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

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

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

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.

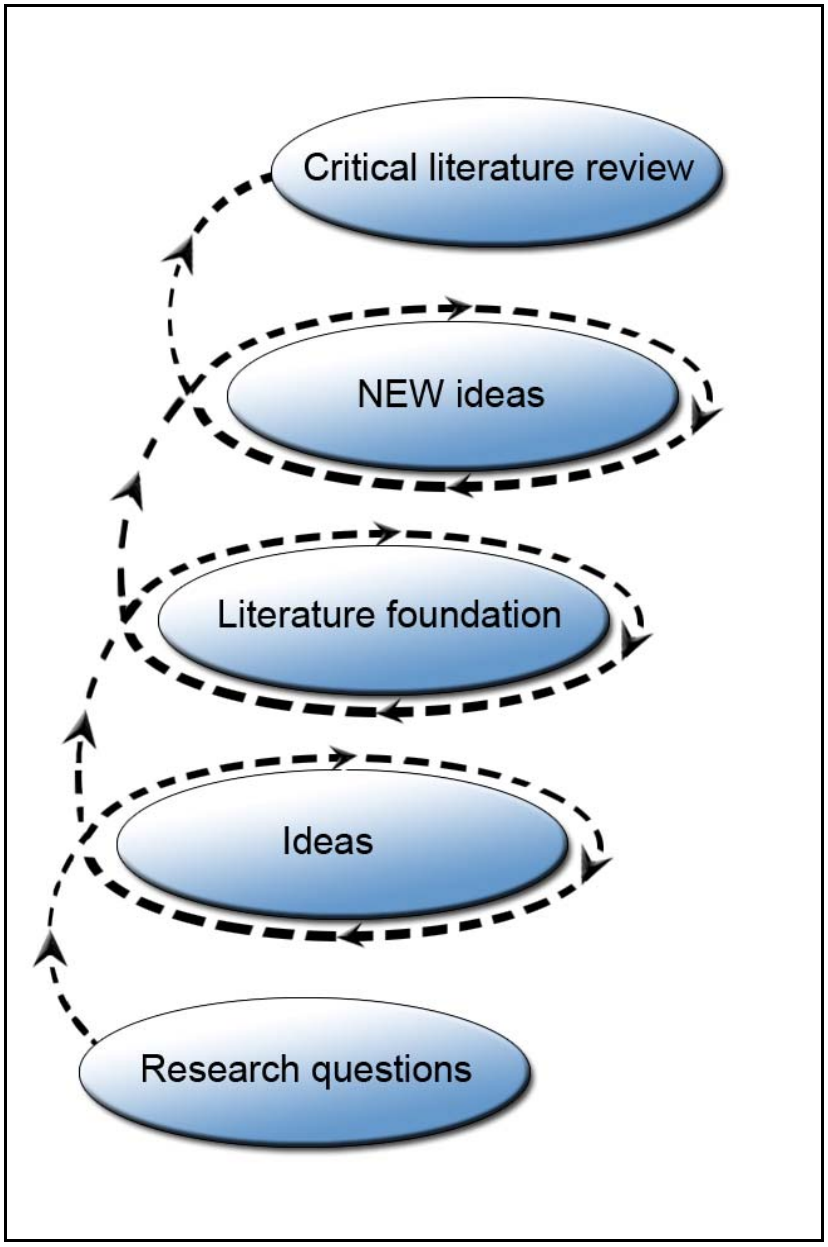

Figure 2 : Literature review process
(Saunders, 2000) Adapted and simplified from Saunders et al (2000).
The picture shows how I used the literature review process in this research.

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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- General issues in eLearning.
- Historical phases and trends in distance education
- eLearning models - Introduction

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.

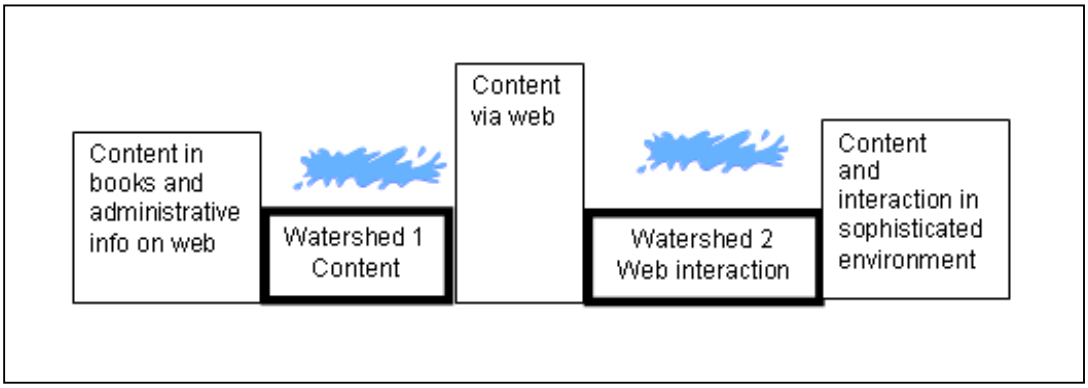


Figure 3 : The watershed-questions to determine web usage
This figure sets out the two watershed questions about web use that permit us to determine whether content is delivered online or not and the extent to which the conventional classroom is replaced by online interactions.

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.

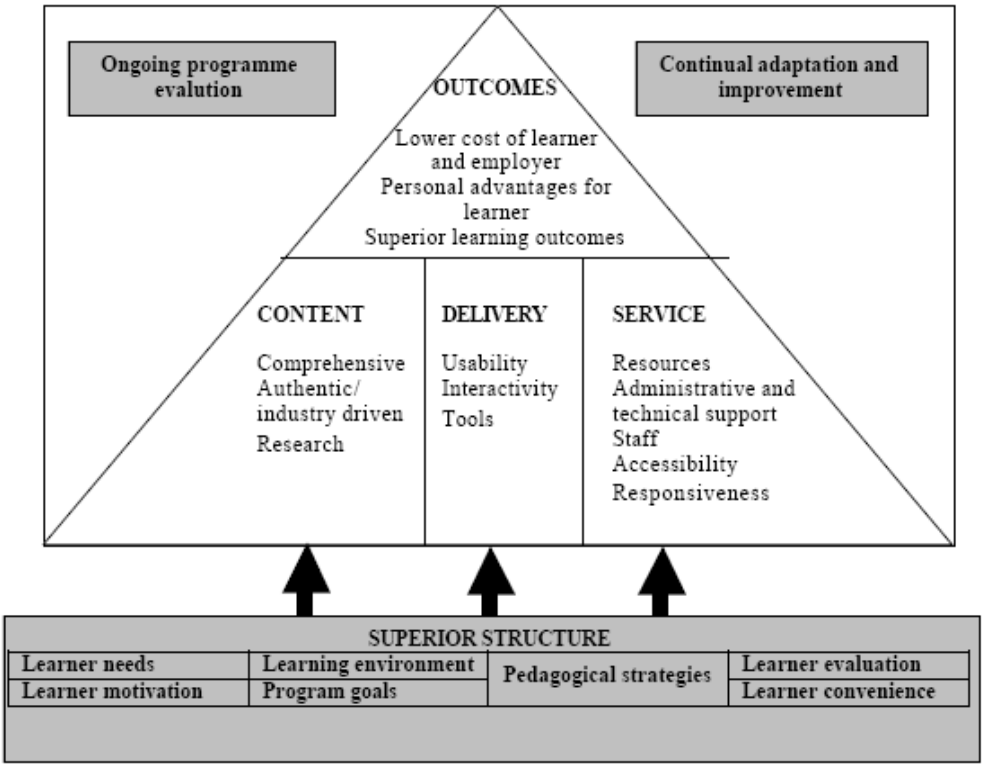


Figure 4 : The Demand-driven learning model
(MacDonald, 2001)

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.

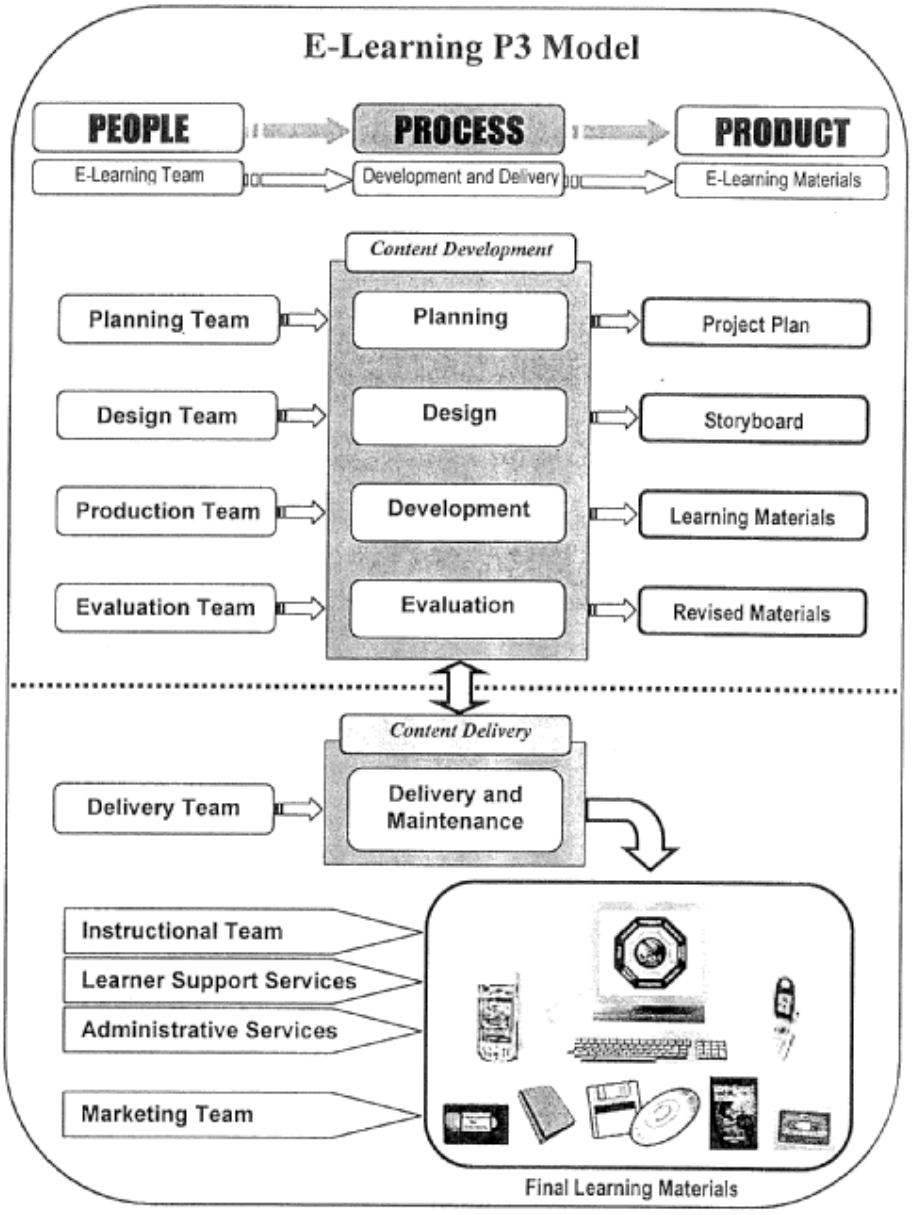


Figure 5 : Khan's ELearning P3 Model
Khan provides a comprehensive picture of eLearning in his ELearning P3 People-Process-Product model, and his diagram (above) sets out the relevant roles and responsibilities assigned by the model.

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.

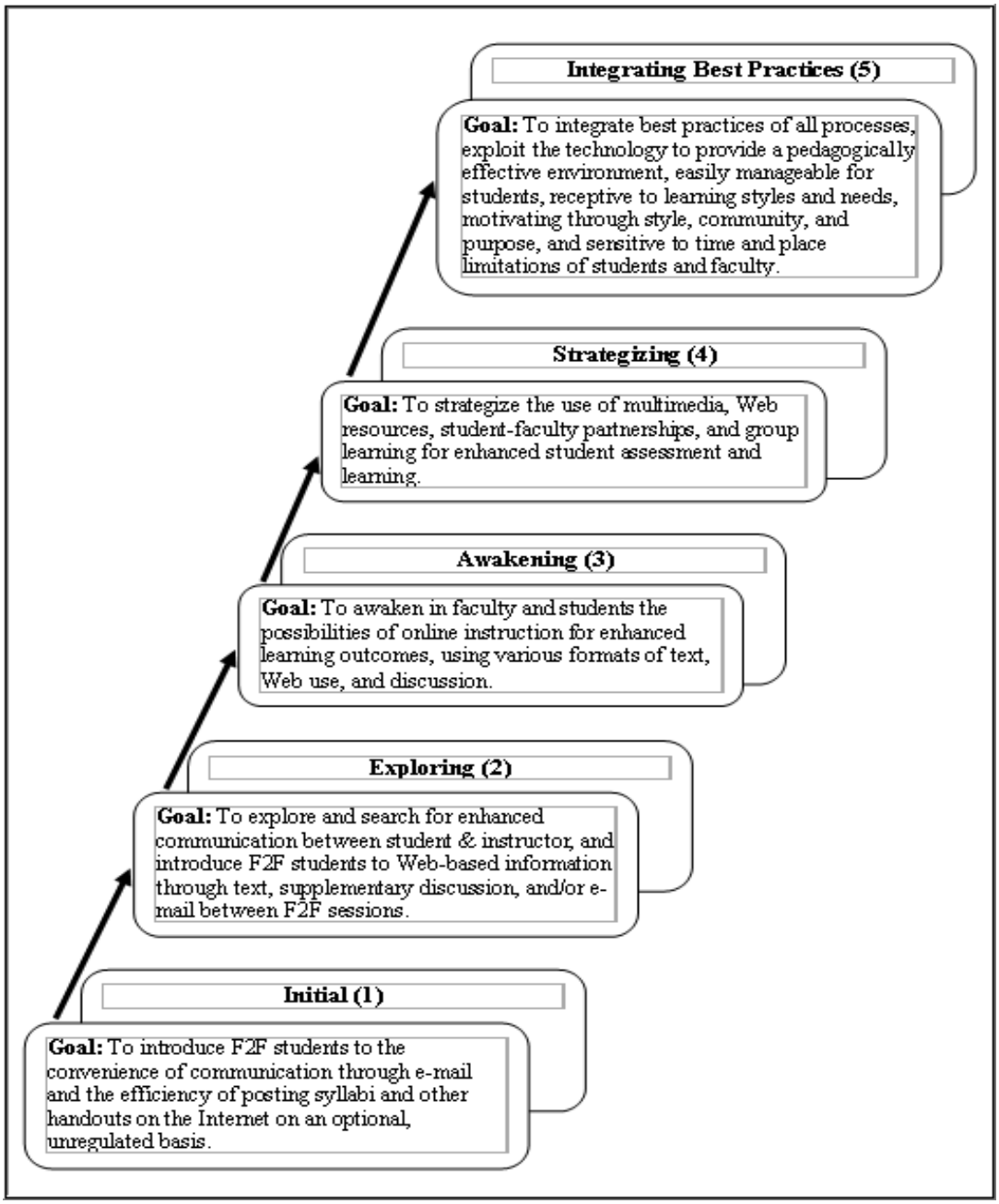


Figure 6 : Neuhausers Maturity Model
Neuhauser's Online Course Design Maturity Model offers a guide to the improvement of any eLearning enterprise

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)

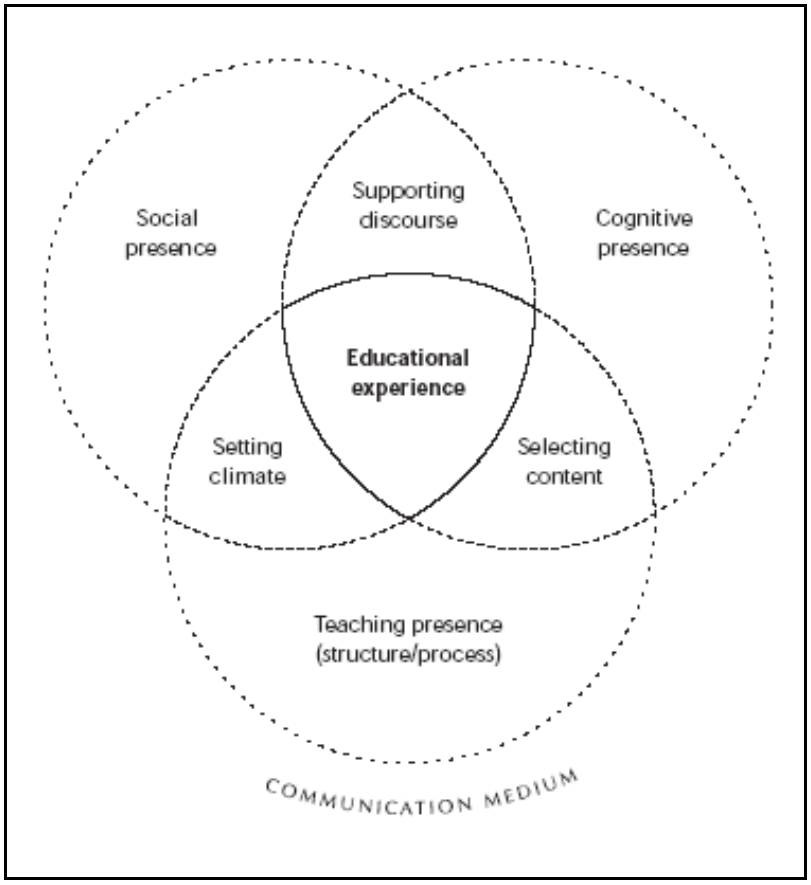


Figure 7 : Garrison, Anderson, Archer : Community of Learning Model
(Garrison, 2003)

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.

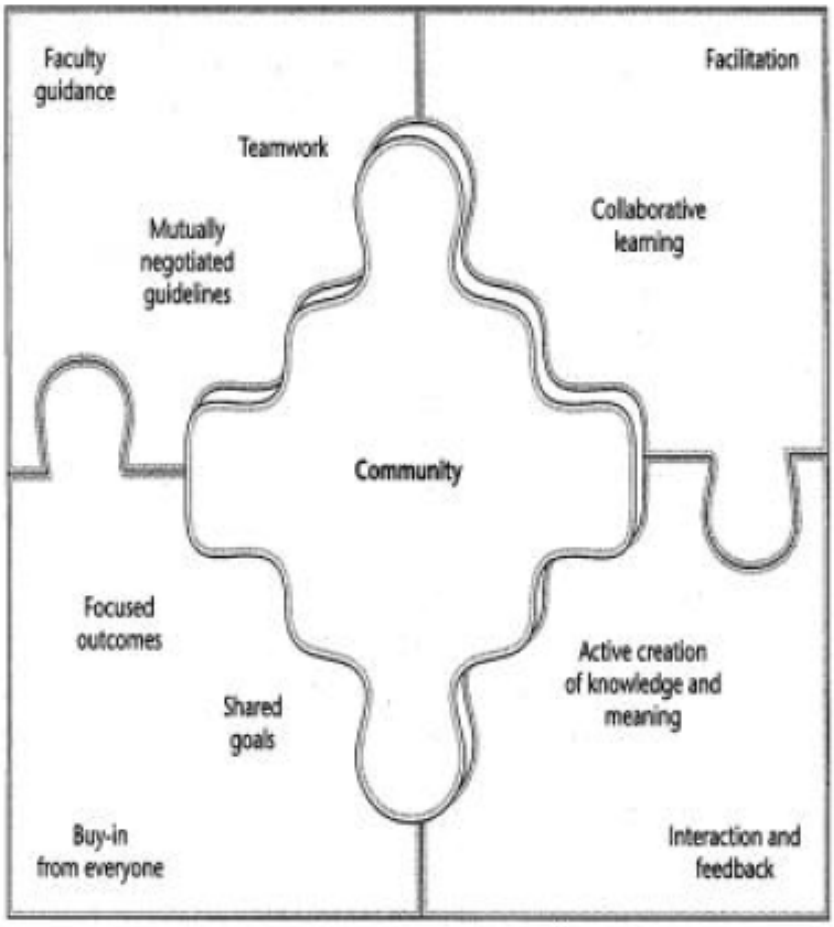


Figure 8 : Palloff and Pratt's model places the learning community firmly on the centre of the metaphorical online learning puzzle
(Palloff, 1999)

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.

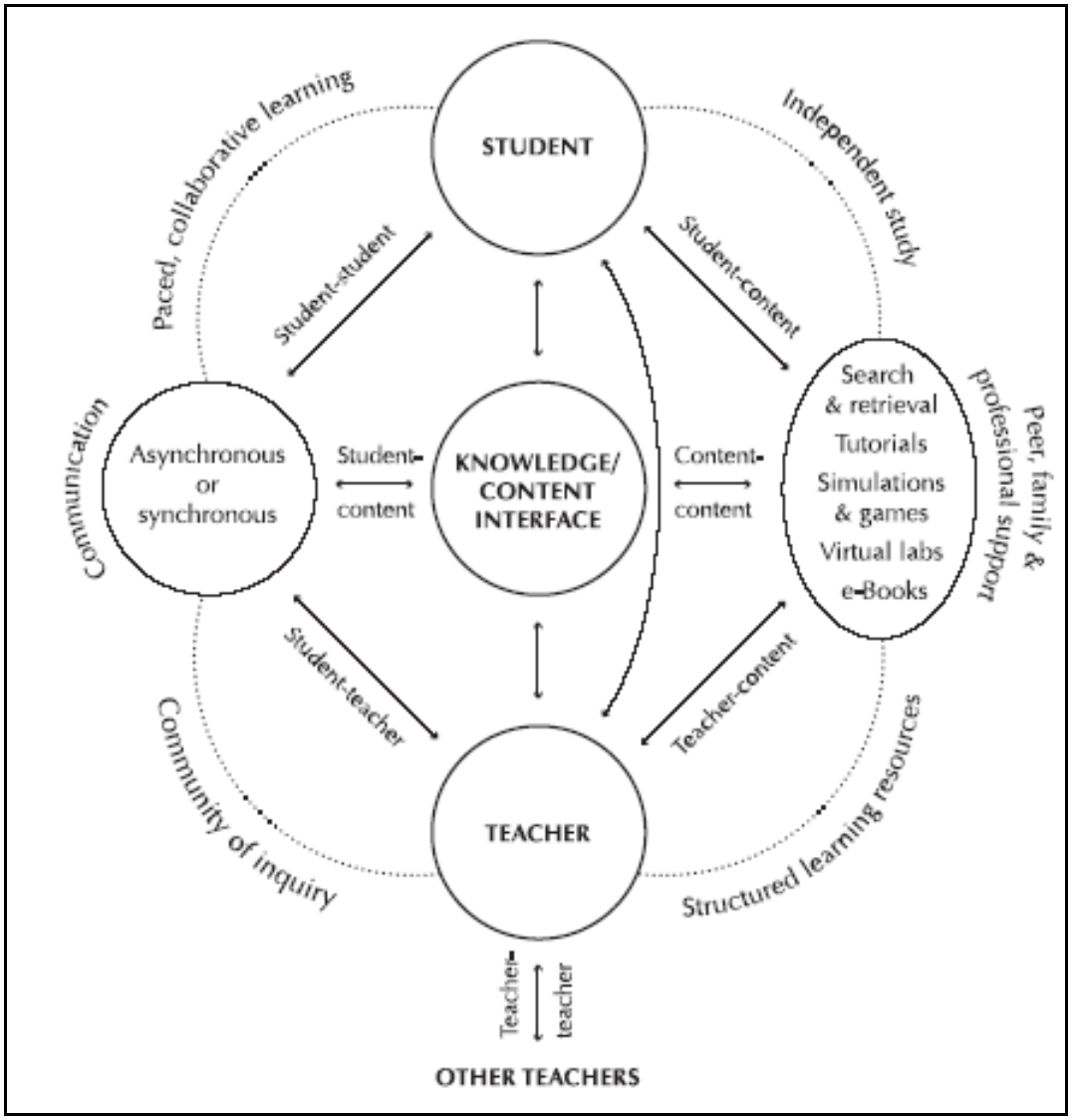


Figure 9 : Anderson's Model of ELearning (Anderson, 2004)
This figure explains Anderson's model of eLearning

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.

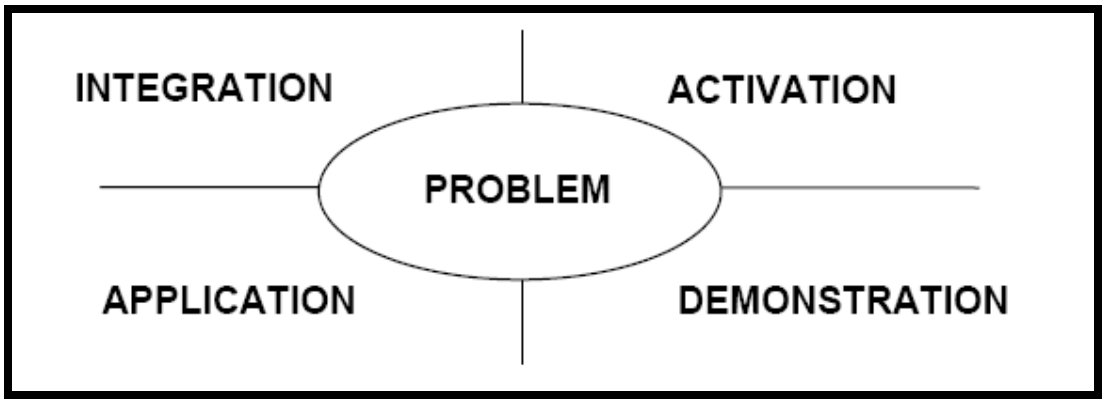


Figure 10 : First principles of instruction (Merrill, 2002)
This figure shows the principles of instruction indicated by Merrill. Merrill's understanding is that these elements are necessary components of all instructional design.

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.

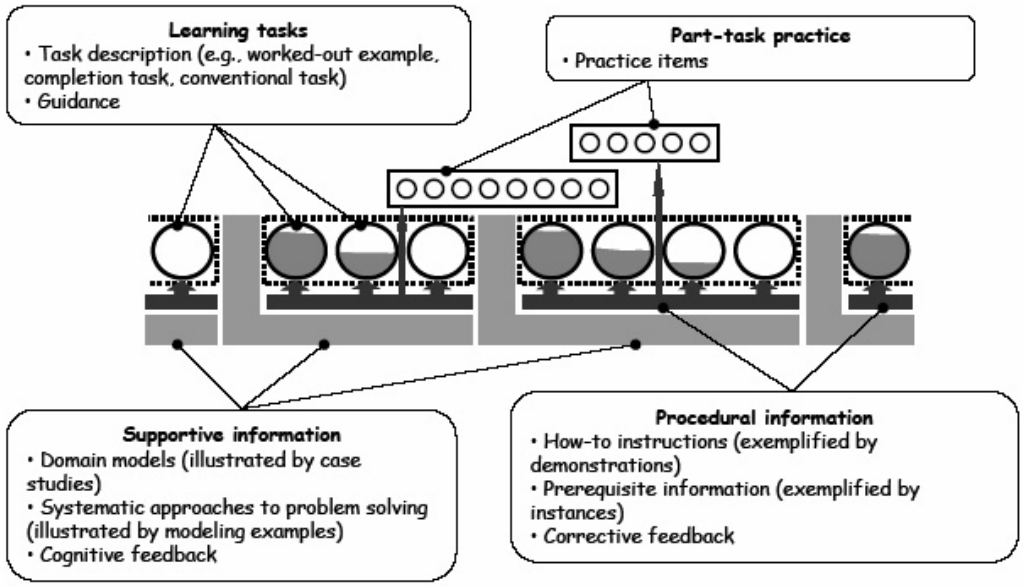


Figure 11 : A schematic overview of the four components in the 4C/ID-model and their main elements. (Van Merrienboer, 2004)

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).

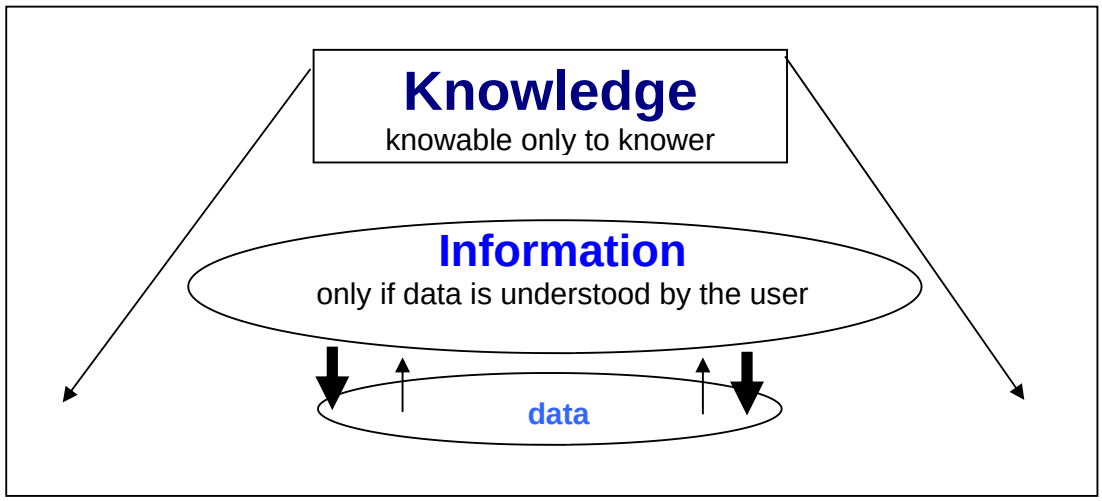


Figure 12 : My interpretation of the different ways in which Wilson defines data, information and knowledge (Wilson, 2000)

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.

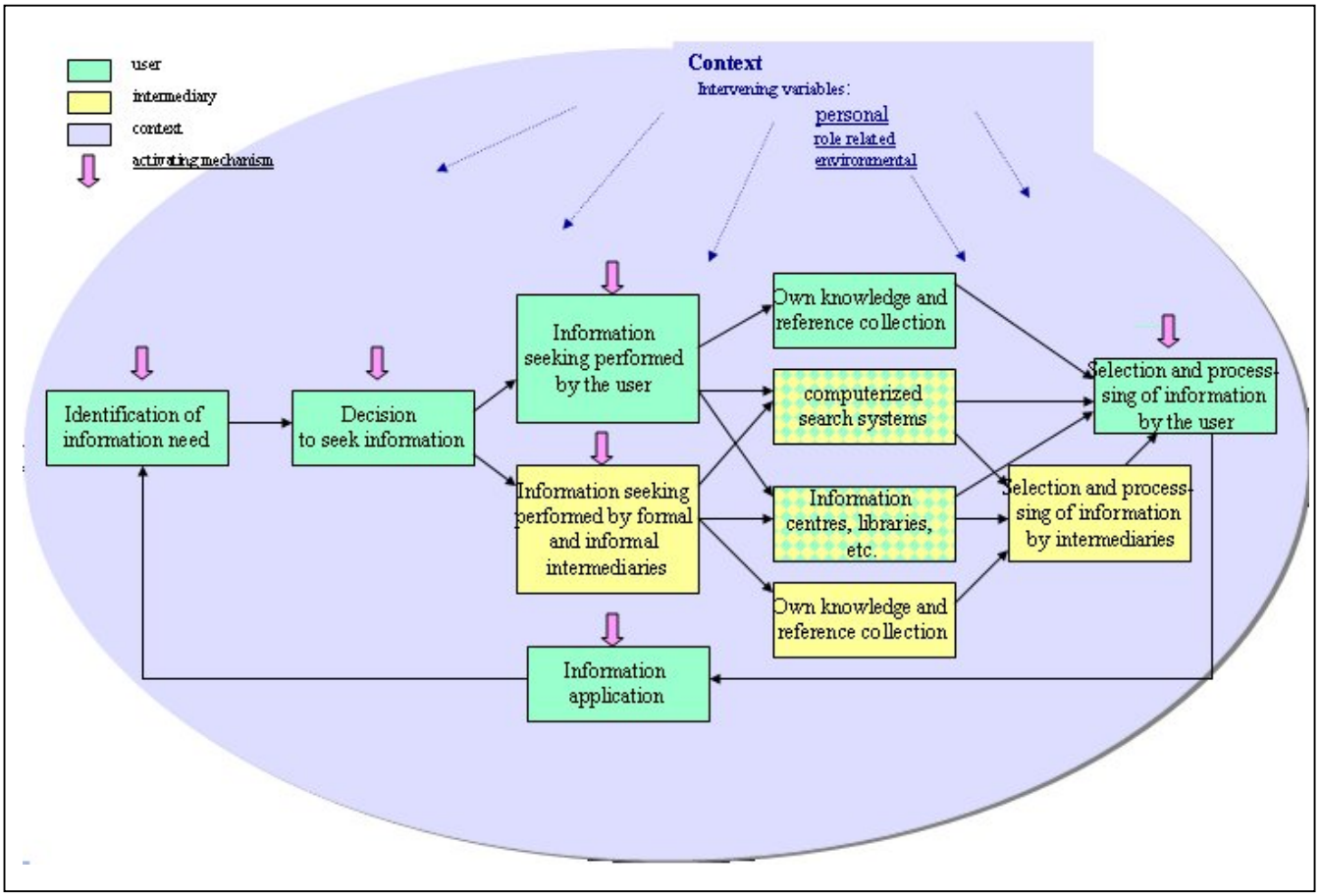


Figure 13 : Wilson's 1996 model of information behaviour as augmented by Niedzwiezka

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.

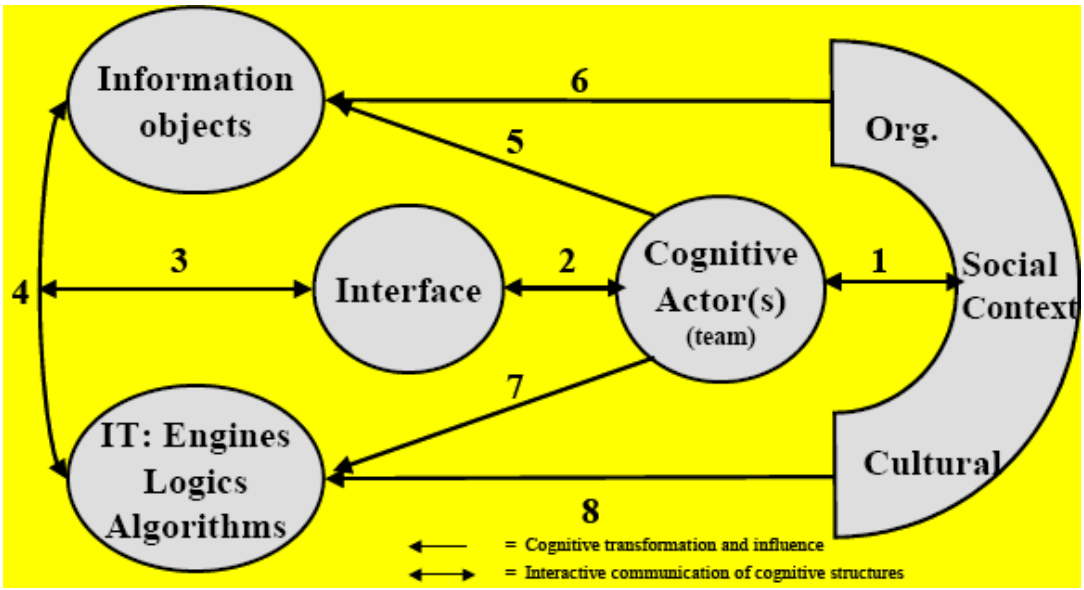
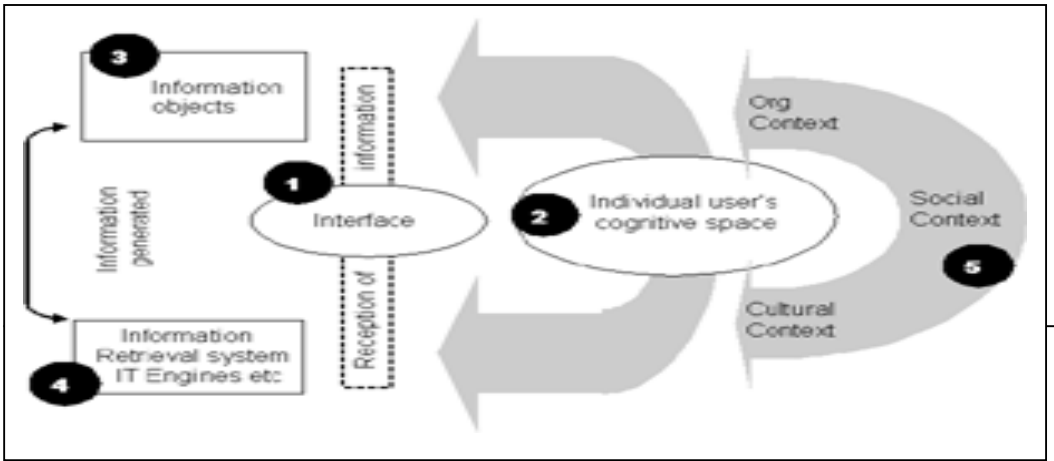


Figure 14 : Ingwersen's 2004 cognitive model of Information Search and Retrieval

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.

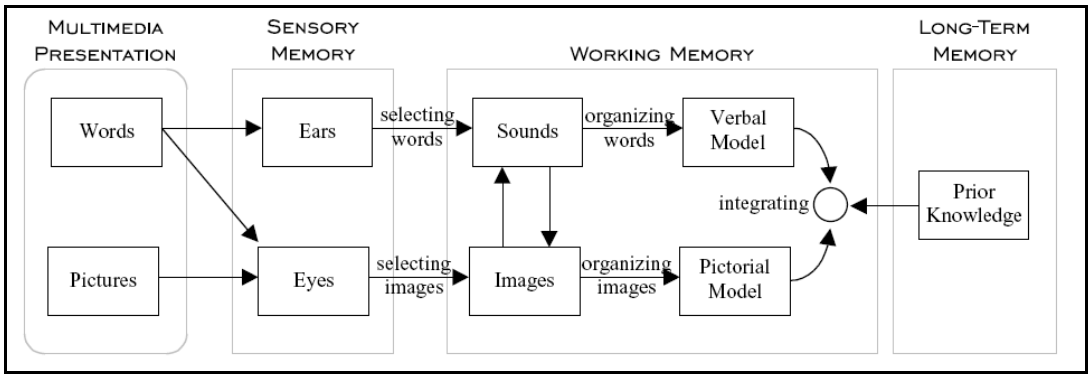


Figure 16 : Cognitive theory of multimedia learning by Mayer
The figure shows the model of Mayer with two input channels

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.

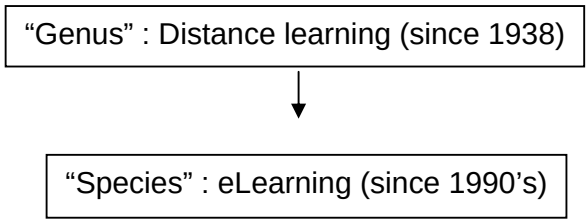
> Literature review POSITIVE pointer 11: Issues that are relevant to how people in general learn are also relevant to how people learn in an online environment. We can therefore only benefit from examining what those who have gone before us learned from the difficulties that they faced and overcame.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

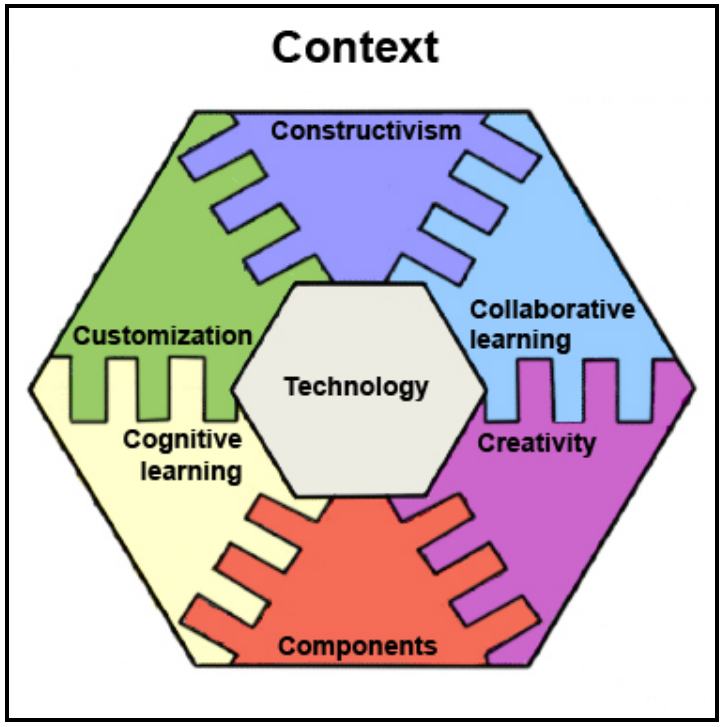


Figure 17 : Framework of the Hexa-C Metamodel by De Villiers
(De Villiers, 2002)

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).

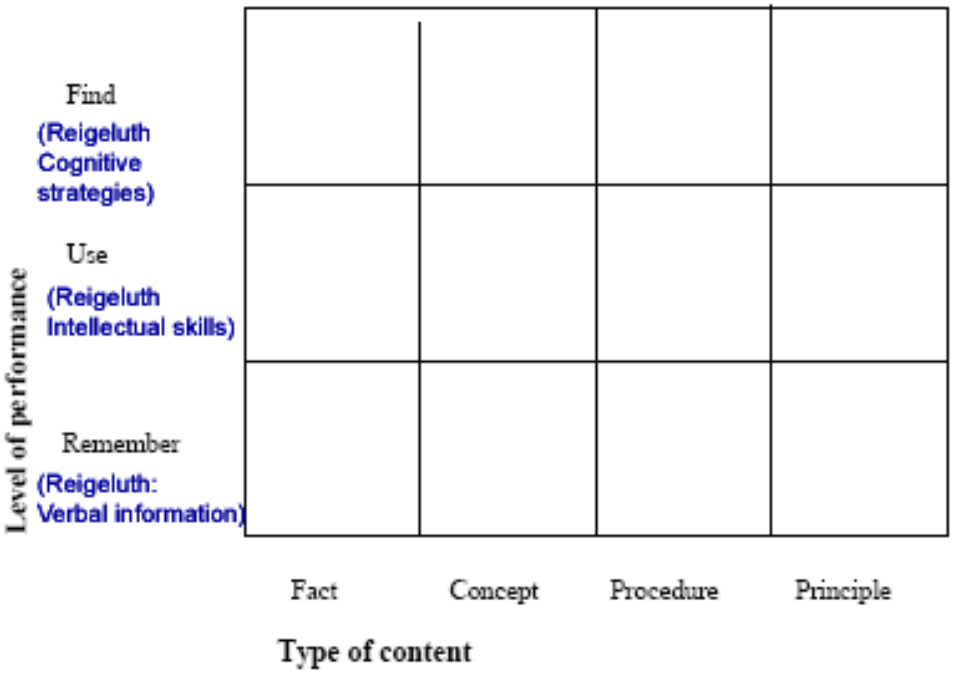


Figure 18 : Merrill's performance -content grid for CDT
(Merrill, 1983)

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).

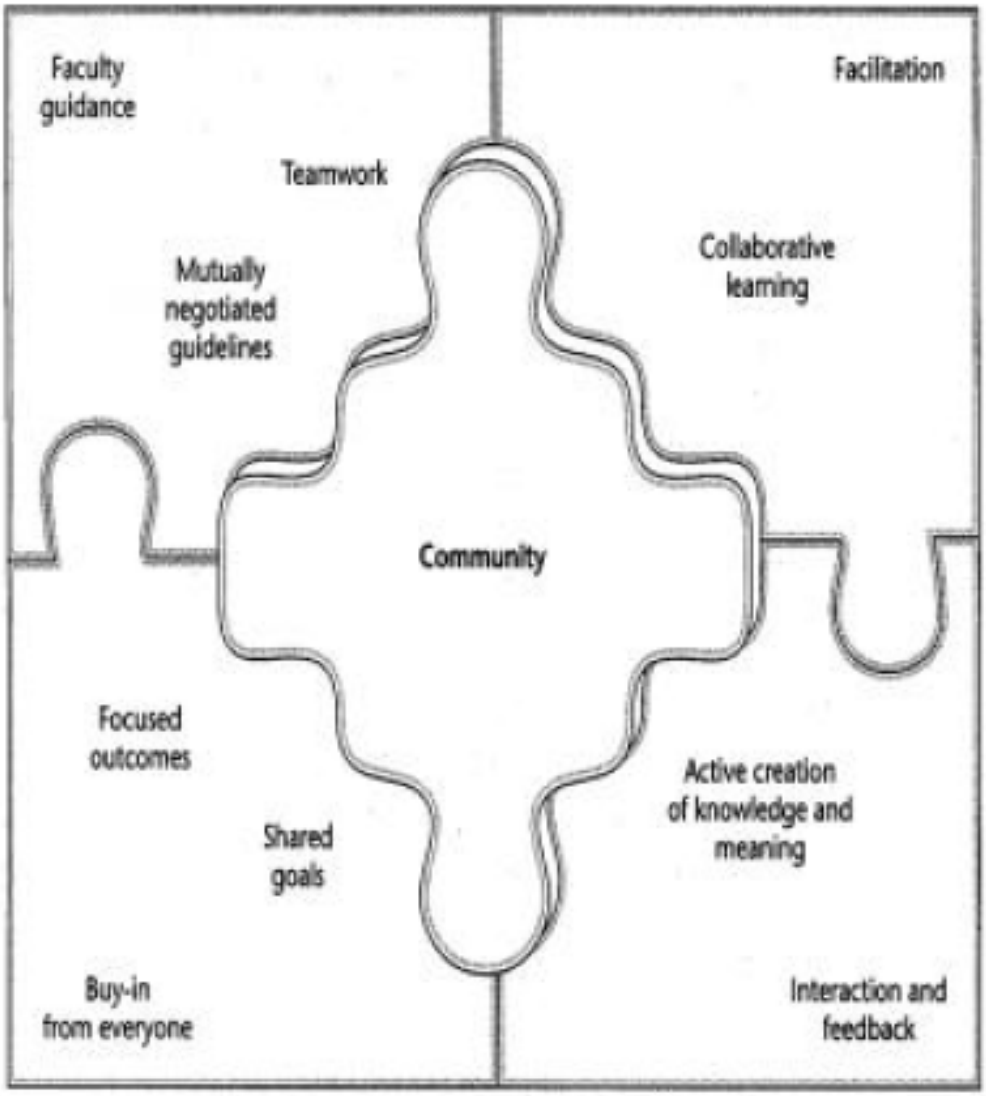


Figure 19 : Palloff and Pratt's view of a learning community being central to to puzzle of online learning
(Palloff, 1999)

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
What worked in online communication according to the literature
What did NOT work in online communication according to.
Lurking
General findings in literature about online communication.
Suggestions to enhance online communication in literature.
Weblogs - Blogs and Wiki's.
Instant messaging.
Journals.
Collaborative issues.
Social issues.
Social and community elements.
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.

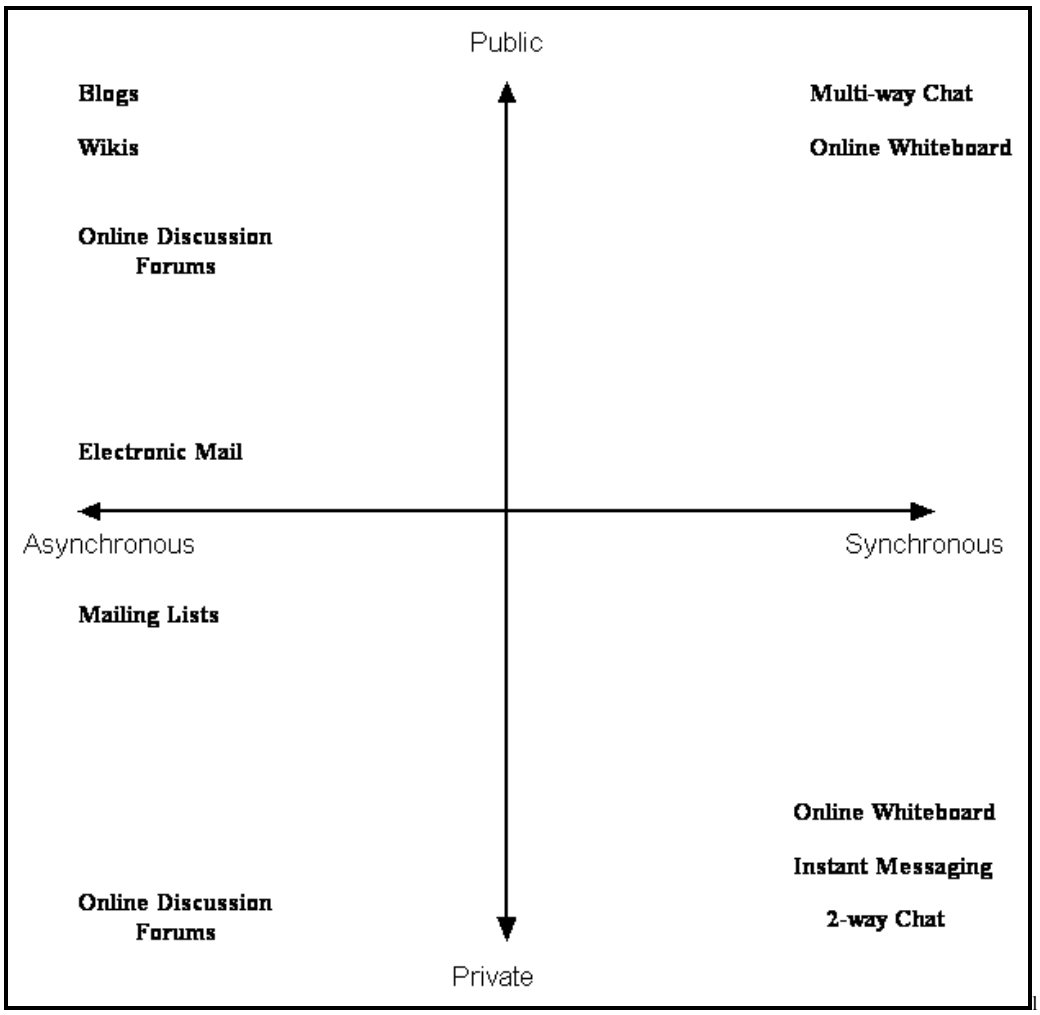

Table 12 : Computer-supported communication and collasboration tools located according to public-private and synchronous-asynchronous dimensions.
(Hemandez-Ramos, 2004)

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

……
……
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.