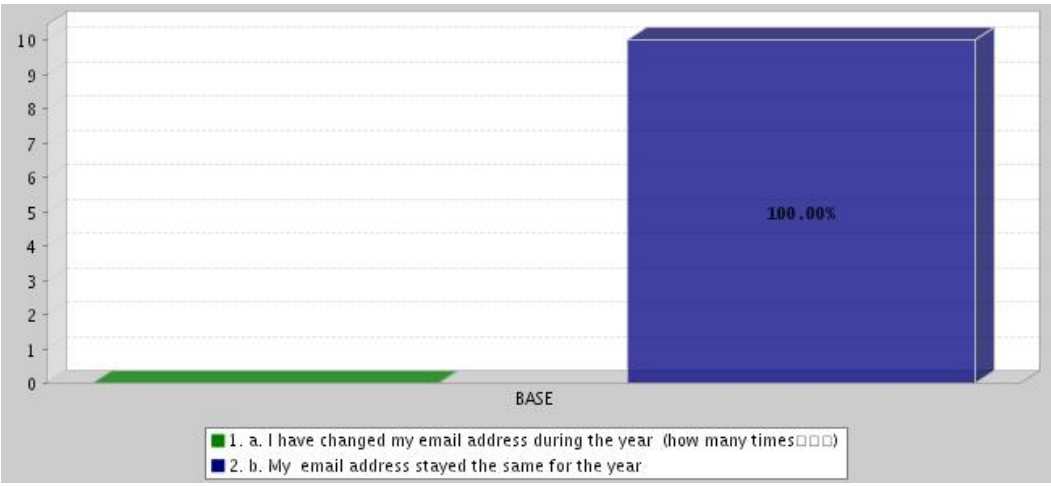
28. Costs of Internet use. What is your own opinion.



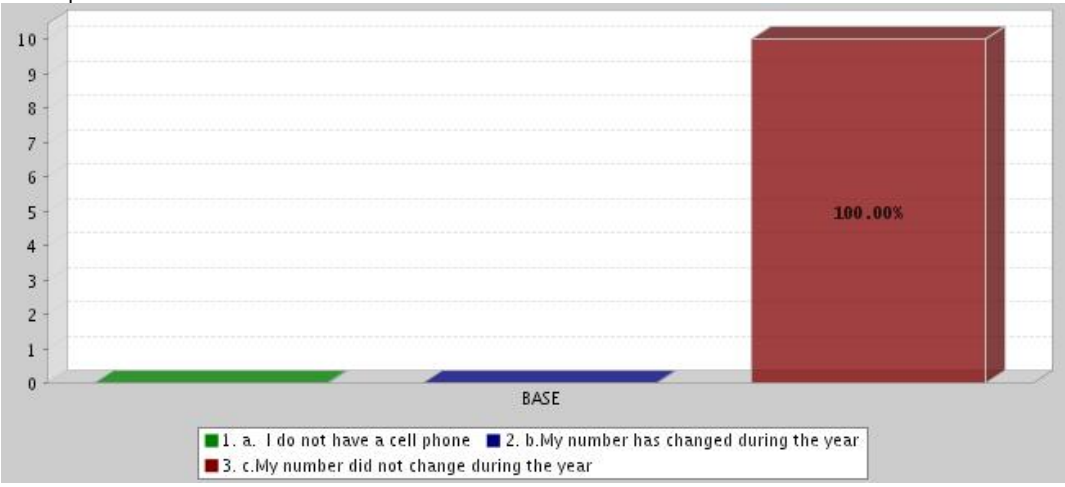
29. Please give your estimate of your Internet and telephone costs per month



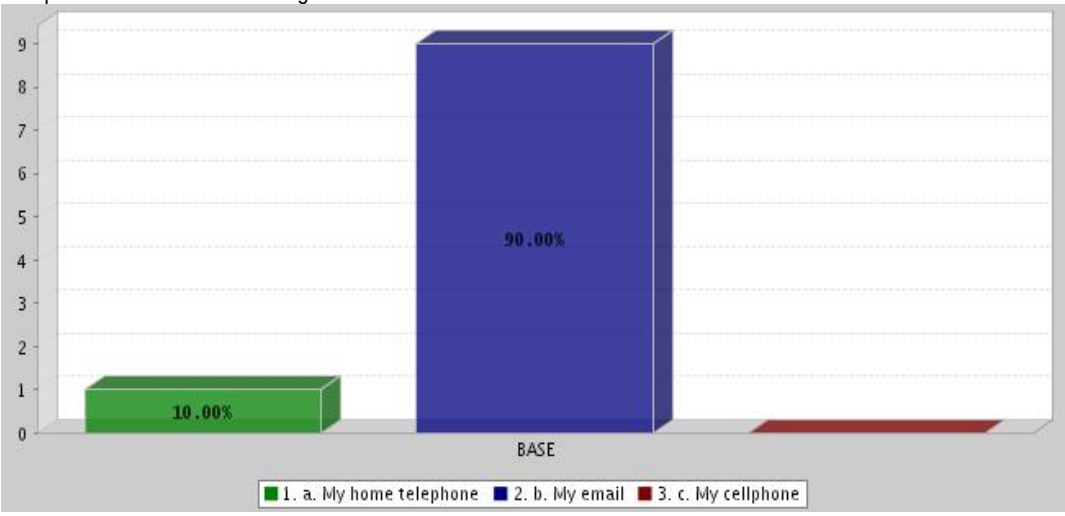
30. E-mail address



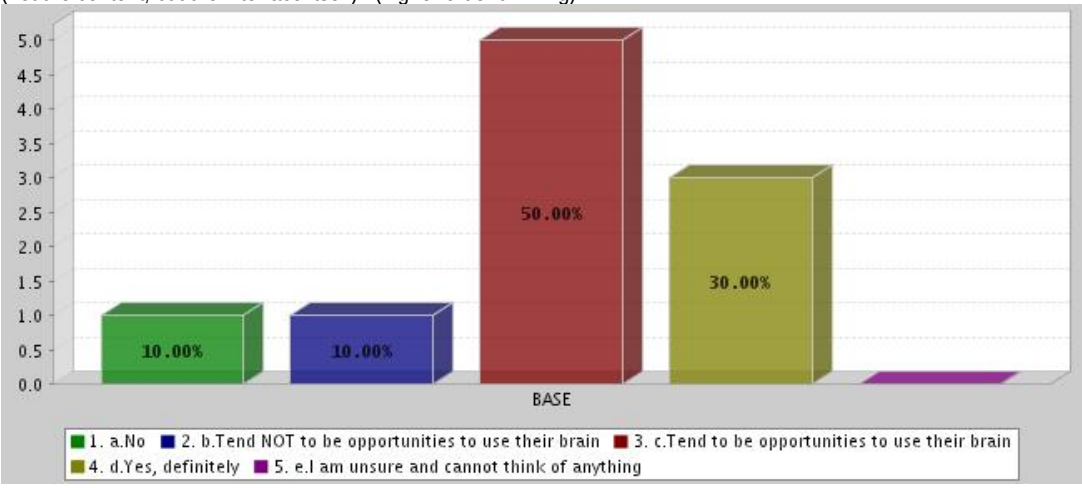
31. Cellphone number



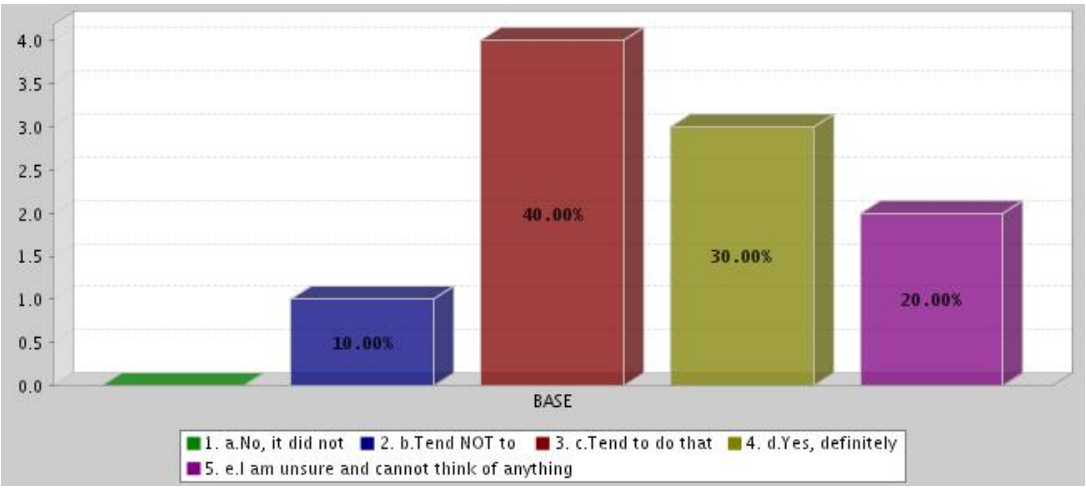
32. I prefer to be contacted through



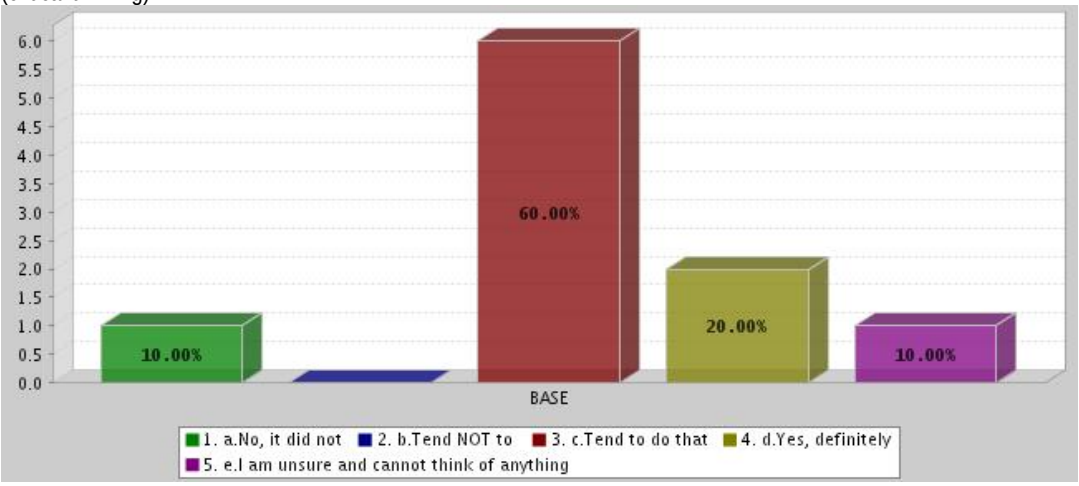
33. Did the brainONLINE interface give STUDENTS opportunities to think, to use THEIR brain to solve problems (not the content, but the interface itself) (higher order thinking)



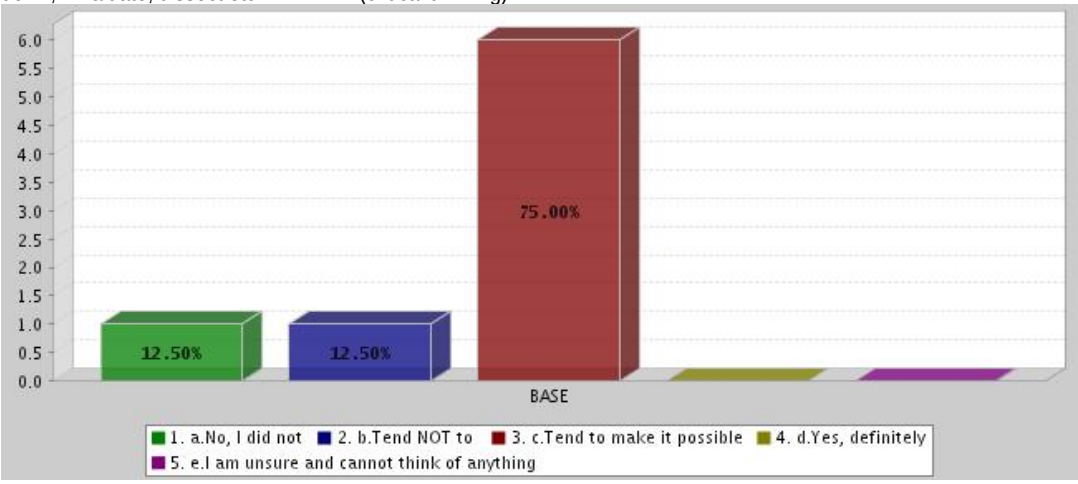
34. Did the brainONLINE interface help them to start from things that they know, working up to things that they don?t know



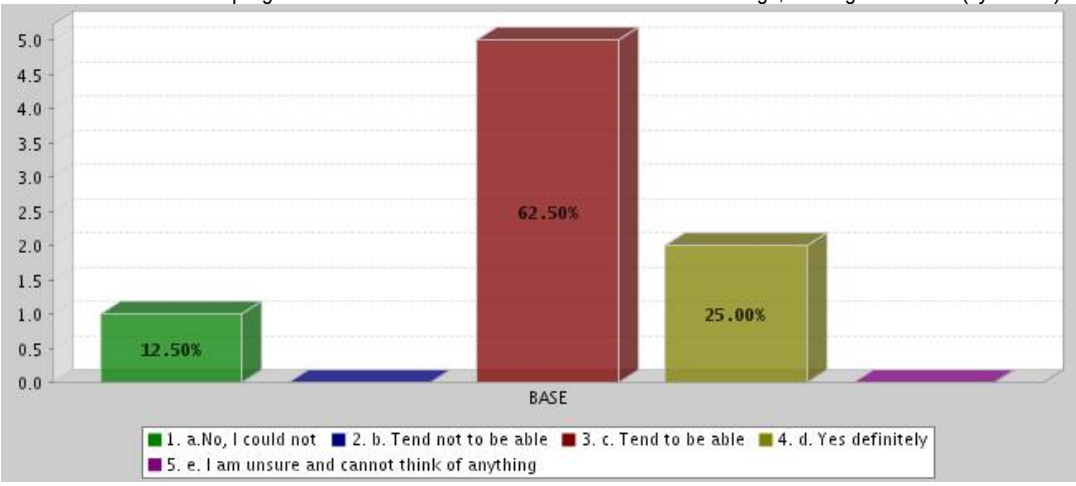
35. Did the brainONLINE interface challenge them to think about things the way other people think about it. (critical thinking)



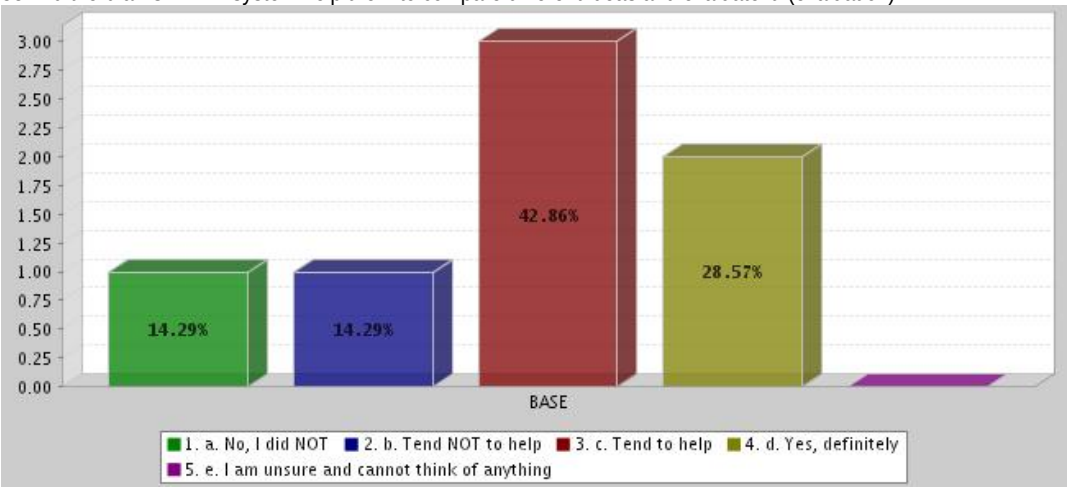
36. Did the brainONLINE interface make it possible for them to analyze things. In other words - Investigate, break down, Evaluate, dissect etc. (critical thinking)



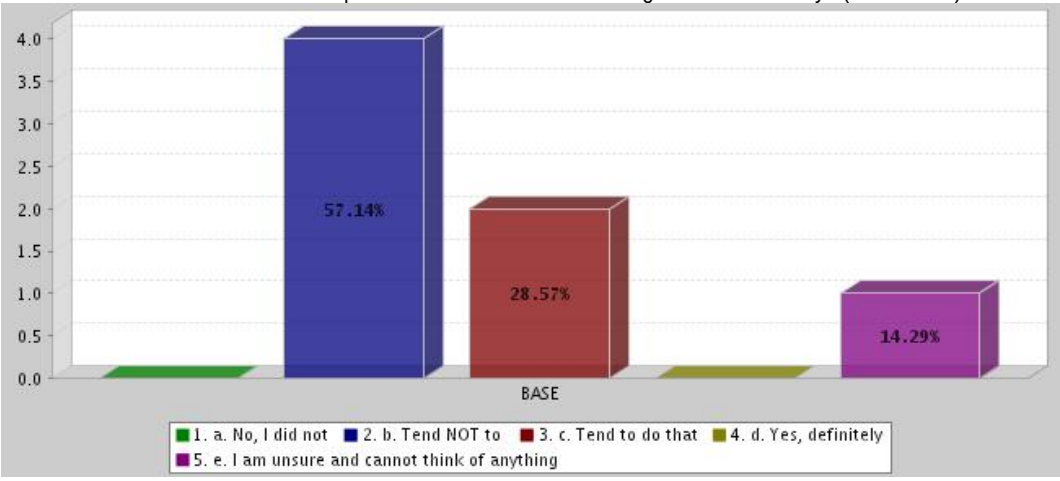
37. Did the brainONLINE program allow them to draw conclusions from various things, making sense of it (synthesis)



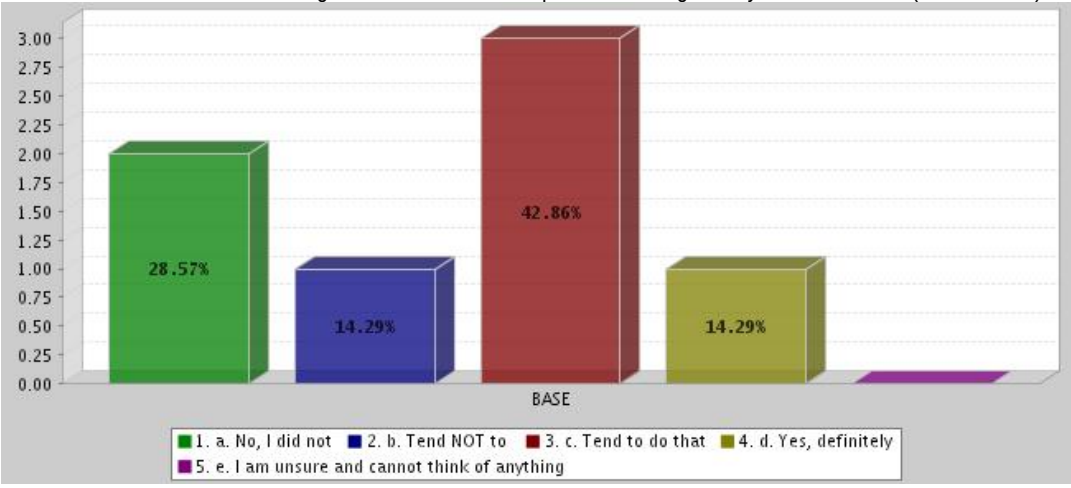
38. Did the brainONLINE system help them to compare different ideas and evaluate it. (evaluation)



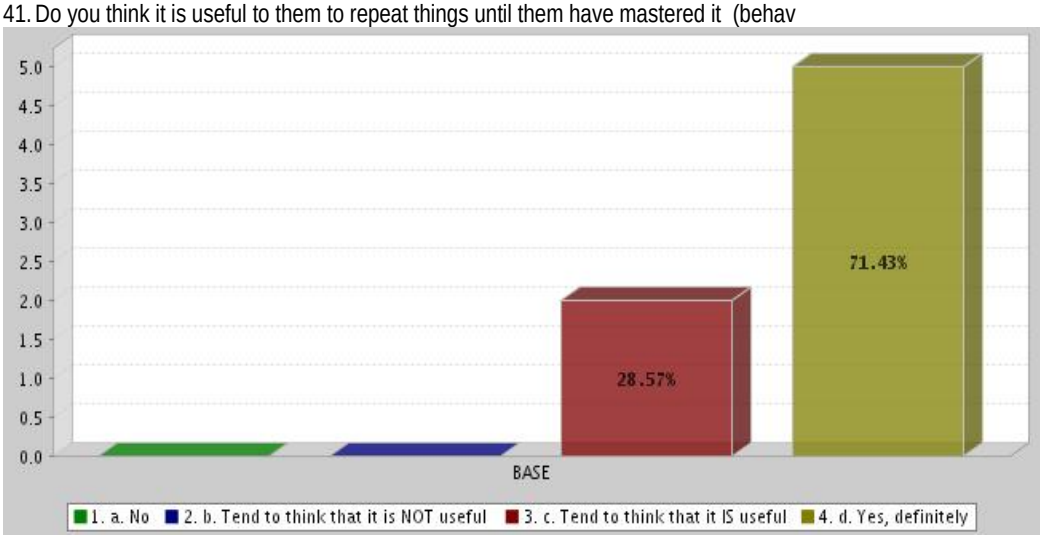
39. Did the brainONLINE interface help them to learn to remember things in a different way (mnemonics)



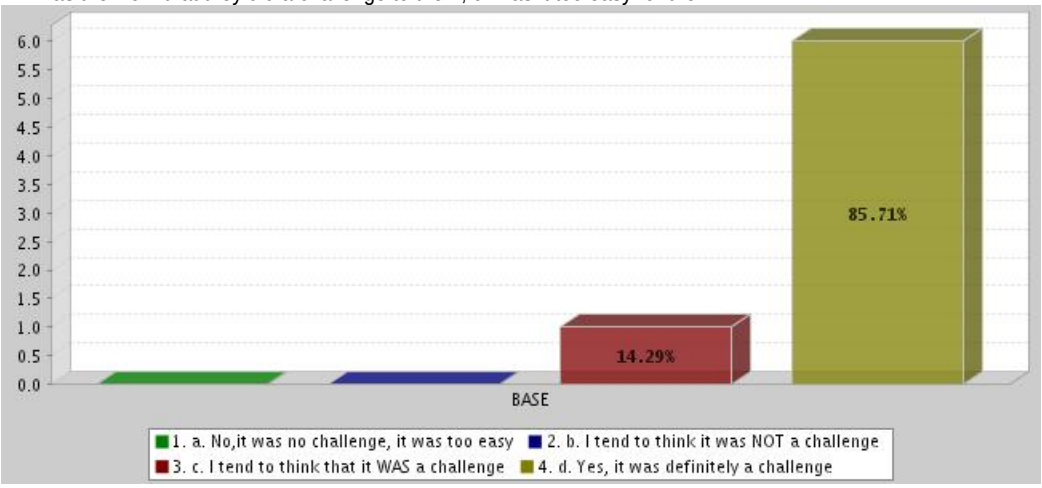
40. Did the brainONLINE interface give them a chance to repeat some things until you mastered it? (Behaviousist)



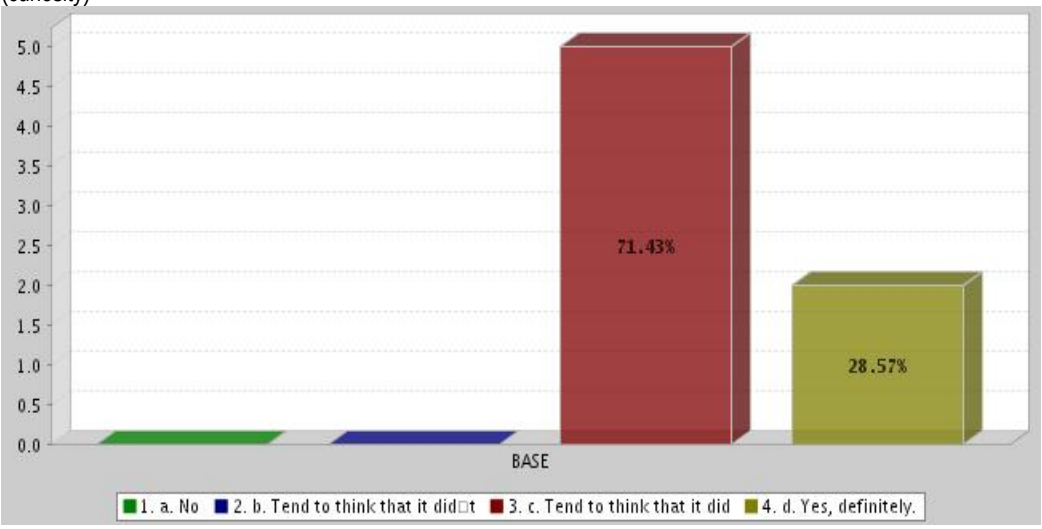
41. Do you think it is useful to them to repeat things until them have mastered it (behav



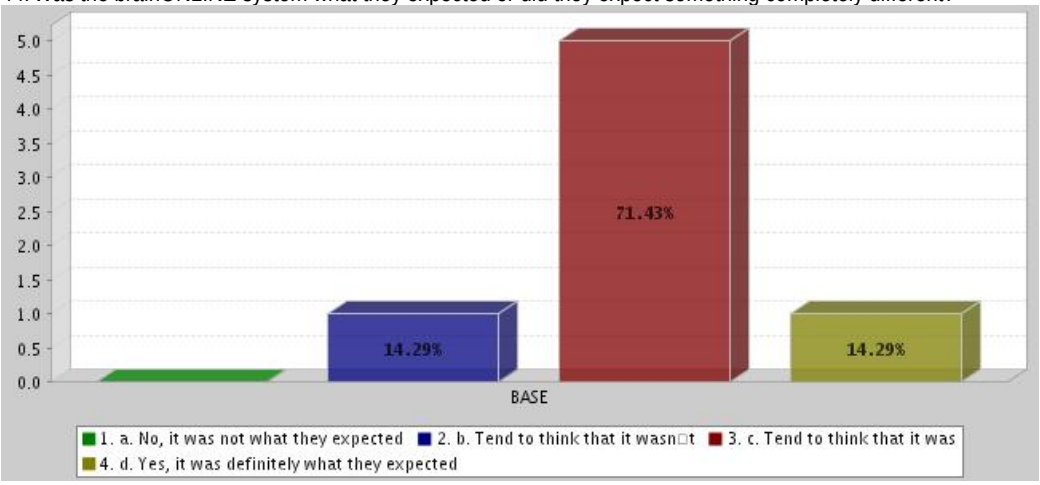
42. Was the work that they did a challenge to them, or was it too easy for them?



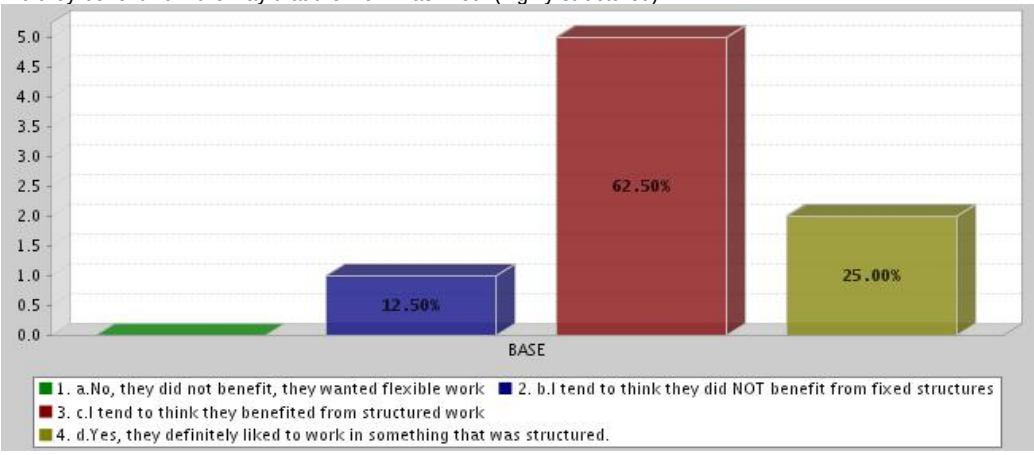
43. Did the brainONLINE system make it possible for them to be curious about things and satisfy their curiosity? (curiosity)



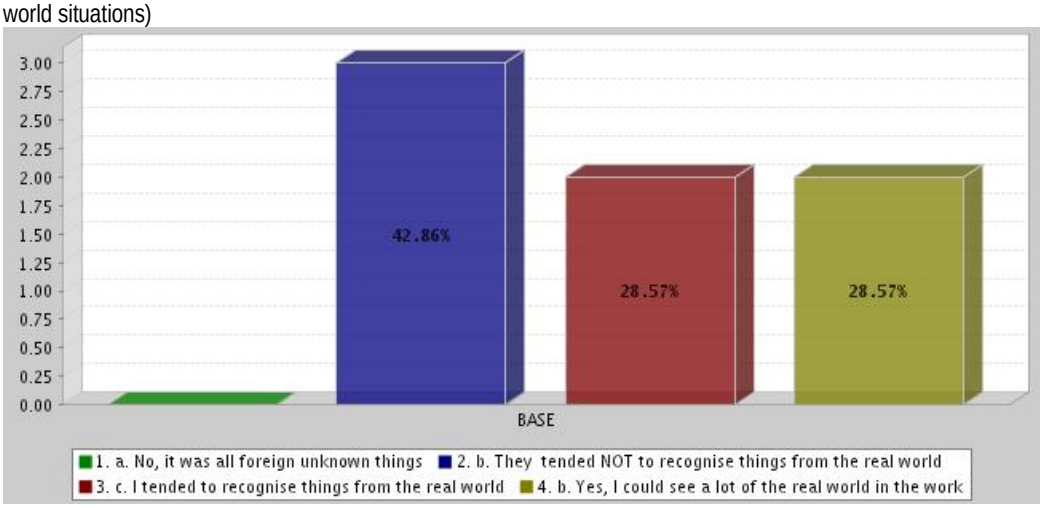
44. Was the brainONLINE system what they expected or did they expect something completely different?



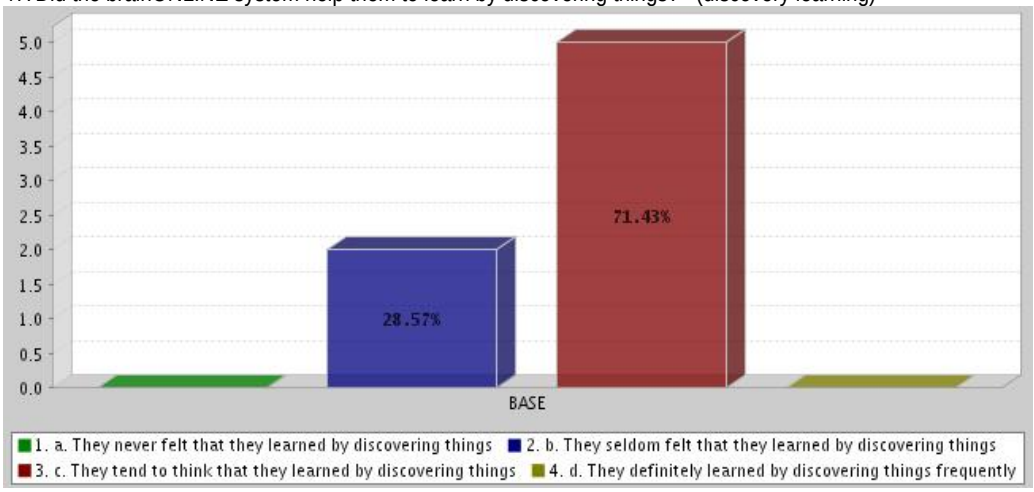
45. They course structure was highly structures.
Did they benefit from the way that the work was fixed (highly structured)



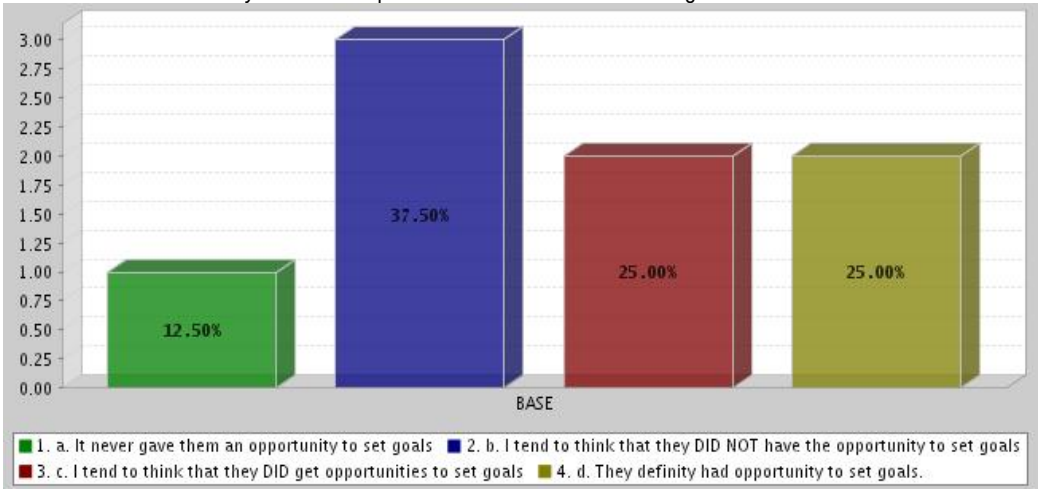
46. Did the brainONLINE system allow them to encounter things that they could recognise in the real world? (real world situations)



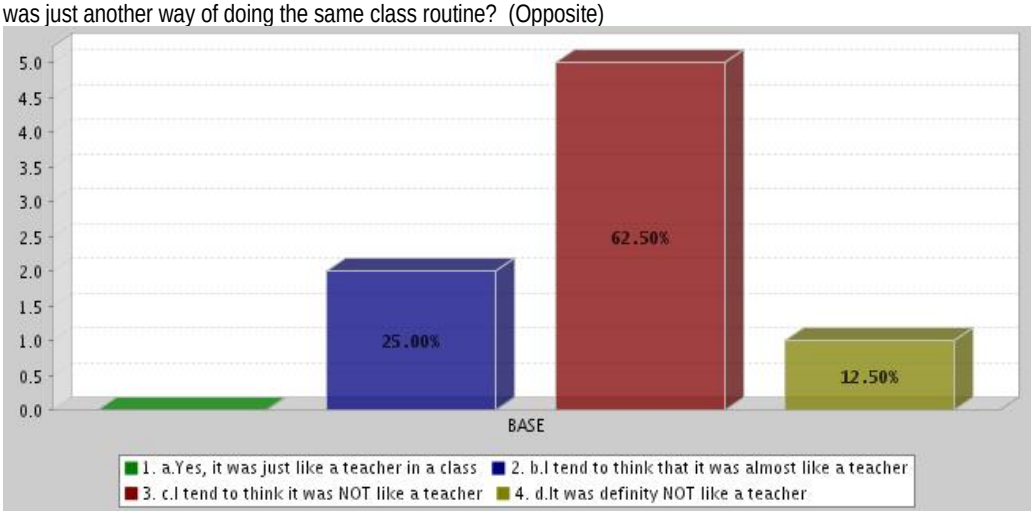
47. Did the brainONLINE system help them to learn by discovering things? (discovery learning)



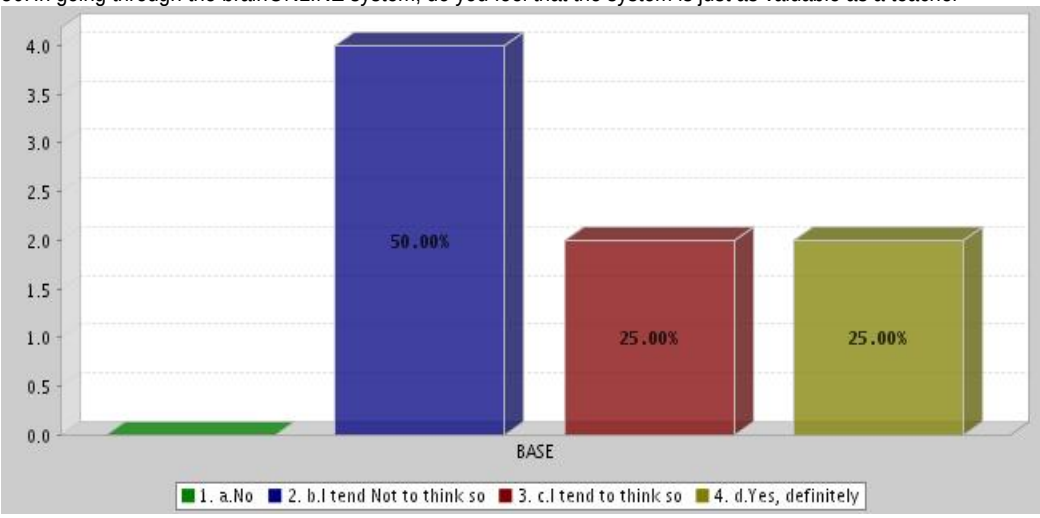
48. Did the brainONLINE system make it possible for them to set their own goals?



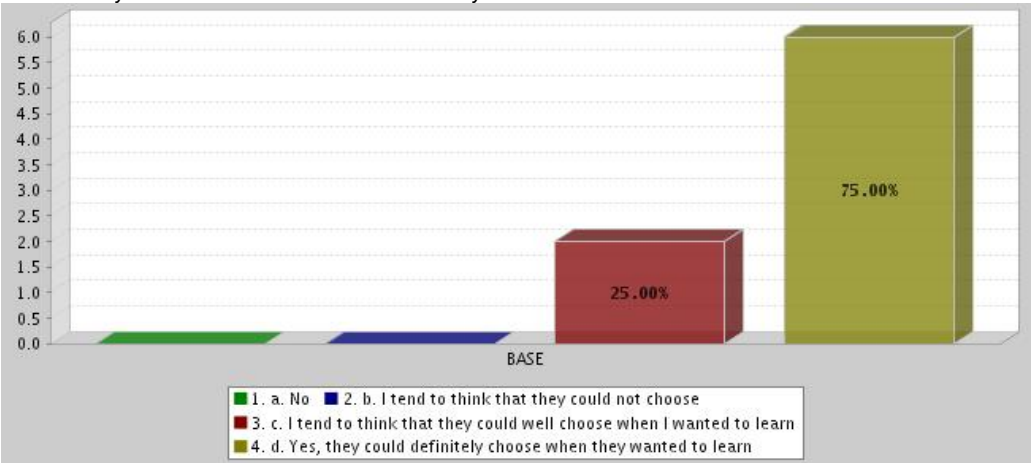
49. In going through the brainONLINE system, did you feel as if they system was just like a teacher, in other words, it was just another way of doing the same class routine? (Opposite)



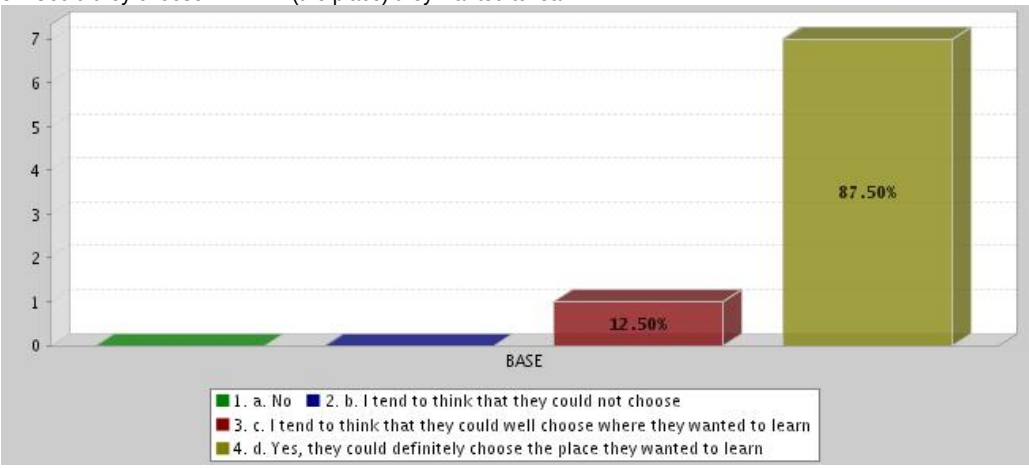
50. In going through the brainONLINE system, do you feel that the system is just as valuable as a teacher



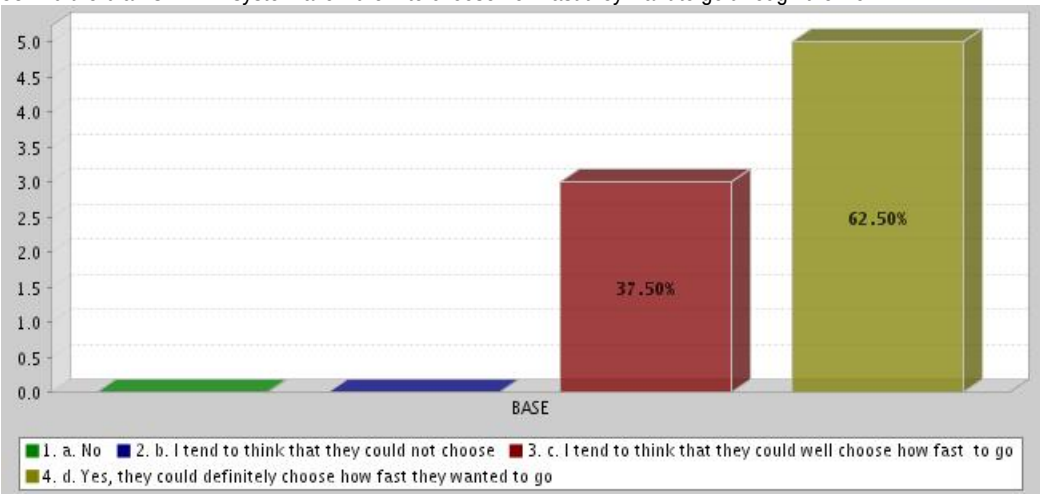
51. Did the system allow them to choose WHEN they wanted to learn



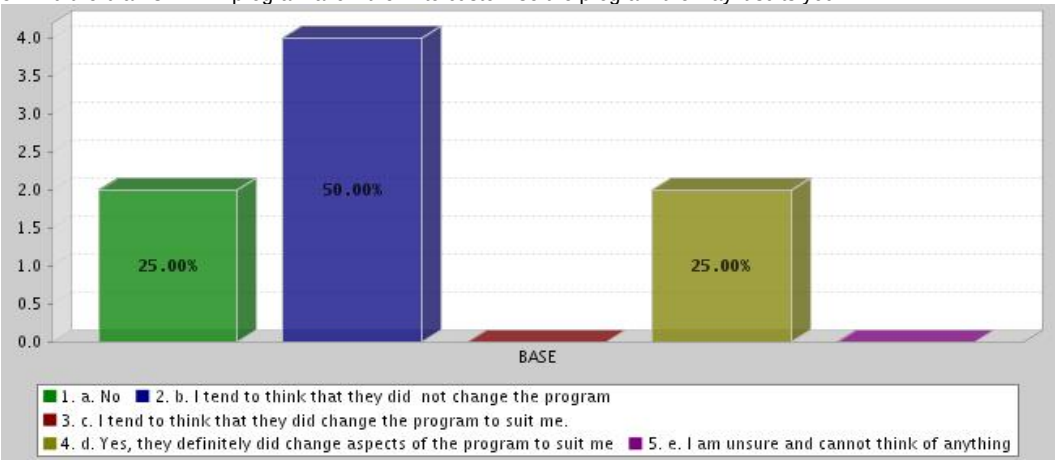
52. Could they choose WHERE (the place) they wanted to learn?



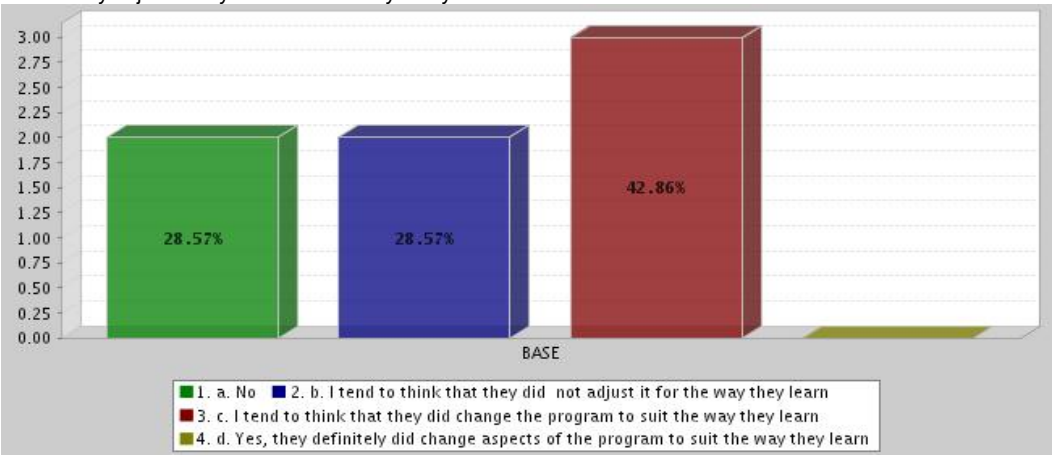
53. Did the brainONLINE system allow them to choose how fast they want to go through the work?



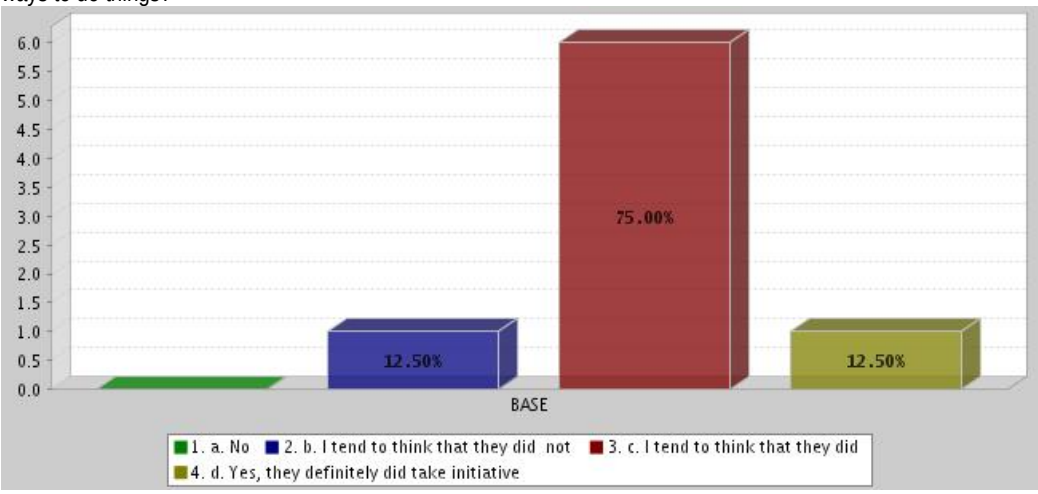
54. Did the brainONLINE program allow them to customise the program the way it suits you?



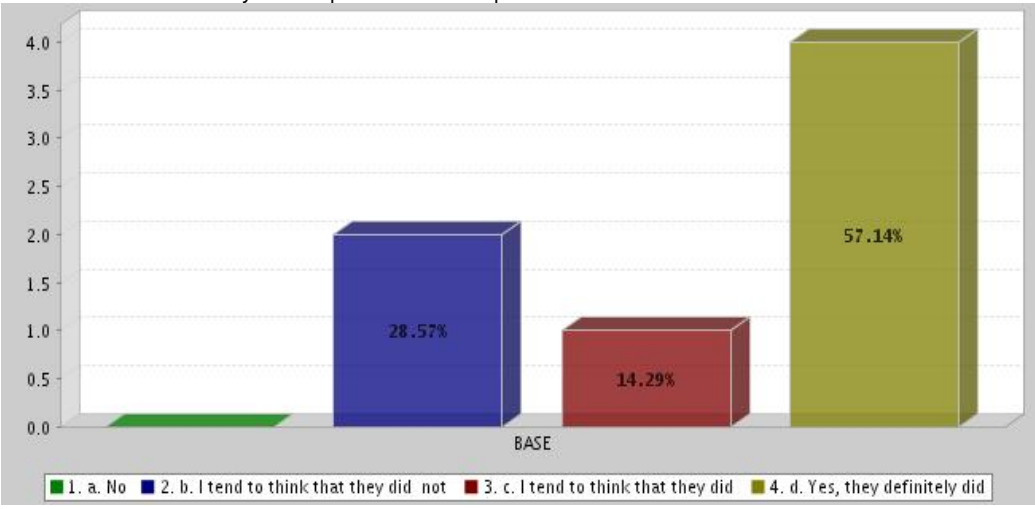
55. Did they adjust the system to fit the way that you learn?



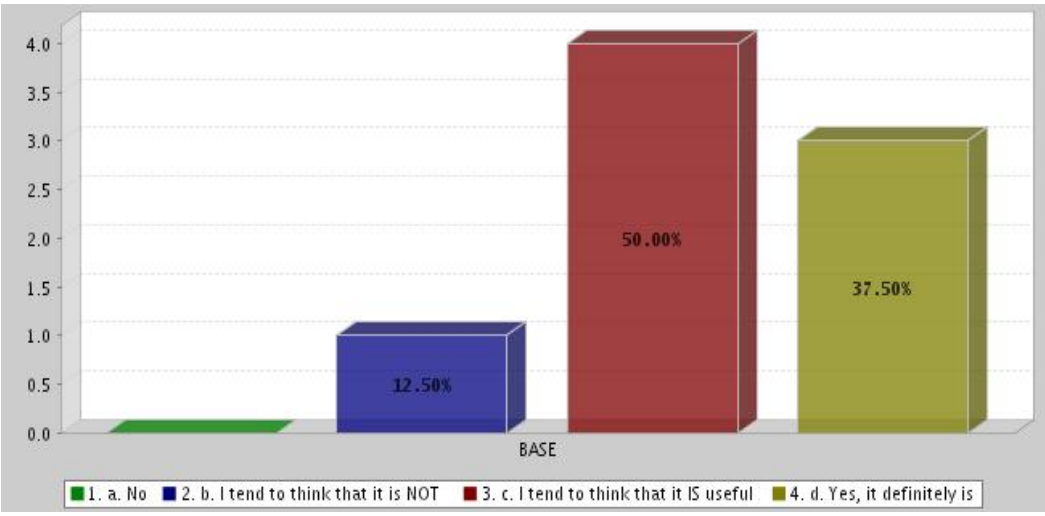
56. Did the brainONLINE system help them to take initiative in learning with the system, eg start things, think of new ways to do things?



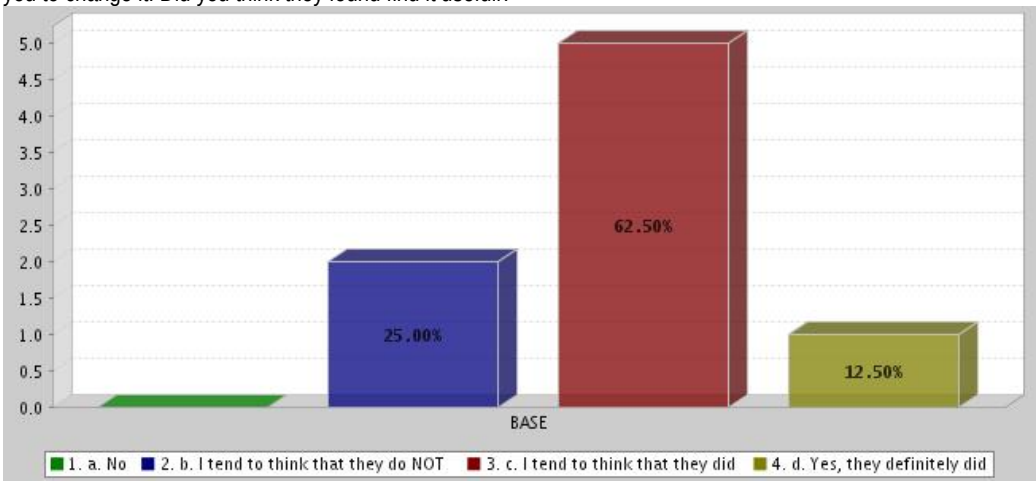
57. Did the brainONLINE system help them ask for help from the teachers.?



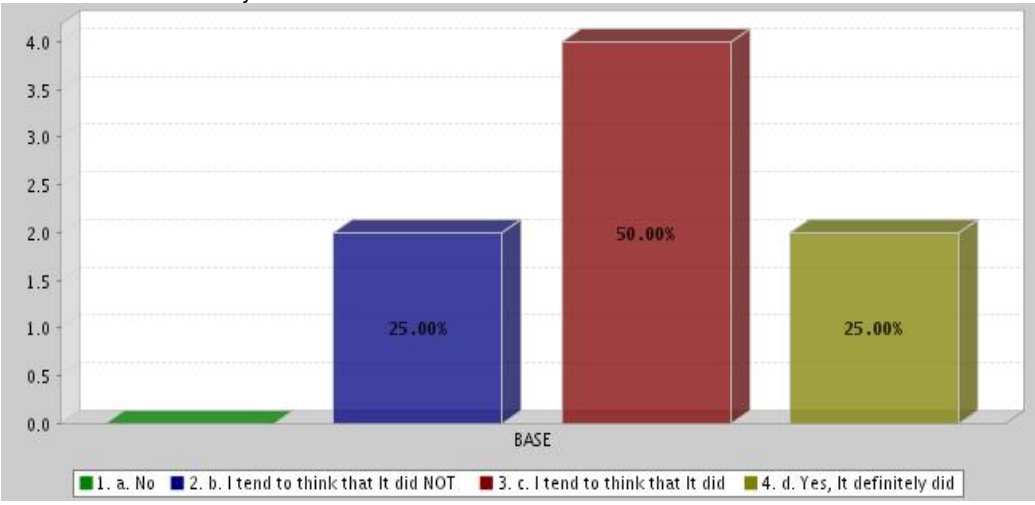
58. Sometimes the work is presented in a fixed structure, and the system does not allow you to change it. Did you think this is beneficial to the students?



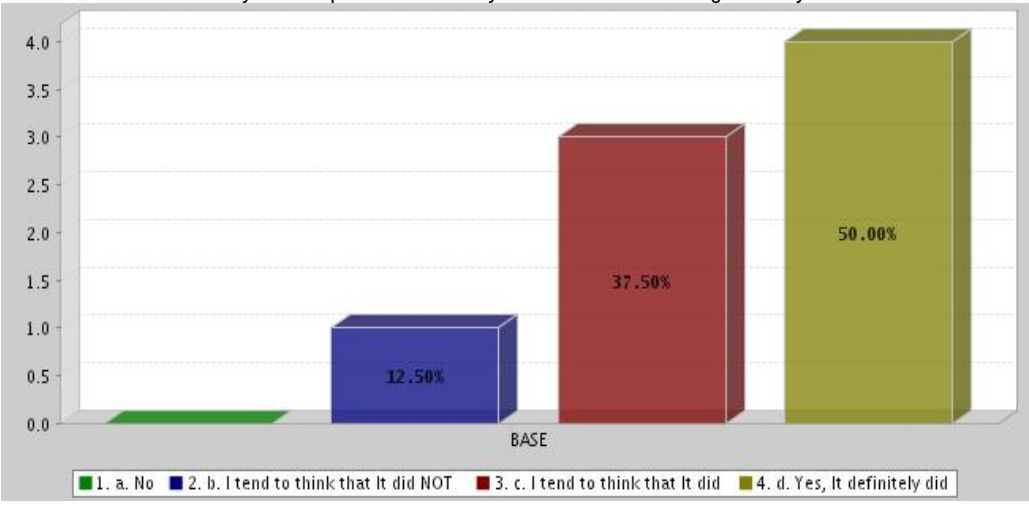
59. What do the students think. Sometimes the work is presented in a fixed structure, and the system does not allow you to change it. Did you think they found find it usefull?



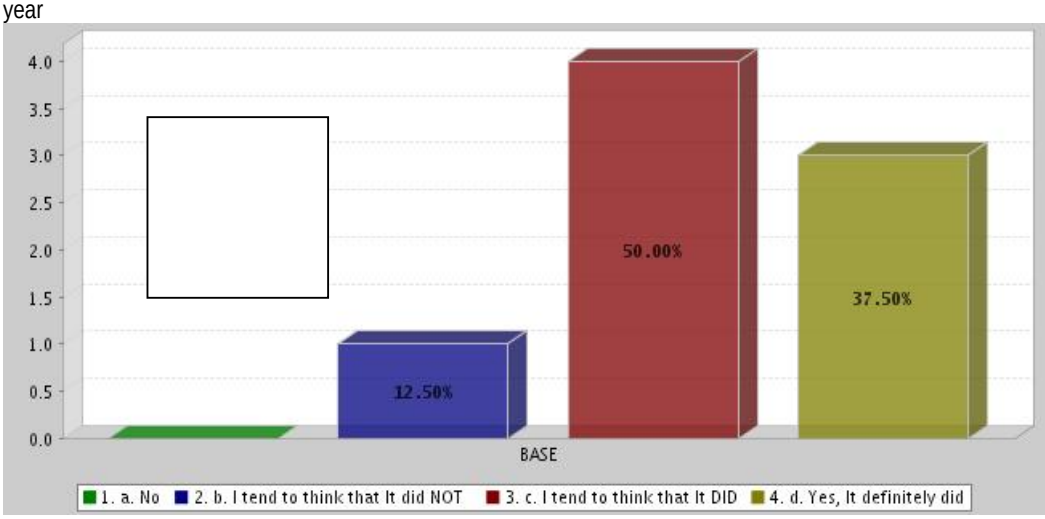
60. Did the brainONLINE system make make it easier for them to learn



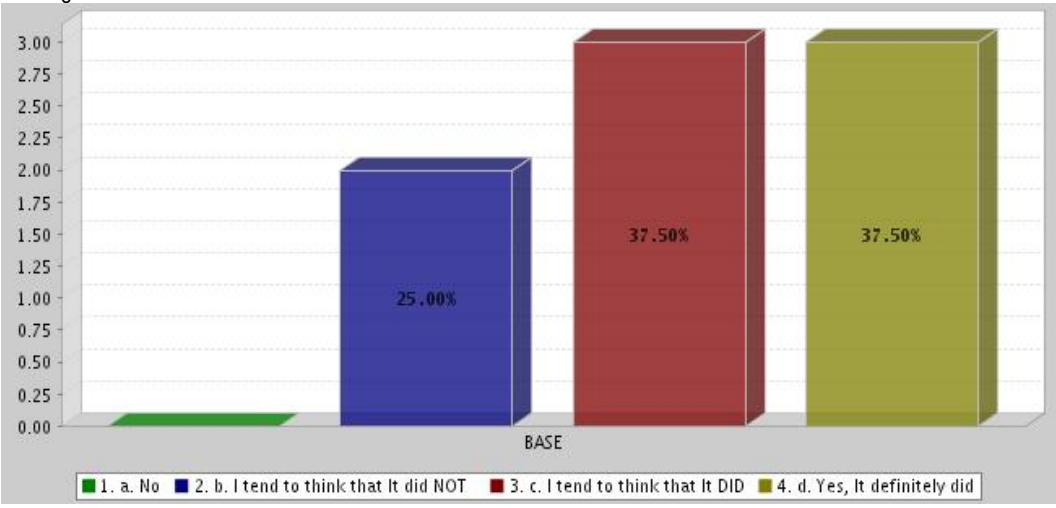
61. Did the brainONLINE system help them when they came across something that they do not understand



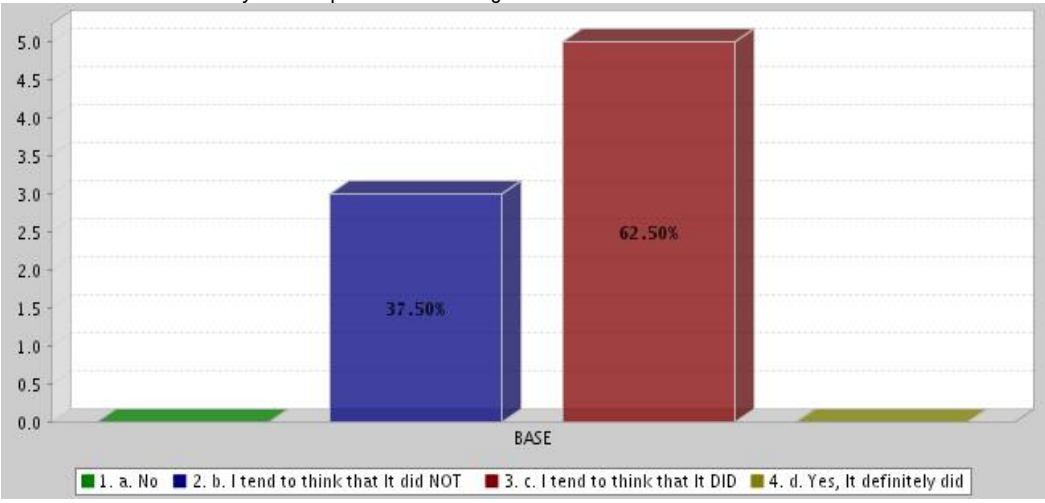
62. Did the brainONLINE system help them to know exactly what lessons and work they were supposed to do for the year



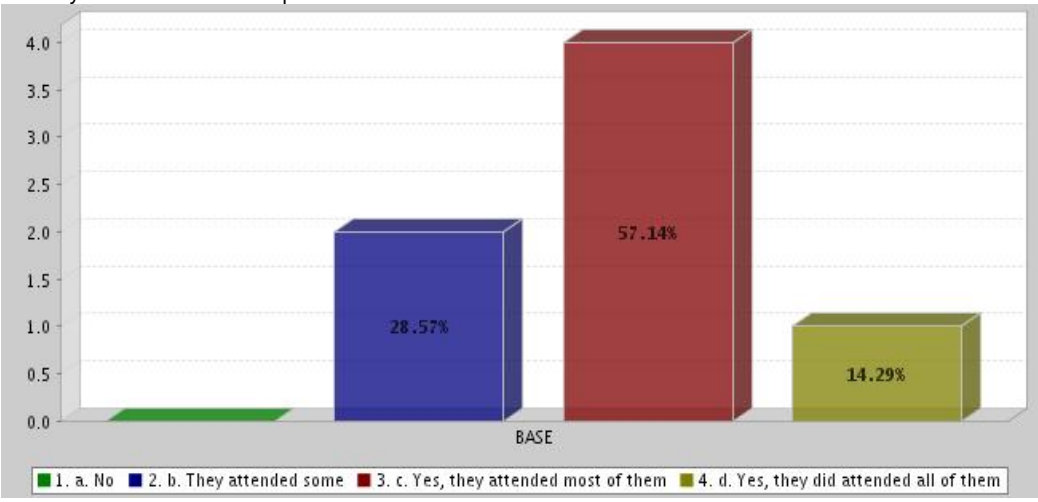
63. Did the brainONLINE system support them sufficiently with Assignment dates and deadlines, and the submission of assignments.



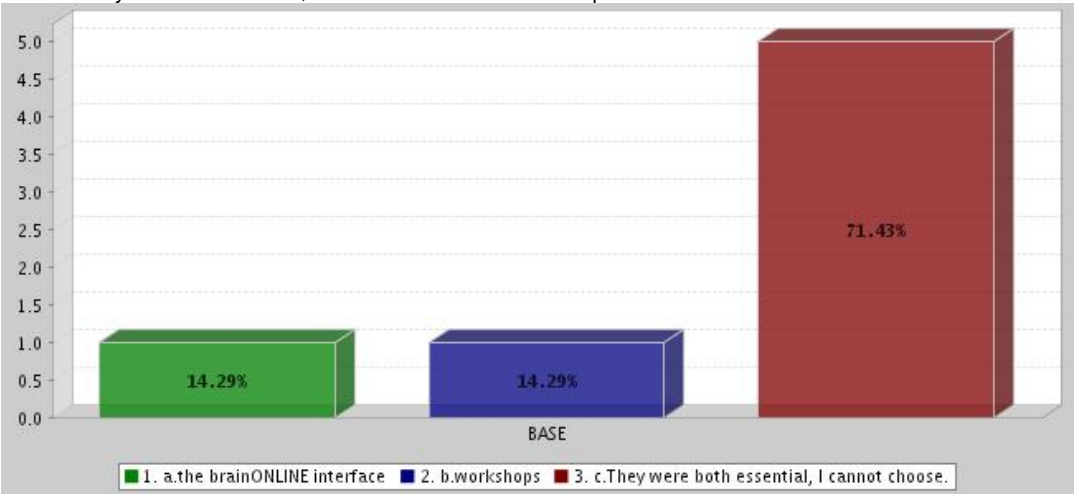
64. Did the brainONLINE system help them to learn together with others



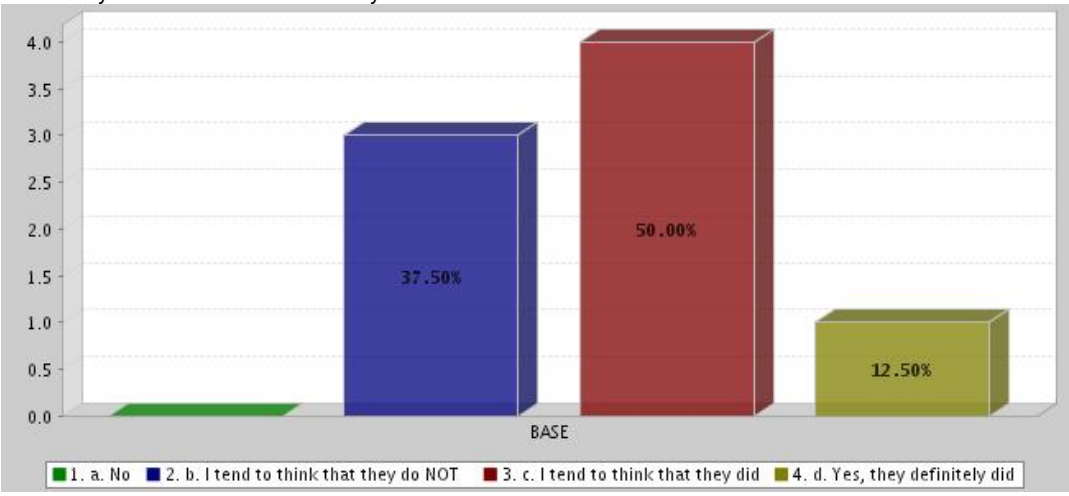
65. Did you attend the workshops



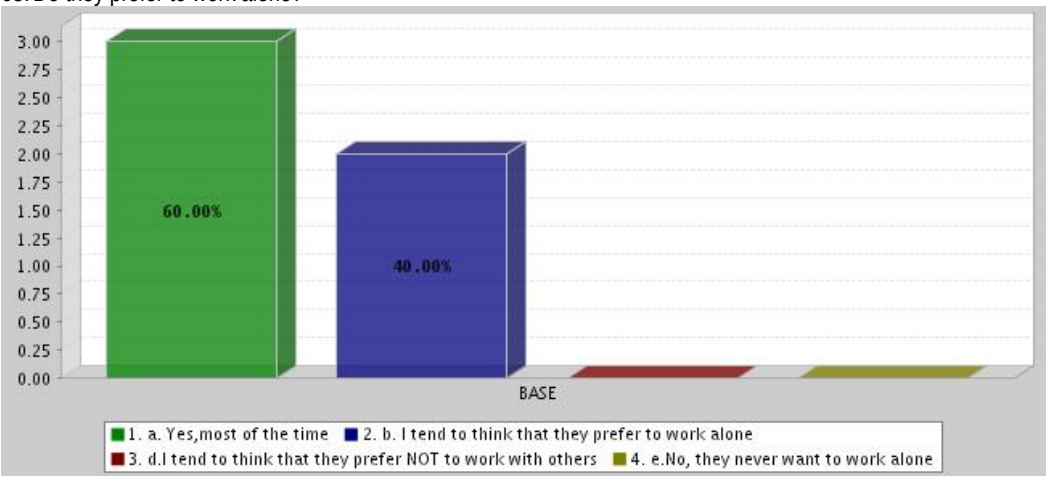
66. What do you find more useful, the online interface or workshops



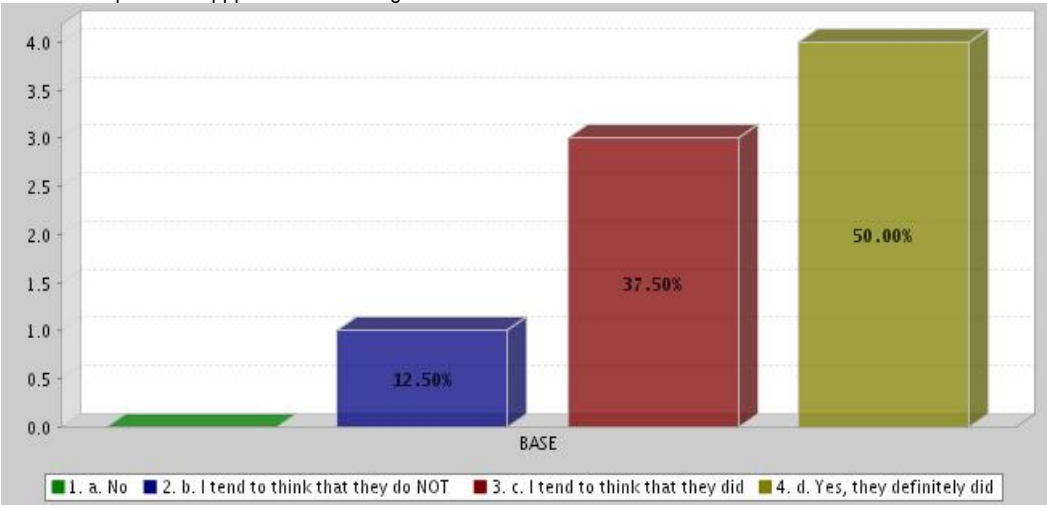
67. Did they make use of brainONLINE system to talk to other students



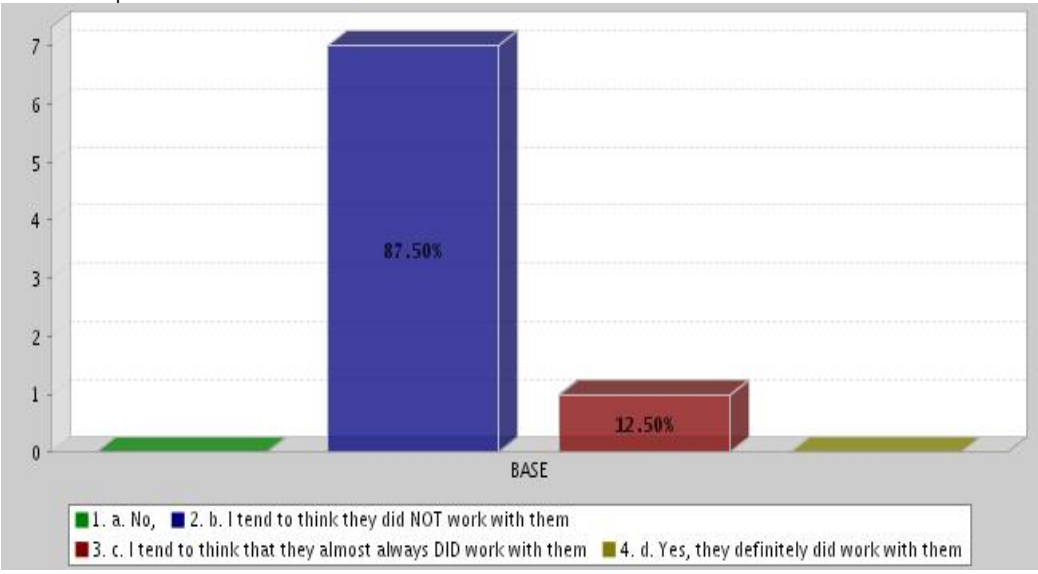
68. Do they prefer to work alone?



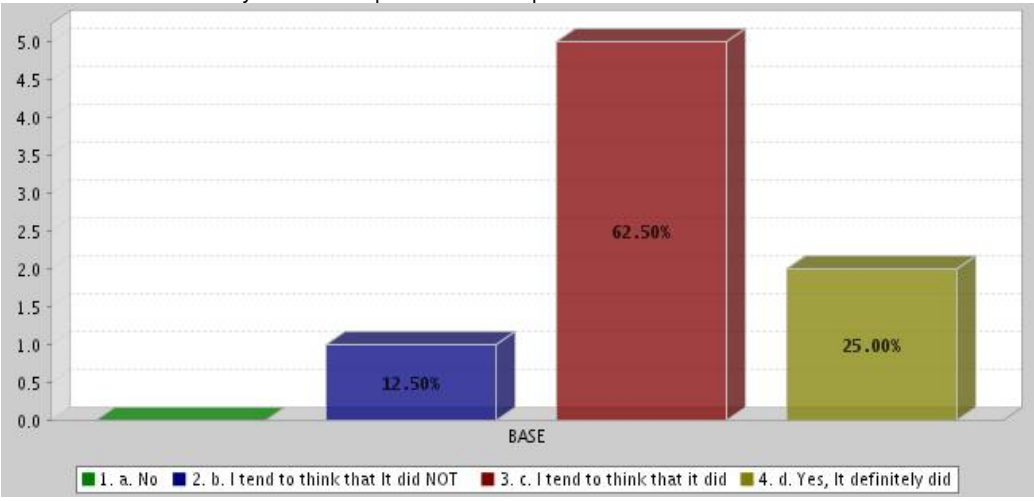
69. Did their parents suppport and encourage them



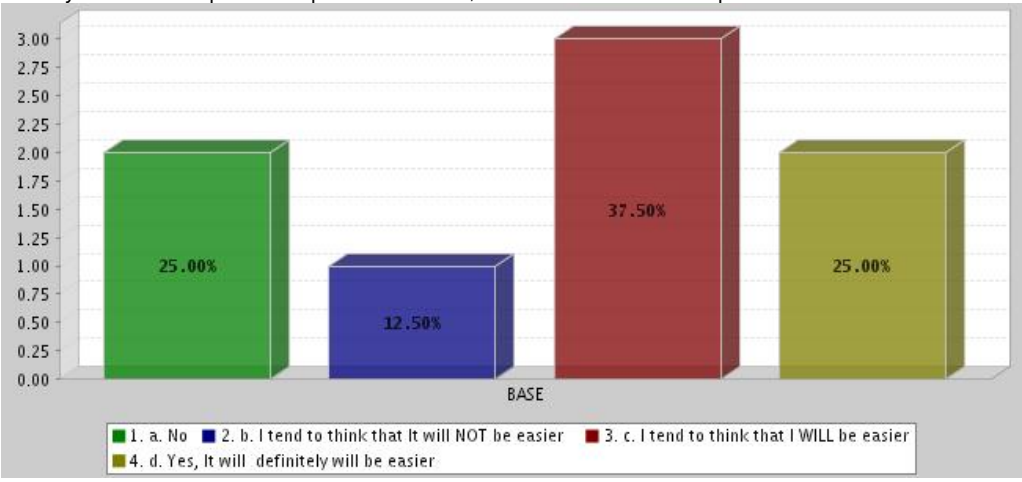
70. Did their parents work with them



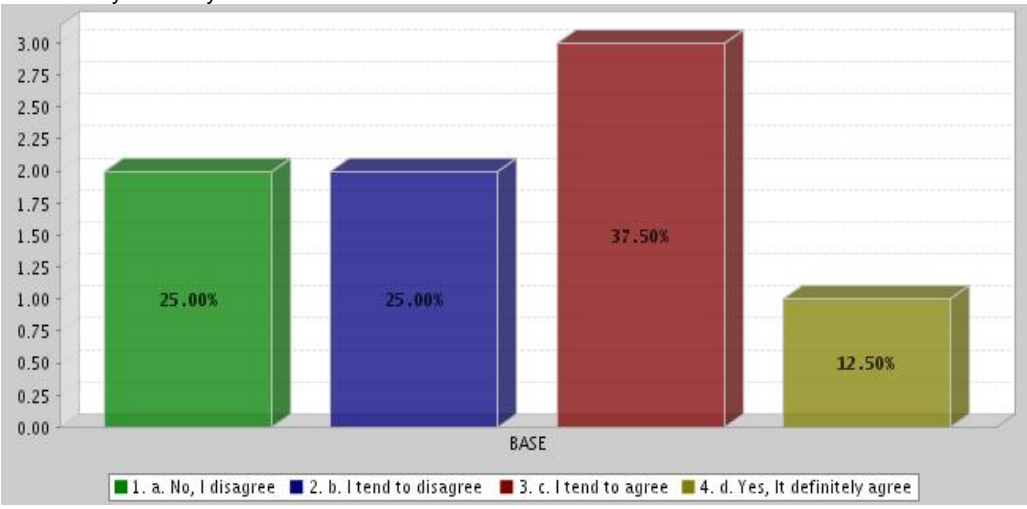
71. Did the brainONLINE system make it possible for their parents to work with them



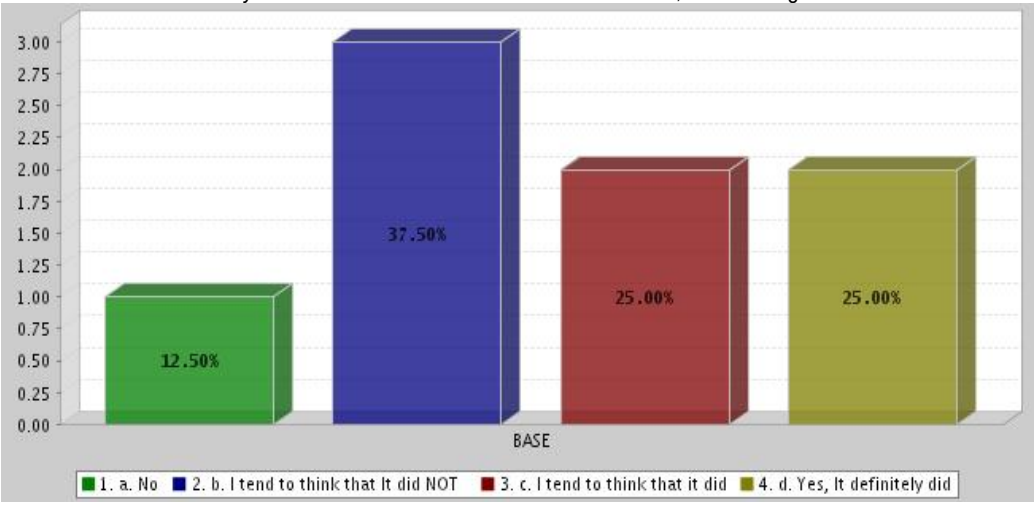
72. Do you think that if parents helped their children, it will be easier to them to pass their exams.



73. They got no support from anyone, and worked on their own, and motivated themselves. They would not have wanted it any other way.



74. Did the brainONLINE system somehow act as a COMPANION to them, like a surrogate mentor.



Appendix 13: Combined analysis of focus group data

Analysis of Focus Group 1 and 2 combined– Students 2004/5 and 2006

Analysis of Focus Group 1 – Students / subject advisors 2004					
		Subquestion			
		Pedagogics	Community	Communicate	Technology
Remark by Student	Interpretation of remarks	1	2	3	4
…It is better than school	In general the eLearning system satisfies	In general the eLearning system satisfies			
…Lots of time wasted on doing nothing …If you compare your work to the time that you are there…. …If someone is going to be getting good marks, he is not going to sit in school socializing anyway ..As I say there are children always disrupting the class, so in theory you don't get to learn as much as you should. Whereas if you sit and you study and you work, you can half the time that you spent learning, and be focused and then have more free time to do sport or to go out, I mean you don't get the elements that you get in school, …No one is going to come up to you in your study and say to you do you want drug, or alcohol	Time wasted in school The eLearning system is effective because it does not waste time like school Socializing – no bad influences like in school	Time wasted in school The eLearning system is effective because it does not waste time like school	Socializing – no bad influences like in schoo		

…most of the students talk in class anyway …The people who talk in class, are usually the ones that disrupt the class, which means people who want to learn can't learn					
We need like more example…and besides the straining through the work actually prepares you for life - a shorter right explanation …and you are asked for a lot of examples in the question paper yourself and if you have all the examples in your mind you can put it in a piece of paper ….I mean it teaches you that. If you get an example in your study and they ask you a similar example it just teaches you to adapt…, to just figure that out for your own.	They like examples that they can go through themselves – like the eLearning system with own pace -Pedagogics Learning material Higher order thinking Learning by examples and applying the knowledge – higher order thinking	They like examples that they can go through themselves – like the eLearning system with own pace -Pedagogics Learning material Higher order thinking Learning by examples and applying the knowledge – higher order thinking			
Study material available offline is important You don't need to go on line to do your work; I mean I don't find it very necessary because its not like your work schedule. No! You still have your books and you still have your CD but you should you go on the internet at least once a month	Study material available offline is important	Study material available offline is important			
Internet is important to do research Ok, first you have to go to the internet or	Internet is important to do research	Internet is important to do research			Internet is important to do

to the library or just go to the search engine and search for the information.					research
Do you find that your need to put something online helps you with your learning ability, in other words the fact that you are forced to put things in words only. Keep in mind my original question of 'do spinach 'you can't do on line. That's a functionality that's not necessarily available to you guys	eLearning resource helps to put thoughts into words:	eLearning resource helps to put thoughts into words:		eLearning resource helps to put thoughts into words:	
"no problem any more" …one of the students answers "No problem any at all" We are learning languages to express yourself when writing so it comes naturally But they do get misunderstood Except if you can't really see the person on the other side.(laughter)	So do you find that there is any hindrance in you putting your thoughts or your emotions in text or is that no problem any more	So do you find that there is any hindrance in you putting your thoughts or your emotions in text or is that no problem any more			
It helps you to adapt The work that you learn helps you to adapt in life if you come across a situation and you know somewhere in the examples I have done something in my study that's actually fairly close to what I've explained now. You actually learn to adapt and you carry on "It helps me a lot like for examples business studies and economics basically when I study next to my mom so she can basically help me in the offices it is basically, especially those subjects you have got a lot that is happening. It helps you to understand"	Work that they do is relevant to their live:	Work that they do is relevant to their live:			

Ok, it seems like you guys are heavily disciplined and all that, are there some buddies of yours that drop out of course….yes there is (student answers) And why did they drop out? Was it…. Keep in mind what we are doing here, we are looking at the toys itself we are not trying to crucify you, we are looking at the toy. So maybe you're just lucky you can break the can and get inside and get the value. Is this so not difficult to open that some guys fall out because of not of their wrong doing but because this toy is so difficult to play with.	Self discipline :	Self discipline is necessity			
In systems such as these you have to learn to study by ourselves, helps with university And another advantage that we home scholars have if normal scholars this days is that we actually have to learn study by ourselves, so when we leave school we will be able to do university cause this days with this curriculum 2005 and all those they don't know how to learn anymore because a lot of them after standard 7 they have to write a test and then they go to standard 8 and from standard 8 they start failing for the reason that they don't know how to study	Self discipline is necessity				
Others may be lazy and have not developed a way to analyse things Yeah I think is the way you think and they you learn and if you can't learn or think like that you can't do Cambridge.	They are in this system because they like to think (higher order thinking)	They are in this system because they like to think (higher order thinking)			

No, no I think they are lazy (personal opinion by one of the student) …No, even some people who worked really hard don't get it right because I don't think is the of the way the analyses stuff but maybe they have a different way of doing things.					
. This better than being spoon fed by a teacher I think if you go and find out more about it, you will know more and you will remember. And next time you can't go like ooh! Teacher what is this about, but if you went and searched it for yourself, then you will know because you took the effort to go and find out what is it about If you spend time researching, trying to understand, it aids remembering I think is one the best ways of learning, is when you, especially when you go and you do either research on it or spend some more time on trying to understand that piece of work. I think it's when you remember a lot of stuff, the best Figuring it out by yourself helps you yourself to get the answer keep on figuring out stuff for yourself while you are working, when you write your papers and there is a question that you don't exactly have the answer, you are still used to figuring things out, cause sometimes you can get the	If one finds out information through this system by yourself, one tends to remember it	If one finds out information through this system by yourself, one tends to remember it			

answer by just figuring it out yourself					
it took me about a year to get used to that and afterwards it's… it's much easier to do	Studying in English as their second language took a lot of adjusting.	Studying in English as their second language took a lot of adjusting.		Studying in English as their second language took a lot of adjusting.	
… it shows there lesson number 1, lesson number 2 you can't really get lost, you just start from the beginning.	They like the fact that material is organised neatly in lessons 1,2,3	They like the fact that material is organised neatly in lessons 1,2,3			
…Aren't you lonely …Loud NO from most students	The system does not result in loneliness		The system does not result in loneliness		
Not school dropouts - Are you guys here because you were dropouts in school – Loud NO Time wasted in public schools Distance is a factor – no schools in vacinity Frustration in normal school If you had the option to go to a normal school or would you still do this system? Yes, will still do this system I think most of us are here because we are not satisfied with the level of education at public school …it's not much fun (public school)	Motivation - why they are involved in this type of learning system Time wasted in public schools Frustration in normal school		If you had the option to go to a normal school or would you still do this system? Yes, will still do this system		

….it's just we are not going to be recognized internationally and you know it might just be good going to school where you have friends. I means when you…I am not living for now, I am living for when in 20 years from now and when I retire I should have got my house or whatever I am trying to build my foundation now for life for university degree, you know I am not going to settle to overseas if I am an South African Would not go back to regular school: I think if you have been in home schooling for a couple of years you kind of get used to it and don't want to go back to school because…	…it's not much fun (public school)		…it's not much fun (public school)		
There is, some of them are like that and is like it happens quite often, like on the Brainline forum, like someone would say they have a problem like Nakita she had a problem with the functional group in science, you know and then we can all help her and explain it to her and it helps in that way …Yeah but you learn You learn by teaching someone When you teach someone it gets fixed in your head even better…you know But some students are too slow: Yeah sometimes they so slow they can never help you	Collaborative learning Peer support How are you doing for peer support, do feel that there is sufficient opportunity to get support from your colleague on line.		But some students are too slow: Yeah sometimes they	There is, some of them are like that and is like it happens quite often, like on the Brainline forum, like someone would say they have a problem like Nakita she had a problem with the functional group in science, you	

			so slow they can never help you	know and then we can all help her and explain it to her and it helps in that way	
You sometimes get this people who really like to chat on the internet and who always likes to talk …yeah a lot of chat … A lot of noise Yeah, no, no, I mean they just like, basically they just talk nonsense Frustrated if nobody is talking gets boring because a lot times you go to the social forum is like “nobody” Do I hear you correctly, that you have a need for interactions with all the Brainline children not just some. We can make a lot of new friends and example now the Cambridge and matrics are together so basically I think we could also make friends, so we can communicate with them as well. The socializing is about friends and about learning: Flaming and fighting : not much	Socializing Mixed reaction They feel that the social forum works good for talking nonsense			Socializing Mixed reaction They feel that the social forum works good for talking nonsense Frustrated if nobody is talking gets boring because a lot times you go to the social forum is like “nobody” Do I hear you correctly, that you have a need for interactions with all the Brainline children not	

We don't really like stuff like that. …we don't spend enough time to start talking about stuff like that, and then usually wait for workweeks.				just some. We can make a lot of new friends and example now the Cambridge and matrics are together so basically I think we could also make friends, so we can communicate with them as well. The socializing is about friends and about learning: Flaming and fighting : not much We don't really like stuff like that. …we don't spend enough time to start talking about stuff like that, and then	

				usually wait for workweeks.	
Sometimes they would just ask somebody instead of subject advisor I think some of the subject advisors most of them are not used to technology thing and internet stuff when they have to help you, they try to figure out what will help No…, but even to answer a small question, sometimes you, you just want to ask a small question because you just got to mind and you really want to….but then the… you put it on line and then it takes forever. I would rather go and ask somebody who would just like…immediately give me the answer its much more easier to ask somebody just like, like at the workshop or something and then to go on and tomorrow you go on again and there is nothing It would be easier to pick up the phone and phone the subject advisor, which I do,	Takes a long time for teachers to respond They think subject advisors are not used to technology and that is why they are slow They would like more immediate feedback They find it easier to ask questions in person than online especially if it is going to take time to answer Some find it easier to rather phone if they need help			Takes a long time for teachers to respond hey would like more immediate feedback They find it easier to ask questions in person than online especially if it is going to take time to answer	They think subject advisors are not used to technology and that is why they are slow

…mean when she's going through all that work, I mean really it's like hundreds papers of work and I mean she doesn't really get the time to deal with the small issues perhaps, you know small questions while she is going to be answering the big picture. Like in a week or so she going to give us a lot of information.	Online communication They think that subject advisors should focus on the big things like making summaries that would benefit all, instead of dealing one on one with small issues			Online communication They think that subject advisors should focus on the big things like making summaries that would benefit all, instead of dealing one on one with small issues	
… haven't really needed the subject advisor because of my parents, basically with all the subject I have they help me … it helps a lot if you have clever parents	Subject advisor help They feel it should be faster (above) Some of them feel they do not need it because they work themselves and their parents help them	Subject advisor help They feel it should be faster (above) Some of them feel they do not need it because they work themselves and their parents help them INDEPENDENCY			
… have the private thing as going on as well so if you have stupid question…..in Cambridge nothing is stupid	They are not scared to ask stupid questions			They are not scared to ask stupid questions	

…But we don't get enough time. Sometimes we don't have enough money to spend time on the internet to figure out someone else's problems	They do not have enough time or money to answer each others questions online (contradicts other place where they say money not issue)			They do not have enough time or money to answer each others questions online (contradicts other place where they say money not issue)	
… baie gaan kyk maar min gepraat (looked a lot but didn't talk much)	A lot of them lurked. They went and looked at discussions but did not participate			A lot of them lurked. They went and looked at discussions but did not participate	
…Dis meer oor die sosial goetes maar dis 'n paar mense wat altyd daar as jy in kom en hulle nog steeds daar (it is more about socialising, but it is just a few people that are always there)	Chatting was more social than educational, with a lot of regulars frequenting the chat rooms			Chatting was more social than educational, with a lot of regulars frequenting the chat rooms	
… a ghost house – if I go there and they are not there. It happened a lot.	Chatting – it frustrates them if they go online and there is nobody there			Chatting – it frustrates them if they go online and there is nobody there	
They did ask online questions and phoned.	Interaction with subject advisors	Interaction with subject advisors		Interaction with subject	

The workshops played a big part in support … Dit is ok, ek het nie regtig baie gebruik gemaak daarvan nie, Ek het dit eintlik gebruik om datums te kry …Ja! Self reg gekom (Yes, I helped myself)	They did not bother them much because they feel they were OK.	They did not bother them much because they feel they were OK		advisors They did not bother them much because they feel they were OK	
…so if you have problems you have it regularly and those with no problems don't seem to have problems.	Little technical problems				Little technical problems
– it is an advantage Have to cope without teachers that teaches, and friends Everything is available, everything is there [25:47] You just have to find the work …I mean you have got the work in front of you and you should just learn it. ..because some people are used to having teachers and friends around them, and teachers teaches them	In this system everything is available				
…would be nice if we had one thing (user friendly) the new things and everything you should do and then you could just like go there…I don't know … Yes just to know the new things because sometimes you go to all sides and ah..! all places where you were at	They want to have a place where they could only see the new things that were added (there is a place like that)				They want to have a place where they could only see the new things that were added (there is a place like that)
… yeah there so much you can't go on everything	Too much information Students complain about too				Too much information

… I want to able to go the homepage and be able to see the relevant information that links to separate pages, one link to all the scores, one link to discussion forum. … There is too much pages, like if you want a little bit of information you have to go and page and wait another five minutes, just to find out is not the appropriate page(another student: to find the schedule for the workshops it always changes) … You know there is so much stuff and there is so much places to go and sometimes you want to find a simple thing and then you go through so much … the need for customization of you interface … very organized its kind of I don't know , I can't find it, it takes a long times to get all your stuff and everything that's what confuses me … on the other hand there is too much links so everything has a sort of problem, but in the end everything is actually like balanced …sê maar jy sukkel en jy kan nie miskien in die onderwyser uit kom dan vra sommer jou friends as 'n email of as dit nou nie op 'n forum is want dit het my bietjie afgesit want ek verkies dit meer soos 'n chat room	much information and busy screens They would prefer ONE page where they could see everything important and that which has changed They would like to be able to customise their screens, others feel it is ok and "balanced" Wanted the forums more like a chat room, meaning more immediate			Wanted the forums more like a chat room, meaning more immediate	Students complain about too much information and busy screens They would prefer ONE page where they could see everything important and that which has changed They would like to be able to customise their screens, others feel it is ok and "balanced"

… internet has got a lot information , it has your updates	They like the fact that on the internet they get updates on the lessons	They like the fact that on the internet they get updates on the lessons			They like the fact that on the internet they get updates on the lessons
…It helps a lot but still overall for your everyday work, you don't want to go and wait five minute of your time when you go on the internet. You just want to get your work done and work through it, that's it … is very successful in one part of it, it has organized your work and it kind of makes you think that, 'I did this' … ons sou gesukkel het (as die CD nie daar was nie) , die CD het baie gehelp	They like the fact that the core material is available on CD so they don't have to waste time on the internet. If the CD was not there, they would have had difficulties.	They like the fact that the core material is available on CD so they don't have to waste time on the internet. If the CD was not there, they would have had difficulties.			They like the fact that the core material is available on CD so they don't have to waste time on the internet. If the CD was not there, they would have had difficulties.
…. What you are telling me is that cost is never a factor that will cause you to use more or less of the internet? … So your problem is not one of cost or technical ability but of parental paranoia …yeah	Internet cost is not a factor for most, it is more parental restriction that inhibits them				Internet cost is not a factor for most, it is more parental restriction that inhibits them
…Find administrative information – calender information …Assignments submission and feedback …Asking questions	What did they use the interface for …Find administrative information – calender information …Assignments submission and feedback …Asking questions	What did they use the interface for …Find administrative information – calender information …Assignments submission and feedback …Asking questions			
… die interface is vinnig (the interface is quick)	Internet connection was not really a problem, and the speed was ok				Internet connection was not really a problem, and

					the speed was ok
…we have to connect after 7 in the evening because it is cheaper (contradiction – thys parents aware of costs but not learners)	Quite a lot was uncertain of the costs of internet, all they know that it is not a factor to consider				Quite a lot was uncertain of the costs of internet, all they know that it is not a factor to consider
Focus group 1 part 2 - discussion with J Cronje in Afrikaans, important sections translated in English					
Ek het gesukkel om goed te kry, ek het nie gedink dis goed nie, ek dink julle moet dit bietjie makliker maak vir die onderwysers.					I think you should make the interface easier for the teachers, and even I had trouble
Ek het op party van die goed in gegaan soos 'n heading en as mens wil in gaan dan dit is nie geupdate nie of nog nie daar nie. Ek weet nie of dit op 'n ander plek moes gewees nie maar ek kon nie die inligting kry nie.					Sometimes I could not find things and expected to find things but found something else in its place
Ja ons het ook gesukkel om updates te kry. Die mense gaan soek oor alles en dan kry dit op 'n ander plek					Had problems getting updates, did not know where to look
…ek het dit gebruik maar het ek altyd gesukkel om my assignments te submit,					Had problems

ek moes dit altyd hierna toe bring saam, dis nie ‘n probleem om dit in te bring maar ek sal dit ook graag wou kon submit.					submitting assignments, but brought it to the workshops
Ek het access met die internet maar die probleme is dit ons lyne krap pratykeer, so on sukkel baie want ons internet spoed is baie stadig, so ons sukkel biejie daarmee					Had problems with internet speed
Sometimes is die internet baie besig en baie stadig in die aand so ek kan altyd so sewe ure oggend of oor naweek vir voorbeeld Sondag middag dit is stil so dit werk rerig. Ek het geen ‘n idée hoeveel per maand dit kos nie					Special times were used for internet access eg special discounts, but they had no idea of the costs involved Most of this group accessed after 7 in evening
Dit lekker om die aand daar te sit en maak ‘n bekkertjie tee en ..				They enjoyed going on the internet chatting with friends	
Ja as mense workshop toe kom en hulp baie…… so sê maar jy sukkel en jy kan nie miskien in die onderwyser uit kom dan vra sommer jou friends as ‘n email of as dit nou nie op ‘n forum is want dit het my bietjie afgesit want ek verkies dit			They would prefer knowing when their friends are online, prefer chats rather than forums	Do not like to go online and there is nobody there – it is like a haunted empty house	

meer soos ‘n chat room Ja! Spook huis! Baie gebeur!					
Het jy met ander woorde, meer studente sê email op gesoek vir ‘n privaat email gestuur? …ja ek het dit gedoen.				Used interface to find email and then send private emails	
Ek is nie so lief vir chat rooms nie, as ek op die internet gaan is daar ander dinge wat ek graag wil doen, maar ek kom nie daar by uit nie				Did not like the socializing on internet, prefer work related things	
…Ja! Dis meer oor die sosial goetes maar dis ‘n paar mense wat altyd daar as jy in kom en hulle nog steeds daar				Chats were more socially orientated than work orientated	
Ek! Maar die workshop is lekker dan moes saam te werk, dis lekker om alleen te werk en dan op die workweek saam te werk en saam te kom. Dis lekker om die workweek te wees want dan kan met die subject advisor praat saam en dan kan julle vir jou verduidelik want dis baie moeilik om sekere goed te verstand		Like to work alone Also prefer subject advisor interaction to explain difficult stuff			
Baie goed, die workweek het baie gehulp		Workshops help	Workshops help, and aids the social community		
Wie van julle het gebel? Ek het baie keer!					
					Used the phone to contact subject

					advisors
Het jy self reg gekom? …Ja! Self reg gekom		Did not ask much questions – preferred to help self			
Wie sê CD is essential? [al die studente: die CD is essential] ok that makes that point quite clear					The CD with the material on is essential, without it they would have problems
Analysis of Focus Group 2 – March 2006 - Students					
Normal school Group work is not popular, just some do the work					
Do not like group work, No recognition of individual work					
Own initiative highly valued					
Normal school fall behind drag all with you.					
In this system you can pace yourself	In this system you can pace yourself	In this system you can pace yourself			
When you do home schooling you can have the whole entire day to do research or to study or whatever.	Flexible daily activities	When you do home schooling you can have the whole entire day to do research or to study or whatever.			
You can do nothing the one day and do double the next day.	Flexible daily activities	Flexible daily activities			
Flexibility schedule	But cannot change deadlines in				

	the system, somethings are fixed				
Happy can Organise own time to work	Happy can Organise own time to work				
How much value does your buddies add to your life? If you had to do this in isolation, would it have been any more difficult?	Respon- sible for self Feel that they can do this on their own, do not need their buddies Thus peers not important	Feel that they can do this on their own, do not need their buddies Thus peers not important	Feel that they can do this on their own, do not need their buddies Thus peers not important		
I will die if I had to work alone.	Others value buddies		Others value buddies		
Okay. Do I have an option? Can I always say I only work when I'm happy?	Option to work when happy	Option to work when happy			
Who of you thinks that your buddies add academic value to your life? Tell me in what ways?	Buddies have Opinions but don't rely on them for assist- ance		Buddies have Opinions but don't rely on them for assist- ance		
We're both seeing the same thing. We've both got different facts which are facts, they're both true. Both sides of the story are true but it's totally different and it's from the same thing, so you will learn. Once again, the more viewpoints you've got, the better.	More view- Points the better		More view- Points the better		
So, how much do you feel exposed, that your friends are wrong? What's the chances that your friend's interpretation may not be a valid one?	Friends may be wrong		Friends may be wrong		

It's just always a good thing to have different viewpoints because yours might be wrong. Perhaps you see the mistake in yours. Perhaps you see that. It doesn't necessarily mean those viewpoints are there	Buddies can give one wrong logic which has to be de-learned		Buddies can give one wrong logic which has to be de-learned		
If I have a real learned friend then I'll phone a friend	If know it is knowledgeable friend then advice is taken		If know it is knowledgeable friend then advice is taken		
Must be specific.	Must have specific knowledge		Must have specific knowledge		
No, no, I mean the answer they put on the net. Maybe it's….ja, I'm looking for x, and I want the result for x and its wrong and everybody sees it and like ha ha she's wrong and everything. I wouldn't do it like that.	If someone puts wrong answers on net, they can get laughed at			If someone puts wrong answers on net, they can get laughed at	
I'm like that.	Do not like to be laughed at and therefor stay quiet			Do not like to be laughed at and therefor stay quiet	
With the online system you also have the choice of being anonymous. There are ways you can do it.	The system allows for anonymous posts which helps in this regard			The system allows for anonymous posts which helps in this regard	
No, not really, its too much effort.	But anonymous is not being used			But anonymous is not being used	
The thing is if you see the people that have just come to Breinlyn, they will hold back and then a few months or a year later you will see everyone knows	Given some time in the system the community aspects kicks in and people start sharing and nobody bothers if you are not			Given some time in the system the community	

everyone. Everyone shares everything, so its not actually…where you say that you're worried that everyone's going to laugh at you. You start off shy or whatever and then you get into the group.	correct in answers			aspects kicks in and people start sharing and nobody bothers if you are not correct in answers	
Yes, in my previous earlier years I decided: well some of these people are just seeing the situation incorrectly so I thought I'd just contribute my side and anybody can contradict me as they wish.	After a while someone has the courage to contribute			After a while someone has the courage to contribute	
So what I hear her say is that, if you are damned sure of your answer, then you'll share it, otherwise you keep seriously quiet. Is that a correct translation? Okay so there are some of you who feel that you are more daring? Do I take it that at times you have just given your opinion without necessarily having this list of facts? Okay. Ma'am you say: yes, you have. Did you consider the risk that they may be laughing at you?	After a while they get more confidence. Some who have daring personalities post more and take risks			After a while they get more confidence. Some who have daring personalities post more and take risks	
We laugh at each other all the time. It really doesn't matter.	Because of the community feeling everyone is laughing at everyone and it does not matter if you give incorrect answers		Because of the community feeling everyone is laughing at everyone and it does not matter if you give incorrect answers		
Great stuff! Now here's the question. If you feel that its actually a problem if people laugh at you, then show me a	Some stay scared and do not want to be laughed at		Some stay scared and do not want to be		

one and if you think: hell, I don't care, we're a lot of paw-paws together so its okay if they laugh, give me a two. Come on. Twos twos twos twos twos. Okay so just about nobody of you cares whether they laugh at you or not? That contradicts earlier opinions.			laughed at		
No, it's a pretty informal like group that we've got. Most of us don't see each other very often except for work groups so	The workshops help to bind the community		The workshops help to bind the community		
I'd rather act like a fool in front of a thousand people I don't know than act like a fool in front of someone I really know…well, not know but that sees me every day.	Easier when wrong because don't see people every day			Easier when wrong because don't see people every day	
Okay so we….let me try to summarise here. The majority have been part of some gossip behind the rest's back. All of you claim that you knew it was going to happen anyway but since you don't really know them that well, you don't give a damn and you'll just give your opinion anyway. Is that a fair assumption? Ja	majority have been part of some gossip behind the rest's back. they knew it was going to happen anyway but since they don't really know them that well, thjey don't care and they just give your opinion anyway		majority have been part of some gossip behind the rest's back. they knew it was going to happen anyway but since they don't really know them that well, thjey don't care and they just give your opinion anyway	majority have been part of some gossip behind the rest's back.	
I think so. Because you build friendships here that when you leave	Yes, friends very important They do comfort		Yes, friends very important		

the friendships aren't that tight and when you get back here then the friendship is the same when you left and you can build it further and you become comfortable and you feel safe with different kinds of people. There are some friends I have I feel extremely comfortable with to talk to them and relax with them. When I have a horrible day I think: I had a horrible day, I feel sorry for myself, help me.	The community does function Feel safe Extremely comfortable with some		They do comfort The community does function Feel safe Extremely comfortable with some		
Okay, you answered my question. So you would blurt it out to the group and say: I am in need of help?	They would post emotional calls for help in the community		They would post emotional calls for help in the community		
Well, it depends, if they think you're like an idiot then they would tell you that you're an idiot, okay, ah shame, but if they seriously see you have a problem then either one, a certain person or everybody will just like try and help you or just make you smile or something.	The community does respond They are sincere when helping		The community does respond They are sincere when helping		
Yep	There are groups of friends helping each other		There are groups of friends helping each other		
Okay, good stuff. Getting back to the serious study, how much of it is stuff that you get online i.e. read from screen print whatever and how much of it comes from text book and other support materials? Want to give me a split percentage wise? Is it 50/50?80/20 80 text books, 20 other.	80% text books, 20 other like online They prefer and use more paperwork and textbooks than online sources	80% text books, 20 other like online They prefer and use more paperwork and textbooks than online sources			
I'm too lazy to do research. I just onto the computer and get everything of	Use mostly work supplied by the system, no access to library	Use mostly work supplied by the			Use mostly work

there. Okay, I go to different websites but I do basically everything on the computer because I have to do it myself. I don't have transport so I can't get to the library or anywhere else. I'm basically stuck at home		system, no access to library			supplied by the system, no access to library
No. No, you see, I do read. I read the website, right and then I try to find another website totally opposite to that, to see if it can prove that this is right.	Others do extensive research	Others do extensive research			
Yes. I don't just go to one website. It's like, ok, this is all I need, I just print. I go to different websites because they teach us specifically that you can't just use one book anymore. I might as well just photocopy the book and give it in. I go to different websites to get different information from different areas.	They use more than one opinion to check views Taught not to use only one source	They use more than one opinion to check views Taught not to use only one source			
Encyclopaedia Brittanica.	Encyclopaedias are used	Encyclopaedias are used			
Depends whose with me. If I like remember I need something. If its just like a friend, you ask. If its like a bunch of people, I'll say I need help like, you know?	They ask what they need		They ask what they need		
My dad's friends with lawyers, pilots, all sorts. So basically if I need help with anything, I can go ask anyone of them but mostly I just listen when people talk. When they're socialising, you listen and you pick up a lot.	They ask parents friends, or listen when they talk Listen and pick up a lot Because they homeschool this is possible	They ask parents friends, or listen when they talk Listen and pick up a lot Because they homeschool this is possible COMPANIONSHIP	They ask parents friends, or listen when they talk Listen and pick up a lot Because they homeschool this is possible		

And you feel you've got the confidence to go to daddy's golfing buddy and say: bring answer? What does the rest of you feel like? Can you use your parents' network?Ja	They have enough confidence to approach older people in their parents' network	They have enough confidence to approach older people in their parents' network			
Not my mom, okay. Well we all have exceptions general things are what we worry about. Now, when we get to the family themselves, do you trust your parents' opinion better than you would any other source?	Exeptions to the rule Do trust parents' opinion	Exeptions to the rule Do trust parents' opinion			
Okay. And if your father, who is an engineer, tells you that this roof is strong enough but his colleague, who is also an engineer, says: 'not a damn', would the fact that he is your father, sufficiently influence your thinking that you will just accept the ……?	Trust parents' opinions	Trust parents' opinion			
Then I would say: 'why do you say that and why do you say that' and put it together.	Parents encourage them to question WHY	Parents encourage them to question WHY			
Uh, uh. Subject advisors.	Some feel the subject advisors are not like parents	Some feel the subject advisors are not like parents			
Okay. And do you think that these tutors are of you always know what is expected 100%? No	Subj adv do not Always know what is expected	Subj adv do not Always know what is expected		Subj adv do not Always know what is expected	
Like for instance in Mathematics, you'll find something that is wrong and she'll think about it and then come back to you and: 'yeh, you're right, its wrong'. So they can't always like…they can give you what they know best and if its wrong then they can try and fix it.	Subj advisors – they will say when they are unsure and come back with answer	Subj advisors – they will say when they are unsure and come back with answer			

Would you like to have to the opportunity to anonymously comment on the quality of the people that help you?	like to have to the opportunity to anonymously comment on the quality of the teachers	like to have to the opportunity to anonymously comment on the quality of the teachers			
	The subj advisors must learn from students as well		The subj advisors must learn from students as well		
So what you're trying to tell us here is that you don't want them teach you. You want them to facilitate learning?	They prefer to be facilitated, and not taught	They prefer to be facilitated, and not taught	They prefer to be facilitated, and not taught		
When you come to the work weeks and _____ and they ask your opinions about things, _____ the teacher would for instance, everything you've done through the year, she'll just go through it over and over again. Sometimes you want to say: 'I have a problem with Unit 4, page whatever'. I want to come and ask the teachers specifically during class: 'I have a problem with Unit 4, page whatever, help me. Most of the time all she does is go over and over and over the work. She just repeats what the book says.	They want to be able to ask specific things in a workweek instead of just going over and over the work at the workshops Complain about paying for rushed through workshops	They want to be able to ask specific things in a workweek instead of just going over and over the work at the workshops Complain about paying for rushed through workshops			
I've done it before but they can't always explain it to you over the computer. Sometimes you need to see how, like for instance in Mathematics…you need to see how the formula works. It can't just be explained over the Internet.	Difficult to explain over a computer or the internet	They want face to face as well because Difficult to explain over a computer or the internet			
That's what they did with that video footage. You know that…..?	Video clips are very usefull resources	Video clips are very usefull			Video clips are very

I know but she's…you don't get it anymore. Ja…that's…those video footages used to show how the maths problems were worked out so….we're missing that this year and that's why some people….. Okay. So what I'm hearing is, there was a useful resource that is now no longer available, please listen, we want it back, is that correct? Yes					usefull
Skype can be considered	Skype can be considered				Skype can be considered
People in this system mostly from rich homes, but in some ways it is cheaper than normal school	People in this system mostly from rich homes, but in some ways it is cheaper than normal school	People in this system mostly from rich homes, but in some ways it is cheaper than normal school			
Better learning opportunity if you have money in such a system	Better learning opportunity if you have money in such a system	Better learning opportunity if you have money in such a system			
Don't have time for playing with techno toys like webcam	Don't have time for playing with techno toys like webcam				Don't have time for playing with techno toys like webcam
Well, Brainline can only offer that much. You can't expect…um…I don't think a person is stupid if he's not…if he	Tutors not because of poor Assistanc from Brainline or time pressure just added	Tutors not because of poor Assistanc from			

doesn't understand a Mathematical problem or something and you can't expect Brainline to also…I…ja…its easier.	assistance	Brainline or time pressure just added assistance			
	Tutors give extra assistance	Tutors give extra assistance			
And…and in general, do you…I'll be with you just now, sorry I started talking before I saw you. In general, do you feel that you get what you pay for? Are you happy clients? Ja.	Generally satisfied	Generally satisfied	Generally satisfied		
In terms of your support that you get from your tea…. from your parents, do you think that they expect more of you within this system than they expected of you from another?….let me make some assumptions here. Have all of you here been in a normal school at a previous stage? So you didn't all start from Grade 1 with this? Okay now, if you compare your parents' expectation from your previous school with what you experience your parents' expectation of this system, do you think there's a difference?	Parents expectations and support	Parents expectations and support			
Some say lower some say higher There is more work Basically high in the term that, if you're in a normal school, the…my personal opinion is that the education is not…doesn't come close to the	Even though this system is more academically demanding you are still expected to get say 80%	Even though this system is more academically demanding you are still expected to get say 80%			

education you get here. So, say they expect 80% from you in a normal school, they still expect you to get 80% now.					
….which is high in that the level of education is high. So what I hear you saying is that you must get the marks but this stuff is more difficult than you had before? Ja. Yes, and you have less support?	Higher standard But same results expected	Higher standard But same results expected			
They get more support from parents but it takes parents a long time to realise that the system is different to other schooling	They get more support from parents but it takes parents a long time to realise that the system is different to other schooling	They get more support from parents but it takes parents a long time to realise that the system is different to other schooling			
If parents give support – does it change the way you react	If parents give support – does it change the way you react Some yes and some nos. Tell us more	If parents give support – does it change the way you react Some yes and some nos. Tell us more			
Well I think its quite important that you have your parents' support. It would change totally if you didn't have it.	Without parents support it would change everything	Without parents support it would change everything			
Well I think its quite important that you have your parents' support. It would change totally if you didn't have it.	Even though they are independent workers, they value support from parents	Even though they are independent workers, they value support from			

Ja but I heard you saying earlier on that you are individuals and that you are forced to work on your own and that you should be responsible and blah blah blah, so from that I logical deduct that you know you are responsible for your own future. So the fact that other people don't want to help you, should you now not as independent learners say, well regardless of that I will do? Yes, but I still like it with my parents' support. Okay. So do I hear you correctly to say that, since I am an individual, eventually I'll just have to bite the bullet and do but hell, its nice if my parents also support me. Yes. It's nice to get any support at all sometimes.		parents			
where does the majority of your support come from?	where does the majority of your support come from? Mostly the work in the first place, that which is in the system	where does the majority of your support come from? Mostly the work in the first place, that which is in the system			
What's the second most important place	Second source - parents	Second source -			

where you get help? Parents. Parents		parents			
Okay. What's the third source of support? Where do you think…. Learning channel. Videos. Okay. Tutors, learning channel, videos. Talk to me more. Is that something you all use, learning channel, videos? Yes. Used. Used?	Third souce is other learning materials	Third souce is other learning materials			
Then we were at the tutors and the learning channel. Any other support that you get? Internet. Friends. That's my point! Friends didn't feature in this at all. Earlier on you said to me: 'hell you get some help from your buddies' but now in the list of support, you didn't mention buddies. Where do they fit in? I don't get any from my friends. Peer pressure does not work in school. I mean not in subject or not intent. I	Collaborative learning Other sources Internet and friends Friends do NOT feature high in this system They do not like peer pressure	Collaborative learning Other sources Internet and friends Friends do NOT feature high in this system They do not like peer pressure	When socializing they do not talk school They do not want help from buddies	When socializing they do not talk school	

mean peer pressure with smoking, drinking, and all that stuff and that works but you know, when I got to my buddies, I someone mentions school its like: 'God you geek' you know? You don't talk about school. And that's why I don't get any support in school work because I don't want any support from my buddies. I don't want to see them like: 'oh, he's my school buddy'. Ja, you've got your buddies to hang out, not to do school. And my personal friend. I want to see him as my friend. Okay. Can I just interrupt you? You indicated an answer long ago and I've been skipping … Friends bring out a competitive sense to schooling. Ja.	They do not want help from buddies When socializing they do not talk school	They do not want help from buddies When socializing they do not talk school			
Collaborative learning Competition They do not like competition If should stay in sport It is not motivational	Collaborative learning Competition They do not like competition If should stay in sport It is not motivational		They do not like competition It is not motivational Competition is tolerable if it is		

			to better yourself		
That's my point. In a normal class situation, I don't compare myself to the teacher's pet with all the seven As who will get in the newspaper as the top ten but in the class I find a buddy and I sort of want to check what they have and its sort of a norm reference. Am I unique in that way? Do you also feel the same? Ja. Ja	Friends do set a norm to compare with		Friends do set a norm to compare with		
It becomes different when you're like, in a group and you were all friends but everybody else around you is getting better grades and you're not. Then it starts to bug you because everybody says: 'ah I got an A', you know, 'I got two percent more than you did'. Then everyone asks you: 'what did you get?' And every time… But isn't that part of life? No. If it happens every time and every time you get pointed out: 'ah you got 40%' For instance you'll be better in music and everyone else is better in all academics, you're just better in talent. Then you get to feel: 'damn I must be stupid because I can't get anything'.	They do NOT like to be compared and to be shown to be stupid academically There are other intelligences which are neglected in school They do NOT like the better this better that comparison		They do NOT like to be compared and to be shown to be stupid academically There are other intelligences which are neglected in school They do NOT like the better this better that comparison		
Everyone's good at like different things. If you've got something like you're good	People are good in different things	People are good in different things	Competition is tolerable if it is		

in, your not going to like worry if you're like not like up to scratch with the others. You can't be brilliant in everything			to better yourself		
Ja. Okay, so everybody wants a niche? But now the point is… Competition is good. Competition is good. Some people think that too much competition….. To better yourself, ja. How about giving the guy that is good at academia, recognition for his work. Is that okay? Ja, it is. Ja, but don't make that person that is not, feel like he is an idiot and he's useless. Okay, fair enough. But we're not jumping on the dummies for now. What we are saying is that: 'is it okay to give a tick and a star to the guy who really achieved?' Ja. Ja. So…..	Competition is tolerable if it is to better yourself				

You have something to work towards.					
Okay, so it is good to have a system of recognition for achievement? Ja. But then again, you must also, you know….once again not everybody is capable of the same, you know, intelligence level so…..	Reward system System of recognition for achievement Mildly acceptable		Reward system System of recognition for achievement		
Yes. Ja, I think so. You can't give a reward system to somebody who didn't do well but you can motivate them by showing you what you can do and what you can be awarded. Okay, so if we award the upper echelons and we don't make the rest available, is that fair enough? Ja. But then again you must also, I mean, if someone did not really succeed in the beginning of the year then he was doing quite well. Then, I mean, you should actually make know…. The best improvement of the year? Ja, like that.	Reward system must be sensitive The Hall of fame is ok		Reward system must be sensitive		

Okay. So there must be different categories of reward…. Ja. …for academic excellence? Ja. Exactly. And, now if we have these people, we put them up in a…ja…we can't call them up to stage, do we put them in a hall of fame.					
So what I'm saying is what's the competition amongst you. Is the competition amongst you such that you would not contribute because you think: 'I'm not the clever one and even though I have the answer for this one, I will not share it because we expected Mary whose clever to give the answer'? Is that an aspect? Some yes'. No, I mean, that's only cheating yourself.	It seems that there are not really emphasis on competition in the system		It seems that there are not really emphasis on competition in the system		
If I feel down, do I get support? And we gathered at that stage that you can get support from these people. At that stage you also knew that everybody were not equally bright but you still felt that you have support. Okay? But this…in the group thing, students	Yes, they do get support Individuality and standing out They will go with the group but		Yes, they do get support Individuality and standing out		

always want to be different. I want to be different, that is why I wear what I wear so that I can stand out a little bit. But be damn, I mustn't stand out too far. I want to be little bit part of the group as well. Talk to me about this balance. What is the need in your lives to be unique and to differentiate yourself from the rest and do I want to be one of the pack? How does this work? I want to be the leader of the pack. You want to be the leader of the pack? Okay. Vrrrm, vrrrrm. Only if the pack appeals to me. Only if the pack appeals to you? Whoa whoa whoa, let me get that. Only if the pack appeals to you, then you want to be part of the pack? If you don't like the pack, then I'd rather be an individual?	only if the group appeals to them, thus strong individuality		They will go with the group but only if the group appeals to them, thus strong individuality		
	One can be an individual in the group		One can be an individual in the group		
But they would definitely prefer 4 workshops per year instead of two Thus important to have contact socially and academically, although their strong individuality will carry them through anyway	But they would definitely prefer 4 workshops per year instead of two Thus important to have contact socially and academically, although their strong individuality will carry them		But they would definitely prefer 4 workshops per year instead of two Thus important to have contact		

	through anyway		socially and academically, although their strong individuality will carry them through anyway		
They like the video contact, it works The videos of the workshops are very important	They like the video contact, it works The videos of the workshops are very important				They like the video contact, it works The videos of the workshops are very important
Reasonably satisfied with the techical support and standard	Reasonably satisfied with the techical support and standard				Reasonably satisfied with the techical support and standard
CD problems	Technical problems				Technical problems
Postage problems	Mailing problems				Mailing problems
And is that mail that goes missing or mail that doesn't arrive or mail that arrives late?	SA postal system?				SA postal system?
Would you like the option to say: 'send my stuff with DHL and I will pay'?	Would you like the option to say: 'send my stuff with DHL and I will pay'?				Would like to have the option to use DHL and pay for it

Smart idea which they had. They actually put all the lessons on the site. Okay. So if the CD doesn't work, then you can go to the www.	All the lessons on the system is great, so if CD does not work then you have your work there.				All the lessons on the system is great, so if CD does not work then you have your work there.
There's own time.	own time	own time			
Probably being able to work by myself because I hated working in the groups at school. Okay. Getting rid of the parasites. Good stuff. Yip	work by myself no group pressure		work by myself no group pressure		
Learning how to learn. Learning how to learn and Brainline taught you that? Yes. Shucks, that's seriously valuable. Okay. Anybody else? Okay good. Yip?	Learning how to learn.	Learning how to learn.			
The flexibility? Being able to travel and stuff. Okay, the flexibility. Good. The fact that I could do it at home and that I have all day to do my work and I can help my grandparents when they need help. They're getting old. Own pace and flexibility? Okay. Yip.	The flexibility?	The flexibility?			

Just the fact of waking up late. Ja, waking up late! Good stuff. Yip? Just the flexibility of the system in every way. Both your pace, from pace to the way you learn.					
not always around the same people all the time	not always around the same people all the time		not always around the same people all the time		
You don't have to drag people. Sometimes when you work in a group you have to drag people. So you don't have to pull the laggards. Okay. Oh, its like efficient, you know.	Not held back by others	Not held back by others	Not held back by others		
Efficient system. Efficient in terms of what they do or efficient in terms of you can use your time efficiently? Both. Both. Okay.	Efficient system. What the system does And the efficient use of my time	Efficient system. What the system does And the efficient use of my time			Efficient system. What the system does And the efficient use of my time
I think we learn more, do more work. Like if you work in a group, you won't let other people do the work for you and then just say: 'ja, I agree'. You'd find out for yourself.	Get to do more – thus time more efficient	Get to do more – thus time more efficient			Get to do more – thus time more efficient
So you are individually accountable?	individually accountable	individually			

Ja. Okay. Jip.		accountable			
Does not waste time like in a normal school, with assemblies etc	Does not waste time like in a normal school, with assemblies etc	Does not waste time like in a normal school, with assemblies etc			Does not waste time like in a normal school, with assemblies etc
I like to do art and music and stuff just because I enjoy it and it gives me more time on that. In school you are limited to: okay that's art. You only have hours of music, so I just thought, I can do that more. Okay. So the ability here to decide on what you want to spend time on and sort of allocate your own time. Okay. Right.	The system enables one to have time for a variety of things like art, music	The system enables one to have time for a variety of things like art, music			
Working through home school, we improve our self discipline. Ja, that's true. Self discipline. Okay. Ma'am?	Self discipline improved	Self discipline improved			
I think these people like Hannes and everybody makes me feel special. I mean, they go through much trouble to like satisfy your needs and I really think well, this is not really like a normal school, it's a college type and it makes me feel special to be part of the system.	Makes me feel special	Makes me feel special			

The work. Now two years ago I was still in a normal school and I think the work is better than…. A higher standard. Ja. Okay. Yes ma'am?	Better standard, better work than in normal school	Better standard, better work than in normal school			
I like the stability that Brainline offers cause in a normal school, I was really messed up, the structure and everything. Okay. So do I hear you say that there's a sound educational engine behind all of this? Yes. Okay. Yip?	Stability in the system helps children not to feel "messed up" Refers to the fact that all the material is available and there is a published structure	Stability in the system helps children not to feel "messed up" Refers to the fact that all the material is available and there is a published structu			Refers to the fact that all the material is available and there is a published structure
The interactivity compared to other home schooling systems. Okay, so if you have to go home school, this is the best home school? Ja. Yes. Okay. Yip. I'm doing it again. Yes?	There is a lot of interactivity in the system	There is a lot of interactivity in the system			

Application of knowledge specifically within Cambridge, how you have to apply your knowledge. In other words, now you are going beyond just theory. Also getting to applications? How to use it. Okay.	Application of knowledge going beyond just theory. Also getting to applications?	Application of knowledge going beyond just theory. Also getting to applications?			
Every now and then upgrading something, you know, making it better…. Okay. ….like their lessons and stuff.	Regular upgrading				Regular upgrading
Well I think everything is pretty much set but I think the flexibility and being able to work at your own pace so you're in control of your studying.	I am in control of my studying	I am in control of my studying			
Ja, the technical side and having your lessons on a CD, I think is good. It makes it so much easier. You don't have to wait. You don't have to wait for the teacher or the fact that the lessons are already prepared, you know. You don't have to go and then work through a, like in other home school systems, you have to actually…they give you handbooks and	Having everything ready in advance, all the material, and not having to wait for a teacher	Having everything ready in advance, all the material, and not having to wait for a teacher			Having everything ready in advance, all the material, and not having to wait for a teacher

they say: 'okay this is what you have to do for the year'. They don't really tell you: 'okay, this is this lesson. You're learning this and this is a little self test just to test yourself', you know. Okay. Part of that sound educational system we heard. Ja. Okay. Yip?					
The fact that they seem to try to make your education better. Okay. Their attitude towards trying to make it better? Ja. Okay. Good stuff.	The care and attitude which is behind the system	The care and attitude which is behind the system	The care and attitude which is behind the system		

Appendix 14: Research question - to- questionnaire question table - STUDENTS

The question numbers are included in the first column.

	Research-question to *Student-Questionnaire-question* Questionnaire 2 –Students – Educational aspects	
	Biographical and general information	
1	My Z-number with Brainline is	
2	Name and Surname	
3	Cell number	
4	I am male or female	
5	My age this year is (today)	
6	My home language is	
7	Have you completed any other Brainonline questionnaire recently	
8	I have been in Brainline for .....years including this year	
9	Private school or home school.	
10	My average grade last year, or in my previous school, in all my subjects were	
	Overall satisfaction questions	
29	Overall, I am satisfied with the online system, the Internet program	
84	If an online system like this is done properly, it is just as good as a normal school	
	Personality indicator questions	
11	Intovert indicator	
12	Extrovert indicator	
13	Sensing indicator	
14	Intuitive indicator	
15	Thinker indicator	
16	Feeler indicator	
17	Judging indicator	
18	Perceiver indicator	
	Subsidiary question 1 – Pedagogical – Cognitive	
24	Do you think the online system used by Brainline (brainONLINE) helped you in your studies	
40	Did the online system challenge you to think about things differently and how other people think about it.	
41	Do you think it is useful to you to repeat things until you have mastered it. Do you agree with the statement “repetition is the mother of learning”	
	Subsidiary question 1 – Pedagogical – Constructivist	
44	Did the online system allow you to learn about things that you could recognise in the real world? (real world situations), in other words : were there things that you think you could apply in the real world?	
45	Did the online system system help you to learn by discovering things? In other words : you had to go out and find out things (discovery learning)	
46	In working with the online system, did you feel as if it was just like a teacher? (opp-discovery)	
47	Do you feel the online system was just as valuable as a teacher	
67	Even though I am motivated, I still think I needed a lot of help to get used to the system, and to get used to the type of work (scaffolding)	

	Subsidiary question 1 – Pedagogical – Component Display	
52	Did the online system make make it easier for you to learn	
53	Did the online system help you to know exactly what lessons and work you were supposed to do for the year	
68	In a system like this, I need to have a lot of instructions and information to be successful.	
69	The lessons in a system like this should be small byte-sized lessons.	
	Subsidiary question 1 – Pedagogical – Customization	
48	Did the online system allow you to choose WHEN you wanted to learn	
49	Did the online system enable you to choose WHERE (the place) you wanted to learn?	
50	Did the online system enable you to choose how FAST you wanted to go through the work?	
51	Did the online system allow you to CHANGE the program the way it suits you?	
	Subsidiary question 1 – Pedagogical – challenge – Creativity and Motivation	
30	The standard of schooling in THIS system was weak or high compared to my previous school	
42	Was the work that you did a challenge to you, or was it too easy for you? (challenge)	
43	Did you benefit from the way that some of the work was fixed (highly structured)	
66	I do not need to get support from anyone. I am motivated and responsible.	
	Subsidiary question 1 – Pedagogical – Collaborative	
54	Did the online system help you to learn together with others	
55	Did you attend the workshops	
56	How valuable was the online program to you?	
57	How valuable were the workshops to you?	
58	What do you find more useful, the online system or workshops	
59	Did you make use of online system to talk to other students	
60	How do you value the feedback (replies) that you got from the teachers and students, and in your assignments	
61	Do you prefer to work alone?	
	Subsidiary question 1 – Pedagogical – Companionship	
25	How do you rate the work of the subject advisors in online system, the Internet program.	
26	Do you feel that the online teachers supported you?	
27	The teachers were almost like a study-father or a study-mother to me.	
28	How important were the teachers to you?	
62	Did your parents suppport and encourage you	
63	Did your parents work with you	
64	Do you think that if parents helped their children, it will be easier to them to pass their exams.	
65	What do your parents know about the content of your courses?	
70	Did the online system somehow act as a COMPANION to you, like a digital teacher, or a digital-friend.	
83	The teachers are important in such an online system. Without them it will not work.	
	Subsidiary question 2 – Community aspect	
71	Do you feel like you belong to a group now that you are in this system (like a school or a community)? Do you feel that you have a group identity.	
72	Do you like to work in groups?	
77	I work hard because I want to impress and please my parents. (this versus friends – question 78)	
78	I may work hard because I want to impress and please my friends. (this versus impressing parents question 77)	
79	I like to be rewarded for good work. I like the fact that there is a Hall of fame in the system.	

	Subsidiary question 3 – Communication aspect	
73	Do you like to social online, talking and chatting about things that are not related to the work?	
74	How much did you social online?	
75	I felt isolated (alone) even if there was an online system. (Admin – Answers swop)	
76	How much did you talk to teachers online?	
80	I feel uncomfortable (shy) to discuss things online	
81	Some people are afraid to talk online because they are scared that the others may laugh at their questions.	
82	If I could talk online and be anonymous, so that nobody knows who I am, I may talk more.	
	Research question 4 – Technological aspects	
19	When it comes to working my computer…..	
31	Getting to know the online system interface. When I started out with online system,	
32	How easy was it to work with the online system?	
33	Connecting to the Internet and working on the Internet.	
34	If you were NOT to have access to the Internet and online system, do you think it would have made a difference in your learning	
	General usage questions	
20	I have my own computer	
21	I have Internet access on my own	
22	My parents (or school) restrict the use of Internet	
23	Type of Internet access	
35	Costs of Internet use. What is your own opinion.	
36	Please give your estimate of your Internet and telephone costs per month	
37	E-mail address changes	
38	Cellphone number changed	
39	I prefer to be contacted through	

The table shows the questions in the student questionnaire and how they relate to the research questions in this research

Appendix 15:Research question - to- questionnaire question table - SUBJECT ADVISORS

Research-question toQuestionnaire-question table for the Subject Advisor Questionnaire

	Research-question to *Questionnaire-question* table for the Subject Advisor Questionnaire	
	Biographical and general information	
	Your name and surname	
	I am male or female	
	My age this year is (today)	
	My home language is	
	I have been in Brainline for .....years including this year	
	Overall satisfaction questions	
16	Overall, I, as a subject advisor, am satisfied with the whole Brainline system (Subject advisors)	
18	Overall, I am satisfied with brainONLINE, the Internet program	
17 *18* *(29)*	Overall, do you think the STUDENTS are satisfied with the Brainline system in general Overall, I do you think STUDENTS are satisfied with brainONLINE, the Internet program *Overall, I am satisfied with the online system, the Internet program (student)*	
(84)	*If an online system like this is done properly, it is just as good as a normal school (student)*	
	Subsidiary question 1 – Pedagogical – Cognitive	
8	Do you think the Internet was of use for you to support students	
9	Do you think the INTERNET helped students with their studies	
10 (24)	Do you think brainONLINE, the online interface used by Brainline helped you to support the students *(24.Do you think the online system used by Brainline (brainONLINE) helped you in your studies) (student)*	
33	Did the brainONLINE interface give STUDENTS opportunities to think, to use THEIR brain to solve problems (not the content, but the interface itself) (higher order thinking)	
34	Did the brainONLINE interface help them to start from things that they know, working up to things that they don't know (linking)	
35	Did the brainONLINE interface challenge them to think about things the way other people think about it. (critical thinking)	
36 (40)	Did the brainONLINE interface make it possible for them to analyze things. In other words - Investigate, break down, Evaluate, dissect etc. (critical thinking) *Did the online system challenge you to think about things differently and how other people think about it.*	
37	Did the brainONLINE program allow them to draw conclusions from various things, making sense of it (synthesis)	
38	Did the brainONLINE system help them to compare different ideas and evaluate it. (evaluation)	
39	Did the brainONLINE interface help them to learn to remember things in a different way (mnemonics)	
40	Did the brainONLINE interface give them a chance to repeat some things until you mastered it? (Behaviousist)	
41	Do you think it is useful to them to repeat things until them have mastered it (behav)	

(41)	*Do you think it is useful to you to repeat things until you have mastered it. Do you agree with the statement "repetition is the mother of learning" (student)*	
	Subsidiary question 1 – Pedagogical – Constructivist	
46 *(44)*	Did the brainONLINE system allow them to encounter things that they could recognise in the real world? (real world situations) *Did the online system allow you to learn about things that you could recognise in the real world? (real world situations), in other words : were there things that you think you could apply in the real world? (student)*	
47 *(45)*	Did the brainONLINE system help them to learn by discovering things? (discovery learning) *Did the online system system help you to learn by discovering things? In other words : you had to go out and find out things (discovery learning) (student)*	
48	Did the brainONLINE system make it possible for them to set their own goals?	
49 *(46)*	In going through the brainONLINE system, did you feel as if they system was just like a teacher, in other words, it was just another way of doing the same class routine? (Opposite) *In working with the online system, did you feel as if it was just like a teacher? (opp-discovery) (student)*	
50 *(47)*	In going through the brainONLINE system, do you feel that the system is just as valuable as a teacher *Do you feel the online system was just as valuable as a teacher (student)*	
(67)	*Even though I am motivated, I still think I needed a lot of help to get used to the system, and to get used to the type of work (scaffolding) (student)*	
	Subsidiary question 1 – Pedagogical – Component Display	
60 *(52)*	Did the brainONLINE system make make it easier for them to learn *Did the online system make make it easier for you to learn (student)*	
61	Did the brainONLINE system help them when they came across something that they do not understand	
62 *(53)*	Did the brainONLINE system help them to know exactly what lessons and work they were supposed to do for the year *Did the online system help you to know exactly what lessons and work you were supposed to do for the year (student)*	
63	Did the brainONLINE system support them sufficiently with Assignment dates and deadlines, and the submission of assignments.	
68	*In a system like this, I need to have a lot of instructions and information to be successful. (student)*	
69	*The lessons in a system like this should be small byte-sized lessons. (student)*	
	Subsidiary question 1 – Pedagogical – Customization	
51 *(48)*	Did the system allow them to choose WHEN they wanted to learn *Did the online system allow you to choose WHEN you wanted to learn (student)*	
52 *(49)*	Could they choose WHERE (the place) they wanted to learn? *Did the online system enable you to choose WHERE (the place) you wanted to learn? (student)*	
53 *(50)*	Did the brainONLINE system allow them to choose how fast they want to go through the work? *Did the online system enable you to choose how FAST you wanted to go through the work? (student)*	
54 *(51)*	Did the brainONLINE program allow them to customise the program the way it suits you? *Did the online system allow you to CHANGE the program the way it suits you? (student)*	
55	Did they adjust the system to fit the way that you learn?	
56	Did the brainONLINE system help them to take initiative in learning with the system, eg start things, think of new ways to do things?	
57	Did the brainONLINE system help them ask for help from the teachers.?	
58	Sometimes the work is presented in a fixed structure, and the system does not allow you to change it. Did you think this is beneficial to the students?	
59	What do the students think. Sometimes the work is presented in a fixed structure, and the	

	system does not allow you to change it. Did you think they found find it usefull?	
	Subsidiary question 1 – Pedagogical – challenge – Creativity and Motivation	
20	The standard of schooling in the system	
21 *(30)*	What do you think the STUDENTS think of the standard of schooling in the system *The standard of schooling in THIS system was weak or high compared to my previous school (student)*	
42 *(42)*	Was the work that they did a challenge to them, or was it too easy for them? (challenge) *Was the work that you did a challenge to you, or was it too easy for you? (challenge) (student)*	
43	Did the brainONLINE system make it possible for them to be curious about things and satisfy their curiosity? (curiosity)	
44	Was the brainONLINE system what they expected or did they expect something completely different?	
45 *(43)*	They course structure was highly structured. Did they benefit from the way that the work was fixed (highly structured) *Did you benefit from the way that some of the work was fixed (highly structured) (student)*	
(66)	*I do not need to get support from anyone. I am motivated and responsible. (student)*	
	Subsidiary question 1 – Pedagogical – Collaborative	
64 *(54)*	Did the brainONLINE system help them to learn together with others *Did the online system help you to learn together with others (student)*	
65 *(55)*	Did they attend the workshops *Did you attend the workshops (student)*	
(56)	*How valuable was the online program to you? (student)*	
(57)	*How valuable were the workshops to you? (student)*	
66 *(58)*	What do you find more useful, the online interface or workshops *What do you find more useful, the online system or workshops*	
67 *(59)*	Did they make use of brainONLINE system to talk to other students *Did you make use of online system to talk to other students (student)*	
(60)	*How do you value the feedback (replies) that you got from the teachers and students, and in your assignments (student)*	
68 *(61)*	Do they prefer to work alone? *Do you prefer to work alone? (student)*	
	Subsidiary question 1 – Pedagogical – Companionship	
14 (25)	How do you think the STUDENTS rate the help the subject advisors gave in general *How do you rate the work of the subject advisors in online system, the Internet program. (student)*	
(26)	*Do you feel that the online teachers supported you? (student)*	
(27)	*The teachers were almost like a study-father or a study-mother to me. (student)*	
(28)	*How important were the teachers to you? (student)*	
(62)	*Did your parents suppport and encourage you (student)*	
70 *(63)*	Did their parents suppport and encourage them *Did your parents work with you (student)*	
71	Did the brainONLINE system make it possible for their parents to work with them	
62 *(64)*	Do you think that if parents helped their children, it will be easier to them to pass their exams. *Do you think that if parents helped their children, it will be easier to them to pass their exams. (student)*	
(65)	*What do your parents know about the content of your courses? (student)*	
(70)	*Did the online system somehow act as a COMPANION to you, like a digital teacher, or a digital-friend. (student)*	
(83)	*The teachers are important in such an online system. Without them it will not work. (student)*	
15	Rate the work of the ADMINISTRATORS the brainONLINE system (Eg, Gaetano, Hannes, Johannes, Regardt)	
73	They got no support from anyone, and worked on their own, and motivated themselves. They	

	would not have wanted it any other way.	
74	Did the brainONLINE system somehow act as a COMPANION to them, like a surrogate mentor.	
	Subsidiary question 2 – Community aspect	
(71)	*Do you feel like you belong to a group now that you are in this system (like a school or a community)? Do you feel that you have a group identity. (student)*	
(72)	*Do you like to work in groups? (student)*	
(77)	*I work hard because I want to impress and please my parents. (this versus friends – question 78) (student)*	
(78)	*I may work hard because I want to impress and please my friends. (this versus impressing parents question 77) (student)*	
(79)	*I like to be rewarded for good work. I like the fact that there is a Hall of fame in the system. (student)*	
	Subsidiary question 3 – Communication aspect	
73	*Do you like to social online, talking and chatting about things that are not related to the work? (student)*	
74	*How much did you social online? (student)*	
75	*I felt isolated (alone) even if there was an online system. (Admin – Answers swop) (student)*	
76	*How much did you talk to teachers online? (student)*	
80	*I feel uncomfortable (shy) to discuss things online (student)*	
81	*Some people are afraid to talk online because they are scared that the others may laugh at their questions. (student)*	
82	*If I could talk online and be anonymous, so that nobody knows who I am, I may talk more. (student)*	
	Research question 4 – Technological aspects	
1 (19)	When it comes to working my computer….. *(19.When it comes to working my computer…..) (student)*	
2	I think the STUDENTS rate the average subject advisors computer skills as	
12	When YOU started out with the brainONLINE program, you had certain expectations. Was your support with the brainONLINE program what you expected?	
13 22 (31)	When the STUDENTS started out with the brainONLINE program, THEY had certain expectations. Do you think they got what THEY EXPECTED Getting to know the brainONLINE interface. When I started out with brainONLINE, *(31.Getting to know the online system interface. When I started out with online system,) (student)*	
23	When I started out using brainONLINE, I was nervous and anxious	
24	The usability of the interface of brainONLINE	
25 (32)	What do you think that the STUDENTS feel about the usability of the interface of brainONLINE *How easy was it to work with the online system? (student)*	
26 (33)	Connecting to the Internet and working on the Internet. *Connecting to the Internet and working on the Internet.*	
27 (34)	If you were NOT to have access to the Internet and brainONLINE, do you think it would have made a difference in your learning *If you were NOT to have access to the Internet and online system, do you think it would have made a difference in your learning (student)*	
	General usage questions	
3 (20)	Do you think students have their own computer *(20. I have my own computer) (student)*	
4 (21)	Do you think students have Internet access on their own *(21. I have Internet access on my own) (student)*	
5 (22)	Do you think parents (or school) restrict the students' use of Internet *(22 My parents (or school) restrict the use of Internet) (student)*	
6	Type of Internet access YOU have	
7	Type of Internet access that you think that STUDENTS HAVE	

(23)	*(23 Type of Internet access) (student)*	
28 (35)	Costs of Internet use. What is your own opinion. *Costs of Internet use. What is your own opinion. (student)*	
29 (36)	Please give your estimate of your Internet and telephone costs per month *Please give your estimate of your Internet and telephone costs per month (student)*	
30 (37)	E-mail address *E-mail address changes (student)*	
31 (38)	Cellphone number changed *Cellphone number changed (student)*	
32 (39)	I prefer to be contacted through *I prefer to be contacted through (student)*	

*The relationship between **Subject Advisor** questionnaire questions and the research questions*

A table of how the questionnaire questions relate to the research questions are presented here .

	Research-question-to-Questionnaire-question table for the Subject Advisor Questionnaire	
	Biographical and general information	
	Your name and surname	
	I am male or female	
	My age this year is (today)	
	My home language is	
	I have been in Brainline for .....years including this year	
	Overall satisfaction questions	
16	Overall, I, as a subject advisor, am satisfied with the whole Brainline system (Subject advisors)	
18	Overall, I am satisfied with brainONLINE, the Internet program	
17 *18* *(29)*	Overall, do you think the STUDENTS are satisfied with the Brainline system in general Overall, I do you think STUDENTS are satisfied with brainONLINE, the Internet program *Overall, I am satisfied with the online system, the Internet program (student)*	
(84)	*If an online system like this is done properly, it is just as good as a normal school (student)*	
	Subsidiary question 1 – Pedagogical – Cognitive	
8	Do you think the Internet was of use for you to support students	
9	Do you think the INTERNET helped students with their studies	
10 (24)	Do you think brainONLINE, the online interface used by Brainline helped you to support the students *(24.Do you think the online system used by Brainline (brainONLINE) helped you in your studies) (student)*	
33	Did the brainONLINE interface give STUDENTS opportunities to think, to use THEIR brain to solve problems (not the content, but the interface itself) (higher order thinking)	
34	Did the brainONLINE interface help them to start from things that they know, working up to things that they don't know (linking)	
35	Did the brainONLINE interface challenge them to think about things the way other people think about it. (critical thinking)	
36 (40)	Did the brainONLINE interface make it possible for them to analyze things. In other words - Investigate, break down, Evaluate, dissect etc. (critical thinking) *Did the online system challenge you to think about things differently and how other people think about it.*	
37	Did the brainONLINE program allow them to draw conclusions from various things, making sense of it (synthesis)	
38	Did the brainONLINE system help them to compare different ideas and evaluate it. (evaluation)	
39	Did the brainONLINE interface help them to learn to remember things in a different way (mnemonics)	
40	Did the brainONLINE interface give them a chance to repeat some things until you mastered it? (Behaviousist)	

41 (41)	Do you think it is useful to them to repeat things until them have mastered it (behav) *Do you think it is useful to you to repeat things until you have mastered it. Do you agree with the statement "repetition is the mother of learning" (student)*	
	Subsidiary question 1 – Pedagogical – Constructivist	
46 *(44)*	Did the brainONLINE system allow them to encounter things that they could recognise in the real world? (real world situations) *Did the online system allow you to learn about things that you could recognise in the real world? (real world situations), in other words : were there things that you think you could apply in the real world? (student)*	
47 *(45)*	Did the brainONLINE system help them to learn by discovering things? (discovery learning) *Did the online system system help you to learn by discovering things? In other words : you had to go out and find out things (discovery learning) (student)*	
48	Did the brainONLINE system make it possible for them to set their own goals?	
49 *(46)*	In going through the brainONLINE system, did you feel as if they system was just like a teacher, in other words, it was just another way of doing the same class routine? (Opposite) *In working with the online system, did you feel as if it was just like a teacher? (opp-discovery) (student)*	
50 *(47)*	In going through the brainONLINE system, do you feel that the system is just as valuable as a teacher *Do you feel the online system was just as valuable as a teacher (student)*	
(67)	*Even though I am motivated, I still think I needed a lot of help to get used to the system, and to get used to the type of work (scaffolding) (student)*	
	Subsidiary question 1 – Pedagogical – Component Display	
60 *(52)*	Did the brainONLINE system make make it easier for them to learn *Did the online system make make it easier for you to learn (student)*	
61	Did the brainONLINE system help them when they came across something that they do not understand	
62 *(53)*	Did the brainONLINE system help them to know exactly what lessons and work they were supposed to do for the year *Did the online system help you to know exactly what lessons and work you were supposed to do for the year (student)*	
63	Did the brainONLINE system support them sufficiently with Assignment dates and deadlines, and the submission of assignments.	
68	*In a system like this, I need to have a lot of instructions and information to be successful. (student)*	
69	*The lessons in a system like this should be small byte-sized lessons. (student)*	
	Subsidiary question 1 – Pedagogical – Customization	
51 *(48)*	Did the system allow them to choose WHEN they wanted to learn *Did the online system allow you to choose WHEN you wanted to learn (student)*	
52 *(49)*	Could they choose WHERE (the place) they wanted to learn? *Did the online system enable you to choose WHERE (the place) you wanted to learn? (student)*	
53 *(50)*	Did the brainONLINE system allow them to choose how fast they want to go through the work? *Did the online system enable you to choose how FAST you wanted to go through the work? (student)*	
54 *(51)*	Did the brainONLINE program allow them to customise the program the way it suits you? *Did the online system allow you to CHANGE the program the way it suits you? (student)*	
55	Did they adjust the system to fit the way that you learn?	
56	Did the brainONLINE system help them to take initiative in learning with the system, eg start things, think of new ways to do things?	
57	Did the brainONLINE system help them ask for help from the teachers.?	
58	Sometimes the work is presented in a fixed structure, and the system does not allow you to change it. Did you think this is beneficial to the students?	

59	What do the students think. Sometimes the work is presented in a fixed structure, and the system does not allow you to change it. Did you think they found find it usefull?	
	Subsidiary question 1 – Pedagogical – challenge – Creativity and Motivation	
20	The standard of schooling in the system	
21 *(30)*	What do you think the STUDENTS think of the standard of schooling in the system *The standard of schooling in THIS system was weak or high compared to my previous school (student)*	
42 *(42)*	Was the work that they did a challenge to them, or was it too easy for them? (challenge) *Was the work that you did a challenge to you, or was it too easy for you? (challenge) (student)*	
43	Did the brainONLINE system make it possible for them to be curious about things and satisfy their curiosity? (curiosity)	
44	Was the brainONLINE system what they expected or did they expect something completely different?	
45 *(43)*	They course structure was highly structured. Did they benefit from the way that the work was fixed (highly structured) *Did you benefit from the way that some of the work was fixed (highly structured) (student)*	
(66)	*I do not need to get support from anyone. I am motivated and responsible. (student)*	
	Subsidiary question 1 – Pedagogical – Collaborative	
64 *(54)*	Did the brainONLINE system help them to learn together with others *Did the online system help you to learn together with others (student)*	
65 *(55)*	Did they attend the workshops *Did you attend the workshops (student)*	
(56)	*How valuable was the online program to you? (student)*	
(57)	*How valuable were the workshops to you? (student)*	
66 *(58)*	What do you find more useful, the online interface or workshops *What do you find more useful, the online system or workshops*	
67 *(59)*	Did they make use of brainONLINE system to talk to other students *Did you make use of online system to talk to other students (student)*	
(60)	*How do you value the feedback (replies) that you got from the teachers and students, and in your assignments (student)*	
68 *(61)*	Do they prefer to work alone? *Do you prefer to work alone? (student)*	
	Subsidiary question 1 – Pedagogical – Companionship	
14 (25)	How do you think the STUDENTS rate the help the subject advisors gave in general *How do you rate the work of the subject advisors in online system, the Internet program. (student)*	
(26)	*Do you feel that the online teachers supported you? (student)*	
(27)	*The teachers were almost like a study-father or a study-mother to me. (student)*	
(28)	*How important were the teachers to you? (student)*	
(62)	*Did your parents suppport and encourage you (student)*	
70 *(63)*	Did their parents suppport and encourage them *Did your parents work with you (student)*	
71	Did the brainONLINE system make it possible for their parents to work with them	
62 *(64)*	Do you think that if parents helped their children, it will be easier to them to pass their exams. *Do you think that if parents helped their children, it will be easier to them to pass their exams. (student)*	
(65)	*What do your parents know about the content of your courses? (student)*	
(70)	*Did the online system somehow act as a COMPANION to you, like a digital teacher, or a digital-friend. (student)*	
(83)	*The teachers are important in such an online system. Without them it will not work. (student)*	
15	Rate the work of the ADMINISTRATORS the brainONLINE system (Eg, Gaetano, Hannes, Johannes, Regardt)	

73	They got no support from anyone, and worked on their own, and motivated themselves. They would not have wanted it any other way.	
74	Did the brainONLINE system somehow act as a COMPANION to them, like a surrogate mentor.	
	Subsidiary question 2 – Community aspect	
(71)	*Do you feel like you belong to a group now that you are in this system (like a school or a community)? Do you feel that you have a group identity. (student)*	
(72)	*Do you like to work in groups? (student)*	
(77)	*I work hard because I want to impress and please my parents. (this versus friends – question 78) (student)*	
(78)	*I may work hard because I want to impress and please my friends. (this versus impressing parents question 77) (student)*	
(79)	*I like to be rewarded for good work. I like the fact that there is a Hall of fame in the system. (student)*	
	Subsidiary question 3 – Communication aspect	
73	*Do you like to social online, talking and chatting about things that are not related to the work? (student)*	
74	*How much did you social online? (student)*	
75	*I felt isolated (alone) even if there was an online system. (Admin – Answers swop) (student)*	
76	*How much did you talk to teachers online? (student)*	
80	*I feel uncomfortable (shy) to discuss things online (student)*	
81	*Some people are afraid to talk online because they are scared that the others may laugh at their questions. (student)*	
82	*If I could talk online and be anonymous, so that nobody knows who I am, I may talk more. (student)*	
	Research question 4 – Technological aspects	
1 (19)	When it comes to working my computer….. *(19.When it comes to working my computer…..) (student)*	
2	I think the STUDENTS rate the average subject advisors computer skills as	
12	When YOU started out with the brainONLINE program, you had certain expectations. Was your support with the brainONLINE program what you expected?	
13 22 (31)	When the STUDENTS started out with the brainONLINE program, THEY had certain expectations. Do you think they got what THEY EXPECTED Getting to know the brainONLINE interface. When I started out with brainONLINE, *(31.Getting to know the online system interface. When I started out with online system,) (student)*	
23	When I started out using brainONLINE, I was nervous and anxious	
24	The usability of the interface of brainONLINE	
25 (32)	What do you think that the STUDENTS feel about the usability of the interface of brainONLINE *How easy was it to work with the online system? (student)*	
26 (33)	Connecting to the Internet and working on the Internet. *Connecting to the Internet and working on the Internet.*	
27 (34)	If you were NOT to have access to the Internet and brainONLINE, do you think it would have made a difference in your learning *If you were NOT to have access to the Internet and online system, do you think it would have made a difference in your learning (student)*	
	General usage questions	
3 (20)	Do you think students have their own computer *(20. I have my own computer) (student)*	
4 (21)	Do you think students have Internet access on their own *(21. I have Internet access on my own) (student)*	
5 (22)	Do you think parents (or school) restrict the students' use of Internet *(22 My parents (or school) restrict the use of Internet) (student)*	
6	Type of Internet access YOU have	

7 (23)	Type of Internet access that you think that STUDENTS HAVE *(23 Type of Internet access) (student)*	
28 (35)	Costs of Internet use. What is your own opinion. *Costs of Internet use. What is your own opinion. (student)*	
29 (36)	Please give your estimate of your Internet and telephone costs per month *Please give your estimate of your Internet and telephone costs per month (student)*	
30 (37)	E-mail address *E-mail address changes (student)*	
31 (38)	Cellphone number changed *Cellphone number changed (student)*	
32 (39)	I prefer to be contacted through *I prefer to be contacted through (student)*	

Subject Advisor questionnaire results in general

This section is duplicated in the text but without the tables and the references to the specific question numbers.

Pedagogical section – Cognitive science (questions :subject advisors : 8, 9, 10, 33, 34, 35, 36, 37, 38, 39, 40, 41 Students 24,40,41)

	Subsidiary question 1 – Pedagogical – Cognitive	Combined %
8	Do you think the Internet was of use for you to support students	100
9	Do you think the INTERNET helped students with their studies	100
10	Do you think brainONLINE, the online interface used by Brainline helped you to support the students	100
33	Did the brainONLINE interface give STUDENTS opportunities to think, to use THEIR brain to solve problems (not the content, but the interface itself) (higher order thinking)	80
34	Did the brainONLINE interface help them to start from things that they know, working up to things that they don't know (linking)	70
35	Did the brainONLINE interface challenge them to think about things the way other people think about it. (critical thinking)	80
36	Did the brainONLINE interface make it possible for them to analyze things. In other words - Investigate, break down, Evaluate, dissect etc. (critical thinking)	75
37	Did the brainONLINE program allow them to draw conclusions from various things, making sense of it (synthesis)	88
38	Did the brainONLINE system help them to compare different ideas and evaluate it. (evaluation)	72
39	Did the brainONLINE interface help them to learn to remember things in a different way (mnemonics)	28
40	Did the brainONLINE interface give them a chance to repeat some things until you mastered it? (Behaviousist)	57
41	Do you think it is useful to them to repeat things until them have mastered it (behav)	98
	Combined positive view of Cognitive Science application in eLearning (by the subject advisors)	**79%**

Seen overall, the subject advisors are very positive (795) about the eLearning resource and cognitive science. The student responsed, analysed in the next two tables indicate a similar positive stance.

In the next two tables, the questionnaire results where subject advisor estimations of students responses could be measured are analysed.

10	Do you think brainONLINE, the online interface used by Brainline helped you to support the students	100%
(24)	*(24).Do you think the online system used by Brainline (brainONLINE) helped you in your studies) (student)*	82%

The subject advisors found the online interface much more of a help than the students did.

40	Did the brainONLINE interface make it possible for them to analyze things. In other words - Investigate, break down, Evaluate, dissect etc. (critical thinking)	80%
(36)	*Did the online system challenge you to think about things differently and how other people think about it. (Critical thinking) (student)*	64%

The subject advisors were more positive in their thinking about the role of the online interface in terms of making critical thinking possible than the students themselves (80% versus 64%)

41	Do you think it is useful to them to repeat things until them have mastered it (behav)	99%
(41)	*Do you think it is useful to you to repeat things until you have mastered it. Do you agree with the statement "repetition is the mother of learning"how other people think about it. (student)*	89%

Both the subject advisors and the students are of the opinion that behaviouristic-type learning is important (99% versus 89%). There is a twist in the result of question 40 in the subject advisors questionnaire. Only 57% of the subject advisors thought that the eLearning system enabled behaviouristic learning, which in my opinion is correct.

Pedagogical section – Constructivist (subject advisors questions 46, 47, 48, 49, 50, student questions : 44, 45, 46, 47, 67)

46	Did the brainONLINE system allow them to encounter things that they could recognise in the real world? (real world situations)	*57%*
(44)	*Did the online system allow you to learn about things that you could recognise in the real world? (real world situations), in other words : were there things that you think you could apply in the real world? (student)*	*75%*

The students experienced the real world through the eLearning resource significantly better (75%) than the subject advisors thought they did (57%)

47	Did the brainONLINE system help them to learn by discovering things? (discovery learning)	*71%*
(45)	*Did the online system system help you to learn by discovering things? In other words : you had to go out and find out things (discovery learning) (student)*	*66%*

The subject advisors and the students were of the opinion that the system enabled discovery learning (71% and 66%)

50 49	In going through the brainONLINE system, do you feel that the system is just as valuable as a teacher In going through the brainONLINE system, did you feel as if they system was just like a teacher, in other words, it was just another way of doing the same class routine? (Opposite)	*50%* *87%*
(47)	*Do you feel the online system was just as valuable as a teacher*	*39%*

Although most of the subject advisors thought that the eLearning system could function just like a school, only 50% thought it was just as valuable as a teacher. The students went further, and only 39% of them thought it was just as valuable as a teacher. It seems like teachers are highly valued.

Overall, there is a positive view regarding constructivist learning with real world situations and discovery learning. The role of teachers is highly rated in this process.

Pedagogical section – Component display (questions : subject advisors : 60, 61, 62, 63, 65, 69, students : 52, 53)

60	Did the brainONLINE system make make it easier for them to learn	*75%*
61	Did the brainONLINE system help them when they came across something that they do not understand	*87%*
(52)	*Did the online system make make it easier for you to learn (student)*	*74%*

Both are of the view that the system made it easier to learn. The subject advisors thought the system did assist understanding of new items.

62	Did the brainONLINE system help them to know exactly what lessons and work they were supposed to do for the year	*87%*
(53)	*Did the online system help you to know exactly what lessons and work you were supposed to do for the year (student)*	*80%*

63	Did the brainONLINE system support them sufficiently with Assignment dates and deadlines, and the submission of assignments.	*75%*
68	*In a system like this, I need to have a lot of instructions and information to be successful. (student)*	*75%*
69	*The lessons in a system like this should be small byte-sized lessons. (student)*	*73%*

Both are positive about adequate information about what needs to be done for the year. The support in terms of deadlines and other information are also agreed upon (Around 75%)

Pedagogical section – Customization (questions : subject advisors : 51, 52, 53, 54, 55, 56, 57, 58, 59, students : 48, 49, 50, 51)

51 *(48)*	Did the system allow them to choose WHEN they wanted to learn *Did the online system allow you to choose WHEN you wanted to learn (student)*	*97%* *85%*
52 *(49)*	Could they choose WHERE (the place) they wanted to learn? *Did the online system enable you to choose WHERE (the place) you wanted to learn? (student)*	*99%* *83%*

53	Did the brainONLINE system allow them to choose how fast they want to go through the work?	*99%*
(50)	*Did the online system enable you to choose how FAST you wanted to go through the work? (student)*	*78%*
54	Did the brainONLINE program allow them to customise the program the way it suits you?	*25%*
55	Did they adjust the system to fit the way that you learn?	42%
(51)	*Did the online system allow you to CHANGE the program the way it suits you? (student)*	*62%*

Although both parties were very positive about customizing when, where and how fast one could learn in the system, the subject advisors are of the view that the program did not allow them to customize their learning (25% versus 62%) and that they did not make use of it (42%)

56	Did the brainONLINE system help them to take initiative in learning with the system, eg start things, think of new ways to do things?	87%
57	Did the brainONLINE system help them ask for help from the teachers.?	71%
58	Sometimes the work is presented in a fixed structure, and the system does not allow you to change it. Did you think this is beneficial to the students?	87%
59	What do the students think. Sometimes the work is presented in a fixed structure, and the system does not allow you to change it. Did you think they found find it usefull?	85%

Overall, certain elements of customization were viewed very positively, ie when, where and how fast learning could take place. But in terms of customization of the interface the subject advisors were less positive.

Pedagogical section – creativity, motivation and challenge (question : subject advisors : 20, 21, 42, 43, 44, 45, students : 30, 42, 43, 66)

20	The standard of schooling in the system	*90%*
21	What do you think the STUDENTS think of the standard of schooling in the system	*89%*
(30)	*The standard of schooling in THIS system was weak or high compared to my previous school (student)*	*93%*

42	Was the work that they did a challenge to them, or was it too easy for them? (challenge)	*99%*
(42)	*Was the work that you did a challenge to you, or was it too easy for you? (challenge) (student)*	*91%*

43	Did the brainONLINE system make it possible for them to be curious about things and satisfy their curiosity? (curiosity)	*99%*
44	Was the brainONLINE system what they expected or did they expect something completely different?	*85%*

45	They course structure was highly structured. Did they benefit from the way that the work was fixed (highly structured)	*87%*
(43)	*Did you benefit from the way that some of the work was fixed (highly structured) (student)*	*89%*
(66)	*I do not need to get support from anyone. I am motivated and responsible. (student)*	*53%*

There is agreement between the subject advisors and the students that the standard of schooling is higher than their previous school (90% and 89%), and that the work was a definite challenge (99% and 91%).

Even though there was opportunity for creativity and to satisfy curiosity (99%), there is consensus that structured work is important (87% and 89%).

53% of students answered positively to the bold statement that they do not need support from anyone, that they are motivated and responsible.

Pedagogical section : Collaboration (questions : subject advisors : 64, 65, 66, 67, 68, students : 54, 55, 56, 57, 58, 59, 60, 61)

64 *(54)*	Did the brainONLINE system help them to learn together with others *Did the online system help you to learn together with others (student)*	*63%* *27%*
65 *(55)*	Did they attend the workshops *Did you attend the workshops (student)*	*71%* *78%*
(56)	*How valuable was the online program to you? (student)*	*89%*
(57)	*How valuable were the workshops to you? (student)*	*84%*
66 *(58)*	What do you find more useful, the online interface or workshops *What do you find more useful, the online system or workshops (student)*	*Both 71%* *online 66%*
67 *(59)*	Did they make use of brainONLINE system to talk to other students *Did you make use of online system to talk to other students (student)*	*63%* *46%*
(60)	*How do you value the feedback (replies) that you got from the teachers and students, and in your assignments (student)*	*78%*
68 *(61)*	Do they prefer to work alone? *Do you prefer to work alone? (student)*	*100%* *66%*

It is surprizing that 63% of subject advisors thought the system helped the students to learn together with others, while quite a lot less students (27%)

thought so. This may be related to the fact that the students prefer to work alone (66% question 61), which was strongly supported by the views of the subject advisors (100% question 68) that this kind of student definitely prefers to work alone. The majority of students (78%) valued the feedback from subject advisors and fellow students. Only 46% of students said they used the eLearning system to "talk" to other students, while the subject advisors thought more of them talked to others (63%).

Most of the students attended workshops, and the subject advisors also thought so (78% and 71%). They found the eLearning programme and the workshops valuable (89% and 84%), but in a question to directly choose between the value of the one or the other, 66% chose the eLearning program instead of the workshops. The subject advisors said both are essential (71%) and that they cannot choose.

Overal, it appears that online collaboration did not play a big role in the life of these students. Although the capabilities of the system is recognised to support it, and feedback is appreciated, not much use was made of the collaborative infrastructure.

Pedagogical section – companionship (questions : subject advisors : 14, 15, 62, 70, 73, 74, and students : 25, 26, 27, 28, 62, 63, 64, 65, 70, 83)

14 (25)	How do you think the STUDENTS rate the help the subject advisors gave in general *How do you rate the work of the subject advisors in online system, the Internet program. (student)*	90% 79%
(26)	*Do you feel that the online teachers supported you? (student)*	74%
(28)	*How important were the teachers to you? (student)*	69%
70 *(62)* *(63)*	Did their parents suppport and encourage them *Did your parents suppport and encourage you (student)* *Did your parents work with you (student)*	88% 90% 30%
71	Did the brainONLINE system make it possible for their parents to work with them	87%
62 *(64)*	Do you think that if parents helped their children, it will be easier to them to pass their exams. *Do you think that if parents helped their children, it will be easier to them to pass their exams. (student)*	63% 78%
(65)	*What do your parents know about the content of your courses? (student)*	66%
(70)	*Did the online system somehow act as a COMPANION to you, like a*	37%

	digital teacher, or a digital-friend. (student)	
(83)	*The teachers are important in such an online system. Without them it will not work. (student)*	88%
15	Rate the work of the ADMINISTRATORS the brainONLINE system (Eg, Gaetano, Hannes, Johannes, Regardt)	100%
73	They got no support from anyone, and worked on their own, and motivated themselves. They would not have wanted it any other way.	50%
74	Did the brainONLINE system somehow act as a COMPANION to them, like a surrogate mentor.	50%
(27)	The teachers were almost like a study-father or a study-mother to me.	39%
(70)	Did the online system somehow act as a COMPANION to you, like a digital teacher, or a digital-friend.	37%

The help of teachers, and the role of teachers are regarded important

Parents supported students in the opinion of students and subject advisors (90% and 88%). but the students said only 30% of the parents worked with them, while the subject advisors though even a lesser percentage (12%) of parents worked with the students. 66% if the students said their parents know the content of their courses. The subject advisors are of the opinion that the eLearning system does make it possible for parents to assist students (87%) and that help from parents will assist learners to pass (63%). 78% of learners think that help from parents will assis them to pass. The bold statement that the students needed not support only got 50% of the subject advisor's vote.

Although the work of the administrators were highly rated (100%) by the subject advisors, they did not think the eLearning system or the teachers fulfilled the role of a companion (50%), neither did the students (39%, 37%).

Pedagogical section : Community aspect and Communicational aspect

No questions were asked to the subject advisors about this section, but the results of the students are included earlier in this chapter.

Pedagogical section : Technological aspects (subject advisors questions : 1, 2, 12, 14, 22, 24, 25, 26, 27, students 19, 31, 32, 34)

1 (19)	When it comes to working my computer….. *(19.When it comes to working my computer….. (student)*	90% 98%
2	I think the STUDENTS rate the average subject advisors computer skills as	80%
12	When YOU started out with the brainONLINE program, you had certain expectations. Was your support with the brainONLINE program what you expected?	60%
13	When the STUDENTS started out with the brainONLINE program, THEY had certain expectations. Do you think they got what THEY EXPECTED	55%
22	Getting to know the brainONLINE interface. When I started out with brainONLINE, it was easy	100%
(31)	*Getting to know the online system interface. When I started out with online system,) (student)*	70%
23	When I started out using brainONLINE, I was nervous and anxious	10% nervous
24	The usability of the interface of brainONLINE	80%
25	What do you think that the STUDENTS feel about the usability of the interface of brainONLINE	60%
(32)	*How easy was it to work with the online system? (student)*	84%
26 (33)	Connecting to the Internet and working on the Internet. *Connecting to the Internet and working on the Internet.*	80% 79%
27	If you were NOT to have access to the Internet and brainONLINE, do you think it would have made a difference in your learning	99%
(34)	*If you were NOT to have access to the Internet and online system, do you think it would have made a difference in your learning (student)*	75%

Both the subject advisors and the students reported very high levels of computer skills (90% and 98%). The subject advisors are confident that the students also rate their computer skills highly (80%). The subject advisors reported that they got what they expected in the eLearning resource (60%). Only 55% of the subject advisors thought the students got what they expected.

All the subject advisors found the eLearning system easy to master (100%), 90% said they were not nervous in getting to know it and 80% rated the overall useability good. Only 70% of the students found the system easy at the outset. In another question 84% of the students said they found working with it easy . Only 60% of the subject advisors thought the students would find it easy. Thus the subject advisors seemed to have found the system easy to get to know, while the students seemed to have more difficulty in getting to know the system. Both parties seemed to have found it rather easy to work with once they got to know it.

Almost all the subject advisors (99%) thought that not having access to such a system would have hampered the student's studies, while only 75% of the students themselves thought so.

Overall the technological aspects of the system is viewed positively by both the subject advisors and students. It does not however, replace the humans involved, ie teachers and parents. They do not see the eLearning resource as a companion, but rather the parents and teachers, and to a lesser extent the fellow students.

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