

E-LEARNING AS A TRAINING TOOL IN THE SOUTH AFRICAN FURNITURE
INDUSTRY:
PEDAGOGICAL TECHNIQUES AND LEARNER SUPPORT

by

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ABSTRACT

Since the birth of the World Wide Web in the early 1990s, web-based e-learning has experienced tremendous growth in schools, the higher education sector, and the corporate world. Although a large body of research and literature has been generated on the subject, discussion has tended to focus more on the technologies themselves than the underlying pedagogical frameworks upon which e-learning courses are built. This study was designed to investigate appropriate pedagogical techniques for workplace e-learning in the South African wood products sector, while also examining the kinds of learner support required from within the corporation. A qualitative research project was conducted, in which eighteen learners at eight factories in three provinces of South Africa participated in a three-month pilot e-learning training course. The study found that learners responded favourably to constructivist teaching approaches, such as online discussions, open-ended task-based activities, and assignments incorporating authentic, real-world aspects. Learners viewed constructivist activities to be more useful than quizzes and traditional essay-based assignments, as they allowed new concepts to be learned in context and were perceived to promote deeper understanding of the subject matter. Respondents nevertheless valued the inclusion of a blend of pedagogical approaches in the course design, as this enabled them to approach and analyse new concepts in an assortment of ways.

The study results highlighted that it is of critical importance for the employer to provide adequate support for learners. Such support should include: timely provision of adequate Internet and computing facilities and IT support; creation of a formal study plan with the involvement of HR staff and learners' superiors; monitoring of learners' progress by HR managers; and the provision of financial or career advancement incentives for web-based training. The study

concludes that web-based e-learning is a viable means of delivering training in the workplace for South Africa's wood products sector provided learner support requirements are fully addressed.

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1. Introduction and Research Questions

1.1 Introduction

E-learning has been touted as a solution to the educational challenges of a diverse range of stakeholders. Large corporations have initiated e-learning as a means of standardising training programs across geographically-diverse locations, bringing new information more speedily to sales and management teams and lowering the costs of delivery (Welsh et al., 2003).

Universities and colleges have introduced online courses to attract new paying audiences outside their traditional geographical catchment areas. New educational offerings have been developed that deliberately exploit the borderless nature of the Internet to examine a wide range of new topics – from peace and security through to environmental science, sociology, and teaching itself – from within a new global context (Bates & Poole, 2003). Educators within the school and higher education systems have seen the potential for online learning tools to facilitate innovative new pedagogical approaches that can transform learning and, at the same time, respond to the rapidly-evolving demands of twenty-first century society (Peters, 2002). Finally, the international development community has seen e-learning as a potential way to enable economically-disadvantaged nations that lack good conventional educational infrastructure to catch up with the educational demands of the global society (Jensen, 2003).

Interest in e-learning grew rapidly following the birth of the World Wide Web in the early 1990s. In the late 1990s in particular, much of the growth in interest in this new educational medium was linked to the promises and hype of the dot com boom. During this time, a number of

justifications were made to support investments in e-learning. Zemsky and Massey (2004) have summarised these as follows:

1. E-learning will cause a pedagogical revolution in which the focus will shift from the instructor to the learner – “the sage on the stage” would become the “guide on the side” (p.1);
2. E-learning will enable education to be provided anytime and anywhere;
3. E-learning represents a money-making opportunity.

Based upon these far-reaching claims, many universities, colleges, and corporations have struggled to establish positions of prominence in an industry that had yet to fully define itself. As a result, many untested and unrefined educational “products” were pushed upon a market that had not yet been fully researched. Profitability proved much more difficult to achieve than anticipated, and many ambitious projects by prominent institutions were quietly shelved or scaled back just a few years after their establishment¹. Perhaps more importantly, entrenched traditional teaching practices and a lack of consideration of the differing teaching and learning practices required online meant that the much-heralded pedagogical revolution did not materialize (Fetherston, 2001).

E-learning has prevailed since the bursting of the dot com bubble and, in the last few years, researchers and practitioners have begun to scrutinise its pedagogical aspects more earnestly. This study builds upon such efforts, and examines appropriate pedagogical approaches for workplace e-learning within the specific context of the South African wood products industry.

¹ For example, Cardean University, an online institution founded through a collaboration between Carnegie Mellon University, Stanford University and the London School of Economics, began by offering degree-level courses, but has since moved to place more emphasis on short courses for the corporate market.

1.2 Problem Statement

Although the field of e-learning is relatively young, a considerable body of research has already been amassed on the subject and, in reviewing the literature, a number of themes can be identified. Following the commercial development of the World Wide Web in the early 1990s, much of the research of the day was concerned with examining specific technology tools and applications to determine their relative effectiveness. This focus has been challenged – during a long-running debate – by writers such as Russell (1999), who performed a meta-analysis of research on technology-mediated learning and found that, in most cases, there is no significant difference in student achievement regardless of the medium used to deliver the instruction. Another popular theme has been the comparison of face-to-face instruction with technology-supported learning. Bates & Poole (2003) point out that the usefulness of such studies is dubious due to the wide variety of complex variables at work in both online and face-to-face situations, making objective scientific comparisons extremely challenging.

Research has also examined learners' technological literacy, the digital divide issue, and the relative merits of pure e-learning in comparison to formats that mix face-to-face and online elements within a single course (blended learning). Until fairly recently, existing literature tended to favour discussion of the technology itself over the more educationally-minded questions of pedagogy and course design: as Zenger and Uehlein (2002) succinctly state, the emphasis “has been largely on the *e* and not the *learning*” (p.60). In the last few years, however, this has changed, and journals on educational technology are now devoting more extensive coverage to pedagogical matters.

A number of educational researchers have also written about fundamental changes in the ways that teaching and learning should occur to take advantage of the potential that learning technologies offer but, until recently, relatively few have attempted to tie these to concrete recommendations on appropriate teaching methods for online learning. Fetherston (2001) proposes that; “the first big challenge is to begin regarding the Web not as a delivery medium, but as a potential teaching and learning tool. Once the focus shifts from delivery medium to pedagogical tool, we can consider pedagogical constructs that can be applied to the use of the Web, shifting the debate from the technical issues” (para.7).

In the field of workplace learning, inadequate attention to matters of instructional design and pedagogy has prevented learners from realizing the potential benefits of educational technology. Trentin (2001) reports that “scepticism about e-learning among corporate clients is the result of experience with poor quality courses that in many cases have been provided by people dabbling in distance education without the necessary design skills and technological-organizational infrastructure” (p.6). Welsh et al. (2003) also note the “dearth of research that has examined instructional design” (p.252).

South Africa has one of the best-developed economies and highest standards of living in Africa, and its Internet infrastructure – although poor compared to western industrialised nations – is well-established in African terms (World Bank, 2000). Despite these advantages, it shares many of the challenges that its economically less-fortunate neighbours experience. These include

extreme poverty among a large percentage of the population and an unemployment rate that has recently been estimated at 41.2%² (Streak & van der Westhuizen, 2004).

The forest products industry in South Africa offers opportunities to address poverty and unemployment, particularly in rural areas. Expansion of plantation forestry and primary wood processing is unlikely due to current public policy limiting further development of plantations (Forestry South Africa, 2003) but there is, nevertheless, significant potential to increase domestic production of value-added wood products, utilizing the existing fibre resource to produce greater economic returns and employment. The main barrier to achieving such growth is a lack of appropriate skills. South Africa's Forest Industry Education and Training Authority states that "78% of the forest industry workforce is either semi- or unskilled, and there are critical shortages of craft or skilled workers, technicians, and professional managers" (fieta.org.za, 2006).

Efforts are currently underway to address this problem at the post-secondary level. South Africa's two designated providers of forestry education – the University of Stellenbosch and Nelson Mandela Metropolitan University – are both in the process of introducing new degree and diploma courses that are relevant to the value-added sector, and the University of Stellenbosch has established a Wood and Fibre Institute to conduct industry training for the sector. E-learning is being considered as a delivery mode for industry training programs, as it allows for flexible study schedules and eliminates the need for employees to leave the workplace and incur costly travel expenses. The e-learning format would also allow courses developed by the South African institutions to be made available to other institutions elsewhere in Africa.

² Although the official Statistics South Africa unemployment figure for the same year was 27.8%, the expanded definition, which includes unemployed people who have given up looking for work, is more commonly cited.

In 2003, the University of Stellenbosch and Nelson Mandela Metropolitan University introduced two pilot web-based courses on forest ergonomics³ and forest engineering⁴ for learners at the two respective institutions. A detailed analysis of the pilot program, conducted by Laengin (2003), found that students responded favourably to the e-learning format. The results suggest that e-learning may also be an appropriate format for industry training, however, there is a need for specific research examining e-learning for workplace learners before any definitive conclusions may be drawn. This is the rationale for the current study.

1.3 Research Questions

This study sets out to identify the key issues and challenges related to the use of e-learning as a means of delivering training to workplace learners in South Africa. The research project will test various pedagogical techniques in order to determine the most appropriate approaches for adult workplace learners in South Africa. The study will also carefully consider the effects that organisational policies and learner supervision within the corporation have on learner performance.

The principal research question of this study is “Is constructivist teaching⁵ and learning an effective pedagogical approach for use in web-based training for adult workplace learners in South Africa?” Adult learners are likely to be relatively unfamiliar with constructivist

³ Forest ergonomics is an area of knowledge dealing with the capabilities and limitations of human performance in relation to design of forest machines, jobs, and other modifications of the physical environment.

⁴ Forest engineering covers factors affecting productivity, forestry machines and systems, timber specification, harvesting operations, costing and planning of harvesting operation, equipment maintenance, and replacement decisions.

⁵ See Section 2.3.1.3 for a detailed description of constructivist learning.

approaches – they can be expected to be much more familiar with didactic teaching approaches which are prevalent in traditional school and university environments (Akerlind & Trevin, 1995). However, if the rationale for the approach is clearly explained, and learners are given sufficient opportunity to become comfortable with constructivist activities, it is believed that these activities can be both meaningful and effective.

In addition to the above, a number of secondary questions will be addressed:

1. What kinds of support, in terms of human resources policies, information technology, employee incentives, and adjustments in working conditions, are required from within the corporation to maximize the efficacy of training via e-learning?
2. What level of commitment can South African forest products industry employees be expected to make to web-based training, in terms of their motivation to complete courses and the amount of time that they can devote to such training?
3. Is current infrastructure in terms of hardware, software, and network bandwidth adequate for e-learning in the South African forest products industry?
4. Do employees in the South African forest products industry possess sufficient levels of computer literacy to participate effectively in e-learning courses?

The next chapter reviews the literature on e-learning and pedagogy in some detail, with a particular focus on workplace training and the African context. Chapter Three outlines the methodology adopted for this study, and Chapter Four describes the results. Chapter Five attempts to answer the research questions posed in this section and, in the final chapter, the

conclusions of this study are summarised and relevant recommendations for the forest products sector in South Africa are proposed.

2. Literature Review

This review considers all aspects of the literature relevant to the use of e-learning as a training tool in the South African value-added wood products industry. It begins by defining e-learning and providing a brief history of its development. Major themes in the e-learning research literature are then identified in order to contextualize the present study. A major aim of this study is to evaluate the suitability of various pedagogical techniques for use with adult workplace learners. The predominant theories of learning are, therefore, briefly described and their implications for online teaching and learning activities are explained. A particular emphasis is placed upon constructivist teaching because of its prominence in recent literature and its growing popularity as the theoretical basis for e-learning instructional design (Tan & Hung, 2002). A number of pedagogical models that have been proposed for online learning are then introduced and described.

The review then examines specific literature on workplace e-learning and highlights the major themes in this body of work. Finally, the South African context is described in terms of the African and national educational sectors, technological infrastructure, and current use of e-learning.

2.1 E-learning: Definitions and current applications

2.1.1 Definition of e-learning

The term “e-learning” generally describes any form of learning in which a personal computer or computer network is utilized to deliver learning materials or facilitate learning activities. This

broad definition encompasses a variety of situations, ranging from the individual use of educational software on a single personal computer to network-based learning systems. Welsh et al. (2003) define e-learning more narrowly as “the use of computer network technology, primarily over an intranet or through the Internet, to deliver information and instructions to individuals” (p.246). This definition is more commonly accepted among current researchers and practitioners, and is the one adopted for the purposes of this study. The term “online learning” will be used synonymously with “e-learning” throughout this thesis.

2.1.2 E-learning - a brief history

E-learning has its roots in the rule-based computer modeling and simulation systems that emerged in the 1960s. Behavioural learning theorists, such as Skinner (1958), proposed applying behavioural principles to the teaching of academic skills through what was dubbed *programmed instruction*. This involved arranging instructional content such that the learner was led through a series of small steps progressing from simple to complex. At each step, the learner was asked a question, with correct responses being positively reinforced and incorrect answers requiring additional practice or revisiting of earlier portions of content. Although more sophisticated versions were subsequently developed, the major drawback of these programs was that they tended to be inflexible and tedious (Driscoll, 2000).

Alvin Toffler, another early advocate of computer-based learning, proposed in 1970 that restructuring of the contemporary lecture-based education system was desirable and should be replaced by simulation exercises in “artificially created situations on a computer basis” (p.322). His rationale for suggesting such a change was somewhat different from Skinner’s – he believed that individuals needed to become more autonomous in the learning process than was then the

case and, in doing so, learn to use higher-order thinking skills⁶ to evaluate and classify new information. Toffler believed that computer-based simulations could provide this opportunity.

During the 1970s, some schools, colleges, and universities used mainframe computers to run computer-assisted instructions (CAI) programs for their students. Microcomputers were first used in schools in 1977, and became commonplace over the next ten years (Guravadoo, 2003). The first generation of educational applications for microcomputers – labeled “computer-based training” or CBT – tended to focus on developing information technology and technical training skills, but were still geared toward individual study rather than group or class learning. CD ROMs became a popular method of delivering this kind of training beginning in the mid 1980s, although a disadvantage of this medium was that content stored on them could not be updated without reissuing the CDs (Peters, 2002).

With the birth of the World Wide Web in the early 1990s, networked computing revolutionized the field of computer-based instruction, shifting the emphasis from individual tutorials, simulations, and drill-and-practice programs aimed at individual learners towards technologies and pedagogies that promoted communication and information-sharing between instructors and peers (Hung, 2001). Internet applications offered a low-cost means to create readily-accessible, shareable educational materials. Educational institutions and corporate training departments began to rapidly create online courses. However, it was common during this period in e-learning development for existing course materials that had been developed for face-to-face delivery to be converted to an online format without much thought being given to the necessary pedagogical

⁶ “Higher-order” thinking skills refer to those used in activities such as case analysis, evaluation, synthesis, and problem-solving. Simple commitment to memory and recall of facts is not a higher-order skill.

redesign. As a result, many online courses were seen to be of lower quality than traditional classroom-based courses (Rumajogee, 2003).

By the turn of the 21st century, technological developments, such as increased bandwidth and personal computing power, made it feasible to use multimedia such as animation, sound, and video in web-based courses. At the same time, website authoring tools and related software became more robust, simpler to use, and more affordable. A number of learning management systems (LMS), such as WebCT and Blackboard, also began to gain popularity among educational institutions. The purpose of learning management systems is to group together common web applications within a user-friendly interface that allows instructors to create and maintain their own fairly sophisticated e-learning courses without possessing a detailed technical knowledge of web programming and publishing. In most cases, the LMS can also be linked to the institutional student information system, and possesses features that allow the instructor to monitor and assess the learners' online activities. (Moran, 2002).

In the last five years, the LMS market has seen consolidation, as leaders WebCT and BlackBoard have merged and open source software has become more popular due to tighter budgets, resistance to growing vendor power, and political pressures to favour local software industries (Yanonsky et al., 2003). Despite this, developments in the capabilities of LMS systems have been incremental compared to the dramatic pace of change of earlier years. Shared and reusable learning objects⁷ have recently garnered greater attention and debate in the e-learning community.

⁷ Learning objects are small units of content that are self-contained and can be re-used in a variety of courses or instructional settings. They are often stored in databases known as "Learning Object Repositories and tagged with descriptive information, allowing them to be easily found by a database search.

2.1.3 Synchronous and asynchronous e-learning and blended learning

E-learning can be either *synchronous* or *asynchronous*, although many courses include elements of both types. Asynchronous e-learning, which is more common, refers to the case in which learning materials or course content is available at any time of the day or night (Welsh et al., 2003). Learning materials for asynchronous delivery can consist of items such as HTML pages, CD ROMs, photos or diagrams, pre-recorded video clips, animations, or discussion forum postings. For this type of learning, participants are not required to “meet” in real time, and this affords the learner flexibility in terms of his/her study schedule. Synchronous e-learning requires that all learners be in front of their computers at the same time (Shotsberger, 2000). This kind of e-learning is sometimes delivered via videoconferencing technology or by “narrowcasting” PowerPoint-style slides in real time via a web page, while delivering the audio through a conference-call-style telephone system. Online chat, instant messaging, and shared whiteboards are other applications that can be used in synchronous e-learning. In general, longer and more comprehensive training and education courses typically rely more on asynchronous elements, while synchronous e-learning is used more commonly for short seminars (Shotsberger, 2000). It is not unusual for practitioners to use a mix of both elements in order to achieve specific learning outcomes – for example, a course may present content information in the form of HTML pages and PDF documents, but could include chat room meetings to add live debate and interaction to the student experience.

Mixed-mode or blended learning refers to the utilization of both face-to-face and computer-mediated elements within the same course or training program. This method is gaining in popularity amongst educators and trainers as a means of combining the strengths of both formats

(Zenger & Uehlein, 2001). Driscoll (2002) identifies a variety of ways that this can be achieved, including: putting assessments online; running an online discussion to allow learners to continue to exchange ideas after a class; making reference materials or lecture notes available online; delivering pre-work online; providing online office hours; providing “job aids” such as personal digital assistants (PDAs) to reinforce workplace training; and offering a virtual classroom to provide access to experts. The mixed mode approach has been used successfully at the University of British Columbia, where first-year students in the Chemistry 123 course use a software-based simulation program to practice experimental procedures before trying out the real experiment in the laboratory. This overcomes the problem of high student to tutor ratios in practical labs, which has meant that students did not receive adequate instruction in correct experimental techniques before carrying the procedures out themselves (Charbonneau, 2003). In another UBC undergraduate program, students taking a course on wood finishing now study the theoretical aspects of the subject via an online course within WebCT, so that time previously devoted to classroom lectures can be spent on extended practical labs and visits to working industry facilities⁸.

2.2 Major research themes in e-learning

Much of the literature on e-learning discusses questions related to the efficacy and appropriateness of particular technologies. Because of rapid and ongoing technological advances in the fields of personal computing and telecommunications, the relevance of such research has a relatively short shelf life. For this reason, much of the research cited below has been conducted since the birth of the World Wide Web (mid 1990s), although older publications related to

⁸ The course mentioned is WOOD 464, a fourth-year undergraduate course in the B.Sc. Wood Products Processing program run by the Department of Wood Science, UBC.

learning theories and pedagogy are also mentioned when relevant. In reviewing the literature, some common themes can be identified, which are discussed briefly in turn.

1. Resisting the technological imperative. E-learning exists, by definition, within a setting of fast-changing technology in which the urge to “keep up with the latest thing” is considerable. Such pressure should be avoided, however, and decisions on technology selection should be based upon educational needs rather than the availability of a particular technological functionality (Selwyn 1999).

2. Technological literacy of students. For e-learning to work, learners must possess sufficient knowledge of and proficiency in using relevant technologies, so that the focus of their efforts is on learning and not on using the technology. The technology layer should be invisible to students during the learning process, just as it should be for instructors during the course design process (Killion, 2002).

3. Technology and power. The use of technology in education alters the power balance between the instructor and learner and between the learner and his/her peers. Instructors can track students’ movements through e-learning websites and determine when they log in, how long they log in for, how long they access certain pages, etc. (Boshier and Wilson, 1998) The absence of a reassuring human presence can create uncertainty and fear among learners (Hara & Kling, 2000), although conversely, the relative anonymity of the web-based environment may encourage learners who would normally be reluctant to speak out in front of their peers to participate in a non-intimidating environment (Horton, 2002).

4. Availability of technology. Some educators see the Internet as a force that will democratize education, predicting that “students in poor countries will have access to instructors from around the world, the best libraries, and a rich menu of courses via the Internet” (Symonds, 2000).

However, a growing digital divide has developed due to enormous inequalities in gross national products, per-capita incomes, and Internet infrastructures throughout the world⁹. The necessity of having technological facilities close at hand creates a dependency for the learner and the educational or training institution, and cycles of planned obsolescence force users to continually upgrade their equipment (Harris & Clover 2004). Tuition costs for learners and technology costs for institutions may represent insurmountable economic barriers.

5. Making online as effective as F2F. Efforts to directly compare e-learning and face-to-face (F2F) courses have been criticized as seeking to compare apples to oranges (Bates & Poole, 2003). Instead, researchers, such as O'Regan (2003), have examined questions such as how educators can recreate the affective (emotional) domain to make the virtual space as meaningful and powerful as the face to face environment.

6. Changing teaching to make e-learning work. Several authors have proposed that the current dominant educational paradigm is unsuitable for successful e-learning. Shank & Childers (1984) argue that teaching methods and educational culture must evolve to take advantage of the enhanced teaching and learning potential that new technologies offer. Similarly, Zemsky & Massey (2004) state that "e-learning will become pervasive only when faculty change how they teach – not before" (p.iii). Writers in this vein advocate the adoption of teaching methodologies that are more student-centred (in keeping with the constructivist view¹⁰) and less transmissive. Fetherston (2001) warns that aims commonly associated with constructivism, such as fostering engagement, creating meaningful social interaction, and promoting critical thinking, are unlikely to be achieved if instructors simply post their face-to-face materials online and use the Web as a convenient delivery mechanism. Some new course management systems place

⁹ See section 2.5 and Appendix 1 for relevant statistics.

¹⁰ The constructivist philosophy of learning is discussed in more detail in section 2.3.1.3.

more emphasis on the contributions of learners and less on the presentation of content by the instructor – this has major implications for the roles of instructors (Collis et al., 2001). Peters (2002) goes further, arguing that the very notion of “courses” – in which teachers create predefined paths of learning that control the manner and pace with which learners are exposed to new information on a given subject – is obsolete because of advances in information technology, network communications, and the Internet. Learners, he proposes, can now source and obtain information at any time and in any place on almost any topic, without the need for a subject-matter expert to prepare and present the information. This changes the skills sets that learners require. Rather than passively receiving and memorizing information, they must develop the competencies required of autonomous learners; quick data retrieval, data management, browsing, navigating, collaborating with peers, and using sophisticated models and simulations.

7. Impact on students. In distance learning, learners need to be self-motivated, employ critical thinking skills, and effectively manage their own studies to be able to successfully participate in learning activities that require them to be much more active and responsible participants in the learning process than in traditional classroom-based teaching environments (Valenta et al., 2001). The adoption of a student-centred pedagogical approach fundamentally alters the educational demands placed upon students, and some resistance can be expected from students who are accustomed to having the answers provided for them, and who are now being asked to seek out and evaluate their own information (Collis et al., 2001). The skills required in e-learning must be developed via a process of careful mentoring and monitoring by instructors (Winnips, 2001), and educators can encourage good learning behaviour by sharing control with students, providing opportunities for choice, and raising students’ awareness of what constitutes quality learning (Baird & Northfield, 1992).

8. Pure e-learning vs. blended learning. Many writers advocate a blended or mixed-mode approach in which teaching is accomplished via a mix of virtual and face-to-face components (Van der Westhuizen et al., 2004). Research has also shown that students who participate in blended learning are more likely to take an online course (Scott, 2001).

9. Merits and demerits of various technology tools. A large number of studies have investigated specific technology tools to ascertain their educational value within particular contexts or to identify optimal pedagogical models for their use. These include multimedia (Ellis & Cohen, 2001), chat (Linder & Rochon, 2003; Shotsberger, 2000), streaming video (Shepherd, 2003), and many others.

2.3 Pedagogical approaches in e-learning

This section considers the inventory of pedagogical approaches that are available to instructors when they design and deliver teaching and learning activities using web-based technologies. Educators are influenced in how they design instructional environments by their personal beliefs about the nature of knowledge (a field known as epistemology) and their views on the various theories of learning that have sprung from it (Driscoll, 2000). There are several dominant philosophies of learning that have, in turn, given rise to a plethora of more narrowly-defined learning theories. This section briefly describes the origins and guiding principles of the three major learning theories, ending with Table 1, a summary of the learning theories discussed. Next, the pedagogical approaches and implications for instructors and learners that are derived from these learning theories are discussed. Following this, a number of pedagogical models for e-learning are introduced.

2.3.1 Major theories of learning

2.3.1.1 Behaviourism

The behaviourist school of thought originated in the 1920s from attempts to study human behaviour using the techniques of the physical sciences and is most commonly associated with the stimulus and response theory of B. F. Skinner (Skinner, 1974). Behaviourism is concerned chiefly with observable actions; Skinner argued that since the inner processes of the mind could not be effectively determined based upon current scientific understanding, researchers should focus instead upon cause and effect relationships that could be ascertained through observation. Behaviourism defines learning simply as the acquisition of new behaviour, and offers two mechanisms to promote such acquisition. The first, classic conditioning, occurs when a natural reflex is produced in response to a stimulus. The second, behavioural or operant conditioning, occurs when a response to a stimulus is reinforced. In the second case, if a reward or reinforcement is introduced following the response to a stimulus, the response becomes more probable in the future. Behaviourism relies upon the premise that learning is governed by invariant principles (Duffy & Jonassen, 1991), and generally disregards the affective domain (feelings, emotions, motivation) which cannot readily be observed. Drill and practice exercises and rote memorization activities are common educational “tools” that fall under the behaviourist paradigm. Early instructional design theorist Robert Gagne built upon behaviourist theory in the 1960s, proposing that the acquisition of knowledge is facilitated best by the hierarchical ordering of content from very elementary information to more complex skills (Gagne, 1962).

Critics of behaviourism point out that the theory disregards the activities of the mind and does not explain some learning processes, such as the acquisition of new language patterns by young

children even in the absence of reinforcement mechanisms. Subsequent research has also shown that organisms can adapt their reinforced patterns to new situations and information (Driscoll, 2000).

2.3.1.2 Cognitivism

The cognitivist view of learning developed in the 1950s as an alternative to the strict focus on observable behaviour advocated by behaviourism. In cognitive theory, knowledge is viewed as a set of symbolic mental associations within the mind that are not necessarily reflected in overt behavioural changes. Learning is seen as a process of relating new information to previously learned information, and searching for meaning, rules, principles, and relationships to organize information, with new information being assimilated into the existing structure of associations (Driscoll, 2000). This view of learning implies that children become capable of increasingly more sophisticated thought as they grow older, and that new information is most easily acquired when people can readily associate it with things that they have already learned. In contrast to the behaviourist view, cognitivism assumes that people control their own learning rather than learning being a response to external stimuli. The cognitive approach places importance on teaching and learning activities that promote abstraction, generalization, and creative thinking. Theorists such as Ausubel (1969) proposed the use of advance organizers¹¹ in teaching to allow learners to relate and compare new information to existing knowledge so that new information could be assimilated into their existing cognitive structure.

¹¹ Advance organisers are introductory materials that are provided in advance of learning materials on a new topic. They serve to review existing knowledge that will be relevant to the topic about to be studied, and allow learners to make contextual links between new concepts and previously learned material.

2.3.1.3 Constructivism

The social theory of constructivism has been explored as an educational approach since the 1980s. Its central principle is the concept that knowledge does not exist as a separate entity from the “knower”, but instead is created by the learner by integrating new information gained through personal exploration and social interaction with one’s existing set of experiences, values, and beliefs. Learning, then, is an active process of constructing, rather than acquiring, knowledge (Merrill, 1991). Constructivist theory proposes that, by critically reflecting upon and reevaluating experiences, people construct their own understanding of the world that they live in and generate their own unique rules and mental models which are used to make sense of their lives (Jonassen & Duffy, 1991). Consequently, learning can be defined as the process of adjusting mental models to accommodate new experiences. Constructivism often involves collaboration and peer criticism as a way of provoking students into attaining new levels of understanding.

Constructivism originated with Piaget’s theory of cognitive growth (1972), which focuses pedagogically on the “interactive, dialogic relationship between the learner and the learning environment, including the material presented by the teacher” (Doll, 1993, p.81). Piaget’s theory proposes that knowledge is actively constructed by the learner, rather than being passively transmitted by the instructor (Piaget, 1972). This concept was augmented by von Glaserfeld (1990), whose radical constructivism theory states that cognition is adaptive in that it is constantly modified by a learner’s experience. Educational theorists have taken these ideas one step further to create social constructivism by incorporating the views of Vygotsky (1978), who argues that social interaction is an essential component in learning, as well as in the development

of the human psyche. Vygotsky proposes that the cultural and social context is a key factor in shaping the development of knowledge and interpretation of meaning (Vygotsky, 1978). Other theorists that have influenced the development of the constructivist worldview include Dewey (1916), who rejected repetitive, rote memorisation exercises common in schools, in favour of real-world practical workshops in which students could work collaboratively and creatively. Bruner (1966) developed the concept of discovery learning, which is built upon similar principles.

Table 1: Summary of Theories of Learning with Examples

Learning Theory	Relevant Teaching/Learning Strategies	Examples
Behaviourism	Stimulus and response - Students remember and respond (change in overt behaviour due to conditioning) - Teachers present and provide for practice and feedback	e.g. $8*5 = 40$
Cognitivism	Information transmission and processing - Students remember strategies, rules, and patterns - Teachers plan for cognitive learning strategies	e.g. $8*5$ equals $5*8 = 40$ or $n*1 = n$
Constructivism	Personal discovery of knowledge - Discover relationships between concepts, e.g. addition and subtraction - Teachers provide instructional context for active and self-regulated students	e.g. $8*5 = 8+8+8+8+8$
Social Constructivism	Learning is a social construction, mediated by different perspectives - Through authentic projects, students discuss and discover meanings, e.g. concept of multiplication - Teachers provide for facilitation and scaffolds ¹² among the students	e.g. two job offers; same salary; Option 1: 8hrs/day for five days/week Option 2: 10hrs/day for four days/wk

Source: Hung, 2001

2.3.2 Implications of learning theories for instructional approaches

Several studies have been concerned with comparing behaviourist and constructivist approaches to teaching in the web-based environment. Oliveira & Viccari (1996) propose that those

¹² In educational terms, ‘scaffolding’ means to provide frameworks to support learners and adjust the levels of difficulty of assigned tasks such that they are neither too simple nor too challenging.

employing technology-supported learning methods can choose between either the “distributed” or “social” option. The former includes intelligent tutoring systems and drill-and-practice software, whereas the latter involves deployment of computer-supported environments that facilitate collaboration and learning activities that allow participants to dictate much more independently the ways in which they create knowledge. Oliveira & Viccari (1996) consider the former approach to be paternalistic and limiting, in that control of the interaction resides within the system rather than with the learner. A social constructivist approach to teaching and learning is, therefore, advocated, in which “the students become a society made up of various autonomous agents (both human and electronic) where some play the role of tutors, some the role of learners, all playing a part in building a common corpus of knowledge about some particular content” (Gottlieb, 2000, para.14). This view is supported by others such as Schank & Childers (1984), whose research has focused on trying to deconstruct the human learning process and respond through appropriate teaching approaches that are facilitated by technology, rather than building intelligent machines to replace educators.

Researchers are by no means unanimous, however, in embracing the online environment as a bastion of constructivism. Archee & Dunn (1995) argue that the web can be likened to an elaborate high-tech whiteboard because of the transmissive nature of some online tools, such as lectures delivered by streaming video and courses dominated by static pages of text. Carr-Chellman & Duchastel (2000) state that many web-based courses lack basic design consideration, and suggest that the web is simply being used as a medium for the delivery of instruction created within another framework. Another example of this sceptical view is Gance (2002), who notes that many common components of online courses do not support constructivism – for example:

“interactive” multiple choice quizzes prohibit students from showing a deep understanding of concepts and are based on information-transfer views of teaching and learning; video segments are didactic in nature; and hyperlinked resources are typically organised and classified in a manner that is consistent with traditional content-oriented instructional design approaches. Gance (2002) argues that the technology itself is rooted in behaviourist theories and, thus, it is difficult and time-consuming for educators to implement constructivist pedagogies for the medium. As mentioned above, Schank & Childers (1984) respond by arguing that it is teaching methods and educational culture themselves that must evolve to take advantage of the enhanced teaching and learning potential that new technologies offer.

2.3.3 A taxonomy of pedagogical approaches for e-learning

As stated above, writers such as Bates & Poole (2003) have called for a pedagogy-driven approach to the design of e-learning programs rather than designing for a particular technology or set of technological applications. Literature on pedagogy for web-based teaching appears to be divided roughly into two camps – those favouring an approach based upon constructivist tenets versus those suggesting that elements of more than one theory can inform the course design process, with the selection of elements based upon the audience, context, subject matter, and required learning outcomes. While it would not be feasible within the scope of this review to summarise all of the pedagogical models proposed in the literature, a range of perspectives are described below to illustrate common themes and highlight areas of divergence.

2.3.4 Constructivist models

Constructivist approaches to online education commonly include group and project work that is based upon real-world case scenarios to enable authentic learning, and the use of synchronous

(chat, computer conferencing) and asynchronous (threaded discussion forums) means to facilitate interaction with peers and social learning. Web-based activities, such as searching the Internet, gathering and organising information, and communicating with peers via email, are said to add to learners' cognitive infrastructure (Vail, 2001). March (1995) has pointed out the important role that web-based education plays in allowing students to work with others outside the traditional classroom, gathering and generating knowledge that is integrated either individually or cooperatively into learners' existing body of knowledge. This community-spanning aspect is reiterated by Hung (2001). Dodge (1995) has coined the term "WebQuest" to describe "an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the Internet optionally supplemented with video conferencing" (para. 2). WebQuests are problem-based learning activities designed so that instructors can guide students' independent Internet-based research and, thus, ensure that their time online is spent productively. Caine & Caine (1994) have attributed the strength of this approach to the cognitive science principles of "natural knowledge". Other tools, such as concept maps¹³ (Novak and Gowin, 1994) and listservs¹⁴, have been explored to assess their effectiveness in facilitating the constructivist approach.

Constructivists argue that meaningful change in students' behaviour is difficult to achieve using transmissive/didactic teaching approaches¹⁵, and that this mode of instruction does not promote the attainment of a rich, well-rounded understanding of concepts (Shymansky and Kyle, 1992).

¹³ A concept map is a diagram showing the relationships between concepts using labeled arrows.

¹⁴ A listserv is a mailing list program that allows users to subscribe to distribution lists pertaining to their topics of interest and exchange information and opinions with members of the list.

¹⁵ An example of a transmissive teaching approach is one in which an instructor conveys the target content to students in a lecture, who passively commit the information to memory for later recall.

Tennyson (2002) proposes that, to promote problem-solving and creativity, there must be a radical change in how instructional time is allocated. Currently, 70% of instructional time is devoted to conveying factual and procedural knowledge, whereas 70% should actually be set aside for contextual and cognitive problem-solving tasks.

Fetherston sees Internet technologies as offering educators the tools to change their pedagogy to one that is more constructivist in nature (2001). In concrete terms, this can be achieved by building online communities, creating authentic activities for learners, providing a wide choice of learning paths through hypermedia, and adopting assessment strategies that are holistic, measure deep learning, and allow students to interpret and critically evaluate information (Fetherston, 2001, p.7).

Akerlind and Trevin (1995) have noted that learners often resist technology-based constructivist teaching approaches because these new methods can conflict with their established beliefs and experiences regarding what learning involves – there is, therefore, a need on the part of the educator to take these reactions into account when planning teaching and learning approaches. Instructors must also consider students' prior knowledge when employing constructivist techniques in online learning, and should address and support their learners' questioning and analytical skills to enable them to make sense of the increased amounts of information that they must process (March, 1997). Against this backdrop, the role of the instructional designer is to move from structuring teaching strategies to designing environments in which constructivist learning can take place.

A number of frameworks for the design of e-learning courses have been proposed in the literature. Ip & Naidu (2001) suggest a set of experience-based designs that exploit the attributes of information and communications technologies (ICTs). First-person experience-based designs include: web-based role-play simulations, in which learners take on the roles of characters responding to a particular scenario; rule-based simulations, in which learners act to control input variables of conceptual or operational models and observe the results; and distributed problem-based learning, in which the focus of instruction is based upon a problem that learners tackle in groups or individually. Third-person experience-based designs include: goal-based learning, which involves learners completing tasks in a contrived but authentic situation designed by the instructor; and case studies, in which the focus is on discussion and exchanges of ideas based upon real-world events. Common to all of these designs is the active participation of the learner and an emphasis on the problem-solving process rather than the internalisation of a set of predetermined set of facts.

Perkins (1991) proposes that learning environments can be defined in terms of five components or facets. *Information banks* are the informational resources used in a course, such as text books or online readings. *Symbol pads* are surfaces that allow learners to construct and manipulate symbols, examples being notepads and laptop computers. *Construction Kits* refer to tools, such as laboratory equipment and building blocks, that allow learners to experiment with and construct systems. *Phenomenaria* is a term coined to mean an area in which phenomena can be presented and manipulated, examples including computer-based simulation games. Finally, *Task Managers* describe teachers, templates, and computer programs that set learning tasks and provide guidance, feedback, and assistance for learners. In a transmissive environment, the

instructor would be the task manager, while the information banks, in the form of the course text and teacher, would be the central components of the learning environment. In a constructivist scenario, Perkins notes that the information banks would be less central to the learning experience, the phenomenaria and construction kits would be more central, and the task manager role would be shared more equally between instructor and learners.

Perkins (1991) adopts the terms “BIG” and “WIG” constructivism to denote how strongly educators adhere to constructivist principles in their pedagogical designs. “BIG” constructivism describes pedagogical approaches where the activities require learners to go “beyond the information given”. In this case, learners might be given assigned readings, but then asked to participate in certain activities that extend their understanding of the concepts discussed in the text – this could involve individual or group projects, online discussions, role playing, or other types of tasks. “WIG” constructivism stands for “without the information given”, and refers to the case in which learning is based solely upon discovery-based activities and interactions facilitated by the instructor, and learners must determine for themselves what the important information is. In BIG constructivist environments “information banks” – sources of explicit information such as text books – may remain, but become less central, whereas in “WIG” environments they may be eliminated altogether.

Shih (2002) proposes the iLeARN design framework, based conceptually upon Perkins’ Five Facets. iLeARN emphasizes interpersonal communications, uses technology as a tool rather than the driving force, and is based upon the premise that effective and self-motivated learning occurs in an environment that is rich with organised, retrievable resources built with clear teacher guidance. iLeARN also allows for a three-way interaction between instructor, students, and

external resources. Rather than being a set of procedural guidelines, the model is intended to be dynamic and applied in a flexible manner depending upon the context. The elements of the model are: the *instrument*, which is the technology and interface itself – this should be designed to allow multiple modes of representation (Hobebein, 1996); the *lead* – the role of the teacher as facilitator and guide; the *environment* – the learning space, which should be user-friendly and non-intimidating; *activities* – with an emphasis on situated, authentic scenarios and problem-solving to enable learners to transfer knowledge to the real world; *resources* – which include those created by the students themselves; and *networks* – to allow social interaction, collaboration, and the sharing of knowledge and perspectives. Shih (2002) describes the key duties of the instructor as liberating the learning space to create an open environment that stimulates independent thinking and learner participation, fostering positive social interaction, and facilitating the learning process for students through mentoring and counseling. In turn, students must interact fully with their peers, participate in experiential learning, and take ownership in the learning process through research that goes beyond the boundaries of the prescribed learning materials.

Jonassen (1999) proposes the CLE (Constructivist Learning Environment) model of instructional design that incorporates six components, these being: a *problem or project* which serves as the focus of the learning episode and is authentic in nature; related *cases* that can supplant student experience where novice learners lack those experiences themselves; relevant *information resources* to help learners solve the problem; *cognitive tools* such as search engines, visualization programs, etc.; *conversation and collaborative tools* such as discussion forums and chat applications; and, *social/contextual support*, meaning technical support, student advising, etc. To support this model, Jonassen suggests three supporting strategies: *modeling* (demonstrating

problem-solving methods); *coaching* (motivating learners and providing feedback) and; *scaffolding* (providing frameworks to support learners and adjust levels of difficulty so that they are neither too simple nor too challenging).

Finally, Heiner et al. (2001), in a study forming part of the Collaborative Virtual European University, identified ten predominant pedagogical principles for online education adopted by many European universities. These were: a shift from teaching to learning; a student-centred approach; the construction of learning environments and learning advice; promotion of active learning and learning strategies; self-organised and self-directed learning; fostering of generic competencies; interactivity, cooperative, and collaborative learning; international and intercultural communication; authentic, situated learning; and modeling of concepts.

2.3.5 Context-based models

The term “context-based models” is coined here by the author to refer to frameworks for pedagogical design that rely on more than one school of learning theory. Hung (2001) suggests that when designing e-learning courses, educators should draw appropriate guidance from whatever learning theories fit the teaching and learning context, rather than feeling that they must work exclusively within the constraints of a single one. Hung argues that, in some learning contexts, such as when learners are being introduced to a new set of basic facts with which they have no obvious relevant prior experience, a behavioural approach is valid. In concrete terms, this might involve asking learners to read online course notes and then perform drill-and-practice exercises and electronic quizzes to commit the information to memory. For situations where critical thinking and more sophisticated analysis is required, a constructivist approach involving authentic tasks and project-based activities would be more appropriate. Hung (2001, p.281)

states that "human cognition is complex, and there is a role for behaviourist, cognitivist, constructivist and social constructivist models of learning based upon the objectives and context of learning". Instructional methods should, therefore, be chosen based upon whichever is the most efficient approach to achieve the instructional objectives for a given group of learners.

A similar proposition is made by Sfard (1998), who identifies two kinds of pedagogical models, the Acquisition Model and the Participation Model. The first model structures learning activities in such a way as to encourage learners to acquire pre-specified knowledge according to predetermined patterns (following the behavioural paradigm). The Participation Model focuses upon learning activities that encourage learners to become active members of a community of practice which they both learn from and contribute to, and which helps to shape their own learning processes. Sfard argues that each model is needed in both higher education and professional training, and that the key factor in providing a successful learning environment is being able to determine the appropriate balance between them.

Tennyson (2002) echoes the sentiments of Hung and Sfard, and proposes Linking Theory as a means of connecting learning theories to educational goals, learning objectives, and instructional approaches. Linking Theory is based upon the principle that the acquisition of factual, procedural, and contextual knowledge each requires a different instructional approach, and that academic time should be allotted to ensure that learners have exposure to all appropriate approaches. Table 2 demonstrates the kinds of instructional approach and assessment techniques that are recommended for each type of learning objective, and the recommended percentage of academic time that Tennyson suggests should be spent on each one.

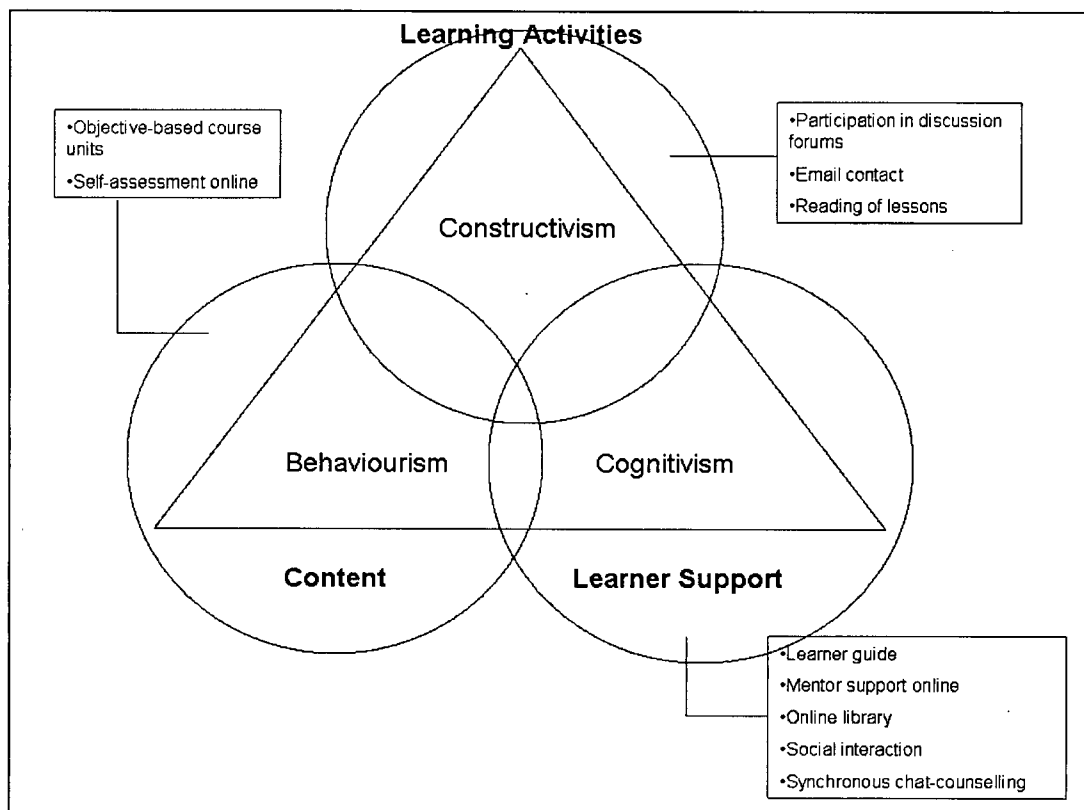
Table 2: Linking Learning Theories to Educational Goals

Instructional Design Components	Educational Goals				
	<i>Acquisition of Knowledge and Skills</i>			<i>Employment, Elaboration, and Construction of Knowledge, Skills, and Strategies</i>	
Cognitive subsystems	Declarative knowledge	Procedural knowledge	Contextual knowledge	Differentiation/Integration	Construction
Learning objectives	Verbal/visual information	Intellectual skills	Contextual skills	Cognitive skills/strategies	Creativity
Academic learning time	10%	20%	25%	30%	15%
Instructional approach	Expository strategies (label/definition, worked examples)	Practice strategies (problem examples, feedback strategies)	Problem-oriented strategies (contextual models, simulations, case studies, role-playing)	Complex-dynamic strategies (situational units, complex simulations, case studies)	Self-directed strategies (lab/field experiments, projects)
Mode of instruction	Didactic (e.g. lecture, text)	Tutorial	Artificial reality	Virtual reality	Experimental
Learner assessment	Objective (standardized tests with correct and incorrect answers)	Performance (standardized format, range of outcomes from high to low)	Authentic/Artificial (standardized format in contextual environment, range of outcomes)	Authentic/virtual (open-ended format with criteria determined by learner)	Portfolio (collection of works, exhibitions and experiences constructed by learner)

Source: Adapted from Tennyson, 2002

Lastly, an integrated instructional design framework is also proposed by Mishra (2002), which draws from aspects of behaviourism, cognitive psychology, and constructivism and is based upon similar principles to those of Tennyson (see Figure 1). The model suggests that well-designed e-learning environments will include elements of behaviourism (such as explicit objectives for each course unit/module and online self-assessment tools such as quizzes), constructivism (discussion forums, chat, group activities and knowledge-sharing), and cognitivism (learner support and advance organiser tools).

Figure 1: Design Framework for Online Learning Environments



Source: Mishra, 2002

2.4 E-learning in the workplace

Ninety-two percent of large corporations in North America offered some form of online learning in 2000 and e-learning continues to increase in popularity as a training tool each year, supported by trends, such as increasing computer affordability and rising costs of traditional instructor training (Spitzer, 2001). Corporations utilize e-learning for a number of reasons. These include: the opportunity to conduct standardized training across multiple locations; quick deployment of time-sensitive training materials such as information on new product features for salespeople; increased learner convenience through the availability of on-demand, asynchronous courses with archiving capabilities; the ability to manage “information overload”; cost savings through

reduced travel time and time away from the workplace for employees; and the ability to track learner activity and performance (Welsh et al., 2003).

Factors seen as drawbacks to the use of e-learning include the considerable upfront costs of designing and developing courses and the costs of hardware and software, as well as a concern among some practitioners over a perceived lack of interaction (Welsh et al., 2003). A European survey conducted in 1998 identified a number of factors that dissuaded companies from utilizing e-learning, such as: perceived high costs; poor impact on participants' professional growth; complexity and heavy demands on time; and unsuitability of courses offered (Teleman Consortium, 1998). However, the same survey found that companies with employees involved in e-learning saw many benefits. These included an improved appreciation of the potential benefits of information and communications technologies, a liking for mixed-mode courses, an interest in group rather than individual learning, and a preference for courses based on trainer support rather than self-study (Trentin, 2001).

The main research themes relating to e-learning in the workplace are summarised below.

2.4.1 Effectiveness

A number of studies have shown that adults do learn effectively through e-learning – examples include computer simulations for naval officers (O'Hara, 1990), technical courses using interactive video (Bramble & Martin, 1995), and computer-based tutorials for truck and bus drivers (Baker, 1992). E-learning, however, is not equally effective for everyone. Gist et al. (1989) found that low levels of computer-self-efficacy correlate with poorer learning outcomes. Mungania (2004) identified four predictors of barriers to e-learning, these being: e-learning self-

efficacy; computer competence; computer training; and organizational factors. Similarly, Irvin (2003) found that those who enjoy working with computers and have more than one year of experience using computers are more likely to succeed in an e-learning environment.

Meta analyses of the literature on corporate e-learning generally suggest that technology-delivered instruction is, on average, slightly more effective than face-to-face training (Welsh et al., 2003; Kulik & Kulik, 1991). However, it is almost impossible to create an e-learning course that is identical to a face-to-face course except in terms of its mode of delivery. Because of such difficulties in comparing classroom and online courses, conclusions that one medium is more effective than the other should be viewed with caution (Clark 1994).

2.4.2 Efficiency

The literature has examined e-learning from the perspective of determining whether it is a cost-effective means of delivering training compared to traditional classroom-based instruction. As mentioned above, development costs for e-learning courses are typically much higher than for classroom-based courses (Chapnick, 2001) but, once the course has been developed, the organisation can realise savings (Whalen & Wright, 2000; Wisner & Priest, 1998) due to elimination of travel, lodging, meals, and materials for course participants. This means that, if there are a large number of geographically-dispersed learners and the course will be run a number of times, e-learning has the potential to be less expensive than face-to-face instruction.

2.4.3 Attrition

Attrition rates for business-based e-learning courses are much higher than for traditional face-to-face classroom training courses. In a survey of 4,100 online learners, Corporate University Xchange found that 85 percent of the learners surveyed dropped out from their e-learning courses in 2000 and 70 percent dropped out in 2001 (Alexander, 2002, p.15). This number is in sharp contrast to the traditional face-to-face classroom training dropout rate of 15 percent.

Although dropout rates recorded by other studies are not as dramatic, attrition is nevertheless a recurring and serious theme. Zielinski (2000, p.68) notes that, "Without a compelling incentive to complete self-paced training, today's time-strapped employees have a hard time staying the course". Phelps et al. (1991) observed, however, that where there is no powerful rationale for completing a course, completion rates for technology-delivered training have been found to be lower than in classroom-based courses, but where incentives, such as chances of promotion, monetary incentives, or formal qualifications, were present, there was much less difference (e.g. Wisher & Priest, 1998; Roberts, 2004). A study of learners who dropped out of an online Masters program found that, although reasons such as technology issues, communication difficulties, and a lack of human interaction might be expected to be important factors, no evidence was found that these were the primary reasons for leaving the program (Willging, 2004).

Some researchers and instructional designers reject the notion that failing to complete all of the course requirements represents an unsuccessful instructional outcome. Instructional specialists at Nokia say that learners gain value by extracting quick information which they can use straight away in their jobs (Welsh et al., 2003). This suggests that corporate e-learning courses may be of

most use when portioned into small chunks of content that can be absorbed quickly in response to given job-related needs. This concept is supported by Dagada & Jakovljevic (2004) and Roberts (2004), who both found that many e-learning practitioners see appropriate "chunking" of content as a key requirement of successful online courses.

2.4.4 Appeal

A number of studies (Gold, 2001; Heinzen & Alberico, 1990; Johnson et al., 2000) have shown that learners generally have more positive attitudes about e-learning after having taken such a course, although, if the technology does not function as it is intended to, the experience can quickly become a negative one (North et al., 2000).

2.4.5 Instructional design & pedagogy

As noted above, there is a dearth of research in the corporate training literature on instructional design and situational factors affecting the efficacy of e-learning (Welsh et al. 2003). Jones (2004) points out that instructional design for training delivered via e-learning is still being done in largely the same way as it was for classroom-based training, leading to ineffective results. The American Society for Training & Development states that this "training/instruction centred approach, however successful in lowering training *delivery* costs, creates products and processes that are difficult to integrate into the real workplace environment and do not meet the requirements of effective performance, thus generating disappointing rates of actual usage and "drop outs"" (ASTD, 2001, cited in Bernardez, 2003, p.6).

Dagada & Jakovljevic (2004)¹⁶ and Giguere & Minotti (2003) have proposed some general guidelines to assist in creating successful web-based training for adult learners. These include: building a learner-centred curriculum that offers flexibility in learning paths and allows for individual backgrounds and experiences; including authentic, real-world activities; clearly defining goals, objectives, and expectations; ensuring a user-friendly learning environment; having content in multiple formats; incorporating a sense of community; creating shorter, focused training; having well-trained online facilitators; providing good technical support; and supplying ongoing assessment and feedback (Giguere & Minotti, 2003). Many of these points echo that of pedagogical researchers in the academic domain. McLoughlin & Luca (2002) suggest that adult professional learners are not well-served by traditional teaching approaches that rely on transmission of content to learners (such as in a classroom lecture), because professional/workplace learners need to be able to apply knowledge to real contexts and be self-directed in their approach. Thus, corporate e-learning environments should include authentic problem-solving tasks that help learners to develop links between the new concepts that they are being introduced to and their own personal experiences.

In separate studies, Welsh et al. (2003) and Roberts (2004) both identified a number of critical factors affecting the success of workplace e-learning. These included: carefully planning instructional design requirements; assessing learners' IT abilities; and planning IT infrastructure and support appropriately. A further, but equally important, factor was the need to facilitate change management in the learning culture of the organization, particularly with regard to gaining support for e-learning initiatives from senior management (Welsh et al., 2003). This is the final research theme discussed.

¹⁶ See section 2.5.7 for further details on this study.

2.4.6 Learner support

The need to provide appropriate support to learners, both in the form of technological infrastructure and through visible buy-in and motivating actions by senior managers and supervising personnel, has been widely discussed in the literature. Noting the importance of supplying adequate facilities and support for training, Orpen (1999, p.41) argues that "it seems that it may be better not to offer training at all, if it cannot be properly resourced, at least in the eyes of the trainees themselves". Selyer et al. (1998) found that environmental factors affecting learners during training had a strong influence on the motivation of employees to transfer training – i.e. to put the skills or information that had been learned during the training course into practice within the workplace. These environmental factors included computer confidence, peer support, supervisory sanctions, supervisor support, and having opportunities to use the training. The authors propose that these results suggest that "motivation to transfer is largely a function of organisational commitment and transfer environment" (p.12). They further note that the environmental factors were seen to outweigh the effects of personal motivation. Although the study examined motivation to transfer rather than successful achievement of learning outcomes, it clearly demonstrates the importance of visible organisational support for e-learning initiatives.

2.5 E-learning in Africa

2.5.1 Education in Africa

The continent of Africa contains 54 countries and a population of 739 million people (AVU, 2005). Over 50% of its population is under 20 years of age, and there is a salient need for tertiary education. The majority of high school graduates are unable to pay for a university education and, due to limited government funding, there is a lack of educational capacity at all

levels, but particularly at the higher education and tertiary levels. Private tertiary education is too expensive for most and is oversubscribed. Africa has become isolated from the global knowledge society, and there is a large labour force that requires serious upgrading of skills (AVU, 2005). Many African countries have their own unique problems that have exacerbated these issues – for example, in many nations, recurrent armed conflicts have destroyed school buildings and disrupted the lives of those pursuing educational opportunities. Publicly-owned higher educational institutions and the programs within them are often subject to periodic closures due to civil unrest or acute under-funding (Temu et al., 2005).

Africa produced just 1% of global gross domestic product in 2001, although it represents 18% of the world's land area and 11% of its population (World Bank 2001). In recent years, however, there has been renewed cause for optimism about its economic growth prospects. In July 2001, the member countries of the African Union signed the NEPAD (New Partnership for Africa's Development) treaty, an ambitious plan for the economic development of the continent that places strong emphasis upon the expansion of the private-sector as a vehicle for sustainable growth and development. In 2002, G8 nations responded by adopting the Africa Action Plan, endorsing NEPAD and pledging new foreign aid resources to assist in Africa's development. In 2005, a subsequent G8 agreement set aside US\$51 billion in debt forgiveness that would provide full debt cancellation to 23 African nations by the end of 2006 (allafrica.com, 2005). Debt forgiveness will potentially allow governments to channel money previously allotted to repaying lenders to more constructive uses, such as improving public services, security, healthcare, and education.

The improvement of education systems throughout Africa has been identified as a priority under the NEPAD agreement (UNESCO, 2006), and a World Bank Development Report (1999, p.2) proposed that, “the most important determinant of the pace of Africa’s development may be its ability to create, acquire, absorb and communicate knowledge”. More than 50 million children in sub-Saharan¹⁷ Africa do not attend school, 200 million African adults are illiterate (Dodds, 2002), and, in 1999, only 3.5% of the population between 18 and 25 years old attended post-secondary education, compared with rates of around 60% in industrialized countries (van Buren-Schele & Odendaal, 2001). Existing educational infrastructure is extremely poor, particularly in sub-Saharan Africa, and problems include inadequate road networks and transportation access to schools, very high student-teacher ratios, lack of access to libraries and supporting resources, crumbling physical infrastructure (buildings, equipment), and outdated curriculum materials. It has been suggested that distance learning – including e-learning – can play a critical role in revitalizing educational delivery (Rumajogee, 2003). Countries such as Egypt and Nigeria have now adopted technology-supported learning as integral elements of their strategic plans for higher education (Radwan, 2003).

2.5.2 Internet Infrastructure in Africa

As can be seen from Table 3, Africa has the lowest Internet usage rate per capita of any region in the world. The continent creates only 0.4% of Internet content, and if South Africa is excluded, this figure falls to 0.02% (World Bank, 2000). Africa’s telecommunications infrastructure is weak – there are fewer than 14 million phones for its population of over 700 million, and over 80% of these are in just six countries. A stark illustration of the contrast between the developed

¹⁷ The term “sub-Saharan Africa” generally refers to 47 of the 54 African nations, excluding the subregion of Northern Africa (as defined by the UN), which includes Egypt, Libya, Algeria, Morocco, Tunisia, Sudan, and Western Sahara. The exact definition has become blurred, however, and the list of countries included varies from source to source.

world and Africa is that Tokyo and Manhattan have more phone lines between them than all of Africa (ITU, 1999).

Table 3: World Internet Usage and Population as of Dec. 2005

World Regions	Internet Usage	% Population	Usage	Usage Growth
	Latest Data	(Penetration)	% of World	2000-2005
Africa	22,737,500	2.50%	2.20%	403.70%
Asia	364,270,713	9.90%	35.70%	218.70%
Europe	290,121,957	35.90%	28.50%	176.10%
Middle East	18,203,500	9.60%	1.80%	454.20%
North America	225,801,428	68.10%	22.20%	108.90%
Latin America/Caribbean	79,033,597	14.30%	7.80%	337.40%
Oceania / Australia	17,690,762	52.90%	1.80%	132.20%
WORLD TOTAL	1,018,057,389	15.70%	100.00%	182.00%

Source: worldinternetstats.com

All 54 African countries have been connected to the Internet since 2000, although four countries in north and southern Africa represent the bulk of those users and, in many countries, there is little access outside the major cities and none in rural areas (Axmann et al., 2002). Many countries have limited power distribution networks that do not include all rural areas, and power outages are a regular occurrence. Bandwidth is extremely limited, and the average North American resident has access to around 570 times more international bandwidth than the average African citizen (Jensen, 2003)

Despite these issues, growth in Internet usage throughout Africa was 403% between 2000 and 2005, dwarfing that of Europe (176%) and North America (109%) (www.internetworldstats.com, 2006). Pricing for international bandwidth is dropping due to greater competition, and new infrastructure is being added in the form of a new marine cable along west Africa to Europe and Asia. Mobile satellite Internet access is also being rolled out as a means of overcoming the poor

telephone infrastructure. High costs of Internet service provision due to monopolies have been a problem and remain so in 16 countries as of 2002, but the situation has improved greatly in recent years. Cybercafés and other forms of public Internet access are rapidly growing in popularity.

2.5.3 E-learning in Africa

Since the mid 1990s, distance learning in Africa has moved from occupying a peripheral role within the education system to one that is “a central pillar” in many countries (ADEA, 2002). The predominant means of distance learning delivery is still print, as indicated in Table 4, but many countries are now “leapfrogging technologies” by progressing directly from radio broadcasting, for example, to satellite and Internet delivery (Rumajogee, 2003).

Table 4: Educational Media Currently Used in African Distance Education Courses

Type of Media	Percentage of programs using each media type		
	Anglophone	Francophone	Lusophone
Print	96	88	90
Telephone	8	2	0
Fax	0	0	0
Audio cassettes	17	15	20
Video cassettes	13	31	0
Radio	2	12	70
Audioconferencing	3	3	40
Videoconferencing	0	0	0
Satellite	2	18	0
Internet/CD Rom	5	34	0
No information provided	6	5	10
Number of institutions/programs	66	67	10

Source: Rumajogee, 2003

Aside from infrastructure limitations, African nations are faced with a number of factors that potentially inhibit e-learning and distance education initiatives. Some of these, such as

resistance to change among educators and a perception that distance education is second rate, are common to other parts of the world. Government policy initiatives to promote distance education have also been lacking (Rumajogee, 2003), although this has begun to change. Another factor cited has been the shortage of local expertise in distance education (ADEA, 2002).

Despite the considerable challenges, active African examples of technology-supported education projects can be found at all levels of the education system. SchoolNet Africa, an NGO launched in 2001, assists schools in 28 countries to increase awareness, train teachers, and raise funds for networked computing and related curricula (Rumajogee, 2003). NEPAD has also developed an “e-schools” program that aims to equip all 600,000 primary and secondary schools in Africa with computer equipment and Internet access by 2013. This initiative involves establishment of an Africa-wide satellite network that will connect the schools to the Internet and to educational content providers (NEPAD, 2005). In South Africa, a satellite television system known as Mindset Network provides mathematics, science, and English lesson broadcasts free of charge to high school learners in one million homes and 2,750 disadvantaged high schools, with higher education offerings also being planned (Mindset Network, 2006)

Africa had more than 150 distance learning institutions in 2000 (Rumajogee, 2003), but development of this mode of education has been slow in most countries, with the exceptions of South Africa, Madagascar, and Mauritius. To address this issue, the African Virtual University was established in 1997 as a pilot project of the World Bank, subsequently becoming an independent NGO in 2002.

AVU has established telelearning¹⁸ centres in 27 African countries in partnership with local higher education institutions, and uses satellite and web-based technologies to transmit video and data-based courses to students. Although it initially focused on providing access to educational programs from established European and North American universities, the current aim is to assist African institutions to build the capacity to offer new, quality education programs with local content that can be leveraged throughout Africa (Juma, 2003).

2.5.4 Education in South Africa

South Africa ranks second-highest in Africa in terms of the United Nations Development Program (UNDP) education index¹⁹, a metric based upon the adult literacy rate and the combined gross enrolment ratio for primary, secondary, and tertiary schools (UNDP, 2005).

Despite this, unskilled workers comprise a large percentage of the workforce, and in the furniture and wood products industries in particular, the skills deficit at both the shop floor and management levels has been cited as a major factor inhibiting growth (Fakude, 2001). Some of the larger companies in South Africa's wood products industry have begun to set up operations in other African nations to take advantage of lower labour costs (Stewart, 2005). E-learning has potential application in this regard as a means of ensuring that standardized training is provided across all of a corporation's locations.

¹⁸ Telelearning Centres, also known as Community Learning Centres, have been introduced in many low-income countries to provide drop-in access to services such as telephone, fax, email, Internet, radio, and TV. Members of the community can use the facilities for accessing technology-supported education programs, digital libraries and educational resources, conducting transactions, performing market research, and accessing government services. Centres are operated by both the public and private-sector.

¹⁹ See Appendix 1

2.5.5 Internet Infrastructure in South Africa

In 2005, 3.6 million people – or 7.4% of South Africa’s population – used the Internet (www.internetworldstats.com, 2006). This compares favourably with Africa as a whole, in which penetration rates as a percentage of population were just 2.5%, but represents a tiny amount when compared with the North American figure of 68.1% (Table 3). Compared to most of Africa, South Africa has a high standard of living, excellent telephone infrastructure, and a reliable power grid, all factors which help to explain the higher Internet use. Telephone charges for land-line connections are billed by the minute for local calls, which is a disincentive to use, but, like many other African countries, South African Internet Service Providers (ISPs) have instituted local calling charges for calls to the Internet regardless of distance between the caller and ISP. This has helped to promote Internet use in rural areas that have telephone service (Jensen, 2003). However, the Internet Society of South Africa (ISOC-ZA) has claimed that rates for connecting to the Internet in South Africa are up to 480% higher than those of comparable Egyptian ISPs (www.internetstats.com, 2004).

A number of factors are expected to result in continued growth in Internet use in South Africa in the coming years. These include: the ending of a government telecommunications monopoly, which should result in increased competition in the sector; the rollout of high-speed wireless Internet access services; and a strong Rand that is resulting in lower costs of equipment to build infrastructure. Encouragingly also, a 2003 survey found that small businesses with Internet connections are increasingly switching to high-speed connectivity, with only 20% now using dial-up modem hardware to access the Internet (www.internetstats.com, 2004).

2.5.6 E-learning in South Africa

As mentioned above, South Africa's higher education sector has been one of the most active on the continent in terms of distance education and, in 1998, 37% of its tertiary learners took courses through this medium (Rumajogee, 2003). The University of South Africa (UNISA) is Africa's leading distance education university and one of the ten largest worldwide (World Bank, 1999). It currently has approximately 130,000 registered students and operates telelearning centres throughout the continent. UNISA is a single-mode institution (distance education only) and its courses are offered via print, Internet, and video (Adei, 2003). UNISA has an exclusive mandate to provide undergraduate education by distance means, but other universities also make extensive use of learning technologies to augment face-to-face programs²⁰. Encouragingly, student opinion surveys conducted at several institutions have found that economically-disadvantaged students have embraced computer-supported learning enthusiastically (Probert & Munro, 1995).

2.5.7 E-learning in South African workplace training

To date, there has been very little research carried out on the use of e-learning for corporate training in South Africa (Toma, 2002). A qualitative study by Dagada & Jakovljevic (2004) examined crucial issues for integration of e-learning in the corporate environments of 15 companies in a variety of industrial sectors including energy, mining, banking, and telecommunications. The study found that, although integration of online learning is still in its early stages, practitioners are employing a variety of innovative tools and pedagogical techniques and integrating e-learning with other corporate systems. Many corporations use learning

²⁰ For example, the University of Stellenbosch delivers elements of over 20 Masters degree programs via e-learning and operates over 50 telelearning centres throughout South and southern Africa.

management systems and trained instructional designers, and employ a variety of instructional modes including tutorials, drills, simulations, chat, discussion forums, email, quizzes, and global message broadcasting. Managers perceived the key benefits of e-learning to be the capacity to offer self-paced learning to employees, and the capability to foster interaction and collaborative learning. Several organisational factors were highlighted as important for the success of e-learning initiatives. Facilitators and learners alike must make a common commitment to the educational experience – facilitators must commit to a certain guaranteed level of support including minimal response times to inquiries, while learners must commit to devote a certain number of hours per week to course studies and be in regular contact with their instructors and fellow learners. Good instructional design was seen as being highly important, and it was recommended that content be “chunked” into small, manageable sections of information. Bandwidth constraints were seen to be a serious issue by some, although others felt that instructional design should simply take the limitations into account by avoiding the use of large graphics or other resource-intensive multimedia applications.

Van Buren-Schele & Odendaal (2001) propose a set of design recommendations for e-learning courses in South Africa that address the issue of bandwidth restrictions. Graphics-heavy course materials should be avoided, and, if multimedia is necessary, instructors should consider supplying this on a separate CD-ROM. Asynchronous, rather than synchronous, learning activities should be used if possible to avoid the problem of slow connections arising from many learners being simultaneously logged on to the same corporate network. Perhaps most importantly, designers should “rely more upon human-computer activity than passive watching and listening” (para.19).

2.5.8 E-learning in the forest and wood products industry

Very little has appeared in the literature regarding e-learning and its relevance for the forestry and wood products industries in Africa. A 2003 survey of African forestry colleges and universities conducted by the African Network for Agroforestry Education (ANAFE) revealed a high level of interest in e-learning at tertiary education levels (Tossel, 2003). The study showed that only a few institutions in South Africa, Nigeria, and Kenya are using e-learning within their curricula. Laengin (2003) conducted a needs assessment of the South African forestry sector, including forestry corporations and relevant higher education institutions. Seventy-seven percent of respondents viewed web-based learning as a suitable method for workplace training, with the major challenges cited being slow Internet connections and high telephone costs.

2.6 Synopsis of literature review

This review has examined literature and research relevant to an investigation of appropriate pedagogical techniques for workplace adult learners in South Africa's furniture industry. The evolving field of e-learning has emerged from a phase of hype and high expectations into a period in which we can expect to see greater emphasis placed upon sound instructional planning and design. Prominent themes emerging from the literature include the need to plan instructional design around teaching and not technology, and the importance of identifying and exploiting the unique features of various media and technology tools to achieve desired learning outcomes. E-learning has major implications for both educators and students. Educators must adjust their traditional teaching approaches to allow e-learning to be as effective as the face-to-face environment. For instructors, this may mean sharing the responsibility for learning with students, and becoming more of a facilitator and less a controller of information. Students will require and

develop different skills in the online environment, including computer literacy, self-regulation, problem-solving, and critical thinking.

Three major theories on the acquisition of knowledge were described, each of which can be drawn upon to inform the instructional design process. Two main types of pedagogical models were identified – the first based solely on constructivist principles, and the second being a context-based model that draws elements from various learning theories depending upon the learning objectives, audience, and subject matter. A variety of pedagogical models have been proposed and implemented in the online domain.

Key themes relating to e-learning in the workplace were identified. Attrition rates are higher in online than face-to-face environments, and incentives must be created to encourage learners to complete online training fully and on time. Learner motivation is affected by the smooth functioning of technology and by various forms of support from within the organisation, and these factors outweigh personal self-efficacy²¹ beliefs and computer confidence. This has important implications for the delivery and support of e-learning within a corporate environment.

Some writers have suggested that constructivist pedagogies are appropriate for corporate training because workplace learners must develop knowledge in context that can be readily transferred to one's job. Authentic learning activities and problem-solving tasks commonly associated with the constructivist approach can provide such context.

²¹ Self-efficacy beliefs are an individual's beliefs in his/her own ability to achieve a specific task (Kreitner & Kinicki, 2002).

Lastly, Africa was considered in terms of its readiness for e-learning as a training tool. Despite serious challenges in terms of educational and technological infrastructure, there are many African examples of successful e-learning in use in schools, higher education, and the corporate sector. Internet penetration is growing faster in Africa than in any other region of the world, and innovative technology solutions such as VSAT satellite Internet systems are enabling African nations to bypass poor telecommunications infrastructures to provide mobile connectivity to rural regions. While the wood and forest products industries have been slow to implement e-learning, results of two recent surveys suggest that attitudes toward this mode of training are largely favourable.

3. Research Methods

3.1 Introduction

As stated above, the purpose of this study is to identify the key issues and challenges related to the use of e-learning as a means of delivering training to workplace learners in the South African furniture industry, with a particular focus on pedagogical techniques, organisational policies, and learner supervision within the corporation. This Chapter describes the research methods adopted in this study and the reasons for their selection. It then discusses how the web-based e-learning course used in the research project was chosen, and describes the measures taken to adapt the course for the purposes of this study. The rationale and design of the pre-course and post-course questionnaires are outlined and, in conclusion, the main limitations of the study are identified.

3.2 Methodology

3.2.1 Literature Review

The aim of the literature review phase of this study was to identify the most important themes in e-learning research and to obtain an understanding of the pedagogical models that have been proposed and are being used in online learning, as well as to examine factors within the workplace that affect the efficacy of e-learning as a training tool. Data collection for this study was conducted by reviewing a wide range of international academic journals related to the fields of educational technology and workplace training and development. Conference proceedings, books, and websites were also reviewed in detail, and Internet searches were conducted using

major search engines and tools such as Google Scholar and Google Alerts²². Lastly, a search of South African educational journals was carried out at the University of South Africa, Pretoria.

3.2.2 Research project structure

This research project involved the selection and adaptation of an existing e-learning course for use as a pilot course and research vehicle. The course content was adapted and augmented so that it was more relevant to South African participants, and the teaching and learning activities modified so that a variety of approaches ranging from highly-structured behaviourist activities to loosely-structured constructivist activities were present in the course. A group of South African workplace learners were selected to participate in the course, which was approximately three months in duration. Detailed, semi-structured, one-on-one interviews with each participant were conducted shortly before and immediately after the course was run. This semi-structured format ensured that the same kinds of information were obtained from each respondent, allowing for flexibility and ensuring effective use of limited interview time (Lofland & Lofland, 1984). Human resources and training managers at each location were also interviewed at the conclusion of the course. During the course, WebCT server logs, quiz scores, and grades for assessed assignments were monitored by the researcher²³.

3.2.3 Selection of methodology for primary data collection

A qualitative case study approach was employed in this research project to obtain detailed information from a small group of respondents. Qualitative research has been defined as “any kind of research that produces findings not arrived at by means of statistical procedures or other

²² This tool allowed the researcher to specify search keywords such as “e-learning+Africa” and receive weekly reports by email containing hyperlinks to articles containing those terms.

²³ However, the author did not grade participants’ assessed work – this was done by other faculty members at the University of British Columbia and the University of Stellenbosch to ensure impartiality.

means of quantification” (Strauss & Corbin, 1990, p.17). Qualitative research has “an interpretive character, aimed at discovering the meaning events have for the individuals who experience them, and the interpretations of those meanings by the researcher” (Hoepfl, 1997, p.14). There were several reasons for this choice of methodology, as follows:

1. The main purpose of the study was to assess participants’ reactions to different learning activities and to track their performance during an online training course. A second major aim was to identify factors in the workplace that impacted the efficacy of the e-learning course. A qualitative approach was deemed appropriate as it enabled the researcher to obtain detailed information from each learner through personal interviews in a way that would not have been possible through the administration of a survey by mail or electronic means. In qualitative research, problems can be framed as open-ended questions (Patton, 1990). The semi-structured interview format allowed the researcher to identify critical issues through a general set of questions and then probe more deeply into these factors through additional questions as required.
2. Another advantage of the personal interview is that topics that had not been covered in the original questionnaire could be brought to light and discussed, helping to ensure that important information was not omitted simply because it had not been anticipated during the questionnaire design stage.
3. Statistical research is not able to take into account all of the complex interactional variables that take place in social settings, such as in learning environments (Cronbach, 1975). Factors that may be important, but are not statistically significant, can be ignored in quantitative research.

4. A large-scale quantitative survey targeting learners enrolled in several different e-learning courses was inappropriate because the teaching and learning methods employed in the various courses would not be uniform. It would be impossible, in practical terms, to ensure that consistent approaches were being used across all courses. An approach considered constructivist by one course instructor might not be by another.
5. By selecting and adapting a specific e-learning course as the focus of the study, the researcher was able to control and manipulate all of the key variables, including the course content, types of learning activities used, presentation of content, assessment criteria, student workload, and the timing of the course.
6. There are very few existing examples of e-learning programs in South Africa's corporate sector that could be examined as the basis for this study.

3.2.4 Selection of study participants

In selecting a group of learners to participate in the study, it was deemed important to eliminate variations in access to technology and corporate policies towards training as much as possible. For this reason, all of the learners were selected from one large, diversified company. The company chosen was Steinhoff Africa Group Services Ltd., the South African division of a European multinational wood products manufacturer, with production operations in several countries, including the United Kingdom, Germany, Poland, Hungary, the Ukraine, and Australia. Steinhoff Africa is the largest employer in South Africa's value-added wood products sector, with 32 plants dispersed throughout the country, as well as expanding operations in Namibia, Botswana, and Mozambique. The company is vertically diversified and runs sawmills, as well as factories making box frames for beds, foam products for upholstered furniture and bedding, mattresses, ready-to-assemble furniture, upholstered furniture, case goods furniture, outdoor

furniture, and wooden doors. The company has rapidly expanded in South Africa in recent years through acquisition of a number of local independent manufacturing companies. Steinhoff Africa actively encourages and sponsors training and further education for its management-track employees, and many of its supervisory and management employees are involved in education programs provided by external polytechnic and further education institutions. The company is interested in evaluating the potential use of e-learning as a training tool because of the challenge of providing standardized training across multiple sites and in many different countries (Geldenhuys, 2004).

In total, 20 participants were identified to participate in the study. Participants were selected with the assistance of several regional human resources managers within Steinhoff Africa, and based upon the following criteria:

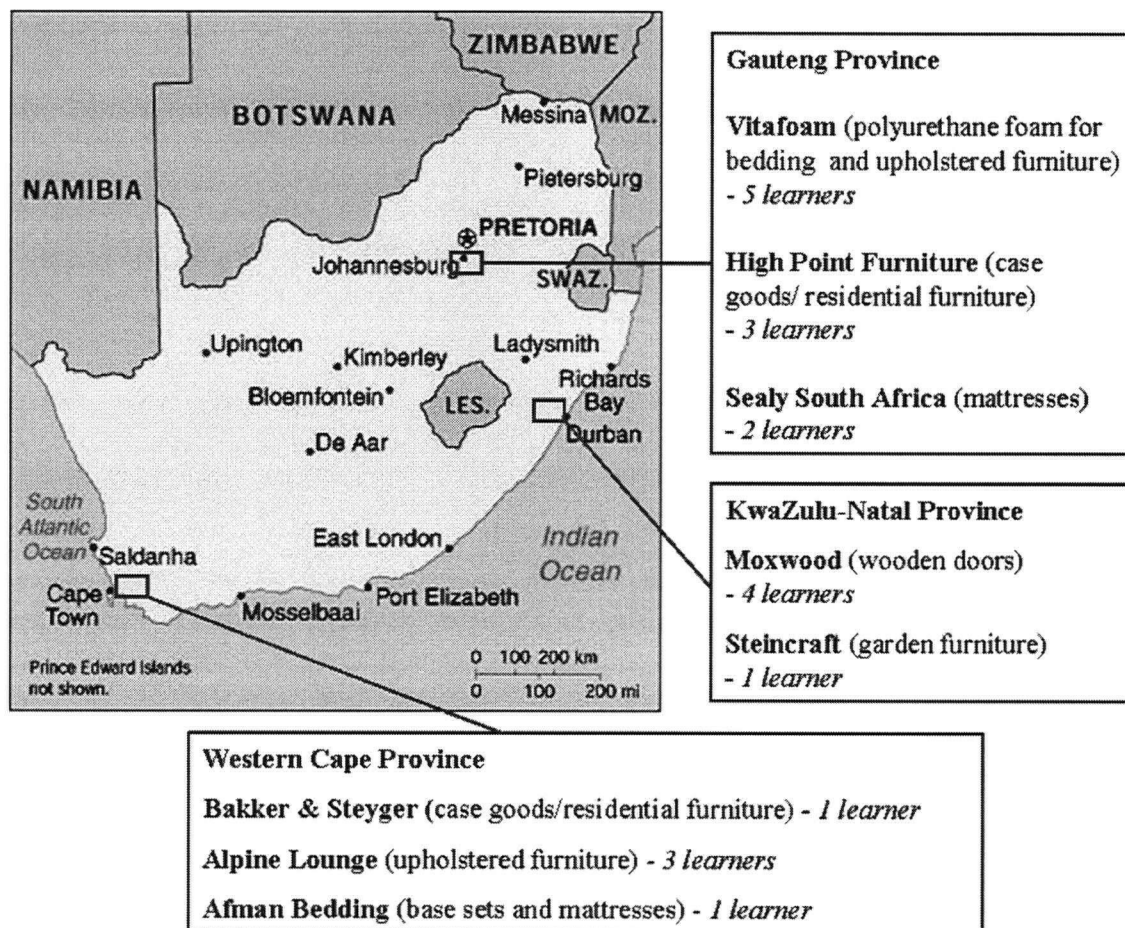
1. Participation in the study was to be on a voluntary basis.
2. Candidates must have had a need for the training being offered. Most of the candidates selected were management trainees or other management-track employees for whom the e-learning course was seen as a means of providing new knowledge that would assist them in their career development within Steinhoff. Several of the management trainees were undergoing a systematic program of cross-training in which they were assigned to different manufacturing sites in the company for short periods of a few months to gain a detailed understanding of the group's operations as a whole. Others had roles in procurement or quality control for which an increased knowledge of upstream and downstream manufacturing processes was seen to be an asset. For instance, some of the

candidates selected were from within a plant manufacturing mattresses and box springs. Although the subject matter of the course was not of immediate relevance to the plant's manufacturing operations, the course was seen to be of benefit in helping the employees to become familiar with factors affecting the quality of incoming raw materials and components (wood and wooden frames for box springs), and to better understand the properties of various wood-based materials and their implications for the product development and design processes.

3. Candidates were required to have access to Internet-linked computers at their workplace and to have previous experience using computers. The main focus of the research project was not on computer literacy or access issues. Therefore, attempts were made from the outset to eliminate variability in these factors. During initial discussions with Steinhoff representatives prior to the study, the company offered to provide basic computer skills training to employees who wished to participate in the course, but lacked requisite experience. This was ultimately not required, as all the candidates had sufficient experience using computers.

The twenty participants were employed by eight manufacturing facilities in three regions, as shown in Figure 2 below.

Figure 2: Study Participants and Places of Employment



3.2.5 Selection and adaptation of the e-learning course

Selection of the e-learning course for the research study was based upon a number of criteria. Firstly, the course topic needed to be of relevance to the wood products manufacturing industry. Secondly, the course had to be relevant to a wide range of supervisory or management-level employees throughout the Steinhoff organisation that were involved in a variety of technical and professional roles. For this reason, the content needed to be fairly generic in nature, while still providing useful and actionable information to the study participants. Because of the varying professional roles and backgrounds of the learners, it was not possible to deliver a course that

required detailed prerequisite knowledge of any specific technical field or area of professional knowledge. The course content also needed to be tailored to, or adaptable for, South African learners. Finally, the course had to be capable of being modified in such a way as to include a specific range of differing teaching and learning approaches that would provide useful insights into the kinds of pedagogical approaches that are most appropriate in a corporate setting.

3.2.5.1 Description of the course prior to modification

E-learning is not currently being used as a training tool in the South African forest products industry, with the exception of two WebCT-based courses on forestry that are offered to Bachelor of Science students at the University of Stellenbosch and National Diploma students at Nelson Mandela Metropolitan University (Längin et al., 2004). Because no suitable workplace learning courses are currently being offered, it was necessary to adapt a course from outside South Africa. The course chosen to be adapted was Wood 120, a web-based course developed in 2000 by Dr. David Cohen at the Faculty of Forestry, University of British Columbia. Wood 120 is a first year course in the B.Sc. Wood Products Processing (WPP) degree program. The course is intended to introduce students to what is known as the forest products value chain, beginning with the planting and management of forests and encompassing all of the key manufacturing stages through to the global trade in forest products and the various issues and interrelationships along the supply chain. A classroom-based version of this course is taught annually at the University of British Columbia, but the online course was developed to enable students from regional colleges to take the course remotely and then transfer into the second year of the UBC program.

Wood 120 is an Internet-based course presented within the WebCT course management system. The course consists of five modules of course content, each divided into between three and nine subsections and ranging in length from twelve to forty-five web pages of information. The module topics follow a logical progression along the forest products value chain, beginning with the practices of forest management, then discussing global trade patterns in wood products, the taxonomy of wood products, primary (commodity lumber and pulp) processing, and finally the manufacture of “value-added” or wood products (items such as furniture, doors, windows, and engineered building components).

The principal stated goals of the course are to help students to “develop an understanding of the flow of material from the forest to secondary processing facilities” and to “gain a basic knowledge of forestry, forest uses and timber harvesting, primary processing and wood product taxonomy”.

The web pages containing the textual information include sparing use of charts, diagrams, and tables that highlight or illustrate points made within the text. Most subsections of the course contain a self assessment quiz, which consists of a series of less than ten questions that ask the student to list certain facts, answer true/false questions, and conduct other activities designed to enable them to measure their retention of the content. In the original version of the course, this was not an assessed activity. In addition to information in text form, the WebCT course management system features asynchronous discussion and chat rooms that can be used to enhance interactivity.

3.2.5.2 Adapting the course for this research study

Once the e-learning course was selected, it was necessary to carry out a major redesign of the online learning environment to achieve two goals. Firstly, the course had to be restructured to create a wide range of teaching and learning activities that reflected behaviourist, cognitivist, and constructivist philosophies. This involved re-ordering of the course content modules as some types of content lend themselves more readily to a particular pedagogical approach (this is discussed in more detail below). Secondly, the course had originally been designed for Canadian students and, as such, information was presented from a Canadian or North American perspective.

Although the majority of the concepts discussed in the course are relevant to both North America and South Africa, large portions of the course content needed to be modified, augmented, or replaced to ensure that the information supplied was relevant to South African learners. The modifications made included the following:

General changes

- Imperial measurements used in North America were converted to the metric system employed in South Africa;
- Monetary values were converted from dollars to Rand where applicable;
- Links to relevant South African web sites were provided in all modules;
- Additional readings in PDF format were provided for most modules;
- In several places throughout the course material, case examples from Canada were replaced or augmented with South African examples. Some original North American case

examples were left in place to highlight differences in the North American and African forest products industries; and

- Graphs, charts and photographic images were added to support South Africa-specific material.

Module 1: Forestry

- Additional information was provided to reflect the differing forestry issues in South Africa compared to North America. For example, there is political pressure in South Africa to reduce the forested land base as forests are seen as consuming too much water, which is a scarce resource. This contrasts with North America, where there is strong public pressure to preserve forest areas.

Module 2: Taxonomy of Wood Products

- Revisions were made to account for differences in terminology between North America and South Africa;
- The course text was modified to reflect the differing uses of wood products in North America and South Africa. For example, in South Africa, structural lumber is used primarily for roof trusses, whereas, in North America, the whole house is typically constructed of wood;
- Additional information was added on the standard dimensions and grades of various wood products used in the South African market;
- Additional information was added on typical product applications for wood products in South Africa;
- The course text was modified to reflect differing commercial tree species used in North America and South Africa; and

- Information was added on additional causes of biodeterioration of wood in South Africa (for example, termite attack of wood is much more important than in North America).

Module 3: Primary Processing

- Information on South African forests and land ownership was added;
- Terminology to describe planing processes was modified;
- Information on equilibrium moisture contents in various parts of South Africa was added; and
- Lumber grading information was modified to reflect South African Bureau of Standards classifications.

Module 4: Secondary Processing and Furniture Manufacturing

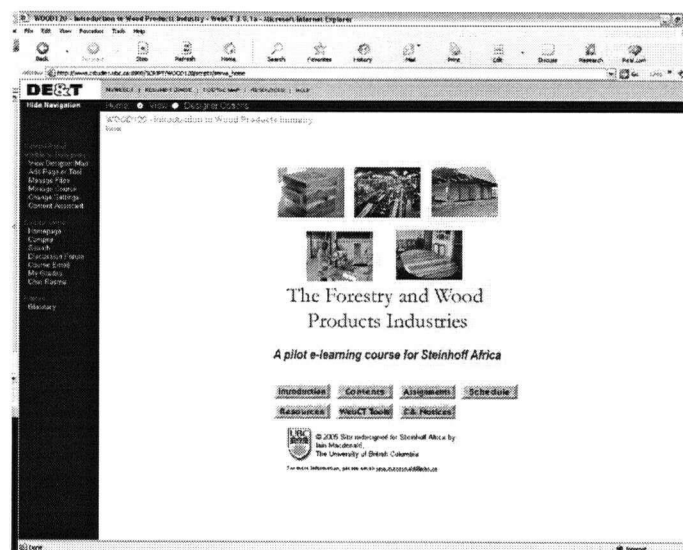
- Information on uses of secondary wood products in South Africa was added;
- Statistical data and market research reports on furniture production in South Africa were added;
- Information on key issues and unique characteristics of the South African furniture sector was added.

Module 5: Global Trade in Forest Products

- A sector profile of the South African forest products industry, including detailed sections on employment, output, trade, export statistics, and environmental aspects, was added;
- The course text was modified to reflect differing commercial tree species used in North America and South Africa; and
- A detailed report on the South African furniture industry was added.

Once the existing HTML files had been modified to incorporate new course content and additional HTML content pages had been uploaded to the WebCT server, the online learning environment was restructured by renaming and re-linking files so that the content would appear in the desired order. Links to banners and graphic icons within individual HTML files were also modified to reflect the new structure. Finally, a new welcome page (Figure 2) featuring photographic images from the South African forest products industry was created and uploaded.

Figure 3: Home Page of the Adapted E-learning Course



3.2.5.3 Pedagogical redesign of the course

General considerations

As noted in Section 2.3.1 above, teaching and learning approaches are influenced by learning theories, and the three dominant schools of theory are behaviourism, cognitivism, and constructivism. The course was redesigned with the aim of providing as wide a variety of teaching and learning activities as possible within the same course, while still maintaining a learning environment in which learners could progress comfortably. It was decided that creating

five discrete modules, each based upon a different learning theory and with no common elements, would confuse learners and, therefore, render the study of little use as a framework for evaluating appropriate pedagogies. For this reason, a more gradual, phased tactic was employed, in which a behaviourist approach in the first part of the course would lead toward a more constructivist, learner-centred approach in the latter half. The behaviourist approach was chosen for the early part of the course because this is the teaching style that is predominantly and traditionally employed in classroom instruction in schools and higher education. It was anticipated that familiarity with this style of instruction would build learner confidence in the early stages. Module by module, learning activities were designed to progress smoothly toward a more constructivist approach, with more loosely-defined tasks and greater freedom for the students to play a more direct role in their own learning. A constructivist approach was chosen as the basis for the later modules because it is the focus of the hypothesis of this study. Cognitivist principles also guided the creation of optional self-test exercises used at various points in the course, as described in Table 6.

Orientation/Introductory notes

At the beginning of the course, an introductory section explained how to navigate around the web site and perform tasks, such as using the discussion forum and chat tool, checking grades, submitting electronic quizzes, and compiling pages of online content into a document that could be printed. This section also introduced learners to the course instructor and tutors, and outlined the goals, requirements, and structure of the course. Learners were given a full week to acquaint themselves with the online course using this section, and as part of the orientation process, they were asked to submit answers to a short practice quiz and post a message in the discussion forum

introducing themselves, their role in the company, and their personal study goals for the course. A detailed schedule was provided for the remainder of the course, listing module readings and assessed tasks with associated deadlines.

Approaches used in each module

Table 5 describes the pedagogical approaches and learning activities employed in the course. A total of eleven graded quizzes and one practice quiz were created within the WebCT electronic quiz tool. All of the quizzes were integrated into the first two modules of the course, which was content-driven and had highly-structured learning activities testing declarative and procedural knowledge. Four discussion questions were set in Modules 4 and 5 and were designed to encourage learners to relate personal experiences and perspectives to the course content to develop knowledge in context. Each module contained a major assignment – in the early modules, these focused on testing comprehension of information supplied in the online course text, while later modules promoted independent research and the social exchange of ideas to achieve authentic project-based tasks. Modules 1 and 3 also contained short optional exercises within the online text pages that encouraged learners to augment the information presented in the online text pages with their own relevant experiences.

Table 5: Pedagogical Approaches and Learning Activities employed in the Course

Module	Pedagogical Approach	Learning Activities
1. Forest Management Issues and Practices	This module followed a behavioural/ transmissive approach that promoted learning in small, controlled steps and relied on a designated source of content information (course web site, supporting PDF documents). Emphasis was on acquisition of declarative and procedural, rather than contextual, knowledge. Assessed activities measured internalisation of a predefined set of facts (those supplied in course web site). Cognitivist principles, in which new information is related to prior knowledge and experience, guided the creation of the optional exercises provided within the course content text.	Short quizzes consisting predominantly of multiple-choice questions to test recall of declarative knowledge (assessed). Exercises relating personal experience and opinions to course content (optional, unassessed). Assignment 1 – review and summarise the values, issues, and conflicts related to forestry in South Africa based upon reading a government website and White Paper (assessed).
2. Taxonomy of Wood Products	This module also followed the behavioural approach described above.	Short quizzes consisting predominantly of multiple-choice questions to test recall of declarative knowledge (assessed). Assignment 2 – provide point-form answers to a list of questions on definitions, applications, advantages, and limitations of various wood-based products (assessed).
3. Primary Processing of Wood Products	This module was the transition point between the primarily behaviourist approach of the first two modules and the more constructivist approach of Modules 4 and 5. Assessed quizzes were no longer included, but sets of self-test questions were provided as a means of flagging the core concepts that learners were required to learn. The module assignment tested learners' ability to link concepts introduced in the online text to real-world consequences, setting the scene for more flexible and authentic learning tasks in the coming modules.	Self-test questions provided at the end of each section of content to allow learners to verify whether they can recall key facts and concepts (unassessed). Assignment 3 – describe all of the main stages in the production of solid lumber, starting with the felling of the tree (from online text). Suggest ways that occurrences at each stage in the process could affect the quality of the final product or of a downstream value-added product. Answers to be posted to the discussion forum.
4. Secondary Processing of Wood Products	This module employed a constructivist approach, still with some direct instruction (HTML pages of course content), but with encouragement and the opportunity for learners to go beyond the information given. Greater emphasis and validity was given to individual opinions and experience and third-party online information sources, versus the dominance of "official" facts provided in the content pages of the course web site. Social interaction and exchange of information with peers was facilitated via the discussion forum.	Discussion questions asked learners to: 1. provide opinions on the meaning of the term "value-added product" using examples from own industry, and; 2. weigh the economic versus social impacts of factory automation in South Africa. Assignment 4 – learners were asked to conduct independent research that considered authentic variables in the furniture manufacturing process, using suggested web links and reputable websites of their choice as sources of information.
5. Global Trade in Forest Products	This module employed a social constructivist approach, incorporating authentic, project-based activities and collaborative learning, but based upon well-structured content and objectives. Learners were given even greater flexibility in shaping their own learning, and the authentic dimension was emphasised. Discussion forum questions allowed for learners to share opinions and learn from the differing experiences and perspectives of their peers. The final assignment was a team-based activity intended to resemble a task that managers may be asked to do in the workplace. The activity encouraged practical application of the knowledge gained during the course within a real-world context. Chat tools and discussion forums were provided as a means for groups to communicate and collaborate.	Discussion questions asked learners to: 1. exchange opinions on Africa's future role in global forest products trade, and; 2. comment on a market analysis report on the South African furniture sector. Assignment 5 – in pre-assigned groups of three, learners were asked to put themselves in the role of entrepreneurs developing a new business venture. Learners were tasked with creating a mini product development plan, incorporating knowledge gained throughout the course on materials, manufacturing processes, product quality, export markets, and other relevant aspects.

The course does not represent a perfectly linear progression from a behavioural to a constructivist approach. This is because course content often lends itself to one pedagogical approach more so than another (Tennyson, 2002). A good example of this is Module 2 – Taxonomy of Wood Products. As the name suggests, this section of the course is concerned chiefly with introducing a wide range of wood products and materials and their attributes, many of which learners are likely to have no previous knowledge of. To build such foundational knowledge, learners must remember sets of basic facts about each product or material – the quiz method is an efficient means of testing this. The optional exercises that appear in Module 1 (e.g. “list examples of conflicting forest values”) do not appear in Module 2 because this type of exercise asks learners to link existing knowledge to the new information being presented. If learners have no existing knowledge about the topic, this type of exercise is of no benefit. Adult learners are very likely to have experienced a forest and considered some of its values and benefits, but are not likely to have experienced the manufacturing process that produces wood composite panels, for example.

Technology considerations

When choosing how new information should be presented in the course, it was decided not to rely upon media or applications that required high bandwidth (video, animated simulations, audio) as it was foreseen that this would cause accessibility problems for some learners due to slow modem connections and poor bandwidth. Presentation of content was achieved through text-based HTML pages supported by photos, diagrams, and charts. Resources, such as third-party reports, were converted to the Adobe PDF document format and optimized so that the file size was as small as possible before posting them on the course web site.

3.2.6 Data Collection

3.2.6.1 Pre-course questionnaire

Detailed pre-course interviews were conducted with all of the learners in June 2005, approximately three weeks before the course began. The interviews were conducted in four full days over an eight-day period in which the researcher traveled to the three regions where the participants' workplaces were located. Each interview was between one hour and ninety minutes in duration. The objective of the pre-course interviews was to obtain a detailed understanding of the learner group in terms of educational and career histories, personalities, experiences with computers and the Internet, and attitudes and beliefs about teaching and learning.

A detailed interview script/questionnaire was created that contained a number of sections, described below (see Appendix 2 for full questionnaire). Most of the questionnaire was designed to be completed by the researcher during one-on-one interviews with each participant. However, participants were also asked to complete two of the sections themselves in the presence of the researcher. An audio recording device was not used, as the intrusiveness of such devices can negatively affect the openness of the discussion between interviewer and respondent (Lincoln & Guba, 1985).

Personal information, education, and career background

This section contained twelve questions inquiring about identifying information (name, email), place of residence, languages spoken and degree of fluency, schools and higher education institutions attended, career history, current job and responsibilities, prior enrolment in continuing education and training courses, and familiarity with the subject matter of the pilot

course. This information was collected to gain a detailed understanding of the profile of the learner group.

Prior experience with computers and e-learning

This section contained ten questions inquiring about respondents' experiences with distance education and e-learning, and about computer use at home and at work. This information was gathered to investigate whether learners with prior experience of e-learning or distance education would perform better in the course than those with no experience.

Computer literacy

This section contained a list of twenty-seven descriptions of tasks commonly performed on a personal computer. Respondents were asked to read the descriptions and indicate their level of competence for each task. These questions were designed to obtain a detailed profile of the level of computer literacy of the learner group²⁴.

Personal learning styles and learning strategies

This section contained nine questions about respondents' preferred styles of teaching and learning and their typical study habits. The final questions in the section inquired about personality type and how respondents felt that their personalities affected the ways that they learn. This section was intended to gather baseline data that could be used to assess whether learners with certain personality types or preferences for certain types of teaching respond better to particular teaching approaches than others.

²⁴ Existing surveys were used as models in developing the computer literacy section of the questionnaire – these included the University of Maine System Computer Skills Quiz, the University of Houston Clear Lake Basic Computer Literacy Skills Survey, and the Portland Community College Online Orientation.

Personal definitions of learning and knowledge

This section contained twenty-four statements related to respondents' views on learning and knowledge²⁵. Respondents were asked to indicate their level of agreement or disagreement with the statements using a five-point Likert (agreement) scale. Each statement described a differing definition of knowledge or way that learners might go about acquiring it, and conformed to either a constructivist or behaviourist viewpoint. The statements were mixed and randomly displayed. The question set was included to provide insights into the epistemological beliefs of the learner group. Since educators' beliefs about epistemology influence the kinds of teaching that they engage in, it can also be assumed that such beliefs among learners have a bearing upon how well they will respond to particular teaching approaches and learning activities.

Professional or other factors affecting the efficacy of web-based training

This section consisted of two questions relating to workplace factors and cultural, social, or gender-based factors that could potentially affect the efficacy of the e-learning program. This question was included to allow respondents to make the researcher aware of any important factors that had not been previously raised in the questionnaire. It also created an opportunity for respondents to discuss factors related to gender or racially-based inequalities that might impact their performance in the course. This was seen as important in light of the greatly varying quality of education available to different groups of learners in apartheid-era South Africa.

²⁵ This section of the questionnaire was created using statements based, in part, on the Constructivist Learning Environment Survey developed by Taylor & Fraser (1991).

Course-specific questions

The final section of the questionnaire consisted of seven questions related specifically to the pilot e-learning course which the respondents were preparing to participate in. Questions in this section probed motivations for taking the course, learning goals, challenges anticipated, and the learning strategies that respondents intended to employ. These questions were asked so that actual performance of participants could be compared to their intended approaches once the course was completed.

3.2.6.2 Exit interview questionnaire

At the conclusion of the e-learning course, the researcher once again scheduled interviews with each learner at their workplace. The interviews were held in October 2005, approximately one week after the course had concluded. The interviews were conducted consecutively over a five-day period in which the researcher once more visited each of the factories where the learners were based. Interviews were between sixty and ninety minutes in duration.

The objective of the exit interviews was to obtain more detailed qualitative data on the appropriateness of the various learning activities, assess the perceived level of difficulty of the various activities for learners, identify aspects that were particularly challenging or rewarding, and ascertain how well the various learning activities were perceived by the learners to have helped them learn. The exit interviews were also intended to capture information that would help to answer some of the study's secondary research questions, including: assessing the minimum level of computer literacy that is sufficient for e-learning in the industry; determining whether current infrastructure (Internet access, computer speed, network bandwidth, etc.) in the

South African forest products industry is sufficient for e-learning; understanding how cultural and societal attitudes influence the efficacy of Internet-based training; determining the level of commitment that South African forest products industry employees should be expected to make to web-based training (hours spent per week, motivation to complete courses, etc.); and examining how human resources policies, training practices, and working conditions should be structured so as to maximize the positive benefits of training via e-learning. The full text of the questionnaire used can be found in Appendix 3.

During the course, it became apparent that the organisational human resources and training policies in effect at each workplace and the levels of support received from human resources managers and direct supervisors/managers had an extremely important influence on learner success. For this reason, much more emphasis was placed upon discussion of these aspects during the exit interviews than had originally been planned. Shorter interviews were also held with the regional human resources managers that had been responsible for liaising with the researcher and supporting learners during the course.

Patton (1990) states that the design of qualitative research is emergent in nature and, therefore, data collection strategies should be as flexible as possible. The exit questionnaire was a good example of this in that, while a standard questionnaire was created, not all of the questions were relevant to each learner because of differing challenges experienced and varying levels of engagement in the course.

The exit interview questionnaire was divided into the following sections:

Study habits

This section contained eleven questions and inquired about how much time learners spent working on the course, how frequently they logged onto the course website and checked email, whether they created and followed a study plan, and how their intentions prior to the course differed from their actual level of engagement.

Organisation and infrastructure

This section contained seventeen questions inquiring about the support that learners received from supervisors, HR personnel, and IT staff during the course. Respondents were also asked about whether IT infrastructure was adequate and whether the necessary IT-related arrangements had been made prior to the course. During the running of the course, it became apparent that this was not the case for a number of learners, with several learners falling behind in their studies or even dropping out as a result. This section was created to probe the reasons for these difficulties and the extent of such problems for each learner.

Communication

This section contained six questions inquiring about communication between the course tutor and the learner. During the course, several learners did not respond promptly to emails that were sent by the researcher inquiring about their progress in the course or reminding them of certain deadlines. The questions in this section were intended to discover why this had happened, and

whether learners felt that there was adequate and timely communication from the tutor and researcher²⁶.

Pedagogy

This section contained eighteen questions inquiring about the teaching and learning activities used in the course. Respondents were asked to comment on the level of difficulty of each one, how well they helped learners retain useful information, how enjoyable they were, and how they learned and benefited from each one. Learners were also asked to state some general opinions on web-based learning, and whether their opinions on e-learning had changed as a result of the course. Comments and suggestions regarding improvements to the course were also invited.

For HR Managers

The final section of the questionnaire contained eight questions and was directed to human resources managers only. HR managers were asked about attrition rates compared to face-to-face courses, major challenges they faced in supporting the course, support provided to learners, feedback from learners, and their opinions on the suitability of e-learning for workplace training. HR representatives were included in the interview process to obtain a detailed and balanced understanding of the levels of support given to learners and relevant corporate policies affecting the course.

²⁶ The researcher did not serve as the course tutor as it was seen as a potential conflict for him to grade the submissions of participants. However, the researcher played a supporting role as a technical contact during the course, and monitored participants' completion of assignments and use of the course web site throughout

3.2.6.3 Monitoring participants' performance during the course

The WebCT course management system provides a number of means of tracking the performance and study activities of online learners. A general student tracking screen in WebCT provides a table containing the following statistics:

- The total number of times each learner accessed any pages of content (page hits);
- The number of times a learner submitted or read a discussion forum posting; and
- The first and last dates and times that each learner logged onto the course web site.

Detailed histories showing the date and time that each learner accessed each page of content can also be viewed. Student scores for multiple choice quizzes that have been automatically or manually graded within WebCT are displayed in a separate table.

During the course, the tools described above were used by the researcher to monitor learner progress. Although such tools contain inherent limitations²⁷ and were used primarily to determine whether learners were keeping up with assigned tasks and meeting deadlines, some analysis is valid, and is described in Section 4.4.

Prior to the start of the study, it was intended that learners would be asked to complete a web-based survey after each module to inform the researcher of their opinions on the learning activities and tasks that they had just completed. Once the course was underway, it quickly became apparent, however, that the course workload was already high given the demanding nature of the participants' jobs and working hours. For this reason, it was decided that such information would be gathered during the post-course interviews instead.

²⁷ These limitations are described in Section 4.4.

3.2.7 Analysis of Results

Prior to the analysis of the completed interview scripts, all of the responses were first typed into a series of spreadsheets. A small number of questions were of the multiple-choice type, and for these questions, answer codes were recorded and averages or scores calculated. Free text responses, which accounted for the majority of the questionnaire, were analysed by searching for common themes or patterns within the spreadsheets and coding those responses. Coding was achieved by highlighting the text in various colours or entering comments or labels in adjacent columns in the spreadsheet. Ryan and Bernard (2003) refer to this process as “pawing”. The spreadsheets were then electronically sorted according to the themes that had emerged, and these sorted lists formed the basis for the narrative description of results provided in Chapter 4.

4. Results

This chapter presents the results of the study chronologically in four parts. The data gathered from the pre-course interviews will be described first, with the aim of providing a detailed picture of the course participants in terms of their educational and career backgrounds, computer literacy, preferred learning styles, and epistemological beliefs. The outcomes of the exit interviews will then be summarised to examine learners' study habits and performance during the course, organisational factors impacting their studies, course communication, attitudes to the various pedagogical techniques used, and overall opinions on the suitability and effectiveness of the course. The third part of the chapter will discuss the responses from the interviews with human resources managers. The final section will summarise how learner performance was tracked throughout the course.

4.1 Pre-course interview results

Twenty learners had originally volunteered to take part in the study. At the time of the pre-course interviews, however, the researcher was informed by human resources staff that two of the group would be unable to participate due to unforeseen increases in their workloads. The following is a summary of the results of the pre-course interviews.

4.1.1 Educational background and level of English fluency

Section One of the questionnaire asked about participants' age, languages spoken, jobs, educational and career background, and training that they had undertaken. All eighteen participants spoke English fluently, twelve as their first language, and the remainder as a fluent second language with either Afrikaans (5 people) or South Sotho (1 person) being their first language. Participants' ages ranged from 23 to 45 years old, with an average age of 31 years old.

Three of the participants had four-year degree qualifications, seven had three-year Technikon²⁸ Diplomas, and all of the remaining participants had undertaken part-time studies of various kinds at local Technikon institutions while working for Steinhoff Africa. It was common for participants to have training and further education sponsored by their employer, and most training, apart from basic orientation courses such as health and safety awareness, was conducted by external providers. A majority of respondents had undertaken several such courses while employed at Steinhoff Africa, and typically described Steinhoff as a very proactive employer in this respect.

4.1.2 Professional responsibilities

All of the participants could be broadly described either as management trainees, supervisory staff, or management employees. Five participants were management trainees who were being given short assignments in a variety of Steinhoff facilities in order to expose them to the diversity of operations in the company and prepare them for future head-office positions. These staff members did not directly supervise anyone on a permanent basis. Two more participants were employed as production planners in different factories. Although these employees did not directly supervise other staff, they were in positions of responsibility in terms of the impacts that their actions had on the smooth running of the factories. Other participants had responsibilities for procurement, product development, quality control, logistics, line management, or production planning and management. The number of employees supervised by these participants ranged from a single employee up to several hundred people, demonstrating the wide range of professional roles among the group (Table 6).

²⁸ A Technikon is the South African term for a technical college, similar to a North American polytechnic institution.

Table 6: Job Roles & Number of Employees supervised by Participants

Job Title	Employees Supervised
Management Trainee (5 participants)	none
Production Planner	none
Production Planner	none
Covers Controller (Procurement)	1
Product Development Manager	4
Nesting Manager	7
Logistics Manager	9
National Quality Assurance Manager	21
Line Manager	35
Line Manager	60
Production Planning Manager	100
Production Manager	122
Production Director	200
Factory Production Manager	500

4.1.3 Familiarity with subject matter

Prior to the course, participants had varying degrees of familiarity with the subject matter. As might be expected, those employed in plants producing wood products, such as household furniture, outdoor furniture and doors, had greater knowledge of wood products than those in factories making non-wood products such as mattresses or polyurethane foam. Most respondents had manufacturing knowledge relating only to the products made in their own factory, and did not have a detailed understanding of the wood products supply chain as a whole. A few participants who had procurement or quality assurance roles had some understanding of wood properties and commercial grading systems. Many of the individuals in the group had studied production management through part-time studies or at the Diploma level, but the courses they had taken had not focused specifically on issues related to the wood products industry.

4.1.4 Experience with e-learning and computer use

None of the participants had prior experience with e-learning. Half of the group had taken one or more distance education courses via correspondence. Most of those who had taken correspondence courses mentioned that the flexibility afforded by the correspondence format was a positive benefit. Overall, however, most of the learners were somewhat negative about their distance education experiences. The most common complaint was that it was very difficult to contact instructors when the learners had questions. Replies were very slow when they did come, guidelines were vague, and feedback inadequate. Some respondents also stated that the lack of interaction was a problem, and that one required a high level of self-discipline to complete the course. Only one of the nine learners who had experienced distance learning thought that the need for self-direction was a positive aspect, stating that "it teaches you to work by yourself and become responsible - if you don't do it, it doesn't get done".

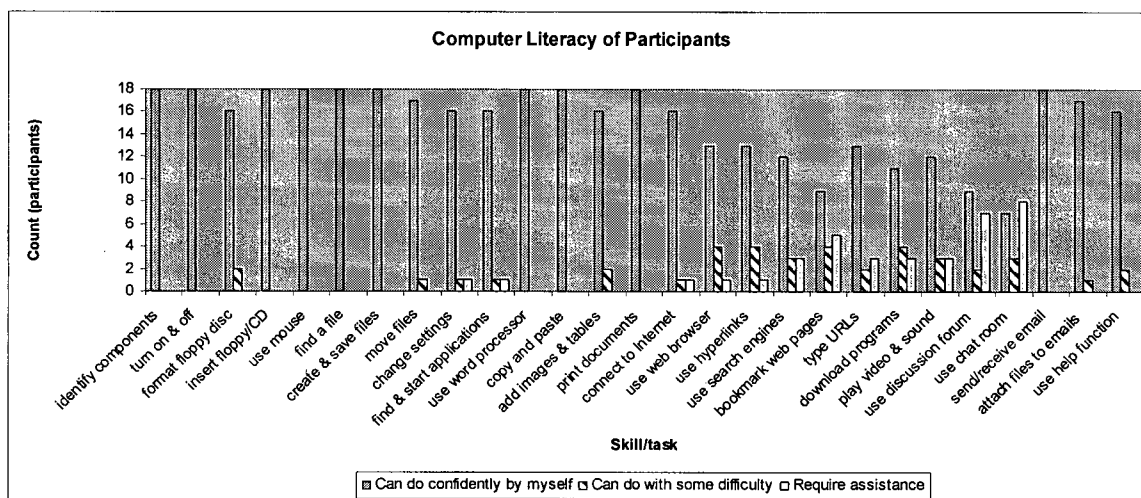
All but two of the participants stated that they used a computer daily, with the others using a computer at least once or twice per week. Sixteen of the 18 participants used computers both at work and at home. Computers were used at work for typing and editing documents, exchanging email, working with spreadsheets and databases, and using inventory control and production management software. Few of the respondents used the Internet at work, although many used it at home for online banking and leisure. Participants had between three and 20 years of experience using computers, with the average being just under 11 years.

4.1.5 Computer literacy

Respondents reported sufficient levels of computer literacy for e-learning, as is demonstrated in Figure 3. All respondents stated that they could confidently perform basic tasks, such as using a

mouse, finding and saving files, using a word processing application, printing documents, and sending and receiving email. Some respondents felt less confident about tasks such as using web browsers and search engines, finding web pages by typing URLs, downloading programs, and playing video and sound. Using discussion forums and chat rooms were the tasks that respondents had the least familiarity with.

Figure 4: Computer Literacy of Participants



4.1.6 Personal learning styles and learning strategies

Respondents were asked to recount educational experiences that they had found particularly positive or negative. These questions were included as a means of starting to identify participants' preferred teaching approaches. Some common characteristics of positive learning experiences described by the respondents included: relating the subject matter to authentic situations using case studies and/or personal experiences; demonstrating the context in which the information can be applied so that learners can identify a reason for learning the given

information; being flexible about the pace of instruction to allow for individuals to ask questions and clarify difficult points; involving learners in discussions and creating interaction; clearly explaining course requirements and being available to answer questions; using a variety of modes of presentation and types of exercise. Several learners also mentioned learning experiences that resulted in positive outcomes in the affective (emotional) domain, such as having increased self-confidence.

Traits identified by respondents as contributing to negative educational experience included: lack of good communications skills in instructors; strict adherence to the course plan or lesson outline such that the individual needs of learners could not be addressed; lectures conducted “parrot fashion” without flexibility; unprepared instructors; courses that taught facts in isolation without illustrating ways in which the facts could be applied in context; lack of support or instructor availability when students had problems or questions; and lack of interaction.

Respondents were asked to describe how they typically go about learning new concepts or facts. Some recurring answers included: thinking through concepts alone first before doing anything else; reading notes; making notes; writing summaries of course content; identifying key words that could be used as triggers to recall important concepts; needing to learn things step-by-step beginning with basic concepts and becoming more complex; asking questions; and using or creating visual tools. Some respondents pointed out that learning strategies differed for informal (problem-solving) and formal learning situations, and for theoretical and practical knowledge.

Respondents were subsequently asked to describe how they evaluate whether a learning experience has been effective or not. Table 7 illustrates the most frequently-mentioned factors and how many respondents cited each one. A strong emphasis on practical outcomes, such as being able to act upon or apply new knowledge, was observed. Emotional/affective outcomes were also mentioned by several participants.

Table 7: Factors that demonstrate that a Learning Experience has been effective

Outcome	# of Respondents
Cognitive outcomes	
When a concept seems simpler than before	1
When I can remember it some time after learning it	3
If I can understand something better than before	2
When an idea or concept sticks in your mind	2
Practical outcomes	
If I improve my speed at doing something	1
If I acquire new techniques or tools for doing something	2
If it improves the way I function	1
If I can apply it or put it into practice	8
If I can relate it to my work or personal life	2
When I make a real-life decision based upon the concepts I have just	2
Affective/emotional outcomes	
If it has been stimulating or thought-provoking	1
If it results in a change in mindset/perspective	2
If I gain more confidence through it	1
If it has an emotional effect	1

4.1.7 Most useful learning activities

Respondents were shown a list of ten activities that they might undertake when trying to learn something new. They were asked to rank these according to how useful they found them to be,

with a value of one representing the most useful activity and ten the least important. The responses were summed to produce an overall ranking for the group, as shown in Table 8.

Table 8: Perceived Usefulness of various Learning Activities

Rank	Activity
1	Reading written text – books, handouts, articles, written instructions
2	Doing practical exercises and tasks
3	Listening to verbal information from the instructor or during in-class discussions
4	Writing notes, paraphrasing content
5	Using diagrams, maps, charts, and other graphic forms of information
6	Drawing diagrams, sketches
7	Discussing the subject matter informally with peers
8	Watching videos, or live demonstrations
9	Doing practice quizzes
10	Creating flashcards

According to the results, reading written text materials was seen to be the most useful activity, followed by practical exercises and tasks. Quizzes were ranked low in usefulness, and most respondents ranked “creating flashcards” as the least useful, with most stating that they never did this.

4.1.8 Personality and learning

Respondents were asked to describe their own personality by stating how closely it matched five sets of descriptors. The results are displayed in Figures 3 to 7.

Participants tended to associate their personality more strongly with the term “outgoing” than with the term “reserved” (Figure 4). Participants were split fairly evenly between the terms “assertive” and “accommodating” (Figure 5). More participants associated their personality with the term “individualistic” rather than with the term “group-oriented” (Figure 6). Almost half of the group (eight respondents) regarded themselves as strongly experimental and four more stated that they were “somewhat experimental”. Only one respondent described their personality type as “somewhat traditional” (Figure 7). Just over two-thirds of participants regarded themselves as flexible, with the remaining five regarding themselves as “somewhat perfectionist” (Figure 8). The term “perfectionist” was defined by the interviewer as “preferring that a task can only be performed in one correct and predetermined way, rather than allowing for employees or co-workers to use a variety of different approaches to reach a given end-goal”.

Figure 5: Personality Traits of Respondents - “Outgoing” vs. “Reserved”

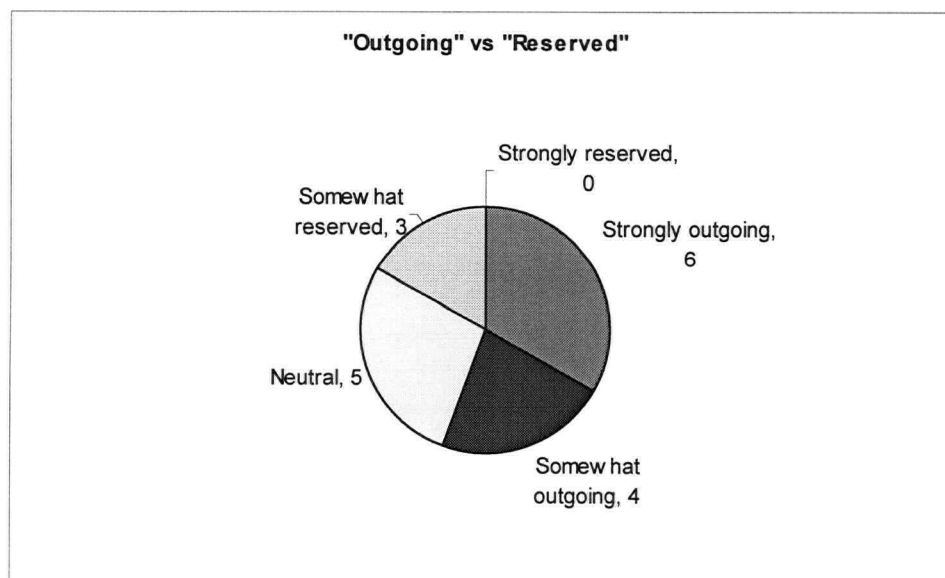


Figure 6: Personality Traits of Respondents - "Assertive" vs. "Accommodating"

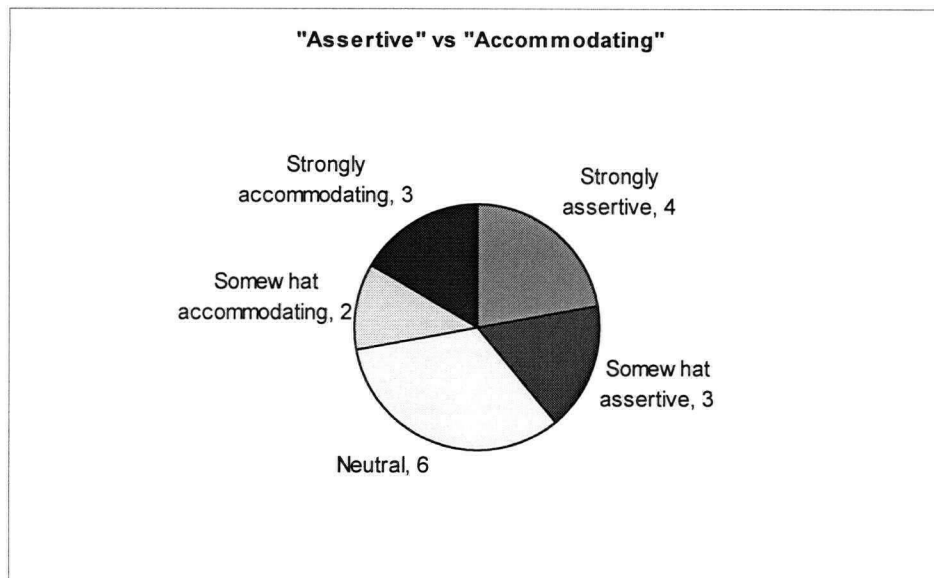


Figure 7: Personality Traits of Respondents - "Individualistic" vs. "Group-oriented"

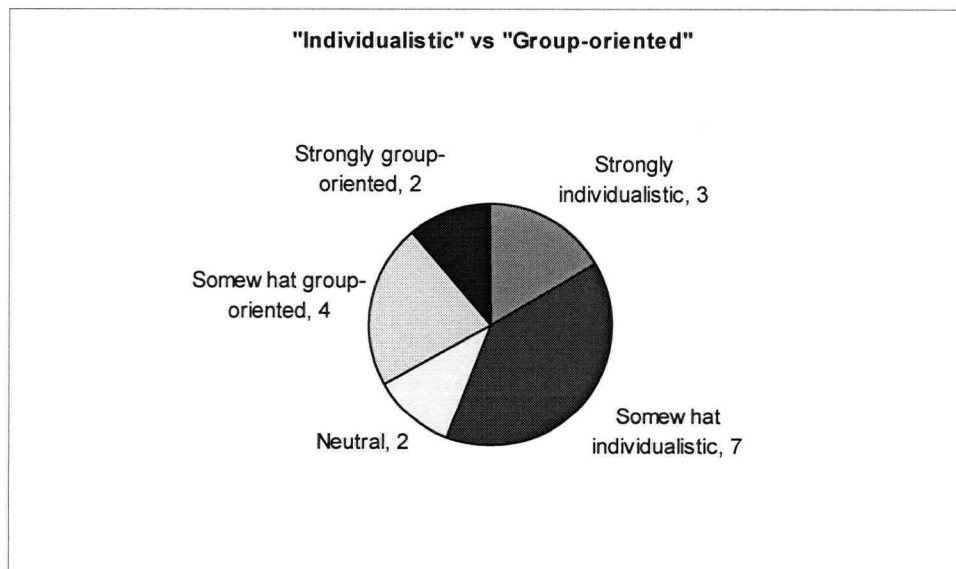


Figure 8: Personality Traits of Respondents - “Experimental” vs. “Traditional”

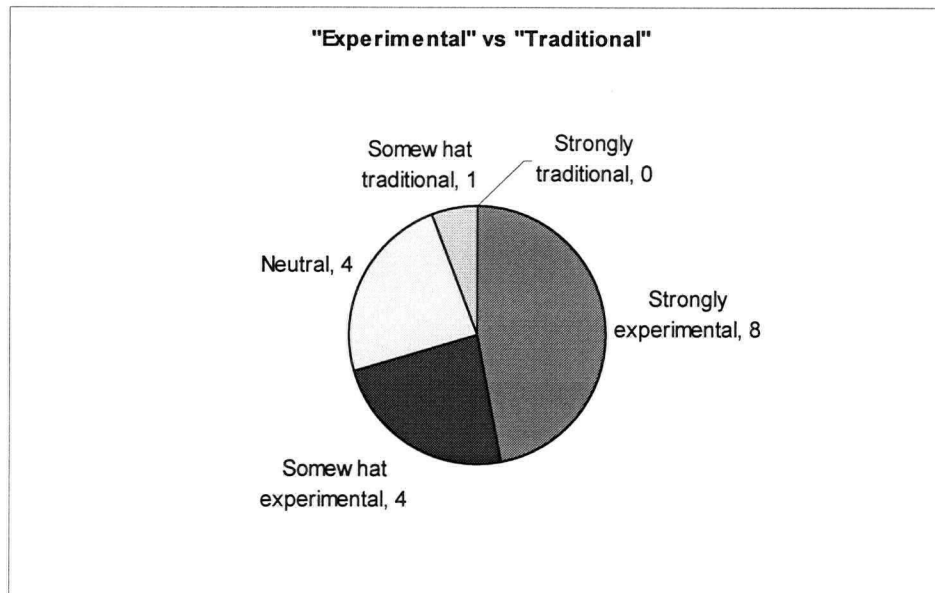
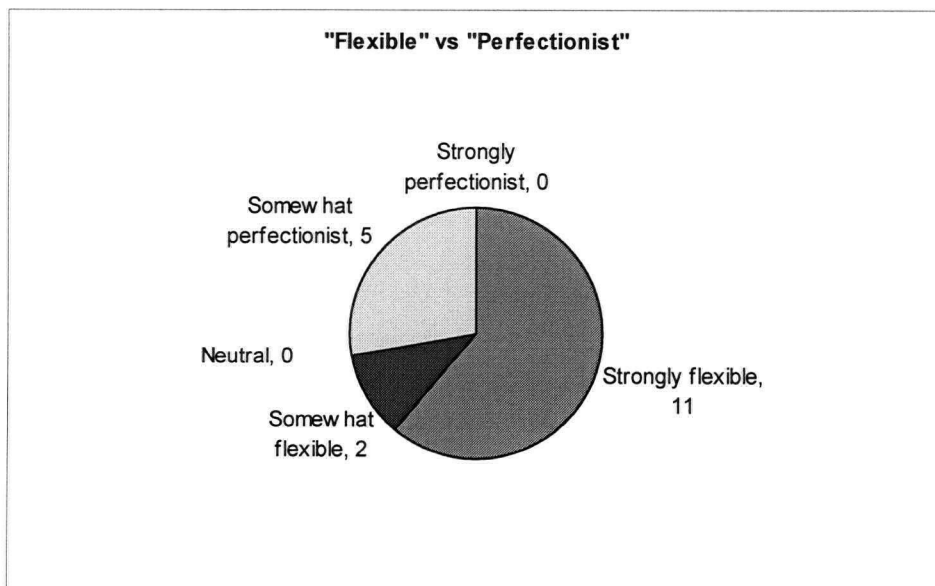


Figure 9: Personality Traits of Respondents - “Flexible” vs. “Perfectionist”



As a follow-up to the questions on personality type, respondents were asked to describe other ways in which their personality affected their own learning. Many respondents mentioned group work – opinions were split on the merits of this approach, although more respondents expressed

positive views. Positive comments included: “understanding others’ ideas is important”; “input from others helps to verify ones’ own understanding of a given subject”; “it is easier to experiment with potential solutions in groups”; and “solutions come once everyone’s ideas are on the table”. Some respondents felt that it was better to work alone initially to gain a basic understanding of new concepts – once this understanding had been achieved, they could then benefit from discussing the topic in groups. Negative comments on group work included: “it wastes time, as 95 % of group work is spent on planning”; “it is not efficient, as you have to wait for everyone in the group to understand each step”; and “in a group, I will be more reserved, so my ideas will not be used”.

Other points raised by respondents included difficulties in working with noise or interruptions, the need for content to be broken into manageable chunks, and problems with maintaining motivation throughout a course of study. One respondent had the opinion that computer-based self-study was better suited to those with analytical, perfectionist types of personalities, while those who are more social and outgoing would require a more interactive learning environment.

4.1.9 Personal definitions of knowledge and learning

Respondents were asked to read a set of twenty-four statements expressing views about knowledge and learning, and to denote their level of agreement or disagreement with the statements by checking the appropriate box on a Likert (agreement) scale. The responses were coded according to whether they corresponded to an objectivist/behavioural view of knowledge and learning or a constructivist view. A score was then calculated²⁹ for each respondent which

²⁹ Scores were calculated in the following manner. First, the level of agreement with the 12 statements supporting the objectivist/behaviourist perspective was found by calculating a simple average, and the same calculation was

represented their level of conformance to either the behavioural/objectivist or constructivist viewpoints. A positive score indicated accordance with constructivist views, while a negative one indicated a behavioural/objectivist perspective. Specifically, a score of two represents the maximum possible degree of agreement with constructivist principles, while a score of -2 represents the maximum degree of agreement with behavioural/objectivist principles (Table 9).

Table 9: Participants' Epistemological Outlook Scores

Respondent #	Epistemological perspective score	Respondent #	Epistemological perspective score
1	0	10	0.25
2	0.583	11	0.5
3	0.417	12	-0.5
4	0.167	13	0.333
5	0.833	14	0.917
6	-0.08	15	0.333
7	1.167	16	0.417
8	0.417	17	-0.25
9	0.083	18	0.5
		AVERAGE	0.338

On average, most respondents tended towards agreement with constructivist principles of teaching and learning, with the average score being 0.338. The highest individual score on the constructivist side was 1.167, while the highest on the behavioural/objectivist side was -0.5. Only three respondents had negative scores, which indicated a general agreement with behavioural/objectivist principles of knowledge and learning.

performed for the 12 statements supporting the constructivist perspective. The objectivist/behaviourist average was subtracted from the constructivist average, resulting in a value between -2 and 2.

4.1.10 Other factors impacting the course

Respondents were asked to identify any factors related to their role in the workplace or in their lives in general that might affect their performance in the e-learning course. The most common concern mentioned was finding sufficient time for studying. Many respondents stated that they frequently worked long hours and their work days were unpredictable due to the need to troubleshoot problems in their respective factories. Some traveled as part of their professional responsibilities and several were involved in other training programs. One respondent was a single mother and stated that family affairs, combined with work responsibilities, would mean that good time management skills would be needed to keep up with course requirements.

4.1.11 Motivations and expectations

In this final section of the interview, respondents were asked to state their reasons for taking part in the course, and their expectations about what they would learn. The most common answer was that the participant wished to broaden their knowledge of the wood products industry in order to do their own job more effectively or open up the potential for movement within the company and/or possible promotions. A second reason cited by many was the desire to try e-learning in order to better their capacity for learning via computers and the Internet. A number of the respondents stated that they had been “nominated” by their human resources managers to take part in the course.

Respondents were asked what personal learning strategies they intended to employ during the course. Many answered this by reiterating the preferred learning strategies that they had described earlier in the interviews. Most stated that they would like to first review the course structure and requirements in detail before planning their learning strategy. While many of the

strategies described (reading, note-taking, using keywords, summarizing content) were the same as those used in face-to-face or correspondence courses, some learners stated their intention to use the Internet as a research tool to source additional information relevant to the course, or to bring real case information from their workplaces into their studies to provide context for the concepts that they would learn online.

Finally, respondents were asked what challenges they anticipated, and how these would be addressed. Again, the predominant problem cited was that of finding adequate uninterrupted time during the work day for studying. Some respondents stated that they had no Internet access at home, so would have to be able to fit their studies into the work day, while others anticipated devoting evenings at home to the course. All of those identifying time as a critical issue stated that they would need to set up a strict study schedule and follow it diligently in order to keep up with requirements. A second, lesser challenge cited was unfamiliarity with the Internet and e-learning. Most respondents stated that they expected that this issue would be overcome with practice and time.

4.2 Exit interview results

Exit interviews were conducted in person between October 24th and 28th, 2005, with fifteen of the eighteen learners in the group. The remaining three participants were unavailable due to work-related matters or illness, and were interviewed by telephone in early November. The following is a summary of the results of the exit interviews.

4.2.1 Study habits during the course

About half of the class had a tentative study schedule in mind prior to starting the course, with the remainder stating that they wanted first to be more familiar with the course content, or that their jobs were too unpredictable to be able to set and maintain a regular study schedule. Of those that did have a study schedule in mind, some planned to stay late and study after hours, come in early and study, study during weekends, or study at lunch or during the time that they regularly worked on their computers (many of the group spent the majority of their working hours on the plant floor and had limited time in their offices in front of their computers). Most of the respondents stated that they were not able to maintain the schedule that they had envisaged prior to the course. There were several reasons for this. Three respondents were promoted within the company during the course and their new responsibilities meant that they had less time available than they had expected. Several more were affected by changes in the shift systems at two plants that affected the working hours of the participants. Industrial action at one plant, a fire at another, and machinery breakdowns at a third caused unforeseen schedule disruptions for other learners.

Extended work-related travel affected the study schedules of two learners, and a two-week spell in hospital affected another. Learners who attempted to study during their normal working hours typically experienced frequent interruptions from their co-workers and superiors, which adversely impacted the effectiveness of their study time.

Most respondents stated prior to the start of the course that they checked email daily, and this routine was maintained throughout the course. Most respondents accessed the course website

much less frequently than they had intended, however. Apart from generally being very busy, the most common reason given to explain this was that Internet access was seen within the company as a privilege afforded primarily to senior managers. Costs per megabyte of data transferred were strictly monitored by financial controllers, and most participants felt that it would be frowned upon for them to spend too much time online. For this reason, most participants used the WebCT Compile³⁰ feature to print course notes as a hard-copy document and read them offline.

Respondents were asked whether they would change their study habits if they were to participate in a similar e-learning course in the future. Several stated that it would have been useful to have set and followed a detailed study schedule, although they mentioned that unforeseen circumstances would be likely to arise anyway to some extent. Almost all of the respondents stated that they would prefer to take future e-learning courses during the first six months of the year as it is the quieter season in the South African furniture industry. Several respondents also suggested that they would prefer to work out an explicit arrangement with their superiors and human resources staff to set aside designated times during their work day when they could “officially” study without interruption.

4.2.2 Perceived importance of the course

Respondents were asked how important they perceived the course to be in the eyes of their superiors and human resources staff. Each respondent rated perceived importance on a scale of one to four, with one denoting “not at all important”, two meaning “not important”, three being “somewhat important”, and four being “very important”. The average score for immediate

³⁰ The “Compile” tool allows course participants to select pages of online content from the course and compile them into a single document which can be printed in hard copy form.

superiors was 2.62, while the scores for company HR managers and corporate HR managers were 2.91 and 1.75, respectively. The scores suggest that immediate superiors generally did not perceive the e-learning course to be important. This is supported by respondents' comments – almost all stated that their superior was aware of the course, but never inquired about their progress or showed any interest. Only one respondent stated that his superior was actively supportive and helpful.

The average score for company HR managers (those located at the factories where participants worked) was slightly higher, but most respondents stated that interactions with their factory HR manager were limited to informing them initially about the course and setting up the pre-course and exit interviews. HR managers were not active in monitoring their employees' progress in the course, and typically contacted learners only when there had been a request to do so from the researcher. One respondent stated that his HR manager came to him with a printout of an email from UBC asking why he had not yet logged into the course web site even though the course had been running for several weeks. When the learner explained that he still did not have access to a computer, the manager responded, "at least you have a good excuse".

Most of the respondents had no direct contact with corporate human resources managers, so were unable to comment on the level of importance that these individuals placed upon the course. Most learners stated that they personally regarded the course to be important, with the average being 3.4. In addition to learning about the forestry and wood products industry and expanding their knowledge of the other operations in the Steinhoff group, many learners expressed excitement at being able to try e-learning for the first time.

Respondents were asked how much direction they were given from within the company regarding the e-learning course. Most learners stated that there was very little or no direction given.

4.2.3 Technology infrastructure

The next set of questions related to the technology infrastructure available to the learners in their workplace. Three learners stated that they did not have access to a reliable Internet connection, and that they experienced severe difficulties as a result.

Four of the learners reported that they did not have reliable Internet connections on their own office computers. One person experienced problems with his user profile on the company network such that email could not be received from certain servers. This included the UBC server, meaning that the learner was unable to receive email from the course tutor and the researcher. The learner made repeated requests to company IT representatives for the problem to be resolved, and the researcher also called from Canada on two occasions to request that the issue be addressed. Despite these requests, the issue persisted throughout the course. In addition, the individual was not provided with his own Internet access and was forced to log into the course using the username and password of a co-worker. These factors, combined, made it extremely difficult for the learner to participate adequately, and as a result he was not able to complete all of the course requirements. The reason that the other three learners did not have reliable Internet access was because they were not supplied with computers in their own offices. The three learners (who were each at different locations) were all asked to share an Internet-linked computer with a co-worker who was also a course participant. This created difficulties, as

the learner had to wait for a time when his/her co-worker was not at his/her desk in order to log onto the course web site. This was both difficult and demotivating and, in all three cases, the learners ultimately were unable to complete much of the course (although for one learner, there were other circumstances influencing this outcome).

Two other learners reported that their Internet connections at work were reliable, but slow, as they were connected to a server some distance away in another factory through an analog line. Although this was frustrating at times, the learners did not report that it seriously affected the learning experience or their ability to complete coursework and assignments. One learner stated that the UBC server was faster and more reliable than many local South African web sites.

Respondents were asked whether Internet access had been set up for them in time for the start of the course. Several respondents mentioned that, within the Steinhoff Group, Internet access was a privilege granted to only a few senior managers, and that requesting such access involved going through several layers of bureaucracy. Of the thirteen learners that stated that they had reliable Internet access during the course, seven of them did not have this access set up by the start date of the course. In most cases, the delays were between one and two weeks. In one region, the cause could be attributed to the resignation of the regional IT manager, which meant that learners had to request Internet access directly from head office. In another region, learners attributed the delays to the human resources department. Most learners stated that the delays negatively affected their motivation; in most cases, they already had extremely busy work schedules, and the late start made it even more difficult to keep up with course requirements.

4.2.4 Support during the course

Learners were asked whether the support provided during the course could have been improved. Two thirds of the respondents expressed the opinion that they would have benefited from more active support from their human resources staff. Many suggested that human resources staff should have ensured that all participants had working Internet access and computer availability well in advance of the course start date, and that better coordination was required within the company on these matters. Several learners also stated that it would have been useful for HR staff to inform learners' supervisors of the goals and importance of the course and the requirements in terms of time needed to study. This was seen as being especially useful in situations where learners were falling behind with studies, and would have allowed them to be in a stronger position to negotiate with managers for more study time or flexibility in working hours.

One learner stated that most training that Steinhoff employees are involved in is conducted by external providers, and that human resources managers normally take a fairly "hands-off approach". Several learners stated, however, that for an e-learning course, it would have been useful to have more proactive involvement, including periodic checks on their progress, by HR representatives. Some learners also stated that the lack of feedback from human resources staff negatively affected their motivation.

Learners reported that the support from the course tutors and others at UBC was adequate or good, and that they received prompt answers to questions in all but one case. One learner

suggested that a system be set up in which auto-alerts are sent by email to participants as soon as a quiz or assignment deadline is missed.

4.2.5 Communication and progress during the course

Learners were asked if they had received emails from UBC course staff inquiring about their progress in the course. All but two of the respondents stated that they had received such messages. Of the two people that did not, one experienced continued and unresolved difficulties with his computer network account which meant that he was not able to receive messages from certain email servers, including the one at UBC. The second was one of two learners who did not have use of a personal computer at their workplace. Of the learners that did receive messages from UBC, most stated that they did try to respond promptly to such messages (the experience of the researcher, however, is that many such messages were not promptly answered).

Learners were asked whether they communicated any logistical difficulties promptly to UBC. Of the learners who experienced such difficulties, most stated that they did not for various reasons. Some learners who experienced delays in having Internet access set up opted to try to resolve the issue internally by talking to their human resources managers. They were generally told that the matter was in hand, and so they did not feel the need to pass the information on to UBC. One learner became so frustrated with the technical difficulties that he experienced that he dropped out of the course. Another who had no access to a personal computer at work did communicate his difficulties to UBC initially, but stated that he had fallen so far behind that he felt "swamped" and was unable to continue the course.

Learners were also asked whether they contacted course tutors about difficulties in meeting deadlines. While most stated that they did, the experience of the researcher was that, in about half of the cases, the course tutor or researcher needed to initiate communication with the learner in order to find out how the learner intended to catch up with assignment deadlines and other course requirements.

Learners were asked how they would resolve problems such as falling behind with assessed work in a face-to-face course, and how this differed from the e-learning situation. One respondent stated that it took longer to sort out problems in distance education courses. A second respondent stated that learners are less likely to fall behind in face-to-face courses because “a set time is allocated, and one has to be there, so I go”. A third learner suggested that issues, such as missed deadlines, are easy to resolve one-to-one in a classroom environment.

The final question in this section asked learners whether they felt less urgency to complete the course because of the distance-learning format. Slightly more respondents answered “yes” than “no”, with one learner stating that the two formats were similar because there were assignment deadlines in both. Those that answered “yes” mentioned that “there is no-one to watch over you”, and that the distance between learner and tutor reduces the sense of importance of the course, making it easier for work pressures to take time away from studying. In answering this question, learners did appear to be influenced by other factors, such as problems and delays experienced in getting Internet access established. One learner who answered “no” to this question stated that individual commitment is a key success factor whatever the format.

4.2.6 Learning activities and pedagogical approaches used

In this section, learners were asked about various aspects of the learning activities used throughout the course in order to ascertain the most suitable and effective approaches.

Learners were asked to rank and comment on the level of difficulty associated with the course activity, the helpfulness of each activity for retaining new information, how enjoyable each one was, what respondents learnt from each one, and any other perceived benefits. During the interviews, however, respondents tended to present their answers in a holistic, non-linear fashion that reflected personal preferences and the experiences and parts of the course that had been most memorable for them. The results of this portion of the interview are, therefore, presented in a summary format.

Learners had an extremely varied range of opinions regarding the activities used in the course. In general terms, most learners saw value in having all of the various activities included in the course, as each activity was seen to yield its own unique benefits and to challenge the learner to engage with the course topics in different ways. The blend of activities was seen to be a positive aspect, as it helped to keep the attention and interest of participants. Learners generally felt that the course got more complex and difficult as it went on, but, at the same time, the majority of respondents stated that they found the later activities, which involved contextualization and critical thinking, to be more useful. One respondent made the comment that “toward the end, because they asked for your opinion, it seemed more difficult to think for yourself, as there was no definitive answer”. Learners stated that the later activities were better for retaining useful information, even though they took more time. The absence of a final exam was seen by some as a positive aspect as it prevented learners from trying to cram facts rather than applying

knowledge in context. One respondent stated that the mixture of activities and study resources was a pleasant change from “death by PowerPoint or death by reading”.

There was a difference of opinion regarding the best order for course activities. Some thought that quizzes should be included in each module as a means of reviewing the course content and preparing learners for assignments. Similarly, some respondents suggested that each module should contain a mix of open-ended and structured activities. In contrast, other learners stated that the flow from structured activities at the beginning to open-ended activities at the end was appropriate, as simpler assignments helped them to build confidence and later, more-complex assignments required more time. Some respondents suggested that the group assignment should be introduced earlier to allow more time for students to coordinate efforts with their peers. The respondents’ views on each of the various activities are summarised below.

Quizzes

It was clear that some learners found the quizzes more useful than others for internalizing the course content. In general, the content of the quizzes was not found to be difficult, although one learner stated that they were tricky because answer choices were very similar, meaning that one had to review the online text very carefully to complete them correctly. Quizzes were seen as useful, by some learners, for generating key words or phrases that could prompt recall of whole sections of text, and in helping learners to focus on the “most important facts”. Another learner viewed their purpose differently, however, stating that he would not be able to remember what the quiz questions were afterwards, but the quiz “forced you to read the content”. Other learners

also stated that having to revisit the text to answer the quiz questions was a useful way of reinforcing what they had already read.

Although the quiz questions themselves were not seen to be very difficult, some learners stated that the method of submitting answers in the WebCT environment was a little tricky at first, as each answer in the quiz had to be individually saved before electronically submitting the completed quiz. This was off-putting to some in the early stages of the course, although learners stated that they quickly became accustomed to using the quiz tool.

Learners who had stated in the pre-course interviews that they were more comfortable with traditional didactic teaching methods (presentation of facts followed by an exam to test recall) also saw more value in the quizzes and in Assignment Two, which was a question-and-answer assignment rather than an essay or project-style activity (see below). One student stated that he preferred structured assignments as they helped him to prepare for exams. Despite the fact that there was no final exam in this course, he still felt more comfortable with this kind of activity, as all of the other training that he had participated in had involved a final exam.

One learner stated that he saw the quizzes as an “extra” and considered the assignments to be more important, despite the fact that learners had been informed that the quizzes were a mandatory part of course requirements.

Self-test questions and exercises

A number of optional exercises were included in some of the modules to allow participants to reinforce their understanding of concepts introduced in the online text. Most of the learners completed one or more of these activities and found them useful – comments included: “the exercises made you think, not just read”; “helps you obtain a deeper understanding”; and “very useful in the sense of making me go back and read carefully”. Some respondents stated that they skipped through the optional exercises due to lack of time – one respondent stated that they were “a luxury I couldn’t afford”. However, the same learner saw value in the exercises. He suggested a modified exercise in which each learner would write two relevant questions that he/she felt were not adequately addressed in the online course text, and then present them to fellow learners for discussion.

Assignment One: Summary of key issues in the South African forest industry

In Assignment One, learners were required to summarise, in short essay form, the main points in the online text, and to supplement this with information from an external website, a government White Paper document, and their own knowledge of the forest industry in South Africa.

Learners generally found this assignment to be useful, although some noted that it was more time-consuming than some of the other assignments because of the need to summarise information from several sources. Interestingly, even learners who stated that they preferred structured, quiz-type assignments still felt that Assignment One was of value in requiring learners to look beyond the course text and consider other information. One learner stated that the fact that the website and White Paper information were authentic was both interesting and motivating.

Assignment Two: Short questions with point-form answers

This assignment asked for a series of point-form answers, all of which could be found in the Module Two online course text. Learners who found the quizzes useful also found value in this assignment. Most learners found this assignment to be fairly simple, as all of the answers were contained in the text. At the same time, most learners considered the assignment to be a useful way of reviewing the content in a quick and concise manner. One learner did not see value in the activity as he “did not like regurgitation”—instead he preferred the later, more open-ended, assignments.

Assignment Three: Impact of primary processing on downstream manufacturing

In this assignment, learners were asked to describe all of the main stages in the production of solid lumber, and to identify how each stage in the process affected the quality of the final lumber product or value-added products such as furniture. Most learners saw this assignment as a transition point between the previous assignments that were based primarily on the module text information, and subsequent activities that were more flexible and drew upon individual opinion and judgment. Most learners stated that the assignment was interesting and not overly difficult. One learner stated that “I learned more in Assignment Three than with previous assignments because I had to understand and then describe each production stage in a story”. Another learner stated that analyzing the lumber manufacturing process within the context of potential production issues gave him valuable insights into the topic, held his interest, and helped retention of the information in the text.

Assignment Four: Internet-based research project

In this assignment, learners were required to use the Internet as a resource to search for information on one of the production steps in the furniture manufacturing value chain and compile a short (400-500 word) report. Learners were able to choose a production step that interested them personally (for example, product development and design, assembly, quality control, or shipping logistics). Some web links were provided to external sites as a means of getting started, but learners were encouraged to seek out additional online information sources on their own. All learners generally enjoyed the flexible, authentic aspects of the assignment. Many stated that having a choice of what to write on was interesting and motivating, and allowed them to focus on a personal interest or strong point or to choose topic that was relevant to their own work situation. Only one learner suggested that there is a natural tendency to focus on something that you are familiar with, so a better approach might be to force each person to write on something outside of their area of expertise.

Learners also stated that the search process was useful, and many felt that their Internet research skills had improved as a result. Learner comments included: “it was useful being able to source external data as it gives you a wider perspective”; “I had no idea so much information was out there relevant to our industry”; “even if you are reading the same information externally as is available in the course text, it is valuable because it validates that information in the text and expands upon it”. One learner stated that some of the sites that he found while doing research for the assignment have become favourite links that he refers to regularly in the course of his job.

Learners did not state any negative opinions on the educational value of Assignment Four, but some pointed out that the need to reference external resources online made the activity more

time-consuming than other assignments. For some, frustration arose from slow download speeds on external sites, and it was reported that the UBC server was actually faster than many of the local sites that learners visited during the assignment. One learner noted that the information on the external websites was not always relevant to the task in hand, unlike the online course text. Another problem mentioned was that Assignment Four required learners to spend more time online than other assignments. This was a problem because learners felt that their superiors would complain if they spent too much time online.

Assignment 5: Group product development plan

In the final assignment of the course, learners were asked to work in groups of three to create a short version of a product development plan for a secondary wood product that they were not currently producing at their workplace. Learners were asked to consider and describe target markets, pricing, structural properties, visual appearance, materials to be used, production steps, machinery and technology to be used, product quality requirements, marketing, competitors, and distribution. In completing the assignment, learners were encouraged to apply as much of the course information as possible to the task. Groups were assigned by the course tutor and each consisted of three people from separate production locations.

Learners who undertook the final assignment were positive about the authentic nature of the activity and appreciated the chance to work and share perspectives with colleagues from other factories. However, all of the learners experienced logistical challenges with the group format. Working long-distance was challenging for the learners. Differing work schedules and business travel made coordination of phone calls or chat sessions between group members difficult, and a

compounding factor was that, by the end of the course, some learners had fallen behind with other assignments and were not able to contribute as fully as expected. It was suggested by several respondents that groups should have been formed such that members were all in the same physical location as this would facilitate coordination of efforts. Some participants proposed that the course, as a whole, could be improved by including a face-to-face meeting of participants from each region at least once a month. Another respondent suggested that face-to-face meetings could be used also for factory or mill tours to reinforce the concepts covered in the course.

One learner suggested that time could be saved if groups were assigned a topic to work on, rather than having the choice left open for discussion. Learners also suggested that group work should be performed earlier in the course so that there would be less chance of fellow group members falling behind. It was also proposed by one learner that course participants should be allowed to select their own group members early in the course so that they could work with people with similar interests.

Lastly, just one respondent stated he would prefer to work individually so that he could be responsible for his own grade, even though he saw the team aspect of the assignment as being highly relevant to his job.

Online Discussions

Respondents expressed overwhelmingly positive opinions about the online discussion forum questions and, for many, it was the most enjoyable part of the course. Some comments were:

“fellow learners contribute alternative points of view and reinforce one’s own opinions”; “it was motivating to share opinions and see others doing the same”; “they helped me remember because it was personal – you remember because it applies more to you personally and you remember the opinions of others because you had to comment on it or because they critiqued what you said”; “when you speak to a person in your industry, you start to think about issues that you didn’t think about before – that person forces you to think about new things”; “I remember things better if I can put it in the content of my own opinion”; and “hearing different perspectives is important as it helps with understanding real life and interaction with others”. One learner stated that if he had used some of the information from the discussion forum in his assignments, it would have “made a bigger impact”. Another learner noted that “the value of the discussion contributions varied depending upon the person, but their real experiences were very useful”.

Many learners saw benefits in having the discussion forum available so that learners could discuss problems or questions with each other, although the discussion forum was not widely used for this purpose. Only one learner suggested that sharing opinions is not as valuable as learning the course content – however, even this learner proposed that the discussion forum should still be included, but be optional rather than mandatory. Learners generally stated that they found the discussion tool convenient and easy-to-use, despite some trepidation prior to the course about using it for the first time.

One student, who was extremely timely in his submission of assignments throughout the course, stated that it was frustrating to have to wait for other students to submit discussion postings before he could respond to them.

4.2.7 Performance in the course and opinions on e-learning

Learners were asked how they felt about their performance in the course. Most were happy with the quality of work that they had produced, but would have liked to have had more time to complete all of the course requirements. Learners were asked whether they felt comfortable working in the web-based environment. In general, most reported that, after some initial challenges, they quickly adapted to the web-based format. The introductory module describing the WebCT interface and associated tools was seen to be adequate, although one learner suggested that a dynamic help tool would have been useful with popup dialog boxes to remind users of how to find and use particular features of the course web site. Some users stated that they were pleasantly surprised at how easy the site was to use. Two learners were frustrated by the slow download speeds they experienced. These learners were situated at a factory with a slow analog Internet connection, and the line was scheduled to be upgraded in the near future.

Respondents were asked whether their opinion of e-learning was more or less favourable than it was prior to the course. Seven learners stated that their opinion was unchanged, while eight stated that their opinion was now more favourable than in the past. Of those stating that their opinion of e-learning had improved, some reasons given were: “the format is preferable to correspondence courses because communication with tutors is easier and the medium is a lot more live”; “all of the content and tools are conveniently available in one place, with the World Wide Web as an additional external resource”; “e-learning is far more interesting than normal classroom learning”; “now that I understand the medium better, e-learning does not seem very different from face-to-face instruction”. Only one learner had a less favourable opinion of e-learning than prior to the course, but explained that this was because he had not been provided

with a dedicated personal computer for the course and had ultimately been unable to complete much of the course as a result.

The point was made by one learner that, although he considers e-learning to be a very good training tool, a formal schedule should be put in place, and the company and trainees should develop a mutually satisfactory agreement to allow the learner freedom (time) to work on the course. Most respondents stated that they would take other web-based training courses, as long as the timing suited their work schedules and the subject matter was relevant to their occupation.

Respondents were asked to identify what they saw as the advantages and limitations of e-learning. From their responses, a number of general themes emerged. Firstly, e-learning was seen to offer the flexibility of “anytime, anywhere” access, but this was viewed as both a positive and a negative aspect. Learners liked the fact that they could fit their studies around their own work and personal schedules, but stated that this made them more likely to procrastinate, especially when their working hours increased during busy periods. Some learners also felt that there was “no-one to push you” (despite the fact that the researcher sent emails to learners to remind them that deadlines had been missed). Personalities appeared to play a strong part in how learners felt on this issue – a learner who had admitted that she “should have pushed herself harder” said that procrastination was a problem in e-learning, while another learner who consistently stayed on track with assignment and quiz submissions argued that “it comes down to individual motivation”. It was suggested that incorporating face-to-face study groups would help to motivate participants to stay abreast of course requirements. One learner commented that he

appreciated the fact that course content was time-released, as it prevented eager learners from jumping ahead and helped to ensure that others did not become overwhelmed if they fell behind.

The issue of interaction was the second general theme. On the positive side, learners typically stated that e-learning afforded greater interaction than correspondence courses, and sharing experiences and opinions with fellow learners was of significant value. However, several respondents noted that there are inherent delays in getting answers and limited opportunities for interaction between student and instructor, as one “can’t just put up your hand”. One learner stated that “humans need contact” and that a face-to-face component should be included, if possible. Another learner noted that learners “cannot have an open discussion without spending money”, referring to the perception that senior management carefully controlled Internet usage to limit costs.

A third theme to emerge was the advantage afforded by the Internet in providing access to an unlimited supply of third-party information. Learners stated that this feature of e-learning offered much more than the classroom environment, introduced them to new job-related resources, and allowed them to “broaden their horizons”. Many respondents stated that they would have liked to have spent more time exploring such resources, but other time commitments and perceived constraints on the amount of time they could spend online prevented this.

Lastly, some learners echoed an earlier comment that the e-learning experience would be more positive if acknowledgement of the training program could be provided and a formal training plan could be formulated by the learner’s human resources manager and direct superiors.

Learners were asked to describe any other benefits that they had experienced from their participation in the e-learning program. Responses included improved computer skills and Internet research abilities, and improved problem-solving abilities attained through learning and practically applying the concepts introduced in the course.

4.2.8 General comments on course design, length, and incentives for completion

To conclude the exit interview, respondents were asked to comment more generally on the course and suggest any means of improving the learning experience. In general, learners found the level of difficulty to be consistent with other training courses that they had experienced. Most thought that the length and number of hours per week specified were either appropriate or slightly less than necessary, provided that there were no delays due to Internet or computer access. Some suggested that the course should be extended to allow for the coordination of group work during the latter part of the course. Learners were asked whether breaking the course into a number of shorter components would have helped them to complete assessed work on time. Many learners stated that this approach may be useful, but generally felt that the longer course format offered more value and substance. A key issue mentioned by almost all of the respondents was that the South African furniture industry experiences much higher production demands in the second half of the year (in which the course took place) and that it would be much easier to participate in training programs of any kind in the first six months of the year.

In general, the design of the course was considered to be appropriate. One learner noted that he had initially overlooked some features on the navigation bar of the course web site, and suggested that items, such as the chat and discussion links, could be made more noticeable.

Another participant suggested that time could be saved by having excerpts from external web resources available on the course web site, although he recognised that there was also value in doing independent research. Other suggestions were to make greater use of illustrations to support sometimes complex text descriptions, and to make the “compile” feature – which allows learners to select pages for printing as a single document – more user-friendly.

The final question asked learners what could have been done differently to increase their motivation to complete the course. Responses to this question were predominantly concerned with support and buy-in from within the company. Many learners reiterated that interest and support from one’s direct superiors would be viewed as interest in one’s own career and would represent a substantial motivating factor. Learners also stressed, once again, the need for adequate and timely technology support. One learner commented that creating respect for the importance of training via e-learning is challenging as senior managers are from the “non-computer generation”. The same learner suggested that one needed to “sell the bottom-line benefits to management”, using this opportunity to negotiate for one scheduled study hour during each work day for the duration of the course. Another learner, suggesting a similar approach, noted that, when attending training at a local college, he was able to leave work an hour early to drive to the campus, but he was not given the same kind of consideration for the e-learning course. A third learner stated that his managers had known little about the course but, after he had supplied them with copies of course notes, they were “amazed at how useful it was”. The importance of communication within the company was again emphasised by several learners. The issue of strict control of Internet access and monitoring of time spent online was also raised.

Other suggestions for improving motivation included providing an accredited qualification for completion of the course and setting a deadline for quizzes, after which time participants would get a mark of zero³¹. It was also suggested that, if participants had been required to pay for the course and be reimbursed upon completion, there would have been greater motivation to complete all of the requirements.

4.3 Results of interviews with human resources managers

The interviews with human resource managers were based on a short list of eight questions that were designed to probe the challenges and benefits of the course as viewed from a corporate HR perspective. Three regional human resources managers and two factory HR managers were interviewed. The regional managers each coordinated HR functions in one of the three regions in which the study was run. One of the regional managers had just changed positions, and had previously been the national training manager for Steinhoff Africa. In this capacity, she had been responsible for liaising with the researcher to make preparations for the study.

4.3.1 Major challenges

Managers were asked what the major challenges had been with regard to the project. The three regional managers mentioned that learner commitment was a key issue. Two managers stated that they felt that many learners lacked the commitment to follow through with the e-learning program, and that they had expected learners to be more self-directed. When asked about specific challenges that learners had mentioned – such as delays in getting PC or Internet access – the same managers stated that learners should have been more proactive in seeking assistance in a

³¹ Required completion dates for quizzes were specified in the course schedule, but learners who had fallen behind were given extra time without penalty because many of them had experienced delays in having Internet access set up.

timely manner. An unforeseen factor affecting some learners' Internet access was that a key IT manager quit his job as the course started, meaning that requests for access were not dealt with quickly enough. Other factors already mentioned in the learner interviews were the change to a new shift system that disrupted several learners' working hours at one factory, and a two-week strike at another that created considerable pressure to catch up with production targets at another. Asked about how interruptions to learners could be minimised during study time, a manager stated that, in any onsite course, learners could be expected to be "pulled out" if a production-related situation demanded it, and that e-learning was no different.

4.3.2 Attrition

Managers were asked about attrition during the course and how it compared to other types of training that was run by or sponsored by the company. Most answered that there was little attrition on short courses, but the former national training manager stated that an attrition rate of 30% was experienced for a longer-term management development program, typically due to learners' family commitments or workload issues. Another factory manager stated that a recent Adult Basic Education & Training course had begun with twenty participants, but had seen only four complete it due to production fluctuations, the aforementioned industrial action, and a fire in the plant.

Another manager, however, argued that a 100% success rate could and was being achieved with certain learnership (apprenticeship) courses, as long as the "correct selection of people" was made. In many cases, Steinhoff Africa provides tuition assistance for employees who wish to enroll in educational programs run by external providers. One arrangement that is used to facilitate this is that Steinhoff will pay for the training upfront and will not ask for

reimbursement as long as the employee passes the course. Employees failing the course, however, are held responsible for their tuition costs in full. At another factory, a standard practice is that the company will pay the full upfront cost and learners will make incremental repayments each month based on salary deductions. If the learner passes the course, a full refund is provided by the company. These funding mechanisms were seen to be an important factor in motivating learners to successfully complete training courses.

4.3.3 Amount of direction given to learners and immediate superiors

Managers stated that they had not given much direction to learners, and that most of the contact with learners was at the beginning when individuals were being invited to participate in the course. Regional HR managers passed on requests in writing to factory HR managers to solicit interest in the course, and the factory HR representatives, in turn, approached people whom they felt were self-directed learners and possessed adequate computer skills. One regional manager stated that he deliberately did not get too involved, and left it to the learners to make sure they had everything they needed to complete the course. When asked about the Internet access problems that some of the learners in his region had experienced, he responded by stating that those learners must not have been sufficiently interested to make sure these things were taken care of.

Managers stated that very little information on the course was passed to the learners' immediate superiors, other than the original correspondence inviting participation in the course.

4.3.4 Requests for assistance and feedback from learners

Managers were asked how often learners had contacted them with problems or comments on the course. The managers stated that they did not receive any specific requests, with the exception of one learner. Two of them stated that they had initiated contact with some of the learners to check on their progress at the request of the researcher. One regional manager expressed his surprise that the learners “were not proactive enough to ask if they had problems”. One manager observed that the most difficult thing for learners appeared to be maintaining the discipline to keep up with assignment deadlines. A suggested answer to this problem would be to have all of the learners in each region meet for a face-to-face session at least once per month.

4.3.5 Suitability of e-learning as a training tool

Managers were asked to state their opinions on the viability of e-learning as a workplace training tool in the light of this study. All of those questioned stated that e-learning is of use as a training tool, but with certain caveats. One manager stated that the course length and format were suitable, but that the e-learning component should be coupled with a number of face-to-face sessions, as a purely-online course was “too isolated”. A second manager suggested that breaking courses into smaller components would be better.

Two managers proposed that e-learning is a good tool to train people in administration, marketing, sales, and finance. The reasons given were that these tend to be the people who have relatively predictable working hours and computers at their desks. One manager pointed out that more than 80% of the Steinhoff workforce does not have computer access. One manager stated that those involved in production-related activities had schedules that were too unpredictable to allow them to participate in training via e-learning. The same manager suggested that self-study

requires very high levels of motivation and that incentives could be used to help achieve this. The opposite opinion was advanced by another manager, however, who disagreed with incentives on the basis that learners should have sufficient interest to complete a course without them. Another manager also commented on motivation, suggesting that Steinhoff employees were “not adult enough” to have the self-motivation for e-learning and that Steinhoff “does not have a learning culture”.

Managers were in favour of seeing further web-based training within their region or factory if their ideas and suggestions could be accommodated (such as including face-to-face sessions or shortening course length). A limiting factor mentioned by two of managers is that Internet access is supplied only to a “preferred few” within the company, and employees must go through lengthy administrative procedures to obtain access privileges. The company is highly concerned about inappropriate use of the Internet, and two employees were recently dismissed for this reason.

4.4 Tracking learner performance during the course

In Chapter 3, a number of tracking features built into the WebCT course management system were described. Such tracking features are designed to allow the researcher to monitor aspects of learners’ progress throughout the course. In WebCT, electronic records are available, listing the content pages that each learner has accessed, on what dates, and for how long. It was not viable to use these records as an exact indicator of how much time each learner was devoting to the course, however, because it is not possible to verify whether the learner is actively studying the content of a page during the period in which it is displayed on his/her screen. A second

consideration is that many learners chose to compile the course notes for each module into a single document and print it, so that they could study offline. This meant that the WebCT tracking system might show that they had never visited certain content pages but, in actual fact, they had read the material in hard copy format. Because of these limitations, the tracking features of WebCT were used only as a general indicator of how well learners were keeping up with the course schedule, and specific results are not reported here. If the researcher noticed that a student had not accessed the course web site for some time and was also late in submitting quizzes or assignments, a reminder email would be sent to them.

4.4.1 Meeting course deadlines

From the outset, learners experienced significant problems in meeting course deadlines. There were many reasons for this and these have been described in Section 4.2, but some examples include: delays in obtaining Internet access or access to computers; sudden changes in work situations; and unforeseeable circumstances such as industrial action and fires. As mentioned above, three of the learners were unable to progress beyond the first module of the course due to problems with Internet and email accounts (one learner) and a lack of access to a personal computer (two learners). Several more learners also quickly fell behind due to delays in having Internet access set up, although these issues were ultimately resolved.

When it became apparent that many learners were experiencing significant delays, the researcher made telephone calls to the learners and to the relevant human resources managers to attempt to identify the reasons. Despite this, the problems experienced by the first three learners were not alleviated.

Most learners reported that they were struggling to find time to study amidst very busy work schedules. Besides the various unforeseen circumstances described in Section 4.2.1, many learners advised the researcher that the second half of the calendar year (from July to September) was typically much busier than the first six months. The term “silly season” was popularly used by employees to refer to this period, which saw production volumes spike sharply compared to the earlier months. In recognition of the general difficulty the group was having in meeting assignment deadlines, the course was extended by three weeks and learners were advised by email in mid-August of the revised schedule. Despite this, half of the group did not complete all of the required assignments and quizzes.

4.4.2 Grades achieved

Learners generally performed very well on the assessed quizzes in Modules One and Two, with an average score of 89% (see Table 10). Performance on assignments was also good, with an average grade of 84%. The lower average for Assignment One is likely to be due to the fact that a different course tutor graded this assignment. This was because a subject matter expert was needed with detailed knowledge of the South African forestry industry.

Table 10: Average Grades obtained by Learners for each Type of Assessed Activity

QUIZZES		ASSIGNMENTS	
Activity	Average Grade	Activity	Average Grade
Forests Section A Quiz	88%	Assignment 1	69%
Forests Section C Quiz	81%	Assignment 2	87%
Forests Section D Quiz	94%	Assignment 3	87%
Forests Section E Quiz	90%	Assignment 4	85%
Taxonomy Section A Quiz	86%	Assignment 5	81%
Taxonomy Section B Quiz	68%	AVERAGE ASSIGNMENT SCORE	84%
Taxonomy Section C Quiz	69%		
Taxonomy Section D Quiz	93%		
Taxonomy Section F Quiz	89%		
Taxonomy Section G Quiz	86%		
Taxonomy Section H Quiz	97%		
AVERAGE QUIZ SCORE	89%		

Table 10 shows that, although many learners reported during the exit interviews that the later assignments in the course seemed more difficult, they nevertheless met the requirements of those assignments very capably.

5. Discussion and Recommendations

5.1 Profile of the learner group

The learner group that participated in the course were fluent English speakers employed in supervisory, management-track, or management roles at eight wood products factories in South Africa. Each learner had varying degrees of familiarity with the course subject matter depending on their background and the kind of factory that they were employed in. All of the participants had adequate computer skills, and most used a computer daily. Some of the learners were unfamiliar with performing information searches on the Internet and using tools such as chat and discussion forums. None of the group had any prior experience with e-learning, but half had taken at least one correspondence course. Learners who had taken correspondence courses generally liked the flexibility afforded by distance learning, but disliked the lack of interaction and tutor support.

Participants tended to place importance on practical learning outcomes and learning that could be actively applied in personal and professional contexts. A possible reason for this is that people who are attracted to careers in manufacturing favour acquisition of such practical knowledge as they have to solve hands-on problems on the factory floor on a daily basis (Felder & Silverman, 1988). Learners' responses may also be influenced by the fact that much of the training that they have done is sponsored by their employer and is vocationally-oriented. Therefore, practical outcomes are valued more than in other educational programs.

As a group, learners described themselves as more outgoing than reserved, much more experimental than traditional, and more flexible than perfectionist. The group's epistemological outlook leaned more towards constructivist tenets than behaviourist, though not strongly so.

Most participants were interested in taking the course to broaden their knowledge of the industry, with a second reason being the desire to try e-learning and, in doing so, improve their ability to learn and carry out research using the Internet. The main factors identified by learners as a possible impediment to their success in the e-learning course were long hours and busy work schedules.

5.2 Pedagogy and Instructional Design

5.2.1 Evaluating the success of learning activities used

In general, participants stated that all of the learning activities included in the course were useful and relevant. Learners identified specific benefits and drawbacks for each one, but overall saw the mix of activities as appropriate. The inclusion of a variety of differing learning tasks helped to stimulate and maintain the interest of learners and promote engagement. These findings support the work of Tennyson (2002), Mishra (2002), and Sfard (1998), who each advocate instructional design models that borrow from multiple theories of learning to match the most appropriate learning activities to the learning task at hand. Approaching the same concepts through different modalities may also strengthen learners' understanding of the course material, and Spiro et al. (1991, p.28) suggest that "revisiting the same material, at different times, in rearranged contexts, for different purposes, and from different conceptual perspectives is essential for attaining the goals of advanced knowledge acquisition".

The perceived advantages of each learning task/activity are summarised in Table 11 and described below.

Table 11: Participants' Opinions on Perceived Benefits of Learning Activities

Learning Activity	Perceived Benefits
Quizzes	<ul style="list-style-type: none"> ▪ useful for generating keywords or phrases that can prompt recall of main concepts ▪ require learners to carefully read course content ▪ reinforce what learners have already read and aid retention ▪ prepare learners for more complex assignments
Self-test (optional) exercises	<ul style="list-style-type: none"> ▪ promote deeper understanding of new concepts ▪ help relate new concepts to personal experience or real-world context ▪ can take on an interactive dimension if learners are asked to generate questions for each other to answer
Tasks incorporating external online resources	<ul style="list-style-type: none"> ▪ the fact that external resources are authentic is interesting and motivating ▪ expand learners' perspectives on concepts covered in the course ▪ introduce learners to the availability of a wide range of readily-accessible information resources ▪ external sources validate and reinforce information in course text ▪ enhance the online research skills of learners
Tasks incorporating choice of topic/area of focus	<ul style="list-style-type: none"> ▪ having a choice on what to write about is motivating and interesting ▪ can focus on topics of personal interest or relevant to their own work
Discussions	<ul style="list-style-type: none"> ▪ issues not covered in course content can be addressed and discussed, issues that are mentioned in the course can be probed in more depth ▪ putting concepts within the context of one's own opinion makes them more memorable ▪ helps one to understand concepts within a real-world context ▪ alternative opinions alter or reinforce one's own perspectives ▪ can be used as a means for learners to discuss questions or problems with each other
Group work	<ul style="list-style-type: none"> ▪ authentic nature of activity is interesting and motivating ▪ provides opportunities to share knowledge and perspectives with colleagues from other factories
Face-to-face meetings	<ul style="list-style-type: none"> ▪ motivates learners to keep up with course requirements ▪ makes coordination of group work easier ▪ allows for human contact and natural interaction with peers

As noted in Table 11, most learners found that the short online quizzes served useful purposes – they encouraged learners to carefully read and review the online course text, and they were also

seen as useful in building a base of knowledge that could be expanded upon through more complex assignments that required higher-order thinking. Several learners proposed that short quizzes also generated keywords that triggered the recall of the main concepts covered in the course modules. This function is similar to that described by Ausubel (1968) in his theory of Meaningful Reception Learning (MRL). Ausubel proposes that memory is organised in a hierarchical structure in which anchoring ideas – the strongest and most inclusive concepts within an individual's cognitive structure – provide points for new information to enter and be assimilated into that structure. According to Ausubel, "the most important single factor influencing learning is what the learner already knows" (Ausubel, 1968, p.18). If the online course text is structured carefully so that basic concepts are covered first and augmented by more sophisticated material, it is possible to structure quizzes such that questions trigger recall of (and, thus, reinforce) the anchoring ideas of the course.

An alternative role for quizzes in web-based courses could be to prepare students for the coming module of content rather than to serve as a review of the content that has just been covered. Using this approach, students could be asked their opinions on various issues related to the topic that will be discussed in the coming module. For example, students preparing to study the module on forestry and forest practices could be asked their views on the use of forests for different purposes – resource extraction, environmental preservation, wildlife parkland, recreation, etc. Model answers could provide summaries of the differing perspectives on each of these issues, serving as an introduction to the kinds of topics to be covered in the module. This approach encourages the learner to reflect upon his/her existing knowledge and ideas relevant to

the new content to be covered. This also helps the learner to relate new information to relevant existing knowledge and experience, which may assist with retention and recall.

The optional self-test questions and exercises provided in the online text were seen by learners as useful in promoting a deeper understanding of concepts and in providing ways to relate the concepts being discussed to personal experiences. The most important role of such questions was seen to be in making learners “stop and think” about a given concept in greater depth than would be achieved simply by reading the online course notes. While time-strapped learners skipped over such exercises to focus instead on the assessed tasks, the inclusion of such questions within the course text would appear to be a simple and effective means of promoting a deeper understanding of the core concepts taught in the course to those learners with the time and interest to take advantage of them.

Learners saw many benefits in pursuing learning tasks that incorporated the use of external web-based sources of information (such as Assignment 4). The authentic nature of third-party web sites was noted as a motivating factor, and such sources served to validate, reinforce, and enhance the online course text or provide useful alternative perspectives. Activities involving external web resources also enhanced learners’ skills in conducting Internet-based research, and opened learners’ eyes to the wealth of information available to them online. The perceived drawback of such activities was the greater time requirement, as learners typically reported that finding and evaluating information from web-based sources was much more time-consuming than writing an assignment based on information in the online course text. The extra time required for the search itself was further increased by the slow download speeds of many South

African web sites and company networks. For this reason, it may be prudent for course designers, in certain contexts, to restrict the number of learning tasks in any one course that require learners to access external web sites. A possible time-saving solution is to post excerpts or copies of documents from external sites on the course web server and link them to the course text. While this is more convenient for learners, it does reduce the perceived authenticity of the information source, however, and prevents learners from developing Internet-based research skills. This trade-off is one that must be carefully considered by the instructional designer.

Online discussions were seen as a stimulating way of allowing learners to consider a range of perspectives beyond that of the course author. The discussions provided a means for topics introduced in the course text to be explored in greater depth, and for new issues to be raised and debated. Learners saw significant value in having to frame the concepts raised in the course within the context of their own experience and opinions, and stated that doing so made those concepts more memorable. Reading the differing perspectives of their peers was also regarded as very worthwhile, as it reinforced or altered learners' own views and often augmented their knowledge. The discussion forum was also seen as a medium through which learners could help each other with any problems that they were experiencing during the course.

Despite the many advantages described by the course participants, the discussion forum was not utilised regularly by most learners. Based on learners' comments during exit interviews, it appears that many participants were worried about spending too much time online because their superiors would be unhappy about the costs incurred. For this reason, many learners printed off and studied course notes offline, and limited the time spent connected to the course web site.

Many learners often did not access the course website as frequently as had been recommended (two to three times per week) and, in some cases, did not fully complete activities that required them to be online for some time. In order to read the different postings on a discussion forum, a user must be continuously connected to the Internet to navigate through the various connected threads of discussion. For a group involving twenty learners all actively contributing, this would require at least one hour per week, but users should ideally visit the site two or three times per week to read and respond to new contributions. The infrequent use of the forum adversely affected the momentum of the discussions, as well as the total number of contributions.

The group assignment was seen by most learners as useful and appropriate, and the authentic nature and interactive dimension of the task drew positive comments similar to those made about the discussion forum and use of external web-based resources. However, many learners were discouraged by the complexities involved in communicating with team members who were based in other locations. Learners were already very busy, but now had to deal with the differing working hours of group members at other factories. It appears that creating groups from within the same factory location would greatly reduce the amount of time required for such assignments to be completed, by allowing for face-to-face meetings to occur among each group. Allowing the groups to form earlier in the course to allow more time for preparation may also be prudent.

The addition of a face-to-face component would appear to offer several advantages. As well as facilitating much easier coordination of group work, meetings of course participants in each region may increase motivation to complete assessed tasks on time, and would create the human interaction that is lacking in pure e-learning courses. For a course of three to four months, one

meeting per month may be sufficient to yield such benefits. Dagada & Jacovljevic (2004) found that South African facilitators of e-learning courses favoured this kind of blended learning approach, and South African researchers van der Westhuizen & Krige (2003) also found that participants involved in e-learning expressed a strong desire for face-to-face interaction.

Although there was a general consensus that a mix of learning activities was beneficial, learners did not have a unanimous view on how the course should be structured. The structure used in this study, in which a familiar behavioural approach transitioned to a constructivist model in the later stages, may be appropriate where learners are taking an e-learning course for the first time. However, many learners suggested that short-answer quizzes should be included in all of the modules in order to prepare learners for more open-ended assignments. The choice of learning activities employed is also dependent on the content and desired learning outcomes for each module.

5.2.2 Suitability of the constructivist pedagogical approach

The principal research question of this study is “Is constructivist teaching and learning an effective pedagogical approach for use in web-based training for adult workplace learners in South Africa?” As evidenced above, most learners found that constructivist activities, such as the online discussions and the authentic, task-based activities in the later stages of the course, were of the greatest use in helping them to understand, remember, and apply the concepts introduced in the course. Although these activities were seen to be more time-consuming than completing quizzes or assignments that asked for point-form answers or simple summaries of course content, they were thought to promote deeper understanding and better retention of new concepts.

The learners who participated in this study tended to place greater importance on practical outcomes than on purely theoretical knowledge for reasons already discussed. To achieve practical outcomes, it is necessary to apply knowledge that has been learned in context, and a dominant belief among constructivist educators is that learning activities must reflect the complex problems that individuals are required to deal with in real life (Driscoll 2000). The course involved many opportunities for learners to relate concepts introduced in the course to the context of real-world industry issues and to the personal experiences of the learners and their peers. This may have been the reason why such activities were highly valued by the group. Learners regarded quizzes and summary-type assignments as helpful when trying to commit new facts to memory, but constructivist activities were seen to be essential for turning those facts into actionable knowledge. This concept is supported by Brown, Collins & Duguid (1989), who propose that, if learning is not done within the context of meaningful activity, knowledge will remain untapped even when relevant problems present themselves to which it could be applied.

5.2.3 Summary of instructional design recommendations

As a summary of the findings of this study and their implications for pedagogy and instructional design, the following recommendations are proposed.

1. Workplace e-learning courses should include a mix of tasks and activities that encourage learners to approach new concepts in a variety of ways.
2. Constructivist activities should be used to enable learners to link new knowledge to a real-world context. For situations in which learners are not familiar with the constructivist approach, the course should begin with behaviourist/didactic activities in the early stages and move in incremental steps toward constructivist methods.

3. Incorporate authentic tasks and research based on external web research, but carefully consider the time demands on learners when planning overall workloads.
4. Create ample opportunities for interaction between students.
5. Include face-to-face meetings to minimise isolation and procrastination and facilitate group work.

5.3 Organisational support and logistical factors

It was originally intended that the main focus of this study would be the identification of appropriate pedagogical techniques for workplace training via e-learning in South Africa's wood products industry. These aspects are described in some detail above. During the study, however, it became apparent that support in various forms from within the organisation was a critical factor affecting the success or failure of each participant's learning experience. Similarly, some corporate policies were seen to have strong, but unforeseen, impacts on learners' performance in the course. This section discusses this aspect of the study and, where relevant, recommendations are given for addressing these issues.

The research project was designed to involve learners from several locations, but within a single diversified company. This was done so, in part, to limit variability in organisational policies towards training and the availability of Internet-linked computers in the participants' workplaces. The results showed that differences between locations did exist, despite the fact that each site belonged to the same parent corporation. This is likely to be partially attributable to the surviving presence of the individual corporate cultures of each factory, most of which originated as independent businesses before being subsumed in recent years by the Steinhoff Group. The

actions of individual managers also appeared to influence learner success and, where human resources managers took a more active interest in the course, there was evidence that this motivated and assisted learners to succeed.

The main issues related to the company/organisation in which training take places are discussed below. A series of recommendations are also proposed to create the optimal conditions for the success of e-learning within organisations such as the Steinhoff Group.

5.3.1 Commitment and training culture

Several human resources managers expressed the view that e-learning requires high levels of self-motivation and commitment, and this is supported in the literature (Malone, 1981; Keller & Suzuki, 1983). Interviews and course results revealed that individuals who appeared to be highly self-motivated tended to be more successful at completing course requirements on time. Accordingly, the learner who performed best in the course in terms of timely submission of quizzes and assignments described himself as “strongly self-motivated”.

In a study of undergraduate e-learners in South Africa, Längin et al. (2004) found that “students are often not used to self-organised learning” (para. 33). This is likely to be the case also for workplace learners who are more accustomed to expository styles of teaching (such as classroom-based lectures) than learner-centred approaches³². Two of the human resources managers interviewed suggested that most Steinhoff employees are not sufficiently self-directed to take part successfully in training via e-learning, and one went further, stating that Steinhoff

³² Interestingly however, Längin et al. also found that undergraduate students in South Africa preferred receptive teaching methods to constructivist methods, in contrast to the workplace learners who were the focus of this study.

“does not possess a learning culture”. Although it is beyond the scope of this study to evaluate such opinions, careful instructional design and support for learners from within the organisation may help to maximize learners’ motivation and encourage their full and active participation in e-learning programs.

5.3.2 Motivation

Learners identified a number of factors that influenced their motivation during the course, some of which were personal and others externally-influenced. At a fundamental level, the relevance of the course content to one’s own job was an important aspect and, as may be expected, those working more directly with wood products generally appeared to be more motivated by the course content itself than others. Technical and infrastructure support had a strong influence on learner motivation. Several learners experienced problems at the beginning of the course because they did not have access to a computer, did not have adequate email or Internet access, or had technical problems with their computer user account that resulted in a communication breakdown. In several cases, this resulted in delays in starting the course, which negatively affected learners’ motivation as they then had to work even harder to catch up. In some cases, learners repeatedly asked colleagues or superiors for assistance in solving these issues, and when their requests were not addressed, they ultimately lost interest and dropped out of the course.

The existence or absence of visible buy-in from managers and direct superiors was mentioned by several respondents as a factor affecting motivation. In the majority of cases, such buy-in was not present because most of the learners’ managers were either not informed about the study or received minimal information. For most managers that supervised learners taking the course, the only interaction with human resources staff regarding the e-learning course was prior to its

commencement when HR managers identified potential candidates. Some of the learners took the initiative to periodically update their superiors on their progress, or requested intervention to solve problems such as delays in getting Internet access. It would appear that better communication of training goals and learner requirements (access to computers and Internet, release time to study) to the learners' managers may increase the likelihood that the managers would support learners' efforts. Generally speaking, inter-organisational communication during the e-learning pilot program appeared to be inadequate, and recommendations are given in Section 5.3.4. to improve this.

Learners stated that the existence of a formal qualification at the end of the course would be a strong motivator. This is particularly important in South Africa because of the existence of the National Qualifications Framework (NQF), which, in theory, allows learners to receive credit for training and apply that credit toward partial fulfillment of other programs (SAQA, 2006). A limitation of this study was that it was not feasible within the research project timeframe to apply for and obtain NQF accreditation. A further limitation was the absence of financial incentives for learners to complete the course. The Steinhoff Group typically covers employees' tuition fees through a variety of arrangements (described in Section 4.3.2), but contingent upon successful course completion. Two of the human resources managers interviewed suggested that learners in this study would have had greater motivation to complete the course had such financial risk existed.

Most of the learners expressed the view that they had gained substantial new knowledge and skills from the course, even though many of them did not complete all of the formal course

requirements. Learners demonstrated continuing interest in the course, and some learners requested, during the exit interviews, that the course should be extended further to allow them to submit uncompleted work. Some authors, such as Welsh et al. (2003), have suggested that, in the case of corporate training, failure to complete courses does not necessarily mean that the training program has been ineffective or unsuccessful³³. It appears that greater levels of flexibility in terms of submission deadlines and course schedules may be appropriate for workplace e-learning, although this may in itself result in a tendency for learners to take their studies less seriously. An alternative approach would be to break the current five-module course into a series of shorter components that learners could study in short bursts, receiving credit for each one. Based upon the exit interviews conducted with learners and HR staff, it is unclear whether this approach would be more or less effective than the current, longer model. While one HR manager advocated such an approach due to the busy and unpredictable nature of learners' work schedules, some learners stated that short modular courses would have less value. The reason given was that it would be more difficult to relate information from one module to another and to gain a realistic understanding of the industry as a whole. This response reinforces the importance that learners placed upon learning in context.

5.3.3 Cost considerations

The costs of Internet connectivity appear to be a sensitive issue within the various company units involved in the study. As a standard policy within the Steinhoff Group, Internet usage is tracked through each employee's user account and shown on a per-megabyte-transferred basis. Many participants in the e-learning study stated that they were very conscious of the need to minimise

³³ For example, trainers at Nokia track enrolments rather than completions because they believe that their staff often use courses to quickly find the solution to a work-related question or problem. Even if they discontinue the course when they find the necessary information, Nokia considers the training to have been a success (Welsh et al., 2003).

connection times to the Internet because financial managers would view such activity as wasteful and excessive. Learners also stated that, from their perspective, applying for Internet access was a slow and bureaucratic process that involved obtaining authorization from senior financial controllers and from Steinhoff's corporate headquarters. Learners and human resources managers alike expressed the view that Internet access was a privilege that only senior managers were afforded, due to concerns about misuse. As discussed in Section 5.2, this resulted in learners visiting the course web site less frequently than they might otherwise have done, which negatively affected the level of interactivity in the course.

Recommendation 1: Cost analysis

Prior to running future e-learning courses, the researcher suggests that the company's training manager should conduct a comparative cost analysis of training through face-to-face instruction versus e-learning. This analysis should consider tuition costs, travel costs to the facility where face-to-face instruction is to occur, cost of course texts and other materials, and lost productivity due to time that employees spend away from the workplace. It is anticipated that, through such an objective analysis, the costs of Internet connectivity will be shown to be relatively small compared to the potential savings on travel time and costs. The training manager or human resources manager will then be able to make a convincing, financial case to relevant financial and IT staff for learners to be granted adequate access time to the Internet.

5.3.4 Communication within the organisation

Awareness of the e-learning program and its potential benefits among relevant individuals throughout the organisation is key to the success of such training. The individuals that must be informed about e-learning training courses include: human resources managers at the corporate,

regional, and factory levels; the direct superiors of learners; and IT personnel and those responsible for reviewing and authorising Internet access privileges and assigning computers. In order for these personnel to be of assistance to learners, they must first be informed, in detail, about: the rationale for such training; the requirements in terms of study time, computer, and Internet access; the duration of the course; and the benefits to the company and individual departments of the employees' participation in the e-learning program. It was evident during the study that this information was not communicated adequately to these stakeholders, resulting in a variety of outcomes that negatively affected participants' learning experiences and motivation. The recommendations below outline the kinds of information that each stakeholder requires and the actions those individuals can take to support training via e-learning.

Recommendation 2: Improved communication

Human resources managers: Based on the information gathered in the exit interviews, it appears critical that human resources managers be fully informed about e-learning courses and provide the necessary support and logistical coordination to maintain learner motivation and ensure that the required technical infrastructure is in place. Human resources managers at the factory locations are the primary contacts for the learners and those that facilitate the learners' participation in the e-learning course. Before the e-learning course begins, it is very important for HR managers to liaise with information technology personnel to ensure that the learner will have a computer available, an email account and Internet account set up, and the necessary software installed on his/her computer. This should be done in advance of the course so that the learner is afforded time to test the system and have any problems addressed. The IT specialist

should be informed of the duration of the course, and asked to perform a supporting role, so that the learners at that location receive necessary technical assistance during the course.

The human resources manager should also discuss the e-learning course with the administrative or financial personnel in charge of securing Internet access privileges for members of staff.

Financial managers should be made aware of the goals of the e-learning course and the recommended amount of time that learners are expected to spend online. The cost analysis described in Section 5.3.3 should be presented and discussed to illustrate the cost savings that will offset the increased Internet costs. These actions should help to ensure that learners do not minimize the time spent online at the expense of their studies.

The human resources manager can also act as a training advocate for learners, to ensure that supervisors and superiors understand the importance of the e-learning program and allow learners sufficient time in their work day to complete course requirements. It is recommended that, prior to the start of the course, the learner, his/her HR manager, and immediate supervisor should meet and set up a study schedule for the course (see Section 5.3.5). It is anticipated that this will create buy-in among the three parties, and reduce the risk that training time will be subsumed by workplace commitments.

The study outcomes suggest that much closer supervision of the learner is required for e-learning to be successful. If the e-learning course provider is located remotely from the learners (as was the case in this study), the company HR managers should act as a point of contact and source of support for learners. Study results suggest that monitoring mechanisms should be set up which

allow HR managers to inquire about learners' progress and suggest corrective action should they fall behind with their studies or perform below expectations. This corrective action may include liaising with learners' supervisors/superiors to negotiate more time for their studies.

Immediate superiors: Most learners' superiors knew very little about the e-learning course that their employees were involved in. As a result, most learners had the impressions that their superiors did not place very much importance on the e-learning program. Learners felt that this negatively affected their performance in the course in two ways. Firstly, it was difficult for most learners to take time away from workplace duties to log onto the course website. Secondly, and perhaps more importantly, many learners felt that, had their superiors actively encouraged and supported them in their studies, they would have been more motivated to complete the course requirements despite busy work schedules. It is recommended that learners and their superiors create a study plan prior to the course that takes into consideration the learners' workloads and responsibilities (see Section 5.3.5). The importance of convincing senior management of the importance of e-learning initiatives has also been highlighted by Welsh et al. (2003).

Financial managers: Financial managers should be made aware of the rationale for the e-learning program and any cost savings that will offset the increased Internet usage. Financial managers should also sign off on the study plan created by the learner and his/her superiors so that the learner is aware that adequate Internet connectivity time has been officially authorized.

IT staff: A key role of IT specialists is to set up technical infrastructure for the course in a timely manner and to quickly resolve technical issues that may confront learners. To do this, IT

personnel must be made aware of the detailed technical requirements of the e-learning course. These include: minimum acceptable hardware specifications; the types of software that must be installed on learners' computers; the URLs of course web sites; any minimum bandwidth requirements; the kinds of media that will be used; and how any security arrangements or firewalls that have been put in place within the company might affect access to the course website or other external websites.

Human resources managers should meet with IT staff well in advance of the course start date to pass on this information. IT staff should be made aware of the importance of the course such that, if problems do arise, they are given sufficient priority and are dealt with quickly.

Learners: It should be noted that adequate and timely communication is not merely the responsibility of management. For e-learning efforts to be successful, learners should immediately advise course tutors and HR supervisors of any circumstances that are preventing them from completing course requirements on time. These circumstances may include: technical difficulties with email, Internet, or network access; sudden fluctuations or unforeseen changes in workload; family and personal commitments; difficulties with navigating the course website and using the various tools; or uncertainties about course requirements or assignments. Course tutors and HR managers must stress to learners the importance of communicating these kinds of problems as soon as they occur, to avoid learners falling behind and experiencing more serious problems.

5.3.5 Establishing a study plan and course schedule

Formal recognition of the time needed to participate successfully in e-learning courses is critical. Prior to the course, most participants expected to fit their e-learning studies into their work day, as few had adequate computing facilities at home. In reality, however, they found that finding sufficient time at work to fulfill the requirements of the course was very difficult, and this was compounded by the fact that their superiors expected them to be available for normal duties as usual throughout the day. E-learning had become “invisible training”, with a requirement on the part of learners to devote time to the course, but no acknowledgement of that need by others within the organisation.

Recommendation 3: Study plan

To address this issue, it is suggested that learners should be required to create a formal study plan prior to commencing any e-learning course. The plan would be drafted in consultation with human resources staff and the learners’ direct superiors, and would be reviewed and signed off by financial managers and IT staff. The plan would set aside specific time so that learners could carry out their studies during normal working hours, and identify requirements in terms of computer and network infrastructure and Internet connectivity. This approach has several advantages. Direct superiors would know in advance that learners would be unavailable for normal duties at certain times due to training commitments. This would create a similar situation to one in which the employee is physically absent from the workplace while taking part in a face-to-face training workshop. The supervisor/manager would also be made aware of the additional workload that the employee had taken on due to training commitments and may, therefore, be more likely to take this into account when assigning tasks. This could result in a more

manageable workload for the learner during the e-learning training period, which would assist him/her to complete the course requirements on time. The study plan would also allow supervisors to plan ahead for production activities, so that negative impacts on employee productivity due to the e-learning course would be minimized. Managers should also inform co-workers of the training schedule so that learners could be left uninterrupted during e-learning sessions.

From the employee's point of view, the study plan commits the learner to studying at specific times of the day and instills in the learner the knowledge that his/her superior is aware of this commitment. It is likely that, having conceded a number of production hours to training, the manager will play a more active role in monitoring the employee's progress in the course. This may encourage the learner to pay attention to course deadlines, and alleviate the tendency to procrastinate.

Although the adoption of a study plan should lead to many of the aforementioned benefits, it is acknowledged that the day-to-day responsibilities of many employees involved in production activities can be extremely unpredictable. As such, the study plan cannot be expected to completely mitigate fluctuations in study time due to changing work pressures.

Recommendation 4: Scheduling

All of the learners stated that, within the furniture and wood products industry, the July to December period is much busier than the January to June period. It is suggested that, in this sector, in South Africa e-learning courses of a similar length or greater than the one employed in

this study should be scheduled during the first half of the year, in order to avoid increased workloads and overtime conflicting with the need to make time for training.

6. Conclusions

This study has found that learning activities designed according to the constructivist philosophy are appropriate for the web-based training of adult learners in the South African wood products industry. Constructivist activities, which emphasise authentic tasks, social negotiation of meaning, and knowledge presented and applied in context, are well-suited to the learning styles of these learners, who favour practical knowledge acquisition that can be readily applied in their personal or professional lives. Constructivist activities should not be employed to the exclusion of other approaches, however, as learners valued the use of a mix of activities that required them to approach and analyse new concepts in an assortment of ways. Each of the learning activities employed in the course yielded specific benefits, and instructional designers should exploit these to create learning environments that stimulate and engage workplace learners.

E-learning was regarded as far superior to distance education via correspondence course because of the much greater potential for interactivity, quicker responses to questions by course tutors, and the availability of external web-based resources. The inclusion of periodic face-to-face meetings of course participants on a regional basis would be useful in facilitating group activities, alleviating feelings of isolation, and motivating learners to stay on task and on time. Depending upon the topics addressed in the course, such face-to-face meetings could include field trips, practical sessions, guest presenters, presentation of project work by learners, or tutorial-style discussions.

Support for the course within the employing organisation was found to be a critical factor affecting the success of e-learning in the workplace and, without such active support, web-based

e-learning cannot be recommended as a training tool. In the Steinhoff Africa case, participants were expected to learn independently without the active involvement of managers or colleagues. As a result, many learners experienced IT problems that remained unaddressed, felt isolated, and/or generally became less motivated. Human resources and training managers must play a coordinating role in e-learning initiatives, bringing together learners' superiors, IT support, and financial staff to ensure that learners have the best possible chance of success.

The study revealed that employees who were familiar with the basic operation of a computer for creating documents and exchanging email experienced no significant difficulties in adjusting to the e-learning environment. Although many of the participants had little previous experience with the Internet and no familiarity with tools such as chat and discussion forums, learners quickly became accustomed to the web-based mode of learning and found navigation around the course web site to be simple and intuitive. It should be noted, however, that within the Steinhoff Africa group of companies, 80% of employees do not have computers, and it is beyond the scope of this study to evaluate the extent to which bridging training in computer operation would be required for employees with no prior computer experience. Human resources managers felt that e-learning would be appropriate for staff involved in administrative, marketing, sales, finance, and management, but not for shop floor staff. It was also suggested that e-learning could be used for train-the-trainer courses aimed at supervisory staff. It is likely that completion rates would be higher for staff not involved in production-related activities as the working hours of these employees are typically far more predictable. However, the researcher proposes that e-learning can be an effective means of providing training to production employees if employers follow the

recommendations related to conducting cost analyses, improving communications, setting up study plans, and scheduling courses at appropriate times.

The Internet infrastructure in place at the factory locations was found to be adequate to allow learners to participate fully in the e-learning course, although some participants found page download speeds to be slow at times. The e-learning course used in the study did not include media or applications that required high bandwidth, however, and care should be taken to ensure that courses designed for South African workplace learners adopt a similar approach. The falling costs of Internet service in South Africa can be expected to improve average bandwidth and connection speeds in the near future, enabling e-learning to be utilised even more widely and for courses to be enriched through greater use of multimedia.

The results of this study suggest that South African wood products industry employees who are regular users of computers are appropriate candidates for participation in well-designed web-based training programs, if adequate levels of support are provided from within the organisation and candidates have a strong interest and motivation to complete such programs.

6.1 Study limitations

This study is limited by a number of factors. The qualitative approach used is an appropriate means of collecting detailed information on learner attitudes and experiences, but the small sample size means that the results are not statistically meaningful. For this reason, judgments about the usefulness and credibility of the results must be left to the researcher and the reader (Eisner, 1991).

In qualitative research, sampling errors can arise from insufficient breadth in sampling, distortions due to changes over time, or lack of depth in data collection at each site (Patton, 1990). To address the risk of insufficient breadth in sampling, participants from a number of locations, demographic profiles, and job roles were asked to participate in the study. Learning technologies and information and communication technologies change rapidly and, while this study attempted to focus on pedagogical and organisational factors rather than technology itself, it was inherently influenced by such changes. The study attempted to ensure that robust data was collected through the detailed in-depth interviews conducted with each participant.

A limitation of the pilot e-learning course itself is that it was not accredited by the Ministry of Education in South Africa, since it was not feasible to undertake a lengthy application process for the purpose of a one-time, three-month pilot course. This factor may have resulted in lower levels of learner motivation than if the course had been accredited. Lastly, the “pilot program” nature of the course may also have tempted some learners to take the course less seriously than would have been the case if the course had been a training program offered regularly by the company or another external training provider.

6.2 Suggested further research

This study has identified the importance of intra-organisational support for employees involved in training via e-learning. This is seen as a critical success factor, and it is anticipated that it is one that will be common to any industry sector. It is recommended that the relevance of organisational support for e-learning be investigated using large-scale quantitative research

methods to survey a variety of organisations involved in corporate e-learning from various industry sectors.

Secondly, this study focused on management or management-track employees who were already proficient computer users and whose professional roles were related to production activities.

Additional, qualitative studies would be of benefit to examine the suitability of e-learning for skilled technical or supervisory employees, or for administrative staff. In the latter case, it may be found that constructivist activities are not as appropriate, as administrative employees are less practically-oriented than their counterparts in production roles.

Lastly, additional qualitative studies could examine the potential to utilise e-learning to train employees who do not possess strong computer skills. In these cases, it would be valuable to determine what kinds of bridging training (provision of basic instruction in computer operation) would be required for subsequent e-learning courses to be successful.

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8. Appendices

Appendix 1: Education-related indices for African countries

		Education index	Adult illiteracy rate (% ages 15 and above) 2003	Adult literacy rate (% ages 15 and above) 2003	Net primary enrolment ratio (%) 2002/03	Net secondary enrolment ratio (%) 2002/03	Children reaching grade 5 (%) 2001/02	GDP per capita (US\$) 2003
HDI Rank								
High Human Development								
5	Canada	0.97	..	..	100	98	..	27,079
10	United States	0.97	..	..	92	88	..	37,648
51	Seychelles	0.89	8.1	91.9	100	100	99	8,610
Medium Human Development								
65	Mauritius	0.8	15.7	84.3	97	74	99	4,274
105	Cape Verde	0.75	24.3	75.7	99	58	88	1,698
120	South Africa	0.81	17.6	82.4	89	66	65	3,489
121	Equatorial Guinea	0.78	15.8	84.2	85	26	29	5,900
123	Gabon	0.72	..	..	78	..	69	4,505
125	Namibia	0.8	15	85	78	44	95	2,120
126	São Tomé and Príncipe	0.76	..	..	97	29	61	378
131	Botswana	0.76	21.1	78.9	81	54	88	4,372
132	Comoros	0.53	43.8	56.2	55	..	72	538
138	Ghana	0.51	45.9	54.1	59	36	63	369
142	Congo	0.71	17.2	82.8	54	..	66	949
143	Togo	0.57	47	53	91	27	69	362
144	Uganda	0.71	31.1	68.9	..	17	64	249
145	Zimbabwe	0.78	10	90	79	34	..	..

		Education index	Adult illiteracy rate (% ages >14) 2003	Adult literacy rate (% ages >14) 2003	Net primary enrolment ratio (%) 2002/03	Net secondary enrolment ratio (%) 2002/03	Children reaching grade 5 (%) 2001/02	GDP per capita (US\$) 2003
HDI Rank								
Low Human Development								
146	Madagascar	0.64	29.4	70.6	79	12	53	324
147	Swaziland	0.73	20.8	79.2	75	32	73	1,669
148	Cameroon	0.64	32.1	67.9	..	..	64	776
149	Lesotho	0.76	18.6	81.4	86	23	73	635
152	Mauritania	0.49	48.8	51.2	68	16	61	384
154	Kenya	0.66	26.4	73.6	67	25	59	450
155	Gambia	0.41	62.2	..	79	33	..	278
156	Guinea	0.41	..	..	66	21	..	459
157	Senegal	0.39	60.7	39.3	58	..	80	634
158	Nigeria	0.66	33.2	66.8	67	29	..	428
159	Rwanda	0.61	36	64	87	..	47	195
160	Angola	0.54	33.2	66.8	61	..	..	975
161	Eritrea	0.49	43.3	..	45	22	86	171
162	Benin	0.41	66.4	33.6	58	20	68	517
163	Côte d'Ivoire	0.46	51.9	48.1	61	21	69	816
164	Tanzania, U. Rep. of	0.6	30.6	69.4	82	..	88	287
165	Malawi	0.67	35.9	64.1	..	29	44	156
166	Zambia	0.61	32.1	67.9	68	23	81	417
167	Congo, Dem. Rep. of the	0.53	34.7	65.3	..	..	..	107
168	Mozambique	0.45	53.5	46.5	55	12	49	230
169	Burundi	0.51	41.1	58.9	57	9	68	83
170	Ethiopia	0.4	58.5	41.5	51	18	62	97
171	Central African Republic	0.43	51.4	48.6	..	..	..	309
172	Guinea-Bissau	0.39	60.4	..	45	9	38	160
173	Chad	0.3	74.5	25.5	63	10	60	304
174	Mali	0.23	81	19	45	..	75	371
175	Burkina Faso	0.16	87.2	12.8	36	9	66	345
176	Sierra Leone	0.35	70.4	29.6	..	..	..	149
177	Niger	0.17	85.6	14.4	38	6	69	232
Without HDI Rank								
	Liberia	..	44.1	55.9	70	18	..	131

Appendix 2: Questionnaire for pre-course interviews³⁴

SECTION 1: Personal information, education, and career background

1.1 Name and email address
1.2 Place of residence
1.3 First language
1.4 Other languages spoken and degree of fluency
1.5 Age
1.6 Schools attended and locations
1.7 Further/higher education attended and locations
1.8 Career history – jobs performed and durations
1.9 Current job title, role and responsibilities (get an idea of where in org chart, how many people supervised)
1.10 Continuing education experiences (not provided by employer)
1.11 Employer-provided training courses
1.12 Familiarity with course subject matter

³⁴ The questionnaires used in both the pre-course and exit interviews included much more space for recording respondents' answers. In the interest of brevity, answer spaces were compressed for inclusion in Appendices 2 and 3.

SECTION 2: Level of prior experience with computers and e-learning

2.1 Have you ever participated in a web-based course?
2.2 When and how many times?
2.3 What were your positive and negative experiences with the course/s?
2.4 Have you ever participated in a distance education course?
2.5 When and how many times?
2.6 What were your positive and negative experiences with the course/s?
2.7 How often do you use a computer?
2.8 Do you use a computer at home or at work?
2.9 What do you use it for?
2.10 When was the first time you used a computer?

SECTION 3: Computer literacy

The tasks below are ones that you might need to perform as part of an Internet-based education course. For each one, please rate your own capabilities to perform the task.

	Can do so confidently by myself	Can do so with some difficulty by myself	Cannot do this without assistance
3.1 I can identify the visible components of a computer (keyboard, mouse, monitor, CPU)			
3.2 I can turn on and off a computer system correctly			
3.3 I can format a new floppy disc			
3.4 I can insert and eject a floppy disk or CD			
3.5 I can use a mouse to move around, select text, click items and drag items			
3.6 I know how to find a file that is saved on my computer hard drive or on a floppy disc or CD			
3.7 I can create new files, name them and save them to my computer's hard drive, a floppy disk, or a network drive			
3.8 I can move files and/or folders to a new location			
3.9 I can change the computer's settings such as date, time, sounds, monitor settings and other hardware settings			
3.10 I can find and start a desired application such as a word processing program or Internet browser			
3.11 I can use a word processing program to write documents			
3.12 I can copy and paste text or images from one document to another			
3.13 I can add non-text items such as images and tables to documents			
3.14 I can print documents			

	Can do so confidently by myself	Can do so with some difficulty by myself	Cannot do this without assistance
3.15 I can connect to the Internet using a computer and a browser program such as Internet Explorer, Netscape, or Firefox			
3.16 I can use the basic features of a web browser to move forward and back through web pages, and refresh/reload the page			
3.17 I can navigate through hyperlinks to find information that I am interested in			
3.18 I can use search engines on the Internet to find information that I am interested in			
3.19 I can mark pages using the "Bookmark" or "Add to Favorites" commands so that I can return directly to the same page later			
3.20 I can type Internet addresses (URLs) directly into the address bar of a browser to locate a particular web page			
3.21 I can download programs or plugins from the Internet			
3.22 I can play video and sound files that I find on web pages			
3.23 I can post messages on a discussion forum and read the postings of other people			
3.24 I can use a chat room to communicate via the Internet with other people			
3.25 I can send and receive email messages			
3.26 I can attach files such as word processing documents to email messages			
3.27 I can use the help function within the computer's operating system or within a particular program to learn new capabilities			

SECTION 4: Personal learning styles and learning strategies

4.1 Please describe a positive and memorable educational experience that you have had.
4.2 What made the experience positive (a particular teacher, activity, or course)?
4.3 Can you think of a negative educational experience, and what made it unsatisfactory or unpleasant?
4.4 Could you describe the way you usually go about learning new concepts or facts?
4.5 How do you know whether a particular learning experience has been effective or not? (what personal judgment criteria do you use to measure your own learning)?

4.6 How much do you normally make use of the following when you are learning something new, and in what ways? How useful are they for you? (Rank and comment)

	Rank (1=most important)
1. reading written text –books, handouts, articles, written instructions	
2. writing notes, paraphrasing content	
3. doing practice quizzes	
4. creating your own flash cards	
5. using diagrams, maps, charts and other graphic forms of information	
6. drawing diagrams or sketches	
7. watching videos or live demonstrations	
8. listening to verbal information from the instructor(s) or in-class discussions	
9. doing practical exercises and tasks	
10. discussing the subject matter informally with peers	

4.7 To what extent would you agree that the following descriptions match your personality (check the appropriate box).

	Strongly matches this description	Somewhat matches	Neutral	Somewhat matches	Strongly matches this description	
outgoing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	reserved
assertive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	accommodating
individualistic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	group-oriented
experimental	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	traditional
flexible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	perfectionist

4.8 What other words would you use to describe yourself and the way you learn and interact with others?

4.9 How do you think that your personality affects the way you learn?

SECTION 5: Epistemological orientation – personal definitions of learning and knowledge

Denote your level of agreement or disagreement with the following statements by choosing a value on the Likert scale:

		Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
5.1	When I learn a subject it is essential that I cover all of the important facts.					
5.2	I construct knowledge by taking in new information, relating it to what I already know, and discussing it with others.					
5.3	For learning to be effective I must memorise as much of the course content as possible.					
5.4	To learn a subject effectively I need to think in depth about the topics that are most important to me and develop my own carefully-considered perspectives.					
5.5	Quizzes and practice drills are the most important tools for learning new information.					
5.6	I can learn as much from my fellow students as I can from the instructor and the course material.					
5.7	The knowledge I have is specific to me and no-one else.					
5.8	The instructor is the most important source of knowledge in an educational course.					
5.9	There is an objective and reliable set of facts on any given subject that are discovered and described over time.					
5.10	I learn best by trying things out.					
5.11	The instructor should break course content into small, manageable chunks and make sure learners master each step before proceeding to the next.					
5.12	It is important for me to test my knowledge by sharing my ideas with others.					
5.13	I look for a lot of guidance from the instructor as to what to learn and how to learn.					
5.14	When a new piece of information is presented in a real-world context it is easier for me to remember.					
5.15	Learning is a process of initiation into an existing body of knowledge.					
5.16	I don't see the value in listening to fellow students' opinions – they do not know enough about the subject.					
5.17	I like to learn by working on real-world problems.					

		Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
5.18	Knowledge is something that exists externally – it can be transferred to us through books, lectures, and video broadcasts.					
5.19	Students should be able to define their own learning goals within a course.					
5.20	It is important to learn things systematically in the order that the instructor tells us.					
5.21	Listening to a broad range of opinions on a topic helps me to increase my understanding of that topic.					
5.22	I remember new concepts better if I can see a way to use them.					
5.23	My experiences and perspectives on a given topic are just as important as what I read about it.					
5.24	We can learn new things by having someone that knows the facts transfer the knowledge to us.					

SECTION 6: Professional and other factors affecting efficacy of web-based training programs

6.1 Are there any factors related to your role in the workplace that might affect the efficacy of this training program?
6.2 Do you think there are any other social, cultural, or gender-based factors that might affect your performance in this course?

SECTION 7: Course-specific questions

7.1 What are your motivations for taking the course – both personal (intrinsic) and professional (extrinsic)?
7.2 What do you expect to learn from the course?
7.3 What do you expect to be able to do after the course that you could not do before?
7.4 What personal learning strategies do you intend to employ?
7.5 How much time do you think you will need to devote to the course per week and how that time will be broken down?
7.6 What challenges do you anticipate?
7.7 How will you address those challenges?

END OF QUESTIONNAIRE

Appendix 3: Questionnaire for exit interviews

PARTICIPANT NAME:	
LOCATION:	
INTERVIEW#:	

SECTION 1: STUDY HABITS

1.1 How much of the course did you manage to complete?
1.2 Before starting the course, did you have a study schedule in mind for the course?
1.3 What days and times and for how long did you intend to study?
1.4 Was that different from your actual study time, and if so, why?
1.5 How many times per week did you intend to check your email?
1.6 How many times per week do you normally check email?
1.7 How many times per week did you actually check email (on average)?
1.8 How many times per week did you intend to log onto the course website?
1.9 How many times per week did you actually log onto the website (on average)?
1.10 If the intended and actual were different, why was that?
1.11 Would you change your study habits the next time you take an online course – if so what would you change?

SECTION 2: ORGANISATION AND INFRASTRUCTURE

How important do you think the e-learning course was perceived to be by the following people? Please rate: (1=not at all important, 2=not important, 3 = somewhat important, 4=very important)		Comments
2.1 Your direct supervisor		
2.2 Your company HR manager		
2.3 Corporate HR		
2.4 You		
2.5 Was there anyone else apart from these people that influenced how much time you were able to devote to the course? In what way did they influence your studies?		
2.6 What specific direction were you given from within the company regarding this course, and by whom?		
2.7 Were there any unforeseen circumstances that prevented you from studying as much as you had hoped or delayed your progress in the course? Please describe.		
2.8 Did you have access to a reliable Internet connection?		
2.9 Where was the Internet connection that you used?		
2.10 Was your Internet connection in a private location?		
2.11 Was your email account accessible from your own computer at work?		
2.12 Was your access to email or the Internet limited to certain hours of the day?		
2.13 Did you have Internet access and a personal email account set up in time for the course?		
2.14 If not, why?		
2.15 Were there any other logistical issues that hampered your progress in the course?		
2.16 From a logistical or organizational point of view, could anything have been done differently to better support you in the course? If so, what and by whom?		
2.17 Were there any organizational factors that affected your motivation in the course?		

SECTION 3: COMMUNICATION

3.1 Did you receive emails from your course tutor inquiring about your progress in the course?
3.2 Did you respond promptly to those messages? If not, why?
3.3 Were any logistical difficulties communicated promptly to your tutor? If not, why, and did you take any other action?
3.4 Did you attempt to contact the tutor if you had difficulties meeting deadlines or course requirements? (<i>if applicable</i>). If not, why?
3.5 How would you handle a similar situation in a classroom-based course?
3.6 Did you feel a lesser sense of urgency to complete the course requirements because this was a distance learning course?

SECTION 4: PEDAGOGY

The course involved a variety of quite different tasks and activities, as summarized in the table. Please think carefully about your experience with them and answer the questions that follow.

ACTIVITY #	Module	Type/Name	Description
1	1 and 2	Quizzes	Multiple choice or true/false with a few open text answers
2	1	Assignment One	Issues in SA forestry – 400-word assignment
3	1,3, 4	Optional exercises	For practice/review only – not assessed
4	2	Assignment Two	Provide definitions and descriptions for various wood products (questions based directly on text)
5	3	Assignment Three	Describe all of the main stages in the production of solid lumber, starting with the felling of the tree. Try to think of ways that occurrences at each stage in the process could affect the quality of the final product
6	4	Self-test Questions	For student practice only – not assessed
7	4 and 5	Discussion Questions	We have seen that there are several definitions of the term “value-added product”. What is yours, and why? Illustrate your answer using examples from the industry with which you are directly familiar
8	4	Assignment Four	Web research project – furniture manufacturing
9	5	Assignment Five	Product Development Plan group project
10	5	Peer review	

4.1 How **difficult** did you find these activities (Rank them - 1=easiest, 10 = most difficult)
Please explain your answers in as much detail as possible

#	Module	Type	RANK	Comments
1	1 and 2	Quizzes		
2	1	Assignment One		
3	1,3, 4	Optional exercises		
4	2	Assignment Two		
5	3	Assignment Three		
6	4	Self-test Questions		
7	4 and 5	Discussion Questions		
8	4	Assignment Four		
9	5	Assignment Five		
10	5	Peer review		

4.2 How well do you think these activities **helped you remember or retain** useful information? (1=best for retaining useful information, 10=poorest for retaining useful information). Please explain your answers in as much detail as possible

#	Module	Type	RANK	Comments
1	1 and 2	Quizzes		
2	1	Assignment One		
3	1,3, 4	Optional exercises		
4	2	Assignment Two		
5	3	Assignment Three		
6	4	Self-test Questions		
7	4 and 5	Discussion Questions		
8	4	Assignment Four		
9	5	Assignment Five		
10	5	Peer review		

4.3 How **enjoyable** did you find these activities (1=most enjoyable, 10 = least enjoyable)
Please explain your answers in as much detail as possible.

#	Module	Type	RANK	Comments
1	1 and 2	Quizzes		
2	1	Assignment One		
3	1,3, 4	Optional exercises		
4	2	Assignment Two		
5	3	Assignment Three		
6	4	Self-test Questions		
7	4 and 5	Discussion Questions		
8	4	Assignment Four		
9	5	Assignment Five		
10	5	Peer review		

4.4 What did you **learn** from these activities?

#	Module	Type	RANK	Comments
1	1 and 2	Quizzes		
2	1	Assignment One		
3	1,3, 4	Optional exercises		
4	2	Assignment Two		
5	3	Assignment Three		
6	4	Self-test Questions		
7	4 and 5	Discussion Questions		
8	4	Assignment Four		
9	5	Assignment Five		
10	5	Peer review		

4.5 Apart from helping you learn about the forest products industry, **was there anything else of benefit** that you **gained** from these activities?

#	Module	Type	RANK	Comments
1	1 and 2	Quizzes		
2	1	Assignment One		
3	1,3, 4	Optional exercises		
4	2	Assignment Two		
5	3	Assignment Three		
6	4	Self-test Questions		
7	4 and 5	Discussion Questions		
8	4	Assignment Four		
9	5	Assignment Five		
10	5	Peer review		

4.6 How **relevant** were these learning activities and tasks to your **job** now or in the future? (1=most relevant, 10 = least relevant)

#	Module	Type	RANK	Comments
1	1 and 2	Quizzes		
2	1	Assignment One		
3	1,3, 4	Optional exercises		
4	2	Assignment Two		
5	3	Assignment Three		
6	4	Self-test Questions		
7	4 and 5	Discussion Questions		
8	4	Assignment Four		
9	5	Assignment Five		
10	5	Peer review		

4.7 How well do you feel you performed overall in the course?
4.8 Did you feel comfortable working in the web-based environment?
4.9 Compared to your opinion prior to the course, is your opinion on web-based learning now more favourable, less favourable, or about the same?
4.10 If other web-based training was offered to you, would you consider taking it?
4.11 What do you see as the advantages and disadvantages of web-based training compared to other modes of learning?
4.12 What can you do now that you could not do before the course?
4.13 What do you know now that you did not before the course?
4.14 How did this course compare in terms of difficulty to other courses you have taken?
4.15 How did this course compare to others you have taken in terms of its length and the number of hours required to complete all of the assigned tasks?
4.16 How could the course have been better-designed to enable you to perform better in this course?
4.17 What would have given you increased motivation to complete this course successfully and on time? (<i>probe for factors such as SAQA qualification, support from within org</i>)
4.18 Do you have any general comments or suggestions regarding ways to improve the learning activities and tasks in the course?

END OF QUESTIONNAIRE

Appendix 4: Course assignments

Assignment 1 - Forest Values

As we explore the subject of forest values we find many contrasts both regionally and around the world. In North America the most publicised conflicts in forest values revolve around the need to reconcile the economic and social benefits associated with harvesting trees with pressures from environmental groups to conserve forest land. In South Africa the Working for Water project highlights a different kind of conflict.

Go to the Module References and Resources page that appears earlier in this module. Follow the link to the Working for Water programme website, and note the kinds of forest values and possible conflicts being described. Another useful resource for this assignment is the White Paper entitled; "Sustainable Forest Development in South Africa. The Policy of the Government of National Unity", published in 1998 by the Ministry of Water Affairs and Forestry (also linked from that page). Write a page that summarises the values, issues and conflicts related to forestry in South Africa today. Email your answer to Iain Macdonald using the internal WebCT course email and it will be passed to the appropriate course tutor for grading.

Note: Your assignment should be between 400 and 500 words, use acceptable grammar, and be free of spelling errors.

When you have completed your assignment, return to this point and continue reading the remaining pages of this module.

Assignment Two

Using a word processing program such as Microsoft Word, create a document containing the answers to the following questions. Submit this as an email attachment to Iain Macdonald before August 8th.

1. With reference to the publication *A New Taxonomy of Wood Products*, fill out the following **as it applies to softwood lumber**. Use point form.
 - a. Definition of "dimension lumber":
 - b. Uses:
 - c. Competing products:
 - d. Technical characteristics (from the course readings):

(4 marks)

2. With reference to the publication *A New Taxonomy of Wood Products*, fill out the following **as it applies to glued wood products**. Use point form.
 - a. Definition of "fingerjoined lumber":
 - b. Production trends of fingerjoined lumber:
 - c. Uses of fingerjoined lumber:
 - d. Definition of edge glued lumber:

- e. Uses of edge glued lumber:

(5 marks)

- 3. With reference to the publication *A New Taxonomy of Wood Products*, fill out the following **as it applies to treated wood products**. Use point form.
 - a. List three reasons why wood is treated:
 - b. What is CCA treated lumber?
 - c. What are the uses of CCA treated lumber?
 - d. Name three competing products (not just wood):

(8 marks)

- 4. With reference to the publication *A New Taxonomy of Wood Products*, fill out the following **as it applies to composite products**. List four types of wood panel products, indicate whether they are used for structural purposes or for non-structural purposes, examples of end uses for each panel type, and indicate whether their production in North America is growing, slowing or steady.
 - a. Name of panel product:
 - b. Structural or non-structural?
 - c. Examples of end uses:

(12 marks)

- 5. With reference to the publication *A New Taxonomy of Wood Products*, fill out the following **as it applies to engineered wood products**. Use point form.
 - a. What are I-beams?
 - b. Uses of I-beams include:
 - c. What are the advantages of using an I-beam instead of a solid wood member to support a floor?
 - d. What are trusses?
 - e. Uses of trusses include:
 - f. What are the advantages and disadvantages of using roof trusses instead of solid wood?

(7 marks)

- 6. What do the following acronyms stand for?:
 - a. MDF
 - b. OSB
 - c. LVL
 - d. OSL
 - e. CCA
 - f. MSR

(6 marks)

Assignment Three: Impact of Primary Processing on Downstream Manufacturing

As we have seen from the module text, the primary processing of wood can be broadly classified into the following activities;

Felling – transportation – log storage – debarking – bucking – head rig (and scanning) – gang saw – edger – planing - drying

Briefly describe all of the main stages in the production of solid lumber, starting with the felling of the tree. Specifically try to think of ways that occurrences at each stage in the process could affect the quality of the final product (the piece of lumber) or even a downstream value-added product (such as a piece of furniture).

You should aim to write 400-500 words for this assignment. Rather than emailing this assignment to your tutor, post it instead to the discussion forum, under "Assignment Three Submissions".

Assignment 4: Individual WebQuest/ Internet-based research project

In this activity you are required to use the Internet as a resource to search for information on a given topic. You will use the information that you gather to compile a short (400-500 word) report and send it to your tutor. Some links are provided for your convenience, but you are encouraged to use search engines such as Google (<http://www.google.co.za/>) to seek out additional information.

The website http://www.soc.duke.edu/NC_GlobalEconomy/furniture/value.php depicts a chain of manufacturing steps for Thomasville Furniture Industries of North Carolina, USA . Choose one of the production steps in the chain and produce a page based upon your Internet research that describes the step in terms of the following;

- The equipment used and approximate costs
- How actions taken at this stage can affect processes further downstream
- How occurrences at earlier stages in the manufacturing process affect this step
- Key issues and common problems at this stage in the manufacturing process
- How the ways of doing this step have changed during the historical development of furniture
- Changes that may occur in the future (as a result of technology, increasing labour costs, etc.)

The steps that you may wish to choose from are;

- Product development and design
- Materials procurement
- Lumber cutting (also know as “breakout”)
- Assembly
- Quality Inspection
- Finishing
- Packaging and Shipping/Logistics

If possible, please choose a manufacturing step that you are not directly connected with at work (i.e. if you are in shipping and logistics do not choose "Packaging and Shipping/Logistics"!)

Once your assignment has been graded by your tutor it will be shared with your fellow learners via the course website so that everyone can learn from the research of the group.

Assignment Five: Product Development Plan

The objective of this final assignment is to encourage you to integrate the knowledge gained during the course and apply it to a real-world task that you might encounter in the course of your job.

For this assignment you will be divided into groups of three people. You will be asked to work together and submit a single group assignment representing your combined work. Your tutor will advise you by email of whom you will be working with.

Choose a secondary wood product that you do not produce at the factory in which you currently work. Imagine you are starting a business to manufacture that product for the export market. Your task is to create a mini product development plan for this product. The plan should be approximately three pages (1500 words) in length, and should cover the following aspects;

- Brief description of the product.
- Who the target market is and what their needs and expectations are (why would they buy your product?)
- What the most important attributes of the product are (price, structural properties, visual appearance, etc.)
- What materials you will use and where you will source these from (wood species, solid lumber or composites, grades of lumber, etc.)
- The production steps that you will follow to manufacture your product.
- The machinery and technology that you will use, and what aspects will be manual or automated.
- How you will ensure adequate product quality.
- The advantages of your product compared to those of your competitors.
- Who your major competitors will be.
- How you will distribute your product to the marketplace.

It is recommended that you have an initial discussion with your group by email or via the chat room in which you decide upon your product and target market and assign responsibilities to each group member for certain parts of the plan. Once you have decided upon your product and market please advise your tutor.

You may wish to use the "chat" feature to conduct discussions online with your group. If you are not sure how to use this please contact your tutor.

Appendix 5: Discussion questions used in the course

Discussion Question 4A

We have seen that there are several definitions of the term “value-added product”. What is yours, and why? Illustrate your answer using examples from the wood products industry.

Your original response should be at least 300 words, and you should also read and reply substantively to the postings of at least two other people.

Discussion Question 4B

How do you decide what level of automation is required in a secondary manufacturing plant? Do you think it is necessary to implement the latest technology to be competitive? How do you weigh the social benefits of employing more people against the need to keep up with the technology that competitors at home or abroad may be using?

Your original response should be at least 300 words, and you should also read and reply substantively to the postings of at least two other people.

Discussion Question 5A

How will Africa's role in global forest products trade change over the next 10-25 years? What do you think are the major trends that will affect it?

Your original response should be at least 300 words, and you should also read and reply substantively to the postings of at least two other people.

Discussion Question 5B

To what extent do you agree or disagree with the views expressed by Fakude in his paper on the SA furniture industry? Are you aware of developments in the sector since the paper was written that have held up or contradicted Fakude's opinions? What do you see as the most effective export marketing success strategies for SA producers?

Your original response should be at least 300 words, and you should also read and reply substantively to the postings of at least two other people.