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

by

Johannes Cronje

Submitted in partial fulfillment of the requirements for the degree 
Doctor Philosophiae

in the

Faculty of Engineering, the Built Environment and Information 
Technology

UNIVERSITY OF PRETORIA

Supervisor : Prof. Dr. J.C. Cronje,

February 2008
High School eLearning

Abbreviated Extract

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

Candidate
J Cronje BA. BD. B Comm.

Supervisor
Prof Dr JC Cronje

Department
Information Science

Faculty
University of Pretoria, Faculty of Engineering, the Built Environment and Information Technology

Degree
Doctor Philosophiae

Abstract

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

Keywords

eLearning, online learning, web learning, virtual school, high school, K-12, MOODLE, open source, Learner management system, content management system, eLearning, web learning, Internet, Internet learning
Abbreviated Table of Contents

1. CHAPTER 1 INTRODUCTION, BACKGROUND AND RESEARCH PROBLEM................................................................. 34
   1.1. Introduction ........................................................................ 34
   1.2. Background ....................................................................... 35
   1.3. Problem identification ...................................................... 38
   1.4. Purpose and objectives of study ..................................... 38
   1.5. Relevance of and need for the research ....................... 39
   1.6. Research question ............................................................ 42
   1.7. Research context ............................................................... 49
   1.8. Rationale and background for the study ...................... 49
   1.9. Uniqueness of the study .................................................. 51
   1.10. Purpose statement ........................................................ 52
   1.11. The scope of the study ................................................... 53
   1.12. Related research ............................................................ 54
   1.13. Research approach ......................................................... 56
   1.14. Research design .............................................................. 57
   1.15. Value of the research and beneficiaries ...................... 62
   1.16. Overview of the research report ................................. 63

2. CHAPTER 2 LITERATURE REVIEW ..................................................... 75
   2.1. Structure and principles of this literature review......... 75
   2.2. The eLearning landscape and models. ......................... 83
   2.3. Theme 1 – Pedagogical theories that inform an eLearning resource 148
2.4. Theme 2 – A learning community ......................................... 191
2.5. Theme 3 - Communicative, collaborative and social issues. 220
2.6. Theme 4 - Issues of technology and the interface ............ 275

3. CHAPTER 3 RESEARCH DESIGN AND METHODOLOGY .......... 308
3.1. Introduction ........................................................................ 308
3.2. Research problem and motivation for the study .......... 309
3.3. Research questions ........................................................... 309
3.4. Research paradigm .............................................................. 311
3.5. Research approach .............................................................. 313
3.6. Research strategy ............................................................... 317
3.7. Research design ................................................................. 319
3.8. Research methodology and data collection ................. 323
3.9. Implementation of the case study .................................... 342
3.10. What does the eLearning environment look like .... 345
3.11. Limitations and delimitations of the study. ................. 347
3.12. Issues of validity, reliability, procedures of authenticity and trustworthiness ......................................................... 349
3.13. Summary ....................................................................... 350

4. CHAPTER 4 ANALYZING THE CASE, EVIDENCE AND DISCUSSIONS 353
4.1. Answering sub-question 1 : To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource? ................................................................. 359
4.2. Answering sub-question 2 : Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning? ......................................................... 379
4.3. Answering sub-question 3 : In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource? ................................................................. 394
4.4. Answering sub-question 4: How and why do certain technological aspects and instructional design issues affect a high school eLearning resource?

5. CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

5.2. Summary

5.3. The answers to the subsidiary questions

5.4. Discussion

5.5. Recommendations:

5.6. Conclusion

6. REFERENCES

7. APPENDICES
# Table of Contents

1. **CHAPTER 1 INTRODUCTION, BACKGROUND AND RESEARCH PROBLEM.** .............................................................................................................................. 34

   1.1. **Introduction** .................................................................................................................................................................................. 34  
      Brief overview of the study......................................................................................................................................................... 34

   1.2. **Background** ................................................................................................................................................................................ 35  
      1.2.1. eLearning has seen a remarkable growth. ................................................. 35  
      1.2.2. Setting of this study.................................................................................. 37

   1.3. **Problem identification** ................................................................................................................................................................. 38

   1.4. **Purpose and objectives of study** ................................................................................................................................................ 38  
      The type of research goal for this study............................................................................................................................... 39  
      Purpose and objective............................................................................................................................................................... 39

   1.5. **Relevance of and need for the research** ..................................................................................................................................... 39

   1.6. **Research question** ............................................................................................................................................................................ 42  
      1.6.1. Main research question ........................................................................... 42
      1.6.2. Supporting questions ............................................................................. 42  
      1.6.2.1. To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource? .................. 44  
      1.6.2.1.1. A general outline of educational learning theories...................... 45  
      1.6.2.1.2. A summary of cognitive learning theories – the Six Cs model ...... 46  
      1.6.2.1.3. Multiple intelligences ........................................................................ 46  
      1.6.2.1.4. Models and theorizing about e-learning ........................................ 47  
      1.6.2.2. To what extent and why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning? 47  
      1.6.2.3. To what extent and why do certain communication, collaboration and social elements influence a high school eLearning resource? ........ 48  
      1.6.2.4. To what extent and why do certain technological aspects and instructional design issues affect a high school eLearning resource? .......... 48

   1.7. **Research context** ................................................................................................................................................................................. 49

   1.8. **Rationale and background for the study** ...................................................................................................................................... 49  
      1.8.1. Why this study was undertaken .................................................................... 49

   1.9. **Uniqueness of the study** ................................................................................................................................................................. 51

   1.10. **Purpose statement** .............................................................................................................................................................................. 52

   1.11. **The scope of the study** ................................................................................................................................................................. 53  
      1.11.1. What is included in the study ................................................................. 53  
      1.11.2. What is excluded from the study ........................................................... 53
1.12. Related research ................................................................. 54
    The research context in South Africa ............................................ 54

1.13. Research approach ............................................................ 56
    The research approach ............................................................... 56
    Theoretical framework .............................................................. 57
    Sampling ..................................................................................... 57

1.14. Research design .................................................................. 57
    1.14.1. Type of study ........................................................... 57
    1.14.2. The subject and participants of the study ............... 58
    Why I chose this case study ....................................................... 58
    More information about the research group ................................ 59
    1.14.3. Research methodology ........................................... 59
    1.14.3.1. Research method ............................................... 59
    1.14.3.2. Data collection methods .......................................... 59
    1.14.3.3. Matrix of research questions and methods – The Intellectual Puzzle 60
    1.14.4. The researcher and his position in the study ........... 60

1.15. Value of the research and beneficiaries .............................. 62

1.16. Overview of the research report .......................................... 63

2. Chapter 2 Literature Review ................................................... 75

2.1. Structure and principles of this literature review .......... 75
    2.1.1. Introduction ............................................................. 75
    2.1.2. Grand structure of the literature review ................. 75
    2.1.3. The literature review process .................................. 76
    2.1.4. Principles adhered to during the literature review process 77
    Funnel approach ........................................................................ 78
    Reference approach .................................................................... 78
    Reflections and significant implications ................................. 79
    The method I used to conduct the literature review ............... 79
    2.1.5. Theoretical construct of the title ......................... 80
    High school ............................................................................. 80
eLearning ...................................................................................... 80
Desirable ... features ............................................................... 80
Workable ... features ............................................................... 81
an eLearning resource ........................................................... 81
Sustain ...................................................................................... 81
eLearning communities .......................................................... 81

2.2. The eLearning landscape and models. ............................... 83
    2.2.1. What is eLearning .................................................. 83
    2.2.1.1. Literature on eLearning definitions ....................... 83
Literature on high school eLearning is scarce ......................... 83
eLearning is a new science ....................................................... 84
The relative novelty of the term “eLearning” ......................... 85
Essential differences between distance learning, eLearning and open-learning: ................................................................. 86

General definitions and opinions: ................................................................. 87

Perhaps the most widely used definition of distance education that is also relevant to eLearning, is that of Keegan: ................................................................. 89

In spite of the comprehensiveness of Keegan's definition, we find a more appropriate, flexible, useful and current definition in that of Ally: ....................... 90

2.2.1.2. Implications and value of an investigation into how definitions of eLearning have a bearing on this research. ......................................................... 91

The definitions that I adduced above ranged from simple statements to complex reflections: ................................................................. 91

On the basis of the critical examination of the literature that I investigated, I venture the following definition of high school eLearning: ................................................................. 91

2.2.2. General issues in eLearning: ................................................................. 92

2.2.2.1. Literature about different issues in eLearning: ............................... 92

1. The effect of technological limitations on the infrastructure: ....................... 92

2. Financial constraints: ................................................................................. 93

3. Human resources: .......................................................................................... 93

4. Learner-student acceptance: ........................................................................... 93

5. Lecturer acceptance: ...................................................................................... 93

The nature of the new networked society and the kind of new skills that are required by the workplace and eLearning: ................................................................. 94

Why eLearning ventures and strategies fail: ................................................................. 96

Issues that determine success or failure in the eLearning market: ....................... 97

The importance of online learning: ......................................................................... 99

Boud’s four questions for determining quality in eLearning: ............................... 100

Barriers to distance education: the perceptions of educators: ....................... 100

2.2.2.2. Implications and value of general issues in eLearning for this research: 101

The issues that I extracted from the literature have the following implications for this study: ................................................................. 101

2.2.3. Historical phases and trends in distance education leading to eLearning: ................................................................. 104

2.2.3.1. Literature on historical phases and trends in distance education leading to eLearning: ................................................................. 104

The relationship between human beings and technology until the present – the emergence of "technopoly": ................................................................. 104

Moving from the industrial to (post)modern era – a warning against extreme positions: ................................................................. 105

Present day technology – five levels of web use in education: ............................... 105

Engelbrecht (Engelbrecht, 2003) conceptualises the evolution of eLearning in three distinct phases: ................................................................. 107

The first phase in models of eLearning (according to Engelbrecht 2003) was concerned with content, service to the customer (user), and content and technology: ................................................................. 108

The second phase in models of eLearning (according to Engelbrecht 2003) concerned instructional design models: ................................................................. 109

The third phase in models of eLearning (according to Engelbrecht 2003) is concerned with learning communities: ................................................................. 110

2.2.3.2. Implications and value of literature on historical phases and trends in distance education that led to eLearning for this research: 111

2.2.4. eLearning models - Introduction: ................................................................. 113

2.2.4.1. Literature on eLearning models: ................................................................. 113
In this section I will investigate models that attempt to understand the most characteristic features of eLearning. Van Merriënboer (Van Merrienboer, 2004) notes that from a teaching perspective, eLearning is still in its infancy. The constant emergence of new eLearning models needs to be investigated. The way in which I chose models for research and description is as follows:

2.2.4.2. Demand-driven Learning Model explained
2.2.4.3. The ELEarning P3 model (People-Process-Product)
2.2.4.4. The Online Course Design Maturity Model (Maturity Model)
2.2.4.5. The community of inquiry model developed by Garrison and Anderson.
2.2.4.6. Palloff and Pratt’s – community-central model
2.2.4.7. Anderson's Model of eLearning – learner, teacher, content...
2.2.4.8. Merrill’s First Principles of Instruction
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. Two pedagogical models that are consistent with van Merriënboer's 4c/ID are Case-Based Teaching and Project-Centred Learning.

2.2.4.10. Models on information behaviour – Wilson, Ingwersen and others
2.2.4.11. Cognitive theory of Multimedia learning
Sweller (Sweller, 1988) was the first researcher to propose a cognitive load theory. Mayer (Mayer, 2001a) continued to undertake research in this area.

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

2.3. Theme 1 – Pedagogical theories that inform an 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. eLearning is rooted in Distance Education. 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. Instructional theory acknowledges the importance of sound pedagogical principles. Learning is fundamentally a social activity. Constructivist learning holds that there is a world we experience. 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... Cronje (Cronje, 2001, Cronje, 2000) discusses the possible integration of the apparent “opposites” of objectivism and constructivism. Behaviourist mastery learning theory...

Cronje (Cronje, 2001) notes that cognitive constructivist learning contrasts with behavioural learning theory...
These “opposites” are two different constructs, with different outcomes. The following assumptions of cognitive learning are adapted from Merrill (1991), an exponent of radical constructivism. How can educationists reconcile the application of constructivism, behaviourism and cognitivism for learners in schools? It was Bruckman’s experience (Bruckman, 2003) that she had to use traditional external motivation to scaffold constructionist courses.

2.3.2. Behaviourism

Behaviourist learning theory asserts that learning outcomes are demonstrated by observable measurable behaviour. The eLearning Guild (E-learning_Guild, 2004) describes behaviorism as a learning theory.

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

2.3.4. Hexa C Meta Model - Cognitive learning

As a result of the major weaknesses of behaviorism, paradigm shift from teacher focus to medium of instruction. De Villiers (De Villiers, 2002) positions constructivism and pragmatic instructionism (which evolved from cognitive learning) within the cognitive family as two opposing polarities. 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. Children demonstrate meta cognition in an online project. Vocabulary analysis shows increased sophistication. Reflecting on performance by means of weblogs helps students and teachers to see the links between theory and practice. Weblogs and discussions are pedagogically significant because they break down the walls that surround the classroom. Superficial eLearning in the form of rote memorization.

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

2.3.6. Hexa C Meta Model – Constructivism

Constructivism originates from Bruner’s theoretical framework for instruction. Development of cognitive structures. Constructing one’s own reality. Learning is an active process. Intrinsic motivation, cognitive readiness, and the social negotiation of meaning. De Villiers (De Villiers, 2002) condensed the general features and characteristics of constructivism as follows: 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. Some students resist constructivist approaches and prefer traditional approaches. Some learners prefer face-to-face “comfort zones” rather than online courses. The brightest and most independent students benefit from constructivist approaches.
When constructivist courses are difficult to implement, they should be augmented with guided construction. .......................................................... 174

Online courses require more creative imagination and skill than conventional instruction. .......................................................... 175

Dick and Carey (Dick, 1996) argue that "boring instruction" is the product of approaches that are inherent limited in scope and flexibility ........................................ 175

The computer can act as an "over-the-shoulder" guide to learners. .......... 176

Online learning must be anchored, contextualised and useful in practice... 176

Psychological motivation includes attention, relevance, confidence and satisfaction.................................................................................................. 176

2.3.7. Hexa C Meta Model – Creativity and motivation... 177

Motivation and creativity are strongly related: ........................................ 177

Stealth education with games (interesting learning environments based on stealth educational principles) increase the effectiveness and power of the learning experience. .......................................................... 177

Experiences of success and positive emotions increase motivation. .......... 178

2.3.8. Hexa C Meta Model – Customization ................. 178

Flexible learning and customization.......................................................... 178

2.3.9. Hexa C Meta Model – Collaboration and cooperative learning .......................................................... 179

Difference between collaborative and cooperative learning ....................... 179

Key elements in cooperative and collaborative learning.............................. 180

Nelson’s (Nelson, 1999) theory of collaborative problem solving .................. 181

The following paragraphs present what the literature says about the practical application of collaborative learning .......................................................... 181

Collaborative learning is usually used in constructivist environments in which learners explain and justify their points of view ........................................... 181

When children learn together in network of science clubs, they learn much more than science. ...................................................................................... 182

Children succeed in the social dimension of learning online. ...................... 182

Students in online learning environment write four times more than others who do not have access to an online cooperative learning project. ............... 183

2.3.10. An add-on to the Hexa C Meta Model – Companionship.......................................................... 184

I add “companionship” as a significant possible contributor to the success or failure of learners involved in online high school learning. ......................... 184

Harris (Harris, 1995) bases his ideas of companionship on principles he finds in the Bible. .......................................................................................... 184

A companion is more than a facilitator or a moderator ................................ 185

Closely related to this concept, the literature in general is very clear about the importance of the role of a facilitator, moderator or mentor ............................. 185

In the paragraphs that follow, the practical applications of companionship in the literature are discussed.......................................................... 185

Students who were preparing for SATS and who appointed mentors tended to view more and study more ............................................................ 185

The facilitator's/moderator's role. ................................................................. 186

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. .......................................................... 186

The most advanced stage of skill development is found in Aristotle’s notion of practical wisdom .......................................................... 187

Embodied presence is essential if skill development is to go beyond the stage of mere competence. .................................................................................. 188

2.3.11. Implications and value of literature on pedagogical theories in this research ................. 188
2.4. **Theme 2 – A learning community** ................................................. 191

2.4.1. **Definitions of an eLearning community** .......................... 191

What is a learning community? ......................................................... 191

The difference between a community of learning and a community of practice .................................................. 191

What is a social community – one in which communication takes place? ......................................................... 191

Analyzing the word “community”.................................................. 192

Some definitions of a learning community ........................................ 192

The origins of the virtual or online community can be traced to the Electronic Information Exchange System (EIES) implemented in 1976 ................................ 192

According to Baten (Baten, 2004), a learning community in general might best be described by what it "looks like" in practice ........................................ 193

A learning community comes into being when a curriculum is deliberately restructured to link relevant coursework in a particular way .................................. 193

Penn State’s College of Education ...................................................... 193

Cascadia Community College (Cascadia, 2004) describes a learning community as a variety of learning strategies designed around a common theme or question ............................................................... 193

2.4.2. **Characteristics of an eLearning community** .................. 194

One cannot produce a workable and desirable eLearning resource merely by moving education and learning online ......................................................... 194

Learning communities are communities in which participants help and support one another in their learning ................................................................. 194

Learning communities are communities in which support and participation are indispensable components of the online experience ........................................ 194

Learning communities are communities in which there is a subtle shift away from individual performance towards a community knowledge that is jointly constructed ................................................................. 194

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 ........................................ 195

Learning communities are communities where teaching and learning are interchangeable; everyone is always involved in both ........................................ 195

The Palloff and Pratt Model: A sense of community is indispensable to a learning community and a learning community is indispensable to online learning ................................................................. 196

Learning communities are communities in which there is a common sense of purpose ................................................................. 197

Learning communities are communities in which independent research is important ......................................................... 198

Improving online support by creating learning communities at Unisa ......................................................... 198

Learning communities are communities in which entrenched patterns of thought are challenged with a view to constructing a more viable kind of understanding ................................................................. 198

Shared activities lead to shared understanding ......................................................... 199

2.4.3. **Taxonomy of an eLearning community** ....................... 200

2.4.4. **The role of online instructors in a learning community** ................................................................. 202

Cavanaugh’s meta-analysis accords a critical role to online teachers in high school eLearning ................................................................. 202

Andersons three critical roles of an online teacher ......................................................... 202

Facilitating discourse is a key task of the facilitator ......................................................... 203

The successful facilitation of discourse requires hard work ......................................................... 203

Teachers feel that their hard work goes unnoticed ......................................................... 204

The implications of the different roles for the online facilitator – an online facilitator should not lecture online ......................................................... 205
Practical suggestions for facilitators. ........................................................... 207
An eLearning teacher should first establish trust by making optimal use of introductory comments. ........................................................... 208
The lack of contact and feedback from teachers becomes a precursor of failure........................................................... 208

2.4.5. **User and personality issues in a learning community.** 209

2.4.5.1. **Gender differences in a learning community.** ................. 210
Gender differences are already detectable in the type of games built by boys and girls in a controlled learning project. ........................................ 210
Gender differences were found in how different genders search the web... 210
Males are abstract, logic and rule driven, and females are concrete, bottom-up thinkers ........................................................... 211

2.4.5.2. **Multiple intelligences, learning styles, thinking styles and personality types in a learning community** ................... 211
Seven multiple intelligences – Gardner .................................................. 212
Mind Styles (cognitive styles) ............................................................... 213
David Kolb’s (Kolb, 1983) Learning Style Model ...................................... 213
Sternberg’s 1988-1997 theory of thinking styles ...................................... 214
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: .................................................................................. 214
A number of studies reported positive effects when they took these perceptual modalities into account. .................................................. 215
Some studies, however, reported that approaches to learning styles makes no difference......................................................................... 216

2.4.5.3. **Motivational issues in a learning community** ...................... 217
If children are allowed to create their own environment, they will become motivated. ............................................................. 217
Attention and motivation should be benchmarks in the creation of intrinsically interesting learning environments for children ........................................ 217

2.4.6. **Implication of literature on learning communities in this research** ................................................................................ 217

2.5. **Theme 3 - Communicative, collaborative and social issues.** 220

2.5.1. **The tools of online communication** ................................... 220

2.5.2. **Face to face versus online learning.** ................................. 222
Hong Kong school learners prefer fae-to-face learning to online learning. 222
Learners who expressed a preference for group work in discussions said that they would like to engage in group work again................................... 222
Solving problems through online discussions is more rewarding than face-to-face discussions and fewer messages are generated.............................. 222

2.5.3. **The nature of online discussions** ...................................... 223
Types of communications in online discussions ...................................... 223
When too many new topics are introduced into a communication forum, attention is diverted unconsciously away from really important online discussion topics................................................................. 223
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 ................................................................. 223
The time of day during which learner discussions normally take place in online courses is the afternoon. ............................................................ 224
How students classified their own contributions to computer-mediated discussions ........................................................................ 224
Personalization effect – better learning with conversational style. .......... 225
The difference between debate and dialogue – dialogue being the preferred mode in online discussions ................................................................. 225
Text-based discussion has its own specific dialect which is colloquial...... 225
The communication setting and the type of task has an influence on results. .................................................................................................................. 225
Students prefer summarised feedback from online facilitators: expectations and value by students. Students want summaries. ......................... 226
New creative ideas (such as audio emails) are needed to entice students to participate ........................................................................................................ 226
New “voice” for teachers and learners in an online environment .......... 226

2.5.4. What worked in online communication according to the literature ................................................................. 227
Eleven strategies to promote online discussions ..................................... 227
Only the course calendar, posted lecture notes and quizzes improved course involvement ................................................................. 227
Delport (Delport, 2003) found that if lecturers interact frequently with discussions, email, contact, etc., learners perceive the learning environment to be varied and challenging ................................................................. 228
Benefits of discussion forums with threaded discussions ....................... 229
Increased social presence leads to more communication, and privacy brings comfort online ................................................................. 229
Setting goals for a conversation and using supportive and probing comments add to the success of discussions ................................................................. 229
Good teacher communication designs lead to more frequent use of tools . 230
Abbott’s factors that make e-communication projects work ...................... 230
A successful online instructor should be a “reflective colleague” .............. 230
Adapting asynchronous communication to meet the seven principles of effective teaching ................................................................. 230
A lively conversational group helps to create a community through relationships and interactions ................................................................. 231
Students who prefer a face-to-face class also to have an online component. .................................................................................................................. 231
Discussions have a positive outcome in final examinations in research by Althaus ................................................................. 231
After participating online, an improvement in the quality of comments is experienced ................................................................. 232

2.5.5. What did NOT work in online communication according to the literature ................................................................. 232
Research on asynchronous and synchronous communication is lacking .... 232
Learners did not develop a significant degree of discussion .................... 232
Competition does not promote cooperation ................................................ 232
Users in chat rooms do not want to be recorded ...................................... 233
Female learners requested more information but did not like to explain issues in online discussions ................................................................. 233
Worrying aspects of online discussions in reality ...................................... 233
Learners spend most of their time in forums socialising and not on tasks . 233
Discussions centred on sharing and comparing information rather than on constructing knowledge ................................................................. 234
Students do not automatically take to discussions (positive and negative aspects of online discussions) ................................................................. 234
Simply making discussion forum available is not enough to motivate usage. .................................................................................................................. 234
When students are forced to participate in discussion forum, unnecessary communications are generated ................................................................. 234
Learners misuse guest lecturers for their own interests ............................ 235
Computer communications undermine the enjoyment of good stories ...... 235
2.5.6. Lurking....................................................... 237
The top five reasons for lurking.................................................. 237
Discussion forums allowed students to ask questions they would not normally ask in class.......................................................... 238
Wenger (Wenger, 2004) talks about big lurking groups and small core groups in discussions involving large groups ........................................... 238

2.5.7. General findings in literature about online communication........................................... 238
Positive correlation between discussions and grades........................................... 238
Personality type and discussions.................................................................. 239
The Internet lowers inhibitions................................................................. 239
Synchronous communications are preferred for writing collaboratively........... 239
A tool to assess online discussions............................................................ 239
Increased activity due to online communication........................................... 239
Time is needed for sophisticated discussion............................................... 239
Computer conferencing is more effective in handling evaluative tasks.............. 240
Female learners dominated social discussions. Synchronous discussion is good for sociability and asynchronous discussion is good for learning tasks. ........................................................................................................ 240
Patterns of engagement seem to be persistent and early intervention is needed.................................................................................. 240
Vocabulary shows an increased sophistication when users participate in discussion forums................................................................. 241
It is a surprise finding that the threaded discussion component does not satisfy students or increase performance.......................................................... 241

2.5.8. Suggestions to enhance online communication in literature ........................................... 241
Online teachers should include scaffolding aids in their online discussions. 242
Why learners are drawn to conflict in online discussions – a lack of cues .... 242
Suggestions for more productive interaction online....................................... 242
Factors that influence successful online discussions – planning, netiquette, etc................................................................. 242
Media-rich messaging may overcome the disadvantage of a lack of visual clues in online discussions................................................................. 243
Asynchronous discussions are for reflection and synchronous discussions are for quick thinking................................................................. 243
Feedback plays a critical role in the dialogue between online tutors and learners – different perspectives on feedback................................................................. 243
It is better to build a learning community with synchronous communication than with asynchronous tools (Fisher, 2002). ............................................. 244
A strategy to prompt students in discussions – summarise a few postings and ask a question................................................................. 244

2.5.9. Weblogs – blogs and wikis........................................... 244
Weblog (blogs). Because they are published in public, students spend more time in preparing them................................................................. 246
Blogs published either in private or public have educational merits.................. 247
The pedagogical significance of blogs and online discussions........................... 248
The pedagogical significance of blogs and discussions being able to break down the walls around the classroom................................................................. 248
Weblogs that are used with reflection on performance can help to make link with reality................................................................................................. 249
Blogs can be used to expose students to a wide audience and help them to become active creators of knowledge................................................................. 249
Blogging raises the standard of written and published text............................. 250
2.5.10. Instant messaging ................................................................. 250
2.5.11. Journals ............................................................................. 251
2.5.12. Collaborative issues .......................................................... 251
2.5.12.1. The nature of collaboration in literature ......................... 251
Successful collaboration is more than just group interaction ............... 251
Collaboration energises learners ......................................................... 252
Because of the lack of non-verbal cues, specific attention must be given to
expressions in online environments ..................................................... 252
2.5.12.2. What worked in collaboration according to the literature ...... 253
Reaching understanding collaboratively in an online forum led to much deeper
understanding ...................................................................................... 253
Perserverence, aptitude, ability and quality of instructional events are
essential .............................................................................................. 254
It is important for collaboration to have a real purpose ....................... 255
2.5.12.3. What did NOT work in collaboration according to the literature
Merely listening is not considered sufficient in the online environment ..... 255
2.5.12.4. General findings in terms of collaboration in the literature ..... 256
Children learn together in a network of science clubs ......................... 256
2.5.12.5. Suggestions about collaboration in the literature ............... 257
Discussion is always a vital feature in defining an online learning community.
............................................................................................................. 257
Project-based learning activities with feedback are essential ............... 257
Feedback must be timeous and promote higher order learning ............ 257
The recommended class size is no more than 20 to 30. Small and big groups
are both necessary ................................................................................ 257
The following table shows that economies of scale can be achieved, using the
Internet .................................................................................................. 258
Recording why a student exits from a communication session ............. 258
If collaboration is not accompanied by clear guided assistance, the time taken
to collaborate may discourage activity .................................................. 259
Serim (Serim, 1996) feels that the Internet will help more student's to have
their work published ............................................................................ 259
Learning is situated, embedded in activity, context and culture ............. 259
2.5.13. Social issues ....................................................................... 260
Learning may best be achieved through social construction ................ 260
The nature of the new networked society ............................................. 260
Online learning means more than “pressing keys”. It also means social and
cognitive engagement ........................................................................ 261
Students expect active and challenging media .................................... 261
Fisher is of the opinion that online courses should always commence with a
face-to-face contact session ................................................................. 261
Czerniewicz (Czerniewicz, 2001) argues (as many others do) that, wherever
possible, online courses should include a face-to-face component ............ 261
A network course with no face-to-face contact may leave participants feeling
isolated .................................................................................................... 262
Online learning in isolation by means of a resource whose design makes no
allowance for social interaction may engender student dissatisfaction and
unhappiness .......................................................................................... 262
If one wants to act correctly towards other people, one first has to get to know
them ....................................................................................................... 263
Appropriately descriptive personal profiles of participants in a course are a
significant aid to socialisation and communication in a course ................ 263
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 ........................................................................ 264
Creating an online presence for oneself when participating online is a challenge. ................................................................. 264
Personal absences from online discussions should be visible to other participants. .............................................................. 265
Online social identities and online presences need attention to be successful. ........................................................................ 265

2.5.14. Social and community elements. .......................... 266
Set roles ensure proper functioning .......................................................... 266
Mind-body separation (as a result of new technology) may be problematic. 266

2.5.15. Games, fun and learning. ...................................... 267
Children are nearly always eager to interact with media when they have been personalised and when they are intuitive and enjoyable to work with. 267
Combining eLearning with entertaining activities ................................................... 267
Children obviously prefer games to schoolwork. ............................................. 267
Games are played for social reasons. ............................................................. 268

2.5.16. Implications and value of literature on communicative, collaborative and social issues for this research. .......................................................... 268
Communication issues ................................................................................. 268
Collaborative issues ..................................................................................... 271
Social issues ................................................................................................ 272

2.6. Theme 4 - Issues of technology and the interface ........... 275
2.6.1. General............................................................................. 275
2.6.2. Setting up an eLearning resource - Choosing an eLearning interface – objectives. ...................................................... 275
2.6.2.1. Platforms investigated ......................................................... 275
Open source platforms and the choice of MOODLE ....................................... 275
2.6.2.2. Webhosting hardware and services .................................. 276
2.6.3. eLearning applications – an overview of features and capabilities ............................................................................... 277
Synchronous and asynchronous communication in eLearning resources... 277
Types of online activities in an eLearning resource – as described by Heydenrych (Heydenrych, 2001)................................................................. 278
Important characteristics of eLearning resources summarised in the Edutools.info Project................................................................. 282
Communication tools should aid “awareness” ............................................. 283
Interface design for digital courses – principles............................................. 284
Tabbers (Tabbers, 2004) suggests principles for designing digital courses. 284
Richard Mayer’s work on cognitive load and multimedia learning......... 285
Mayer’s ten research-based principles for the design of multimedia instructional messages. ................................................................. 287
Basic principles of instruction – Merrill’s “First principles” ................. 288

2.6.4. Student experiences and evaluations of eLearning. 289
What surveys reveal about student experiences........................................... 289
Hara and Kling (Hara, 2000) also quote some positive comment, which should not be ignored. They include: ............................................................. 290
Pincas (Pincas, 1998) offers some reasons for the unfortunate .................... 291
In evaluating WebCT, students found the following: ................................ 291

2.6.5. Costs and cost-effectiveness of eLearning. ............... 292
Eight propositions to lower the cost of eLearning ........................................ 292
Cost-effectiveness under the spotlight............................................................ 292
The cost of one online course is $100 000............................................... 293
2.6.6. Overall practical lessons learned about eLearning resource implementations. .......................................................... 294

Combined use of printed and online resource reduces costs significantly. .......................................................... 294

The use of a call centre to support online resource suggests that most calls do not need to be answered by a professor. .......................................................... 294

Webserver logs analysis are useful. ..................................................................................................................................................................................................... 294

Logging visits to a site is more useful than a “hit” on a site. .................................................................................. 295

The challenge is to keep online learning alive. ........................................................................................................... 295

Hyperlinks to information outside courses should be used to keep it “web-like”. ..................................................................................................................................................................................................... 296

The challenge to eLearning lies in the instructional design. .................................................................................. 296

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: ..................................................................................................................................................................................................... 296

Learning strategies that support various types of learners should be implemented. .......................................................... 297

What is required is open-ended thinking together with problem solving and critical thinking. .......................................................... 297

Three steps to create a learning environment. ........................................................................................................... 298

Retention is improved in learning in proportion to the number of senses that are used. ..................................................................................................................................................................................................... 298

The virtual universities and the “hamburger” universities .................................................................................. 299

How Unisa accepts and processes assignments. ........................................................................................................... 301

The overall challenge in an online learning environment is to get a number of disparate elements to work together effectively at the same time. ..................................................................................................................................................................................................... 301

Students may sometimes do only what is required to pass a course and nothing more.......................................................... 301

Ideal eLearning response time to communication – opinions from some European universities. ..................................................................................................................................................................................................... 302

Lazenby (Lazenby, 2002)) found that when students are given their course content on CD, they tend to ignore the eLearning resource. .......................................................... 302

The Semantic Web – the future of the Internet medium. .................................................................................. 303

2.6.7. Implications and value of the literature about the technological components of this research. ................. 305

3. CHAPTER 3 RESEARCH DESIGN AND METHODOLOGY ................. 308

3.1. Introduction .......................................................................................................................................................... 308

3.2. Research problem and motivation for the study .......................................................................................... 309

3.3. Research questions ......................................................................................................................................... 309

3.4. Research paradigm. ........................................................................................................................................... 311

Positioning this research in Burrel and Morgan’s research paradigm ..................................................................................................................................................................................................... 312

This research falls into the Interpretivist quadrant ........................................................................................................... 313

3.5. Research approach. .......................................................................................................................................... 313

The nature of qualitative study ..................................................................................................................................................................................................... 314

3.6. Research strategy ............................................................................................................................................ 317

This research is an explanatory case study ........................................................................................................... 319

3.7. Research design ............................................................................................................................................... 319
3.7.1. A summary of the research design for this study is presented below. ................................................................. 319
3.7.2. Research design - the case study of this research. ...

3.7.2.1. The case study group and background. .................. 321
3.7.2.2. The eLearning program used. .............................. 322
3.7.2.3. The process. ...................................................... 322
3.7.2.4. The samples ..................................................... 323

3.8. Research methodology and data collection. .............. 323
3.8.1. Research method ................................................ 323
3.8.2. Data collection methods ..................................... 324
3.8.3. Matrix of research questions and methods - The
Intellectual Puzzle ......................................................... 325
3.8.4. Observation ....................................................... 327
3.8.5. Electronic messages .......................................... 329
Advantages and disadvantages of textual documentation .......... 330
3.8.6. Literature review ............................................... 330
3.8.7. Questionnaires ................................................ 331
Questionnaire design .................................................... 334
Questionnaire 1 – personality type indicator – students .......... 335
Questionnaire 2 – students ............................................ 335
Questionnaire 3 – subject advisers .................................. 336
3.8.8. Sampling procedure with questionnaires ............ 337
3.8.9. Analysis of questionnaires ................................... 337
3.8.10. Computer generated log files and database content. 
3.8.10.1. The webserver logs ........................................ 337
3.8.10.2. The eLearning resource log files ...................... 338
Acquiring the online data from the eLearning database .......... 339
3.8.11. Interviews ....................................................... 340
3.8.11.1. Focus groups ............................................... 340

3.9. Implementation of the case study ............................. 342
3.9.1. Setting up the system - Choosing an eLearning
interface – objectives ................................................. 342
Platform used ............................................................. 342
Aims and purpose of implementing the eLearning platform in the researched
organisation ............................................................... 343
Pedagogical and educational aims of the system were taken care of inside
each subject ............................................................... 343
3.9.2. Implementation the basic hardware and software
systems ................................................................. 344
Webserver ..................................................................... 344
Webserver hardware (2004, 2005) .................................. 344
Webhosting ................................................................... 344
3.9.3. Setting up the system - course materials ............. 344
Available materials ported to the eLearning interface ........... 344
3.9.4. Introducing the eLearning platform to the users,
subject advisers and administrative staff .......................... 345
Training session with subject advisers and administrative personnel .. 345
3.9.5. Accessing course content. ........................................ 345

3.10. What does the eLearning environment look like.......... 345

3.11. Limitations and delimitations of the study. ................. 347

3.12. Issues of validity, reliability, procedures of authenticity and trustworthiness. .................................................. 349

3.12.1. Member checking, peer reviews and crystalization. ....... 349

3.13. Summary...................................................................... 350

4. CHAPTER 4 ANALYZING THE CASE, EVIDENCE AND DISCUSSIONS

4.1. Answering sub-question 1 : To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource? ................................................................. 359

4.1.1. The overal academic results were favourable ...... 359

4.1.2. Results from the questionnaires and interviews about pedagogics.......................................................... 363

4.1.2.1. The views of learners and subject advisers about cognitive science in the eLearning resource................................. 363

4.1.2.2. The view of learners and subject advisers about constructivism in the eLearning resource................................. 365

4.1.2.3. The views of learners and subject advisers about Component Display Theory in the eLearning resource................................. 367

4.1.2.4. The views of learners and subject advisers about customization in the eLearning resource................................. 369

4.1.2.5. The views of learners and subject advisers about creativity and motivation. 370

4.1.2.6. The views of learners and subject advisers about collaboration in the eLearning resource................................. 372

4.1.2.7. The view of learners and subject advisers about companionship. 374

4.2. Answering sub-question 2 : Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning? .............................................. 379

4.2.1. Results of an analysis of the opinions of learners about various aspects of community in the eLearning resource. 379

4.2.2. The personality type of the learners ....................... 383

The first questionnaire comprised a set of questions drawn up by the researcher to give the basic personality profile of each Learner. .......... 383
Personality profile of learners .............................................................. 383
A member-check form was designed for this personality profile ........ 384

4.2.3. Patterns of online activity by the learners .................... 385
4.2.4. Patterns of online activity of the subject advisers .......... 387
4.2.5. Ratio of subject advisers to learners .............................. 390
The average class size is calculated here as 57 learners in 2004 and 62
learners in 2005 .......................................................... 391

4.3. Answering sub-question 3: In what way and why do
certain communication, collaboration and social elements influence a
high school eLearning resource? ......................................................... 394

4.3.1. Did the learners adequately exploit the opportunities
for communication inherent in the eLearning resource? ....... 394
4.3.2. Reachability and preferences of learners in terms of
communication? ........................................................................ 395
4.3.2.1. How do learners prefer to be contacted? .................... 395
4.3.2.2. How reachable were the learners on their cell phones? ....... 396
4.3.2.3. How reachable are learners by means of email? .......... 398
4.3.3. How did the learners use the chat facility of the
eLearning resource? .............................................................. 399
4.3.3.1. Chat data is mostly of social nature ......................... 399
Learners were frustrated when they went online but there was no one
there .......................................................... 400
The learners felt that the chatroom’s social forums worked well for casual
talking .......................................................... 401
4.3.3.2. Analysis of CHAT data in terms of gender, totals and averages. 401

4.3.4. How did the learners use the discussion forums
facility of the eLearning resource? ........................................... 402
Learners felt that the feedback from subject advisers and on forums
should be faster .......................................................... 405
Private emails and discussions .......................................................... 405

4.3.5. Learners that were active or were isolated? ............ 405
4.3.6. Learners that “lurked” (i.e. were learners who never
chatted or posted replies in forums)? ................................. 406
In 2004 42% of learners neither chatted nor posted any reply .......... 407
A large percentage of learners lurked ........................................... 407

4.4. Answering sub-question 4: How and why do certain
technological aspects and instructional design issues affect a high
school eLearning resource? .......................................................... 410

4.4.1. Computer skills and attitudes of learners and subject
advisers .......................................................... 410
Both subject advisers and learners reported very high levels of computer skills
(90% and 98%). .......................................................... 410
Connectivity, cost and speed .......................................................... 412
The learners felt that it was important for course material to be provided
on CD and not just on the Internet ........................................... 413
Video clips and videos of face-to-face workshops were important to the
learners .......................................................... 413
4.4.2. What was found in the implementation of the basic hardware and software systems ........................................... 414
    Webserver hardware and software........................................... 414
    Web speed comparison between international and local internet service providers......................................................... 415

4.4.3. Setting up the system - course materials ............... 416
    Available materials ported to the eLearning interface.......................... 416
    Uploading to the eLearning resource – useful information extracted ... 416
    The figures for March 2004 showed the peak caused by the uploading of course material in that month................................. 417
    How the denial of service (DoS) attack created abnormal bandwidth usage and disruption ................................................ 417
    Creating the user interface in the courses........................................ 418
    Customized course creation ........................................................................ 419
    Development costs of the course material ........................................ 420
    My estimate is that, in real terms, the minimum development cost in South Africa would be around R20 000 or (US$3 000) per course 420

4.4.4. Setting up the system - Users and Facilitators ......... 421
    Enrolment prerequisite for learners: the necessity to have both Internet access and email......................................................... 421
    Number of users on the system ............................................................. 421
    The personal data captured in learners' personal profiles are made up of a number of entries. These included 422
    The number of learners who added a picture of themselves (customisation). ............................................................. 422

5. CHAPTER 5 CONCLUSION AND RECOMMENDATIONS ............... 425

5.1. Introduction .............................................................................. 425

5.2. Summary.................................................................................. 425

5.3. The answers to the subsidiary questions ......................... 427
    5.3.1. To what extent do certain pedagogical theories and eLearning theories inform a high school eLearning resource? 429
    5.3.2. Why do certain community elements in an eLearning resource contribute to creating and sustaining high school learning? 430
    5.3.3. In what way and why do certain communication, collaboration and social elements influence a high school eLearning resource? ................................................................. 432
    5.3.4. To what extent and why do certain technological aspects and instructional design issues affect a high school eLearning resource? .................................................................................. 433

5.4. Discussion.................................................................................. 435
    5.4.1. Methodological reflection .................................................. 435
    5.4.2. Substantive reflection ......................................................... 436
    About pedagogical theories........................................................................ 438
    Cognitive science.................................................................................... 438
    Constructivism ....................................................................................... 439
Creativity – motivation ................................................................. 440
Customization .................................................................................... 440
Companionship .................................................................................. 441
Community aspects ........................................................................... 443
Communication .................................................................................. 447

Learners did not utilise the communication potential of the e-learning resource to the full. ................................................................. 447
The substance of learner communications ........................................ 450
Active and isolated learners and the phenomenon of lurking .............. 450
Modes of communication and preferences ........................................ 451
Technological considerations ............................................................. 451
The intellectual puzzle for this study together with findings, links to data, and implications ................................................................. 454

5.4.3.Scientific reflection ................................................................. 460
Recapitulation: the highlights and main findings of the research ............ 461

5.5. Recommendations: ................................................................. 463
5.5.1. For policy & practice .............................................................. 463
Strategic .............................................................................................. 463
Tactical ................................................................................................ 464
Operational (functional) ...................................................................... 464
5.5.2. Recommendations for further research ...................................... 465
Fundamental research ........................................................................ 465
Applied research ................................................................................ 465
5.5.3. Recommendations for further development work ....................... 466

5.6. Conclusion .................................................................................. 470

6. REFERENCES.................................................................................... 472

7. APPENDICES.................................................................................... 503

Heydenrych (Heydenrych, 2001) outlines the following synchronous communication tools ................................................................. 509
Asynchronous tools described by Heydenrych (Heydenrych, 2001) ........ 509
Groupware ......................................................................................... 510
File transfers ...................................................................................... 510
Simulations ......................................................................................... 510
E-mail ................................................................................................. 510
Newsgroups ....................................................................................... 510
Discussion forums ............................................................................ 510
Biographical and general information ............................................... 542
Personality indicator questions ........................................................... 542
Overall satisfaction questions ............................................................... 542
Subsidiary question 1 – Pedagogical – Cognitive ................................ 543
Subsidiary question 1 – Pedagogical – Constructivist .......................... 543
Subsidiary question 1 – Pedagogical – Customization ......................... 543
Subsidiary question 1 – Pedagogical – challenge – Creativity and Motivation ................................................................. 544
Subsidiary question 1 – Pedagogical – Collaborative ............................ 544
Subsidiary question 1 – Pedagogical – Companionship ......................... 544
Subsidiary question 2 – Community aspect ...................................... 545
Subsidiary question 3 – Communication aspect .................................. 545
Research question 4 - Technological .................................................... 545
Student questionnaires 1 and 2 - Sampling data of the student questionnaires ................................................................. 597
Instrument 2 – Student Questionnaire 2: Educational .................. 597
Inherent trustworthiness check on questionnaire 2 ..................... 597
The relationship between Subject Advisor questionnaire questions and the
research questions ................................................................. 676
Subject Advisor questionnaire results in general ...................... 681
Pedagogical section – Cognitive science (questions: subject advisors: 8, 9,
10, 33, 34, 35, 36, 37, 38, 39, 40, 41 Students 24, 40, 41) ............. 681
Pedagogical section – Constructivist (subject advisors questions 46, 47, 48,
49, 50, student questions: 44, 45, 46, 47, 67) .............................. 682
Pedagogical section – Component display (questions: subject advisors: 60,
61, 62, 63, 65, 69, students: 52, 53) ..................................... 683
Pedagogical section – Customization (questions: subject advisors: 51, 52,
53, 54, 55, 56, 57, 58, 59, students: 48, 49, 50, 51) ...................... 683
Pedagogical section – creativity, motivation and challenge (question: subject
advisors: 20, 21, 42, 43, 44, 45, students: 30, 42, 43, 66) ............... 684
Pedagogical section – Collaboration (questions: subject advisors: 64, 65, 66,
67, 68, students: 54, 55, 56, 57, 58, 59, 60, 61) ......................... 685
Pedagogical section – companionship (questions: subject advisors: 14, 15,
62, 70, 73, 74, and students: 25, 26, 27, 28, 62, 63, 64, 65, 70, 83) .... 686
Pedagogical section – Community aspect and Communicational aspect .... 687
Pedagogical section – Technological aspects (subject advisors questions: 1,
2, 12, 14, 22, 24, 25, 26, 27, students 19, 31, 32, 34) ................. 687
**List of Tables**

Table 1: Research context and subsidiary questions ........................................... 43

Table 2: Related Research Search Results Summary Grid .................................. 55

Table 3: Data collection instruments .................................................................... 60

Table 4: Hammon & Jones: Five levels of web use in education ....................... 106

Table 5: Questions to determine level of web usage ............................................ 107

Table 6: Elements in the meta-study by Cavanaugh (Cavanaugh, 2004a) - linked to eLearning models in this research .................................................. 116

Table 7: Neuhauser’s Online Course Design Maturity Model with pathway grid and process areas .............................................................................. 124

Table 8: How this research correlates with Wilson's intervening variables (Wilson, 2000) ........................................................................................................ 141

Table 9: Elements in Ingwersen at al.'s Cognitive Model of Human Information Behaviour compared to elements covered in this research . 143

Table 10: Pedagogical polarities or dimensions as set out by Reeves and Hammon (1996) ........................................................................................................ 153

Table 11: Common elements from the literature that describe a learning community .............................................................................................................. 201

Table 12: Computer-supported communication and collaboration tools located according to public-private and synchronous-asynchronous dimensions. .................................................................................. 221

Table 13: Comparison of class size and teacher-student ratios – Korea (KNOU) and this study ........................................................................................................ 258

Table 14: Top 15 important characteristics in 45 eLearning resources .......... 283

Table 15: Awareness elements listed by Gerosa and availability of the same type of service in the eLearning resource of this research .......... 284

Table 16: The intellectual puzzle applicable to this study in terms of the schema set out by Mason (2002) ................................................................. 311

Table 17: Research paradigm .................................................................................... 312

Table 18: Characteristics of qualitative research .................................................... 316

Table 19: Special features of a case study ............................................................. 319

Table 20: Research design for this study ............................................................... 320
Table 21: Data collection instruments ................................................................. 325
Table 22: Summarized Intellectual Puzzle for this research / The Research Matrix
.......................................................................................................................... 326
Table 23: Typology of participant observation researcher roles .................... 328
Table 24: Written (typed) text used in this research ....................................... 329
Table 25: Disadvantages of using textual documentation and its countering
measures in this study ....................................................................................... 330
Table 26: Types of questionnaires ................................................................ 331
Table 27: Disadvantages of questionnaires and measures to compensate for these
disadvantages (Creswell, 1998, McNamara, 2004a) ................................. 333
Table 28: Questionnaire data summary ............................................................ 334
Table 29: Example of statistics on the webserver ......................................... 338
Table 30: Example of the eLearning program logfiles ................................. 339
Table 31: An example of data extracted from the eLearning database, with SQL 340
Table 32: Focus group interviews for this research - a graphical depiction by the
researcher ......................................................................................................... 342
Table 33: Overview of online resource capabilities ....................................... 347
Table 34: Learner performance 2000 to 2005 ................................................ 361
Table 35: Data table of academic results of Cambridge students in this research
2000-2005 .......................................................................................................... 361
Table 36: Overall pass percentage of the group 2000 to 2005 ..................... 362
Table 37: Personality profile results of 4 personality types in this research 2004 384
Table 38: Member-check reliability of personality data indicator 80.91% ....... 385
Table 39: Patterns of online activity: when the students used the eLearning interface
to chat and make forum posts ................................................................. 385
Table 40: Chat and discussion forum activity 2004 and 2005 ......................... 386
Table 41: Patterns of online activity: subject advisers ................................... 388
Table 42: Patterns of online activity: subject advisers ................................... 388
Table 43: Patterns of online activity: subject advisers: forums 2005 ............ 389
Table 44: Comparison of online activity times: students vs subject advisers 2005 389
Table 45: Comparison of online activity times: students vs subject advisers 390
Table 46: Calculating average class size ................................................................. 391
Table 47: Preferred contact methods of students 2004 2005 ............................... 395
Table 48: Contact preferences of older and younger students (2004 and 2005) 396
Table 49: Success rate in sending SMS messages to students 2004................. 397
Table 50: Cell phone number stability .................................................................. 398
Table 51: Email delivery success rate in 2004 ..................................................... 399
Table 52: Example of chat room data analysed .................................................... 400
Table 53: Gender differences in chat summary (2004 and 2005): females, males, total and averages ................................................................. 402
Table 54: Example of discussions in a discussion forum ..................................... 403
Table 55: Chat, forum posts and forum replies: summaries for 2004 and 2005 403
Table 56: Posts by learners in discussion forums of academic nature 2005.... 404
Table 57: The categorisation of learners in this research as active contributors or isolated learners according to Leionen's categories ............... 406
Table 58: Learners who were "lurkers" (i.e. those who never chatted or posted replies in forums) ................................................................. 407
Table 59: Hardware upgrade path for the computer equipment of the eLearning resource server ................................................................. 414
Table 60: The table shows the various updates performed on the software that drove the eLearning resource in this study ........................................ 415
Table 61: Internet speed comparison - international vs local web hosting ...... 416
Table 62: Usage summary for brainonline.com for the year 2004 ....................... 417
Table 63: Customized course creation: manual course setup versus programmatic course setup time and costs .................................................... 420
Table 64: Calculation course development costs ................................................. 421
Table 65: Analysis of learners supplying representations of themselves .......... 423
Table 66: The intellectual puzzle for this study together with findings, links to data, and implications ................................................................. 459
Table 67: Summary of Research findings ............................................................. 461
Literature review NEGATIVE pointers

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)................................................................. 92

Literature review NEGATIVE pointer 2: eLearning ventures fail because CONTENT is not engaging, not well organised and of inferior quality. Although online experiences need to be striking, interactive and effective, they are frequently not so. ......................................................... 96

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. ........................................................................................................ 150

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)........................................ 159

Literature review NEGATIVE pointer 5: Students 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)................................. 173

Literature review NEGATIVE pointer 6: Bright and independent learners seem to benefit more from constructivist approaches online. (2.3.6) 174

Literature review NEGATIVE pointer 7: Constructivist online courses are difficult to implement online because of time contrants in building relationships. (2.3.6) ................................................................. 174

Literature review NEGATIVE pointer 8: Designing online courses may require more imagination and skill than traditional courses. (2.3.6) ............... 175

Literature review NEGATIVE pointer 9: The online facilitator should NOT lecture online. (2.4.4 Learning community – instructor)................. 205

Literature review NEGATIVE pointer 10: Lack of interaction and feedback are common problems in eLearning resources............................. 208

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 ........................................................................................................ 216
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) ................................................................. 223

Literature review NEGATIVE pointer 13: Competition does NOT benefit inter-group cooperation. (2.5.5 Communication) ................................................................. 232

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) ......................................................................................... 233

Literature review NEGATIVE pointer 15: Online interaction centered around information rather than constructing knowledge. (2.5.5 Communication) ......................................................................................... 234

Literature review NEGATIVE pointer 16: Simply making a discussion forum available does not motivate students to use it properly. (2.5.5 Communication) ......................................................................................... 235

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 active dislike of the group. (2.5.6 Communication-lurking) ......................................................................................... 237

Literature review NEGATIVE pointer 18: If collaboration serves no real purpose, learners will end up learning in isolation. (2.5.12.2 Collaboration) ......................................................................................... 255

Literature review NEGATIVE pointer 19: A network course with no face-to-face contact may leave participants feeling isolated. (2.5.13 Social) 262

Literature review NEGATIVE pointer 20: Children prefer computer games to schoolwork. Their preferred choice of media is entertainment. (2.5.15 Games) ......................................................................................... 267
Research findings

Research finding 1: The overall academic performance was favourable. 360

Research finding 2: Cognitive science theory elements are supported by the eLearning resource. 364

Research finding 3: Constructivist learning theory elements play a crucial role in the eLearning resource. 366

Research finding 4: The learners expressed themselves as being quite certain that the eLearning system was workable and desirable in terms of Component Display Theory elements. 367

Research finding 5: While customization was regarded as important, the eLearning resource only permitted a limited amount of customization. 369

Research finding 6: The eLearning resource made allowance for personal creativity and provided an environment that challenged learners to develop and nurture their own motivation. This effect of the resource suited those learners who were more independent and mature than the average. 370

Research finding 7: While learners appreciated the value of collaboration, they preferred to work alone rather than together. 372

Research finding 8: Companionship (i.e. other human beings) is the most important element in the eLearning resource. 374

Research finding 9: Learners experienced an increased sense of community between the first year and the second year. 380

Research finding 10: The learners have strong individualistic inclinations. 380

Research finding 11: Peer pressure does not play a role in the lives of these learners. 380

Research finding 12: Learners do not prefer group work. 380

Research finding 13: Learners do not like competition. 380

Research finding 14: The learning community creates a feeling of safety, care and openness. 380

Research finding 15: This type of community makes it possible for learners to have a wider range of friends. 380

Research finding 16: Face-to-face meetings enhance a sense of community and serve to bind the community together. 380

Research finding 17: The personality types are more or less balanced, with no particular trait dominating. The “Thinking” (71%) and “Perceiving”
(68%) traits are the only ones indicated by around two thirds of the learners. ................................................................. 383

Research finding 18: The pattern of study activity among learners was similar to patterns found in a “normal” school in 2004 (the first year of implementation), but changed in 2005 to a pattern of more activity in the afternoons and evenings. ........................................ 385

Research finding 19: Subject advisers worked mostly in the mornings in the first year of implementation (2004) but then changed to working mostly in the evenings in the second year (2005). ............................ 387

Research finding 20: The online activity of learners and subject advisers follows an asynchronous pattern, with the learners either being active in the mornings or afternoons, while subject advisers are most active in the evenings............................................................. 390

Research finding 21: The average class size was 57 and 62 learners per class in 2004 and 2005 respectively.................................................. 390

Research finding 22: The ratio of learners per subject adviser was 223 to 1.... 390

Research finding 23: Less than half the learners said that they adequately exploited the possibilities for communication inherent in the eLearning resource. ................................................................. 394

Research finding 24: Learners mainly preferred to be contacted by means of email for purposes of learning. Fewer preferred to be contacted by means of a conventional (landline) telephone, and an increasing number preferred to be contacted on their mobile telephones.395

Research finding 25: While 83% of learners had a cell phone, only 56% could be reached by means of an SMS despite the fact that approximately 80% agreed that their numbers had not changed.......... 396

Research finding 26: Almost all emails (92-94%) were successfully mailed. But this high delivery rate does not mean that they were read........... 397

Research finding 27: Learners used chat rooms mostly to socialize............ 399

Research finding 28: Female learners chatted to a far greater extent than did their male counterparts (approximately 50% more). Averages: Female chat volume was 73% in 2004 and 63% in 2005 – as opposed to male chat volume which was 27% in 2004 and 37% in 2005.401

Research finding 29: Analysis showed that only about one third of the discussions were about academic-related matters (1008 out of 2741 = 37% in 2005). ................................................................. 402
Research finding 30: The gender spread in terms of academic discussion participation is about equal (50%-50%) – dissimilar to chat activity where female learners contributed most of the traffic volume.404

Research finding 31: On average, learners contributed 174 chat posts per year, around 14 forum posts per year, and approximately 9 forum replies per year. ................................................................. 404

Research finding 32: Approximately half of the learners were active contributors and half were isolated learners. .............................................................. 406

Research finding 33: The percentage of learners who “lurked” was about 40% initially, but this percentage decreased in the two-year period (42% in 2004 became 32% in 2005) ..................................................................... 407

Research finding 34: Both learners and subject advisers were highly computer-literate and displayed positive attitudes towards both the medium itself and the eLearning resource. ........................................ 410

Research finding 35: Because constant updating is necessary, it is necessary to have the kind of reliable technical expertise that will enable one to upgrade continuously. ......................................................... 414

Research finding 36: Web servers inside the local country usually provide better speeds. ........................................................................................................ 415

Research finding 37: The average size of a file of course material was 72 kilobytes. It took 5.5 hours to upload 1.1 gigabytes of data in 16 000 lessons in South Africa in 2005. ........................................................................ 416

Research finding 38: Hack attacks and viruses can waste large amounts of bandwidth and increase running costs. ......................................................... 418

Research finding 39: Automated course creation of 74 courses saved approximately 1300 hours of human labour and around US$11 000 in South Africa in 2005. The automation used US$500 versus manual creation of US$11 000 ........................................................................ 419

Research finding 40: Course development costs in the researched institution were significantly cheaper than international costs – US$3 000 in South Africa as opposed to US$88 000 in the United States. .......... 420

Research finding 41: It is necessary to set certain minimum hardware requirements for those who enrol. ................................................................................... 421

Research finding 42: Only about one third of the learners added a photograph or a symbolic image (icon) of themselves to their profiles........ 422