Interactivity in an online learning environment: A case study of participant experience in professional development

Revonda G. Morrow
BAEd, MAEd

Faculty of Education

Griffith University

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ABSTRACT

The role of interactivity in learning is seen as important to the processing of content and the creation of new understandings. Whether this interactivity is viewed as internal interaction with the content by individuals or a broader socio-cultural concept of interaction among others, interactivity is seen as critical to learning. What has not been so clearly defined, however, are the ways that interactivity functions for individuals and groups whose learning is increasingly taking place outside the traditional face-to-face methods, supported and managed by information and communication technologies in online learning environments.

This study drew on the literature from online learning and online professional development and examines learner-centric forms of interactivity (learner-content, learner-learner, learner-instructor, learner-interface, learner-self, learner-other and learner-environment). It examined the interactivity of a group of learners enrolled in an online professional development course. These adult learners, who were practicing teachers, were experienced in learning through traditional methods of instruction, including face-to-face and traditional distance education, but had little to no experience in online learning. This study specifically sought to answer questions about the nature of the interactivity present in the online environment, the influences that contribute to the interactivity, and the students' perceptions of how the interactivity supported their learning. The researcher, who was the lecturer in the course, was well-positioned to develop an in-depth understanding of the meanings, perceptions and understandings that students attached to learning online. A case study approach was used and a range of data collection methods were employed including statistical data available from the course management system, archived exchanges in online discussion forums, e-mail exchanged between lecturer and student and interviews with students.

The findings of the study demonstrate that the students chose to engage in learner-centric interactions that they believed would further their goals of succeeding in the course. Interaction with the content was seen as core to this success and students used other forms of interactivity to support their processing and understanding of the content. The study revealed that the interactivity that occurred within the online environment was only part of the structure of interactivities that supported the

students. Interactions within their local communities developed as students sought emotional, academic and technical support from friends, family and professional colleagues.

It was possible to define some types of interactivity as more important to the students and their experience of online learning. Along with learner-content, the students indicated that learner-interface and learner-self interactions exerted a strong direct influence, emphasising the importance and interconnectedness of the content, the learner-self interactions and the interface, which acted as a gatekeeper to the content. Also seen as a direct influence by the students were the interactivity with the environment and the interactivity with others outside of the class, indicating the presence of a strong connection within their local communities that existed outside the online environment. Interactivity with the lecturer and vicarious interactivity with other learners were viewed as having secondary influence while direct interactions with other learners were deemed to be of lesser influence.

An analysis of contributions to four online discussions spaced over the fifteen weeks of the course revealed that little social presence existed among the students in the class. Students used the online forums to post their own ideas and opinions but not to challenge or question the opinions or ideas of others. The study also found that the public and textual nature of the online environment was initially a barrier for students and they feared that their writing would be judged and criticised. Even though students became more comfortable with submitting their opinions to the discussion forums, the writing was formal and little direct interaction took place between students. However, students reported that the opportunity to read others' opinions strongly supported their own learning. Even though there was little direct learner-learner interaction, students still value and learned from the others in the class.

Students reported that they were satisfied with the online learning experience and were able to articulate what they had learned and what types of interactivity had supported them. The students mentioned interactions with their local communities as the strongest support for their learning, following by access to the ideas and opinions of others learners, the availability of the lecturer and the time and place independence of the online environment.

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The findings of this study demonstrate that motivated adult learners choose the types of interactivity that will help them succeed. Although the learners in this study were new to online learning and found some aspects unfamiliar and initially problematic, they developed strong structures within their local communities that supported them academically, emotionally and technically as they participated in the online course. Although learner-learner interactivity was not strong and social presence was low, students still felt satisfied with the experience and perceived that they had learned.

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Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Date: 15 January 2007

Signature

Chapter One
Introduction

This study examined the nature and implementation of interactivity in an online professional development course and investigated the impact of this interactivity on the students in the online course. The study explored how the participants experienced the online interactions and sought to identify crucial elements in the online experience that influenced the students' participation and perception of learning online.

The Impact of Online Education

Online education has in the last decade come to exert a significant influence on higher education. The rapid increase in the demand for online delivery of instruction, the advances in both hardware and software that make this delivery possible and the availability and use of the Internet have resulted in an unprecedented growth in the number of online courses being offered by institutions of higher learning. According to the U.S. Department of Education, surveys conducted in the last decade indicate a steady increase in the number of higher education institutions offering distance education courses in the United States (Waits & Lewis, 2003). In Great Britain the success of the Open University points to less dependence on the physical campus and more reliance on distance delivery (Clark, 2003), while increasing numbers of providers of higher education in Australia, New Zealand and Asia are seeking to understand and implement the benefits of e-learning (Clark, 2004; DfES, 2002; Selwyn & Gorard, 2003).

New, descriptive terms such as "online learning," "web-enhanced instruction," "computer-mediated instruction," "computer-supported collaborative learning" and "e-learning" underline the importance of the technology in transforming the delivery of instruction to the online environment. Sherron and Boettcher (1997) point to three factors that are contributing to the rise of online education: the convergence of communication and computing technologies, the need of information age workers to acquire new skills with a minimum of disruption to their work schedules and the need to reduce the cost of education. Data from the latest NCES report on distance education in postsecondary education (Tabs,

2003) reinforce this view. Reasons given by the institutions for supporting online education include increasing student access to courses by decreasing time, place and cost constraints, increasing enrolment through the institution's access to new audiences and reducing the institution's per-student cost.

Within this new structure of online learning, the need exists to clearly define the pedagogical issues, understand the underlying theory that best serves online learners and discover the unique benefits and possible disadvantages of using such an environment (Berge, 1999). Willoughby (2003) urges an investigation of the different models that exist in the online environment in order to find the most realistic and sustainable strategies to ensure success for both students and institutions.

Research has shown that although students studying online are found in all areas of tertiary education, more females than males, more graduate students than undergraduates and more students who considered themselves part-time make up the profile of the online learner (Potter, 1998; U.S. Dept of Education, 2002). The online learner is slightly older (Carr, 2000; Kretovics, 2003) and more focused and self-reliant (Moore, 1998). Many of these online learners, of particular interest to tertiary providers, are classroom teachers and educational administrators who turn to online classes to upgrade their knowledge, skills and qualifications. It is these online learners that are the focus of this research.

The Evolution and Increase in Online Learning

In much of the literature, online education is regarded as the natural outcome of the infusion of technology into distance education. Conceptually different from the correspondence model where students worked in isolation, the new online model uses telecommunication technologies to integrate quick, reliable communication and functional interactivity into distance learning experiences (Dede, 1996; Peters, 1993). From the primarily one-way technologies of print, radio and television, through the advent of more personal and flexible use of audio and video, to the interactivity of such technologies as computers, e-mail, audio and video conferencing, these developing technologies have resulted in a viable means of engaging in two-way communication and have acted to decrease

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the isolation of distance study. The latest generation of technologies have seen the increase in bandwidth and speed that enables faster transmission of streaming audio and video as well as the simplification of course authoring software that supports both the instructor and student. It is the changes in technology within the last fifteen years that have created new distance learning environments and required a new definition of the culture and theory of learning online (Bates, 1995; Sherron & Boettcher, 1997).

Online students, though physically separated from the instructor, can make use of technologies to bridge the distance between the two and have the advantage of a course of study that is not bound by time or place (Willis, 1993). Online education offers the learner the ability to interact easily with other students in the class, through formal and informal discussion forums, through e-mail and through the collaboration and sharing of student-generated content (Navarro & Shoemaker, 2000; Ohlund, Yu, Jannasch-Pennell, & Digangi, 2000; Swann et al., 2000).

Much of the research comparing online delivery of instruction with more traditional classes has been based on the assumption that the face-to-face class was the more effective and preferred venue for learning. Studies were designed to look for similarities and differences based on how well the online classes mimicked the face-to-face delivery of instruction (Bates, 1995). A continuing and comprehensive review of over 355 research studies has found however that in a variety of technology-based distance situations, online students learn as well as students engaged in traditional, on-campus instruction (Russell, 2003).

Some practitioners and researchers assert that the time has come to stop searching for differences between distance and traditional forms of education, calling instead for an examination of the issues common to both. Seeing online education as "simply education at a distance with common frameworks, common conceptual concerns and similar research questions relating to the social process of teaching and learning," McIsaac and Gunawardena (1996, p. 408) argue that technology has blurred the differences between distance and traditional education and therefore necessitates the blending of the two theoretical frameworks. These

views are supported by the idea that the online environment has something to offer that can enhance or transcend traditional education and support the development of a unique theory that does not rely on models borrowed from more traditional disciplines (Blanton, Moorman, & Trathen, 1998; Jonassen, Davidson, Collins, Campbell, & Haag, 1995). Dede (1996, p. 5), discussing implications of new technologies which make possible learning beyond the traditional classroom, points out that this new medium serves as a channel for conveying content as well as a representational 'container' that enables both new ways to communicate and also new pedagogical strategies. There is evidence of a shift in perspective toward online learning from some of higher education's academic leaders. Allen & Seaman (2003, p. 3) reported on survey results that showed half of those surveyed felt that online learning was equal or superior to traditional on-campus classes and most felt that this methodology would continue to improve. These authors propose that the previous question of "can it be as good as?" will soon be replaced by "how is it better?"

The Impact of ICT on Teaching and Learning

The last two decades have seen tremendous technological advances which have in turn raised new questions about how these technologies should be used to support teaching and learning. Connectivity and speed, an increase in multimedia capabilities and miniaturization, along with a decrease in price has made new information and communication technologies (ICT) more prevalent in schools and homes (Honey, Culp, & Carrigg, 2000). Many government, business and community sponsored initiatives to network schools and equip classrooms with Internet access have been successful, and the numbers of computers and types of computer-related hardware available in most primary and secondary schools have increased (NZ Ministry of Education, 2001; U.S. Dept of Education, 2000). Along with increased access to hardware, software and networks, the rapid growth of online opportunities has brought new resources into classrooms. New technologies are being developed that will continue to change the way that teachers and students interact in the classroom. It is now possible for students and teachers to access vast amounts of information, participate in collaborative projects with students in distant locations, consult experts in the field, and post their own information to the Internet (McLester,

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2001). All of these opportunities have raised the profile of classroom ICT use and created a need for new teacher competencies and evaluative techniques (Cuban, Kirkpatrick, & Peck, 2001; Lai, 1999).

Along with this increase in technological development is a corresponding shift in thinking about teaching and learning. Referring to this shift as a cognitive revolution, Bruner (1996) supports the idea that teaching and learning take place within a framework of reflection, collaboration, cultural context and the autonomy of the learner. A new focus on the construction of knowledge emphasises the making of meaning and assumes that knowledge is a function of how the individual interprets and builds understandings based on his or her experiences. Constructivist theory requires active analysis, reflection and articulation and the implementation of constructivist practice is mediated through the socio-cultural framework of collaboration and conversation (Duffy & Cunningham, 1996; Jonassen et al., 1995). This socio-cultural view argues that individual learning is situated within a physical and social context, that learning is distributed across the social system, and that tools and artefacts mediate the learning and transfer cultural knowledge among the learners (Putnam & Borko, 1997; Salomon & Perkins, 1998).

Researchers have suggested that computers can both encourage the transition to constructivist approaches by teachers and support the construction of knowledge by students in the classroom (Collins, 1991; Jonassen, Peck, & Wilson, 1999). Trilling and Hood (1999), describing the effects on education of the transition from an industrial-based to a knowledge-based society, argue that the role of the teacher must shift to facilitator and co-learner; that students must become directors of their own learning; that learning should be collaborative, flexible, based on real-world problems and use an inquiry approach; and that computers applications should be seen as a vehicle to provide dynamic multimedia interactions and unbounded worldwide communication. This new 'socio-technical paradigm' (Porat as cited in Leach, 2000) has created for teachers a need to restructure their own personal and professional learning.   The need exists to study and understand how teachers can best be supported to incorporate information and communication processing skills into the curriculum, to use

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these tools within a pedagogical framework and to best organise these resources for student learning (Lai, 1999).

Online Learning and Professional Development for Educators

A focus on professional development and research on teacher learning is necessary to meet the changing needs of professional educators. A synthesis of effective professional development characteristics includes issues concerning time, focus and methodology. Effective professional development allows sufficient time to absorb and effect change, is ongoing and recurring and includes time for follow-up sessions built into the design. Focus issues include professional development that is embedded in teacher work, that has an emphasis on student learning and that makes use of teacher experiences. Methodologies include reflection, collaboration, coaching, mentoring and constructivist techniques (Abdal-Haqq, 1996; Ball, 1996; Cochran-Smith & Lytle, 1999; Fullan, 1991; Loucks-Horsley, 1999; Putnam & Borko, 1997; Wilson & Berne, 1999). Referring to traditional professional development as a "patchwork of courses and workshops," Joyce and Showers (1995, p. 8) describe the current state of professional development as one that is gradually evolving into "a system ensuring that education professionals regularly enhance their academic knowledge, professional performance, and image as professionals."

Online study, in which all or most of the course content is accessed via the Internet, is a methodology that has the potential and the capacity to meet the needs of effective professional development for teachers. In a survey of such courses, Branzburg and Kennedy (2001) found that offerings ranged from self-paced tutorials with little or no interaction among participants to graduate-level courses with web-based discussion utilizing discussion boards, chat rooms and e-mail exchanges. There exists a need to understand this new method of delivering professional development to practicing teachers in terms of the impact of the technological medium used to deliver the content and the impact on the learner.

It is clear that online learning is increasing in importance and becoming a more mainstream method of delivering instruction, allowing a freedom from time and place restrictions which is particularly relevant to teachers seeking professional

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development in their field. The technologies used to deliver online courses should be able to encourage and support models of teaching and learning that are interactive, but the rapid adoption of this methodology has outpaced an in-depth understanding of the factors that influence the learners involved in this type of delivery. As online learning becomes more prevalent as a method of delivering courses, the need to understand how the learners experience online learning grows. Questions remain as to the type of learning environments that are created online, the types of support that are required by learners and the ways that teaching and learning are adapted to fit this new methodology.

The Nature and Contribution of this Study

While research on different aspects of online learning has advanced in the last decade, the rapidly evolving nature of the medium means that there is much still to be examined before the complexities are identified and the advantages and disadvantages of such a methodology are understood. It has only been within the last decade that online teaching and learning has been realistically possible on a broad scale but the increase in numbers of students studying online creates a compelling case to study the phenomena. Although many studies on online courses attribute apparent success or lack of success to interactivity, few have closely evaluated what interactivity is in practice and what it means from the learner's perspective.

Through a case study approach, this research study provided a means through which the types of interactivity present in an online course could be identified, and a means by which the influence that this interactivity has on the learners, both individually and collectively, could be analysed.   The study's particular focus is how learners experience interactivity in an online professional development environment.

Drawing on socio-constructivist theory, which argues that learning takes place not in the minds of isolated individuals but in a community of learners engaged within a social context, this study examined the ways that learners engage with one another and with the components found in an online learning experience. Speaking about face-to-face interactions, Gilbert (2005, p. 76) argues that

"knowledge is something that is created not in individual people but in the spaces between people." This study sought to examine the online "spaces" and define through a learner-centric approach, how, and with whom or with what the learner chooses to interact in the online space, and why he/she chooses to interact in a particular way. The study also examined the correlation between student success and types of interactivity that seemed to be present in the course experience.

Overview of the Thesis

The importance and prevalence of online learning is increasing and the literature on this topic reveals that, though much has been written on interaction in online learning environments, conceptual rather than empirical evidence dominates and little has been examined from the learners' perspective. Chapter Two of this report examines the current literature in an attempt to understand the different perspectives, definitions and applications of interactivity in the online environment. This chapter also undertakes to define the particular issues that impact on the delivery of online professional development courses in an attempt to focus and inform a study of learners in such an environment. Chapter Three describes and justifies the research design, the data collection, methods and data analysis used in the study. Chapters Four through Six report the analysis of the data, and looking specifically at the nature of the interactivity experienced, the influences present that contribute to the interactivity, and the ways that the interactivity contribute to participants' perception of their learning.

Chapter Two
The Question in the Context of Relevant Literature

Introduction

The literature relating to this study is drawn from content in two main areas. The first is the online delivery of instruction, which is examined to review the impact that the interactivity in the online learning environments has on the learner. Literature selected for this part of the review focused on online delivery of instruction at the tertiary level, examining specifically the ways that learners interacted with the online environment. It comprised studies of situations where all or a significant portion of the course delivery was conducted online. The second area, the field of online professional development, is examined to determine the areas of concern within this method of professional development delivery. Literature selected for this part of the review focused on professional development offered in an online context to practicing educators. It comprised studies of situations where all or most of the course content and interaction of participants was accomplished through online delivery. This review of the literature helps to refine the research topic and to inform the empirical research.

This review first examines the concept of interactivity in the context of learning and highlights the different perspectives that exist in the literature about how this construct functions to support the learner. Focusing on the evolution of the concept of learner-centric interactivity, the review examines the definitions of interactivity as they relate to computer technologies in general and online learning in particular. The literature shows that there is debate in the academic community about how students interact, why they interact in the ways that they do and how important these interactions are to the success of the learner.

An examination of the types of the interactivity previously reported in the literature includes a study of the agents of interactivity and helps to define the "who" and the "what" of interactions found in the online environment. In order to understand the "why" of interactions, additional investigations of

interactivities defined by the purpose, analysis of the learners in the online environment and a study of online discussions are included in the review.

The review also examines the particular issues that surround online professional development for practicing educators and points out the specific needs that these learners have in the context of their situation as adult learners with busy professional lives. The review of the literature offers support for this particular research study in that it points out a need to understand, particularly for the adult learners involved in online professional development, what interactivity is present, what influences this interactivity and how the online learner experiences it.

While the present tense is used in the discussion of this literature, it should be understood that all ideas are situated in the context of the time and place of the written papers.

The Nature of Interactivity

Anderson (2003, para. 1) refers to the role of interactivity in education, and particularly education at a distance, as a "contentious debate" arising from a lack of consensus in defining the term. This debate is due in part to differing perspectives and vested interests of professional educators who use the term but also due to epistemological assumptions about the role of human interaction in education and learning. Salomon and Perkins (1998) describe two conceptions of learning: first, the concept of the individual learner which emphasises the acquisition of knowledge and cognitive skill and second, the socio-cultural concept of learning which emphasises the participatory aspects of context, interaction and situation. In both conceptions, interaction is seen to be essential but present in different forms. Dewey (1933), describing the interaction for the individual learner as internal interaction, sees it as necessary to the process of transforming inert information into meaningful knowledge. Holmberg (1983, p.115), speaking particularly to distance education, referred to this process as the "guided didactic conversation" that occurs as a student interacts with content. The more participatory, socio-cultural concept of learning encompasses and

depends on a broader range of interactivity between learners, instructors and other learners (Jonassen, 2002).

Daniel and Marquis in 1979 (as cited in Anderson, 2003) cautioned that a mix of independent study and interactive learning was an important consideration for distance learners, but until the last decade interaction between learner and content, and to a lesser degree interaction between learner and teacher, have been the mainstays of distance education (Dede, 1996; Peters, 1993). Web-based technologies and Internet access have increased markedly in the last 10 years and distance learning, infused with information and communication technologies, has evolved into a medium of delivery that allows for faster and better communication between learners and lecturers, and learners and other learners, and has changed the way that content is delivered and constructed (Wagner, 1994). This evolution makes possible types of interactivity that support social learning and constructivism, where learning is seen to be a social-dialogical process (Duffy & Cunningham, 1996) that requires communication and feedback from fellow learners as meaning is explored and constructed (Dewey, 1933; Jonassen, 2000, 2003; Salomon & Perkins, 1998).

Simpson and Galbo (as cited in Wagner, 1994, p. 6) define interaction in terms of a broad range of individual and group activity as "reciprocity in actions and responses in an infinite variety of relationships: verbal and non-verbal, conscious and non-conscious, enduring and casual. Interaction is seen as a continually emerging process, as communication in its most inclusive sense". While this definition clearly fits interactions present in traditional, face-to-face classes, a growing body of literature looks at ways that definitions of interactivity also fit the online learning environment and involve the use of information and communication technologies. Garrison (1993, p. 16), taking this new functionality of emerging technologies into account, defines interactivity as "sustained two-way communication among two or more persons for purposes of explaining and challenging perspectives." Wagner (1994, p. 8) recognising the importance of non-human interaction mediated through the technologies, defines interactivity as "…reciprocal events that require at least two objects and two actions. Interactions occur when these objects and events mutually influence one

another." Anderson and Garrison (1998) defining more clearly the purpose and outcomes of the interactions, describe interactivity in terms of reciprocal, consensual and collaborative communication that furthers and facilitates the making of meaning.

Much of the study of interactivity in the online learning environment builds on the work of Moore (1993) who defined interaction between learner and learner, learner and instructor and learner and content, and on the work of Hillman, Willis and Gunawardena (1994), who defined the interaction between learner and the interface. Using these interactions present in online environments, researchers have attempted to define the quality, impact and outcomes of interactivity on the learner and on learning. Researchers have expanded the models of interactivity (Hirumi, 2002; Sims, 1999), examined the purposes behind interactivity (Sims, 2003), and explored outcomes such as student satisfaction (Gunawardena, Lowe, & Carabajal, 2000), academic self-concept (Gibson, 1998b), social presence (Tu & McIsaac, 2002), patterns of engagement (Pawan, Paulus, Yalcin, & Change, 2003), and cognitive presence (Garrison, Anderson, & Archer, 2001).

Thoughtful and specific comment is evident in the debate about how interactivity is to be defined and utilised in the online environment. Rose (1999, p. 43) makes the point that attempts to define the term have resulted in "exhaustive taxonomies of interactions" that focus on outlining and naming and avoid the thoughtful criticism and discussion required to understand, apply and build on the implications for learning inherent in the construct. Berge (1999) cautions that it is possible to design poor interactivity into a course and that increasing the quantity of interaction does not necessarily mean an improvement in the quality of that interaction. Yacci (2000) argues that interactivity viewed from the students' perspective is a psychological construct of each student, which further increases the challenge for those who design online instruction. Shearer (2003) questions the importance of interactions in meeting learning outcomes and argues that adult learners, normally highly motivated and self-directed, may require only minimal online interactivity to be successful in meeting the learning outcomes of the course. He cautions that all interactions should be meaningful

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and authentic and should be analysed according to how well each interaction assists the learners in meeting the course objectives.

Clearly, the debate over the definition and uses of interactivity, particularly in the online environment, is ongoing and far from reaching consensus. Considering the rapidity of the change in the technologies that support new models of distance education, it is of critical importance to continue to examine these issues in order to understand the most effective ways to design and support students who are learning online.

The Influence of Design on Interactivity in Online Environments

The rapid increase in online delivery of instruction in higher education has provided opportunity for more in-depth examination of the design of both the interface and interactivity that is inherent within such a design. Harmon and Jones (1999) define five levels of interaction supported by technology in course design and structure. The first level is *informational* in which the student receives fairly stable information via a web page such as syllabus, course outline, contact information. The second level is *supplemental* in which course content is provided online and includes such resources as course notes, handouts and PowerPoint presentations. The third level is *essential* where regular access to the web is required because students obtain most, if not the entire course content, from the web. Level four is *communal* in which classes meet both face-to-face and on-line and course content may be provided in both environments. Level five is *immersive* in which all course content and interactions occur online and students generate the course content in a sophisticated, constructivist, learning community.

Gilbert and Moore (1998), describing the process required to implement interactivity in web-based instruction, outline a five-step process. First, designers must identify the types of social and instructional interactions desired for the web-based course. Second, designers must identify the resources available to them in terms of personnel, technology and finance. Third, designers must define the levels of control for instructors, for learners and the influence of the group within this control structure, which in turn helps to define

the design tools to be used. The fourth and fifth steps in Gilbert and Moore's model, more applicable to designers not using courseware authoring systems, speak to the designers who use web-based design tools to the maximum extent possible and who complete the programming as required in order to implement any missing features of instructional interaction and to produce the most open-ended environment possible.

Berge (1998) describes two major frameworks of instruction that have an impact on the design of online learning environments. The first, a *transmission* framework, sustained by a belief that a set body of knowledge exists to be transmitted to the learner, relies on lectures, textbooks and videotape and is based on theories of positivism and behaviourism. The second, a *transformation* framework, in which the learner transforms information by generating hypotheses, making decisions and constructing knowledge either individually or through social interaction with others, is based on the theory of constructivism. Contrasting these methods as teacher-centred versus learner-centred, Bates (1995) cautions that the transmission model no longer meets the changing needs of knowledge economy workers, where communicating effectively, working in teams, analysing information and generating new knowledge are creating complex new educational needs.

Describing transformational, constructivist environments as those that "engage learners in knowledge construction through collaborative activities that embed learning in a meaningful context, and through reflection on what has been learned through conversation with others learners," Jonassen et al. (1995, p. 11) outline a framework of context, construction, collaboration and conversation to facilitate the making of meaning for learners. These authors suggest that the design of online instruction needs to shift from prescriptive, directed learning situations to environments that allow learners to solve real-world problems and engage in dialogues with a community of practitioners. Within the online learning environment, this interactive framework can be mediated by a variety of technologies. Computer-mediated communication is available through electronic mail, computer-based discussion and conferencing. Collaboration is available online through the ability of the technology to support groups across a distributed

environment where learners can actively work toward a negotiated meaning. Using situated, case-based learning to give authentic contexts in which students can work is supported by both video and hypermedia environments and gives learners an opportunity to reflect, communicate and negotiate a shared meaning within the group (Jonassen et al., 1995). Wiggins (1993) defines the characteristics of good learning environments, both distance and local, as being centred on worthy problems or important questions, including tasks that are replicas of real-world problems faced by professionals in the field, providing access to resources commonly available to those professionals, and presenting problems that require a repertoire of knowledge, judgement and skills. In defining the constructivist online environment Jonassen et al. (1995, p 21) state: "Constructivism can provide theoretical bases for unique and exciting distance learning environments. These environments should emerge from authentic tasks, engage the learners in meaningful, problem-based thinking and require negotiation of meaning and reflection on what has been learned."

Design of the online environment has been found to be a significant factor in successful online learning experiences for students. Swan et al. (2000) found that three factors contribute to the success of online courses: a transparent interface, frequent and constructive interaction by the instructor and the availability of a dynamic and ongoing discussion. The relationship of these factors was believed to be significant in that they jointly supported the building of a learning community. Anderson (2003) outlines an equivalency theorem that suggests that meaningful learning can be supported as long as at least one of three types of interactivity (interactivity between learner and content, between a learner and other learners or between a learner and the teacher) is present at a high level in the design and implementation of the online course. He contends that the other forms of interaction can be offered at minimal levels or eliminated altogether without a degradation of the effectiveness of the education experience. Taking the viewpoint that learning is more than just a response to teaching, Olgren (1998) suggests that course design should include: (1) activities that foster mental involvement in the learning and draw on interactions between the student and instructor, other learners and the content; (2) support emotional involvement in the learning by communication, collaboration and support; (3)

develop students' learning capacities by embedding support devices in the instruction; and (4) and use assessment methods that allow students to demonstrate that they have developed knowledge structures and application skills. Speaking to the importance of design, Garrison (1993, p. 207) states: "Those of us that have the technology must design the learning process not just to learn information faster or easier but that will encourage and challenge learners to construct their own meaning and create new knowledge."

This examination of literature on the design of online environments suggests that the quality of the learning is related to the design of online learning programmes and can aid or hinder both the building of community and the success of the online learner. Hirumi (2002) points out that it is possible to design too many interactions into an online course and cautions that course designers and lecturers need to examine courses through a meta-analysis of planned learning interactions. Shearer (2003 p. 20) states that we must "judge the value of interactions and not the quantity of interactions." In an attempt to analyse the quality of interactions, Woods and Baker (2004, Recommendations section, para. 5) suggest a hierarchy of classification where the term transaction is used to designate a limited communication and the term interaction be reserved for more substantial exchanges. Transaction is defined as "a limited engagement to meet a specific need (or toward a specific purpose) of one of the participants with little intent of ongoing dialog or communication; while interaction reflects an active engagement with the expectation of some level of ongoing communication. Interaction, therefore, goes beyond transaction".

Twigg (2002, p. 3) cautions that we must be aware of the paradigms that we are using to develop, implement and evaluate online learning opportunities for learners, and suggests that "the higher education paradigm, honed and perfected for hundreds of years, [that] has served us well" is a factor in maintaining traditional academic practices. Garrison and Anderson (2003, p. 6) state that "although e-learning has attracted much attention, its adoption has largely outstripped our understanding of the technology from an educational perspective. Its value is not faster access to information. The value of e-learning is in its

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capacity to facilitate communication and thinking and thereby construct meaning and knowledge."

The importance of this information as it related to this particular study lies in the examination of the correlation between how the interactivity, as a function of the design of the online class, was perceived and used by the online learners. Since the types of interaction made available to the students in an online class are structurally dependent on the types of interactivity built in by the design, this correlation is important information in an attempt to understand the issues related to effective learning online and to understanding which types or "agents" of interactivity are crucial to students' success.

Interactivity Defined by the Agents of Interactivity

Recognising interactivity as an exchange between two parties, much of the information about online interactivity in the literature has focused on the agents of the interaction, or the *who* or *what* involved in the interactions. Moore (1989), describing interactivity from the viewpoint of the learner, defines three types of learner interactions: learner-content, learner-instructor and learner-learner. Hillman, Willis and Gunawardena (1994) identify another form of learner-focused interactivity as learner-interface, and point out the impact on the learner of the technological interface required for delivery of online learning. Hirumi (2002) creates a model of e-learning interactions that takes a meta-view of how interactions relate to the learner and is constructed of three levels. The first level is learner-self interactions that Hirumi describes as the self-regulation and cognitive operations required for successful learning in the online environment. The second level is made up of learner-human interactions and learner-non-human interactions and is described as those interactions planned by the designer of the instruction. Within this second level Hirumi includes the interactions between the learner and the content, other learners, instructor, and interface previously defined by Moore (1993) and Hillman, Willis and Gunawardena (1994) and adds additional categories of learner-other and learner-environment. The third level in Hirumi's model is the learner-instruction interaction, described as the deliberate arrangement of events, based on theoretically grounded

instructional strategies, which enhance learning and serve to organise the interactions in level two.

Learner-content Interaction

Moore defined learner-content as the process by which the learner intellectually experiences the content. Inherent in this type of interaction is the "internal didactic conversation" in which learners reflect on and "talk to themselves" about the content (Holmberg, 1983; Moore, 1993). Intrapersonal interaction, the processing of content within the learner's own head, is necessary if the learner is to construct meaning from that content (Weller, 1988). Turoff, Hiltz and Balasubramanian (1994) speak to the particular human element in dealing with content presented online in the form of hypertext and hypermedia and suggest that the learner's interaction with the content should allow for discovering agreement or disagreement with the material, for reaching an understanding of what is presented, for relating the information to what is already known and for recognising where lack of understanding needs further study. These authors propose that students create and share their own materials as they work with content, and that these materials should be made public and accessible to the other members of the class. This archived learner-generated content can offer a dynamic, growing representation of the knowledge being constructed by individuals and by the group as they interact with the content. Moore (1994) describes another dimension of the learner's interaction with content in terms of personal learner autonomy. Personal learning autonomy is seen as a crucial trait in successful online students and the design of learning environments that foster autonomy is described as a challenge for distance educators. Sutton (2001) argues for another type of interactivity that she calls "vicarious interaction" in which the learner, although not actively participating, learns through observing and processing the interactions of others. Since in the online environment most interactions are written, and become archived content for the course, it can be argued that vicarious interaction of this sort can function as a type of learner-content interaction.

Learner-instructor Interaction

Learner-instructor interactivity encompasses the exchanges between instructor and student and can be important in motivating and encouraging the student as well as helping the student to understand and apply what is being learned. When this interactivity is high then learners are able to draw on the experiences of the instructor and receive more individualised instruction and feedback (Moore, 1991). When this interactivity is low, more of the responsibility falls on the learner to interact with the content, remain motivated, diagnose learning difficulties and set an appropriate pace. The quality and frequency of this interaction between instructor and student results in a construct that Moore refers to as transactional distance. A more structured course with less student-to-instructor dialogue produces greater transactional distance than a course with greater interactions and less structure. Viewing this construct from a perspective of learner control, Saba and Shearer (1994) and Shearer (2003) propose that as learner control increases transactional distance decreases due to the greater amount of interaction between learner and instructor initiated by the learner. Hirumi (2002) identifies feedback as an elemental part of the learner-instructor interaction and a crucial component of learning. Other studies have identified feedback as particularly important in the online learning environment, as an interaction that provides closure to communication exchanges (Berge, 1999; Weller, 1988; Yacci, 2000).

Maor (2003) found that the role of the instructor was a complex and challenging one, requiring the adoption of different roles to facilitate the building of an online community both between instructor and students as well as among students themselves. She suggests that pedagogical, social, managerial and technical dimensions of the learner-instructor interaction comprise the approaches needed and cautions that in many cases, instructors need support and opportunity to develop the necessary skills to be successful online instructors. Williams (2001) describes this as a move from a traditional, directed learning approach of "management by surveillance" to "management by results" as students take on more responsibility for their learning process. Swan et al. (2000) found that the more interaction students believed they had experienced with the instructor the more satisfied they were with their online courses and the

more they felt that had learned. The effect of this interaction with the instructor was greater than the effect of similar interactions between students and other learners, leading these researchers to conclude that interactions with instructors are crucial factors in the success or failure of online learning.

Learner-learner Interaction

Learner-learner interactivity occurs "between one learner and another learner, alone or in group settings, with or without the real-time presence of an instructor" (Moore, 1993 p. 22). This type of interaction is useful for clarifying and sharing ideas and is a new element in distance education made possible by telecommunication technologies. High learner-learner interaction has been shown to increase student satisfaction with their courses (Swan et al., 2000). Online discussion, particularly in asynchronous forms such as threaded discussion and e-mail lists, can encourage and facilitate reflection for the course participants. McMahon (1997) found that in spite of technical difficulties and little in-depth discussion, participants reported that the on-line interactions had made them more reflective about their own practice. Zeidler and LeBaron (1997, p. 20) found that use of online communication expanded "the scope and quality of intellectual conversation." In a study which endeavoured to determine what reflective content was characteristic of both face-to-face and online discourse and what factors influenced reflective dialogue, Hawkes (2001, p. 311) showed that the face-to-face and online communicated discourse served distinct purposes. Discussion on actual curriculum design and development was more prevalent in face-to-face discussion while exploring possibilities and/or outcomes of instructional development appeared to be more likely in an online communication environment. "Though these face-to-face discussions were infused with what independent raters determined were reflective exchanges, face-to-face discourse failed on several dimensions of analysis to reach the levels of breadth and depth that teacher reflection on network-based communication achieved." Blanton, Moorman and Trathen (1998) however, caution that many studies that claim increased reflection as a result of a telecollaborative online environments fail to support these results with strong evidence. These authors criticise in particular research based on number of exchanges, categorisation of exchanges that fail to causally link the said categories to reflective thinking, and

results that fail to show evidence of individual or collective construction of meaning. Citing Dewey's (1933, p. 9) definition of reflection as "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and further conclusions to which it tends," Blanton, Moorman and Trathen suggest that reflection in an online environment requires more than an exchange of e-mail or contributions to a discussion forum. They contend that reflection requires an object of that reflection, such as course content, and an application of reflective processes that are made clear to students.

Learner-instructor and learner-learner categories of interactivity correspond to "interpersonal interaction" as described by Berge (1998) who sees this form of interaction as important in helping students to build shared meaning and to make sense of what is being learned. The concept of vicarious interaction, developed by Sutton (2001) may also be viewed as a form of learner-learner interaction if it is perceived as an exchange between two or more members of the group, observed and processed by a third member who doesn't interact, but nevertheless participates vicariously through a social learning situation.

Learner-interface Interaction

Learner-interface interactivity occurs when the learner must use the technologies to access the content and communicate with the instructor and other learners (Hillman et al., 1994, p. 32). Seeing this as crucial to the success of online learners, these authors state:

> Successful interaction in the mediated educational transactions is highly dependent upon how comfortable the learner feels in working with the delivery medium. Learners need to possess the necessary skills to operate the mechanisms of the delivery system before they can successfully interact with the content, instructor or other learners. The challenge to practitioners of distance education is to create new instructional methods that empower learners to work successfully with the technology.

In addition to the learners' ability to interact with the physical technologies inherent in the delivery system, it is also important that the learners develop the ability to interact effectively with the course management system, which is the gateway to the content and discussion that comprise the course. Two dimensions govern these systems: the complexity and functionality of the software itself and

the skill with which the instructor or course designer constructs the course. Consistency among the course modules has been shown to have an effect on student satisfaction with online courses (Swan et al., 2000). Also writing about delivery technologies, Wagner (1994) defined the causal relationship between system interactivity and instruction interactivity and distinguished between the interactivities required for interfacing with the media and those required for taking part in an instructional event. Competencies with technology skills such as e-mail and computer conferencing have been shown to contribute to success in the online environment (Ross, 1996; Tsui & Wing, 1996).

Learner-other interaction

There is growing evidence in the literature that communication between learners and others not in the online class constitutes a valid type of interaction that can serve to enhance and support the learner. Hirumi (2002) includes this categorization within his model and suggests that these types of interactions should be planned in order to allow the learners to access and acquire knowledge from a variety of external sources. Similar to this category is the learner-environment interaction, also described by Hirumi as interactions occurring outside the computer interface of an online learning environment. (Gibson, 1998a) suggests that those involved in distance education must come to understand and appreciate the value of the context in which the learner exists and to recognise the contribution of peers, such as family, friends and colleagues, to the success of the learner.

Learner-self Interaction

Supported by the view that learning is an activity that students proactively carry out rather than a "covert event that happens to them in reaction to teaching" (Zimmerman, 2002, p.65) learner-self interaction refers to the student's ability to self-regulate his or her own learning (Soo & Bonk, 1998). Seen as different from interaction with the content, Hirumi (2002) describes this type of interactivity as particularly important for distance learners. In a study designed to examine self-direction, Lee and Gibson (2003) found several factors that contribute to the support and development of this construct: a learning environment that supports dialogue, flexibility in the structure, and students who are allowed and

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encouraged to take some responsibility for how they will approach the content and learning.

Lurking or Vicarious Interaction

While the terms *lurking* and *lurkers* carry a somewhat negative connotation, the concept of vicarious interaction (Sutton, 2001) is gaining more support in the literature. Perkins and Newman (1996, p. 161) state: "Not only is scholarly contempt for lurkers unwarranted, but lurking should be recognised in educational settings as it is in recreational settings, as a particular feature of e-discourse that is beneficial to many and one way to participate." Davis and Ralph (2001) suggest that participating through vicarious observation can be a valid way to participate, particularly for those who find face-to-face interaction intimidating.

It is clear that from the examination of the agents of interactivity in online environments that much of the research in the area of online learning has been focused on "who" and "what" is involved in the interactions and many questions remain about the importance of the various types of interactivity as applied to online learning. The literature on the agents of the interactivity was critical to this study because the various types and models of interactivity formed an a priori set of concepts from which the interactivity present in the online environment was examined.

From these existing modes of interactivity, new models have arisen which have begun to look at interactivity from different perspectives. These new models include the purpose behind the interaction, the outcomes of the interaction and the relationship that exists between the interactivity and other elements in the online environment.

Interaction Defined by the Purpose Embedded in the Interactivity

As online courses have increased and the number of students engaged in online education has grown, the definitions of interactivity have broadened to recognise the purpose embedded in the interactivity. Wagner (1997), outlines a list of interactions that should be built into learning whether in distance, online or face-

to-face environments. Interactions should be designed to increase participation, increase engagement, develop communication, receive feedback, enhance elaboration and retention, support learner control and self-regulation, increase motivation, negotiate understanding, aid team building, allow for discovery and exploration, aid clarification and enable closure. Wagner argues that interaction can only be valuable if the goals and objectives of a specific learning experience are considered in the design of the interaction.

Gilbert and Moore (1998) make a distinction between social interactivity, which can serve to create positive or negative learning environments, provide affective feedback to instructors and students and foster instructional interaction; and instructional interactivity, which has as its purpose the delivery, processing and responses to content. Berge (1999), building on the work of Weller (1988), Garrison (1993) and Gilbert and Moore (1998, p. 6), also broadens the definition of interactivity to include purpose, a distinction he sees as relevant to online learning: "Interaction is two-way communication among two or more people within a learning context, with the purposes either task/instructional completion or social relationship-building, that includes a means for teacher and learner to receive feedback and for adaptation to occur based upon information and activities with which the participants are engaged." Within this definition interactivity is made up of more complex actions performed by the learner, among them such things as questioning, answering, elaborating, inquiring, linking, constructing and evaluating.

Sims (2003), highlighting the increasing complexity of interaction options in the online environment, suggests that interactivity be addressed through multiple perspectives of educational psychology, interaction research, the human-computer interface, communication and design. He proposes that learners' expectations of online interactivity are quite sophisticated and should be supported by the design of the learning environment to give them a more participatory and active role.

Approaching purposeful interactivity through the perspective of instructional planning, Hirumi (2002) outlines in the third level of his planned e-learning

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interactions model, the learner-instruction interactions, which include a series of interactive events that, by deliberate arrangement and purpose, promote learning and facilitate the achieving of goals. Instructors follow a six-step process for designing and sequencing interactions. These include:

1) Identifying essential experiences necessary for learners to achieve objectives;

2) Selecting a grounded instruction strategy based on objectives, learner characteristics, context and epistemological beliefs;

3) Actioning each event and describing how each strategy will be applied during instruction;

4) Defining the type of interactions (from Level II in Hirium's model) that will be used to facilitate each event; analyse the quantity and quality of planned interactions;

5) Selecting the tool (chat, e-mail, discussion forum) that will be used to facilitate each interactions;

6) Analysing materials to determine frequency and quality of planned interactions; revising as necessary.

Hirumi (2002) views interaction in this model as a meta-level design construct that provides instructors with a grounded approach to creating purposeful interactions.

The Concept of Presence in an Online Learning Environment

The online environment is missing the non-verbal clues such as facial expression, tone of voice and eye contact that give social context to face-to-face exchanges. The asynchronous online environment relies on text and students and instructors must rely on textual messages to make them "present" in the online medium. Presence, defined as the use of technologies that provide the users of the media with the impression that a mediated experience is not mediated (Lombard & Ditton, 1997), has an impact on interactivity. Social presence was defined by Short, Williams and Christie (as cited in Rourke, Anderson, Garrison, & Archer, 2001 p. 65) as "the salience of the other in a mediated communication and the consequent salience of their interpersonal interactions." Russo and

Campbell (2004) found that frequency of interaction, responsiveness, non-verbal communication (pictures, voice), and participants' communication styles were the behaviours reported by students that contributed to a sense that others in the class were real. Garrison, Anderson and Archer (2000, p. 4) argue that effective interactivity in an online community of inquiry has three critical and co-dependent components of presence: social presence, teaching presence and cognitive presence. Social presence, defined as the "ability of participants in the community of inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as real people," is seen as important because it supports and enables the critical thinking environment that is basic to success in higher education. Also seen as supporting critical thinking, instructor presence is identified by two elements: design of the educational experiences and facilitation of the online class. Cognitive presence, split into four phases of triggering event, exploration, integration and resolution, is identified as the most important of the three, and defined as "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication." Cognitive presence is supported by the degree of social and teaching presence existing in the shared world of the online community of learners and the private world of the student where reflection, deliberation and integration take place. In agreement with the earlier studies by Anderson, Garrison and Archer (2000; 2001), Kanuka and Garrison (2004, p. 45) found that cognitive presence is central to successful learning in an online environment and a key element of critical thinking supported by "external constructs (discourse, collaboration and management) and internal constructs (reflection, monitoring and the construction of knowledge)."

Gunawardena and Zittle (1997) found that social presence was a predictor of overall satisfaction in text-based computer conferences and suggested that characteristics associated with student perceptions of social presence, though not inherent within the medium of an online discussion, can be enhanced through the use, design and implementation of such things as moderator roles, participation patterns and involvement. A similar study by Richardson and Swan (2003) showed a relationship between social presence and perceived learning and between social presence and instructor immediacy, and concluded that social

presence was a strong indicator of satisfaction in a text-based online discussion. Exploring additional aspects of social presence, Tu and McIsacc (2002, p. 144) define this concept as a feeling of community that a learner experiences in the online environment. These researchers explored three dimensions of social presence: social context, online communication and interactivity and found that social presence has an important impact on online interaction. The context of social presence included factors such as familiarity with other learners, informal relationships, trust, a positive attitude toward the technology and privacy. Online communication, defined as use of the language online, included factors such as keyboarding skill, the ability to convey meaning through written text, the ability to convey feelings and emotions, and the ability to function in multi-threaded discussion groups. Interactivity was defined in this study as the "cooperative activities and communication styles used" by members of the class and included such factors as timely responses, use of open, casual communicative styles, appropriate message length, familiarity with the topic and appropriate group size.

The impact of presence in an online environment, whether academic or social, appears to be a crucial element of the online experience and is worthy of further study to examine how this construct enhances online learning when it is present or discourages it when it is not.

Learners in the Online Environment

Studies of students who take online classes show that although learners in the online environment are spread over all age groups, the convenience and anytime/anyplace availability of distance classes tend to attract more learners who are slightly older and who study part-time (Beisser & Steinbronn, 2001; Carr, 2000; Cereijo, Young, & Wilhelm, 2001; Diaz, 2002; Kretovics, 2003). The opportunity to learn at their own pace is another factor that leads these students to choose an online course (Navarro & Shoemaker, 2000). The older, part-time online student tends to have family and professional responsibilities that influence their choice and mode of study. Gibson (1998a) explored the context in which learners exist and outlines the importance of understanding the forces that impact on those learning in an online environment. She points out that the context of family, work and social community often exert considerable

influence on the learner in terms of emotional, logistical, economical and educational support. Lack of support or active discouragement was also possible from these same sources and could exert a negative influence on the learner.

Learner satisfaction and learner success are constructs that are seen as especially important because the online environment is considered by many to be new and different from traditional, face-to-face instruction. Not surprisingly, much of the literature surrounding the investigation of online learner satisfaction and success focuses on a comparison between traditional and face-to-face instruction. Carr (2000) reports that completion rates are 10-20 percent lower for online students than for traditional courses, but students who do complete the courses perform as well as traditional students (Diaz, 2002). Johnson, Aragon, Shaik and Palma-Rivas (2000) compared a face-to-face course and an online course and found that students rated both online and face-to-face positively with the face-to-face students rating the traditional course format slightly more positively. However, the lack of difference in the learning outcomes from the two course formats indicates that the quality of the learning that took place was equally effective. Navarro and Shoemaker (2000) compared the performance and perception of online learners to that of traditional learners and found that the online learners learn as well as the students in a face-to-face course and had a high degree of learner satisfaction. Hall, Watkins and Ercal, (2000) conducted an analysis of current trends in web-based instruction and found, based on test performance and grades, that students in web-based courses were as successful as those in traditional classes and that techniques, such as structured collaboration and active learning found in traditional classrooms, were equally effective in online courses. In contrast, some studies have found that it is possible for students to perform as well as or better in an online class but still perceive that they learn better and are more successful in face-to-face classes (Benson, Guy, & Tallman, 2001; Rovai & Barnum, 2003). Lu, Zhu and Stokes, in a study based on students' patterns of use of online components, found a positive correlation between the use of web-based content and learning. On the other hand, Graham and Scarborough (1999) conducted a study that compared traditional distance education with online learning and found that although students were positive about the decrease in isolation and were successful in meeting learning outcomes and obtaining good

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grades, they experienced a decrease in flexibility normally associated with distance education due to the need to make timely contributions to discussions and meet tutorial deadlines. Eschewing the traditional versus online debate, Gunawardena and Duphorne (2000) conducted a study that sought predictors of student satisfaction within the unique aspects of the online environment and found that students who understood the distinct features of the online environment could adopt learning approaches suitable for this environment, and those who exhibited learner readiness to deal with the online environment had higher rates of satisfaction with online learning.

Speaking to the complexity of participation and involvement in online courses, Davis and Ralph (2001, p. 228) state that "participation in an online conference needs attention to different kinds of detail than that employed in other settings. Technical competence and access occupy one end of the spectrum, while more abstract notions of presence occupy the other." Factors that influenced participation and had an impact on a successful experience for online learners included: time and personal commitment issues (Gibson, 1998b); concerns about electronically mediated communication (Perdue & Valentine, 2000); technical challenges (Broady-Ortmann, 2002; Lobry de Bruyn, 2004); level of student support (Kretovics, 2003; LaPadula, 2003); structure (Nisan-Nelson, 1999); time delays in feedback and responses in the asynchronous environment (Kretovics, 2003); availability of one-to-one communication (Nisan-Nelson, 1999; Russo & Campbell, 2004); and confidence (Gibson, 1998b; Lim, 2001; Nisan-Nelson, 1999; Russo & Campbell, 2004). Arguing that student support would alleviate many barriers to participation and should be an integral part of the delivery of distance courses delivered online, LaPadula (2003) supports online services for students that provide the same opportunities and services as students in traditional classes. These services include social services, academic advice, technical help and personal counselling. In a study designed to assess the needs of adult learners, Stein and Glazer (2003) found that three essential themes emerged: responsiveness to inquiries from the learners, reassurance for the learners that they could complete the study, and respect for the life situations of the learners.

Learning and personality styles were also found to influence the learner's decision to engage in online learning. Martinez and Bunderson (2000) suggest that learning is enhanced when the instruction and learning environment matches the learning orientation of the learner. Cereijo, Young and Wilhelm (2001) found that factors such as classroom preference, learning and personality style influenced the way in which students perceived and valued a web-based course. Themes were grouped as to advantages (convenience, flexibility, learning enhancement and psychology) and disadvantages (isolation, learning environment and technology problems). Students who expressed most frustration and dissatisfaction with the web-based learning were extroverts, were visual learners, lived near campus, had technical problems and were inexperienced computer users. A similar study by MacGregor (2002) also found differences in the personality of online learners when compared with face-to-face students. She found that successful online students were self-controlled, introverted, accommodating and serious, while the face-to-face students in this study were more extroverted, more playful and independent. Likewise, a study by Dewar and Whittington (2000) found that introverts and extroverts, while participating equally, reported different views of the experience and interacted in different ways in the online environment Shearer (2003) notes the importance of examining not only how interactions can occur in an online setting but also why people choose to interact in the way that they do. He contends that in addition to learning and personality styles, aspects of power, culture, ethnicity and gender will impact on how a student chooses to participate in the interactive opportunities available in an online environment.

A reliance on learner initiative is a theme that is found in the literature on online learners. Students enrolled in online courses need to take more responsibility for their own learning in an environment where participation is asynchronous, the time and place of study are largely their own choice and they control the pace and sequence of the various learning experiences (Diaz, 2002; Levitch & Milheim, 2003; Palloff & Pratt, 2003). Pachnowski and Jurczyk (2000) examined the type of student who would be best suited for online learning and found evidence that students' habits and attitudes were the best indicator of academic success in the course. Students who were self-directed and willing to take

responsibility for their own learning were more successful. Moore (1994, p. 4) identifies autonomy and interdependence as critical components for groups as they seek to become successful online learning communities. Individual personalities, the level of learner autonomy of individual members and the interpersonal dynamics within the group are the variables that Moore sees as more important than the instructor's design and intervention. He states that "in the end, students must make the environment work for themselves." Exploring the related theme of self-efficacy, defined by Bandura (1994) as people's beliefs about their capabilities to produce designated levels of performance and exercise influence over events that affect their lives, Duvall and Schwartz (2000) found self-efficacy to be positively related to performance in an online class. Related studies have found that students who exhibited self-efficacy in terms of mastery of the computer-mediated communication environment were more successful in online classes (Gunawardena & Duphorne, 2000; Lim, 2001). Related to the concept of self-efficacy is Gibson's (1998b, p. 66) definition of academic self-concept for online learners as the student's "perception of his or her ability to succeed in the educational environment." This construct is seen as multifaceted and includes the process of learning as an adult and as a distance learner. Factors are grouped into two categories: process related (personal success, empathy of the lecturers, progress toward a larger education goal, familiarity with the process, self-growth) and content-related (mastery of content, new awareness of prior knowledge, successfully completing assignments).

Motivation is seen as an important factor for the online learner because intrinsic goals (learning for skill development, intellectual interest, challenge or personal growth) have been associated with deeper learning, while extrinsic goals (completing an academic qualification, getting a better job) are associated with surface approaches to learning (Olgren, 1998). Tuckman (2004) identified students who were high procrastinators and found that motivation scaffolding (synchronous, online-line support and instructor office hours) provided the support needed to help these students stay on task and successfully meet deadlines. This scaffolding provided no benefits to low-procrastinators who were seen to be managing their time appropriately. Another indication of the effect of self-motivation is outlined by Hall, Watkins and Ercal (2000), who

found that although students who selected web-based courses were older and in many cases better students (based on GPA) , they tended to be more likely to drop out, indicating that self-motivation was an important factor. Diaz (2002), while agreeing with the online student profile of older students who are independent learners, cautions that decisions to drop out made by these students, may be mature, well-informed decisions based on work, school or family obligations.

Students' perceptions of their own learning and perceptions of the online learning environment represent a theme in the literature of online learning. Wu and Hiltz (2003) found that students who enjoyed and participated in online discussions reported higher perceptions of learning from the online discussion. These authors also found that the instructor played an essential role in promoting students' motivation and perceptions of learning online. Highlighting the instructor's role, Jiang and Ting (2000) found a strong correlation between the instructor's requirements for participation and the awarding of a higher grade in the online discussion and students' perceived learning. However, their study found no significant relationship between instructor-student interaction and students' perceived learning or the number of responses by the students and the students' perceived learning. In contrast, Rovai and Barnum (2003) investigated the perceived learning of students in 19 online graduate courses and found a positive correlation between active interaction, represented by the number of postings per week, and students' perceived learning. This led the researchers to conclude that course design that encouraged active interaction leads to greater perceived learning. Passive interaction (reading but not participating in discussions) was not found to be a significant predictor of perceived learning in their study. A similar study by Benson, Guy and Tallman (2001) attempted to correlate changes in perception to the online learning environment to changed perceptions of learning and learned independence. Their findings indicated that although successful in meeting the learning outcomes of the course, the students had very different online experiences. Although most students gained skills, they did not experience a change in perception about their learning. These researchers suggest that this result may be due to prior perceptions not adequately understood by course designers and lecturers and thus not catered for in the

instructional design of the course.   In an attempt to understand the factors related to student performance in an online course, Picciano (2002) looked for a correlation between assessment and interactivity measured by scores on an exam and a written assignment. He found that there was no correlation between interactivity and exam performance and made an assumption that students with low interactivity measures studied for the exam, which was taken from the weekly discussions and instructor notes, by reading the materials, even if they did not post anything to the discussion. However, there was a correlation between interaction and the written assignment, which was designed to determine a student's ability to integrate multiple perspectives and differing points of view in solving an academic problem. Students with higher interactivity measures scored higher on the written assignment, but from the study it could not be determined whether the skills for this were learned in the discussion or already present in the students.

Clearly there are many variables that have so far surfaced in the literature focused on the online learner and it is evident that the online environment, which is different from the traditional face-to-face and traditional distance modes of learning, has generated many new questions about learners in this online context. Although much of the literature comparing traditional modes of instruction with online learning indicates that students can learn equally effectively in all environments, the online environment seems to require different skills and attitudes. Such things as organization, initiative, motivation, self-direction, self-efficacy and an understanding of the nature of the online environment appear to contribute to online learner success but it is not yet clear how critical these traits are, individually or in combination, nor how they can be effectively supported and encouraged in the online environment.

Interactive Online Discussions

Online discussions used as a means of examining content in an online course have the capacity to incorporate all the agents of interactivity defined by Moore (1989) and Hillman, Willis and Gunawardena (1994). Whether described as network-based communication, computer-mediated communication, electronic discussion groups, asynchronous discussion groups, synchronous chats, or online

learning communities, these terms all refer to systems that allow people to communicate via networked computers, either in real time or with a delay between the delivery of the message and its receipt by the intended audience (Hawkes, 2001).   Berge and Collins (1995, p. 2) point out that the term computer-mediated communication denotes a merging of telecommunication technologies with computer networks to produce new tools to support teaching and learning. These new tools use computers to store and retrieve information in traditional ways but new communication capabilities allow emphasis to be placed on an exchange of information and ideas. These authors suggest that these tools "are enabling and promoting several paradigmatic shifts in teaching and learning, including the shift from instructor-centred distance education to student-centred distance learning and the merging of informal dialogues, invisible colleges, oral presentations, and scholarly publications into a kind of dialogic virtual university." Santoro (1995, p. 16) defines computer-based conferencing as a subset of computer-mediated communication and lists three forms that this methodology can take: electronic mail, group conferencing systems and interactive messaging systems, and refers to this communication form as "uniquely shaped by the medium, yet unquestionably human in nature." Pointing out the advantages of using computer-mediated communication for teacher professional development, Hawkes (2001) lists the time and place independence of the medium, the capacity for multiple conversations and the archiving of content and messages as supports for engaging in discourse, investigating related information, and the constructing and refining of ideas. Althaus (1996, p. 5), also noting the advantages of place and time independence, suggests that the computer-mediated discussion is an "intellectual environment that encourages active, thoughtful and equal participation from all comers." The study by Althaus, which compared the use of a traditional class augmented with computer-mediated discussion to a traditional class using only face-to-face discussion, concluded that students perceived the addition of the online discussion as a superior learning environment compared to the traditional classroom discussion. A similar study by Wu and Hiltz (2004) found that online discussions improve students' perception of learning but caution that the instructor role is essential for promoting students' motivation and enjoyment in participating in the online discussion. These two components contributed

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positively to students' perception of learning. In addition, studies of online learning communities have shown that participants form groups with similar interpersonal issues and comparable stages of development to those that form in face-to-face classes. Highlighting the unique features of online communication, Perkins and Newman (1999) examined e-discourse using three approaches: philosophy of language, sociolinguistics and communication theory, and found in addition to the production, transmission and consumption of electronic text, e-discourse was also a set of social relationships which formed the context, the result and the articulation of the communication. Examining group dynamics in online communication, McDonald and Gibson (1998) found that it was possible to identify specific criteria for the study of group dynamics and development within a computer-mediated course that identified interpersonal issues and predictable patterns of group development. Participation in online course discussions has been tied to increased satisfaction with the course (Swan et al., 2000); an increased rate of completion of courses (Ohlund, Yu, Jannasch-Pennell, & Digangi, 2000); better performance on some assessment (Rovai & Barnum, 2003); the development of self-direction (Lee & Gibson, 2003); and a strong sense of community (Lee & Gibson, 2003; Poole, 2000).

Although much of the research on online discussions has been positive in terms of the benefits to students' satisfaction and participation, research which attempts to evaluate the quality of such exchanges has been varied and much less definitive. Jonassen (2000, p. 262) points out that online asynchronous conferencing does not necessarily result in "critical, creative or complex thinking" and depends heavily on the type of question or problem posed to the group by the instructor. Describing asynchronous conferencing as largely an evaluative activity, Jonassen suggests that contributions to discussions and online conferences can be assessed by quantity (number and length), accuracy, coherence and relevance to other messages. Pawan, Paulus, Yalcin and Chang (2003), researching whether the discussion in an online graduate course included evidence of interaction and critical thinking, found that students tended to engage in one-way serial monologues and that most participants were sharing information and brainstorming their own ideas rather than challenging and building on the ideas of others. These authors recommend that online

discussions be structured with deadlines for initial posts, that a number of responses be specified, that instructor facilitation be overt and that students be taught to self-code their responses. In a similar study Angeli, Valanides and Bonk (2003) found that the online conferencing environments failed to sustain the students' initial interest and that the quality of the postings indicated that little critical thinking was occurring. Students appeared to be sharing experiences and opinions without grounding these opinions on evidence or course content. These authors suggest that the situated practices of the instructor play a critical role both in the mentoring of the online discussions and in the role that the students perceive the conferencing system plays within the class structure. Conferencing systems used to deliver course content to remote locations were seen as having more value than conferencing systems that supplement traditional face-to-face classroom environments.

In an attempt to study the effect of a coding and grading system on contributions to a discussion forum, MacKinnon (2000) made students aware of the coding and grading system being used. MacKinnon found that while the quantity of student messages over three discussions decreased, the quality of their participation increased, indicating that awareness of the coding and marking system increased the students' use of those communication patterns. Whether this result indicated an increased use of higher order thinking or whether students were purposefully designing their responses to fit the coding scheme was not clear from this research. This raises the question of how spontaneous, non-assessed online discussions are different from formally assessed and structured discussions.

Garrison, Anderson and Archer (2001) designed a model for coding exchanges between students in an online environment, referred to by the authors as the Practical Inquiry Model, that relies on two dimensions: a dimension that represents a continuum between action and deliberation and a dimension that represents the transition between the abstract and concrete worlds. Both of these dimensions recognise that the learner operates in both a shared and a private world. Four phases represent the action that is taking place within the critical inquiry model: a triggering event, exploration, integration and resolution. Building on this model, Rourke, Anderson, Garrison and Archer (2001) have

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designed a twelve-indicator model to assess social presence represented in discourse as is shown in Table 1.

Table 2.1. Model and Template for Assessment of Social Presence (Rourke et al., 2001)

Hara, Bonk and Angeli (2000), investigating how an online discussion contributes to the construction of a community of learning, used a content-analysis model developed by Henri (1992) which includes the five dimensions of participation, interaction, social, cognitive and metacognitive categories in order to classify online discourse. This research of both undergraduate and graduate students revealed that the level of complexity found in the starter question and how the instructor structured and scaffolded the task was related to the level of cognitive development exhibited by the students. Hara, Bonk and Angeli suggest

that while online discussions have the potential to become rich learning tools for students, the design and implementation are critical and should include structure, pedagogical strategies, methods to foster student interaction, and a full understanding and utilization of the conferencing software.

Meyer (2004), in a study which compared four different models for analysing online discussion, suggests that all the models were useful and had value, even though they addressed different concepts found within the discourse. She cautions that the use of any model may colour the interpretation and narrow the perspective to the single view presented by the individual model.

This examination of literature related to interactivity through online discussion shows that there is little consensus as to its effectiveness, efficiency and outcomes. Many variables impact on the functioning of an online discussion: a compelling initial topic, the input of the teacher, group dynamics, and individual motivation. Not surprisingly, the assessment of online discussions is not definitive, the literature showing both quantitative and qualitative approaches and measuring many different aspects of the online discussions. This information is important, however, to gaining an understanding of how students use and perceive the online interactions found in discussions, and informs this study from the perspective that online discussion constitutes one of the main ways that students interact with other learners and with the teacher.

Online Professional Development

Online professional development for practicing teachers in the field, in which all or most of the course content is accessed via the Internet, is a form of instruction that is increasing in use and popularity. Colleges and universities are making use of online technologies that provide professional educators with the opportunity to broaden their knowledge, upgrade their qualifications and increase classroom effectiveness (Clark, 2004; Collis & Gommer, 2001; Hawkes & Dennis, 2003; Morrison, 2003; Werry, 2001). These offerings range from traditional courses supported by web-based materials to courses delivered entirely online. Teachers can enrol in online graduate programs or pursue individual online courses for credit or continuing education units (Schrum, 2001). Commercial providers also

offer a wide range of professional development activities to educators in the field, offering training exclusively online, and in some cases competing with institutions that offer credit courses and degrees (Moore, 2000). These online courses represent a cross-section of topics and types of online professional development, with courses originating from many different countries and types of providers. In a survey of such courses, Branzburg and Kennedy (2001) found offerings ranging from self-paced tutorials with little or no interaction among participants to graduate-level courses with web-based discussion utilizing discussion boards, chat rooms and e-mail.

The focus on professional development for teachers is influenced by a corresponding shift in thinking about teaching and learning, new demands placed on schools and teachers brought about by demands of the knowledge based economy, and an upsurge in the technologies that support interactive communication (Moon, 2000; Wilson & Berne, 1999). The need for lifelong education in which adult learners acquire new skills without interrupting their working lives for extended periods and the need to reduce the cost of education are factors contributing to the popularity and growth of online distance learning in general and online professional development in particular. Driven both by the need to deliver education more economically to larger groups and the fear of being left behind in the competitive educational market, the number of tertiary institutions and commercial providers offering online learning opportunities is increasing (Bates, 1995; Leonard, 1999; Potter, 1998; Sherron & Boettcher, 1997; U.S. Dept of Education, 2002).

In examining the potential of the online environment to deliver effective professional development, Hawkes (1999) argues that the advocacy claims for this method of delivery outnumber the adversarial claims. Using Lichtenstein, McLaughlin and Knudsen's 1992 knowledge-based model (as cited in Hawkes, 1999, p. 49) which emphasises the role of collaboration and social learning in achieving teacher knowledge, Hawkes describes online professional development as encompassing the teacher collaboration and discourse parameters established for quality teacher development. The anytime, anywhere access to professional knowledge made available by network-based systems and

network-based communication provides "a flexible learning environment that satisfies teachers' needs to be autonomous learners."

Convenience has been identified as a factor that motivates many educators to enrol in online professional development courses. Participants appreciate the ability to complete a course at a time and pace that is convenient to adult learners (Beisser & Steinbronn, 2001; Ohlund et al., 2000; Shotsberger, 2000) and are pleased not to have to add face-to-face group meetings to their busy schedules (McMahon, 1997). Many students access course materials during the evenings and weekends, pointing out the reality of adult learners' responsibilities to jobs and families (Poole, 2000).

Time is another issue that has been identified as a potentially negative influence on participation. Finding time to access networked-based communication within the structure of busy professional responsibilities proved problematic for many students (Hawkes, 1999; Meyen & Yang, 2003). Harmon and Jones (2000) found that the single largest problem reported by students in their online course was the amount of time it required. Participants struggled with the amount of time required to learn, locate and use Internet resources and to complete course requirements (Saunders et al., 1997). Carboni and Friel (2000) report that time was an issue for the teachers in their study and was often linked to technical issues. If the technical problems used up too much time, teachers often gave up.

The level of students' technical skills has been identified as an indicator of success in an online class (Pachnowski & Jurczyk, 2000). Students who self-identified themselves as technically strong created more technically rich resources, located resources to share with the class, and were more active in creating the learning community (Harmon & Jones, 2000). Access to the online class from a home computer has also been indicated as a factor contributing to students' success. Some students have access only at school where they teach and availability and privacy may be a problem. Participants with home access tended to post more frequently, and were more interactive and reflective in their writing (Hawkes, 1999, 2001; McMahon, 1997; Poole, 2000). Students with stable access from home preferred this to working from a work computer or

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computer lab. Even with available access to computers some students found getting computers configured and online was time consuming and often required buying new computer equipment and changing Internet service providers (Harmon & Jones, 2000). In addition to students' access and availability issues with their own connections, down-time of servers and networks that deliver the online professional development created obstacles (Meyen & Yang, 2003; Zeidler & LeBaron, 1997) and served as a roadblock to full participation, often relegating students to the periphery of class activities (Saunders et al., 1997).

Course design has an effect on participation and learner satisfaction in online professional development courses. Beisser and Steinbronn (2001) identify four key features of web supported courses: manipulation of information by students as they create, transmit, store, process and retrieve information; facilitation of communication through discussion boards, e-mail and group conferencing; supporting an environment that allows students to generate and publish their own work; and serving as an instructional delivery medium to disperse intellectual material and assess student understanding. Poole (2000) suggests that, due to the higher participation required, the online environment may facilitate and encourage a shift to a more active, participatory environment but Harmon and Jones (2000) caution that some students feel threatened by the need to take increased responsibility for their own learning. Also highlighting the needs of practicing teachers who engage in online professional development, Nisan-Nelson (1999) suggests that the design must include a structure that enables one-to-one communication with the instructor. Many, Wallace, Stephenson and Eickholdt (2004) propose that good design should include both a presentation and interaction with the stated content of the course and, incorporated into the course design, a focus on how to learn in the online environment supported by highly personalised assignments and feedback.

Participation in online discussions is another area of particular interest in online professional development courses. Requiring participation appears to be useful in generating discussion and keeping the level of interaction high (Poole, 2000), while no assessment connected with participating in online discussions tends to reduce participation because students see such participation as optional (Joyce et

al., 2001). Having students act as moderators for a given discussion increased students' participation and was found to be empowering for students and helpful in building community (Poole, 2000). However, Hara, Bonk and Angeli (2000) and Angeli, Valanides and Bonk (2003) found that most students contributed the minimum number of postings required per week and the interactions were one-way. In addition to time constraints of the participants (Hough, Smithey, & Everton, 2004; Stephens & Hartmann, 2004), other possible explanations for low participation might be that teachers preferred discussion that was particularly relevant to their own situation and the age level of students with whom they work (Hawkes, 2001; Hawkes & Dennis, 2003; McMahon, 1997), or as reported by Meyen and Yang (2003), teachers failed to see a correlation between the content of the discussion and their practically oriented focus on the learning outcomes of students in their own classrooms. Lack of interest and participation in online discussions has also been linked to the collegiality present in the participant's place of employment. If local professional and pedagogical support is high then students have less need to find this community of practice online (Hough et al., 2004; McMahon, 1997). Schlager and Fusco (2003), taking a slightly different approach to this same issue, argue that online professional development is often created in isolation from the local community of practice in which the practicing teachers exist, and suggest that this needs to be understood and addressed as a prerequisite to designing online professional development.

The instructor or facilitator of an online professional development course plays an important role in encouraging participation. Students' perceptions of the social and human qualities in online environments depend on the social presence created and enabled by the instructors (Gunawardena, Lowe, & Anderson, 1997; Hara et al., 2000; McDonald & Gibson, 1998; Nisan-Nelson, 1999; Rice, 2004). Teacher immediacy, defined in traditional classrooms as verbal and nonverbal communication such as smiles, head nods, eye contact and inclusive language, is defined in an online course as frequency of postings, empathetic content in messages such as mentioning self or family, and/or projecting a tone of cooperation in the message. Lucking, Rovai and Ireland (2001) found that teacher immediacy explained the difference between online classes whose members reported a sense of community and those that did not. The willingness

and ability of instructors to facilitate participation by creating and/or expanding discussion and focusing the direction of the discussion is an influence on the frequency and quality of postings to the discussion board (Joyce et al., 2001).

There is evidence that affective issues impact on participation and satisfaction in online professional development. Harmon and Jones (2000) found that bonds were strong in web-based classes with regular communication and a constructivist environment, which helped foster a feeling of ownership in the class. A correlation between level of satisfaction and level of participation also seems to exist. Those who participated most frequently were also those who expressed the greatest satisfaction with the course and who contributed the most detailed writing to the discussion (Carboni & Friel, 2000). Participation in online professional development courses also seems to be related to recognition by the students of a need for professional growth. Participants who were satisfied with the staff development in their local school posted messages less frequently and had a lower interactivity score than those who felt little support from their local situation (McMahon, 1997). An increase in self-confidence and self-determination was noted by students upon completion of online courses (McFerrin, 1999). Saunders' (1997) study, which examined self-confidence, self direction and self-efficacy found that a sense of self-control was evident in student responses given at the end of the course even though almost three fourths of the students reported never having used the Internet before the course began and almost a third reported not feeling confident using a computer at the beginning of the course. A study conducted by Marra (2004) showed that some students found that the independent learning required in an online environment created a sense of self-reliance that resulted in deeper learning. Not all affective influences reported by the research were positive however. Feeling overwhelmed with the work, keeping up with assignments and discussion resulted in some students falling behind and never managing to keep up (Harmon & Jones, 2000). Communication anxiety was identified by some class participants as influencing their experience with online learning (Saunders et al., 1997) and students reported feeling uncertain about academic expectations (Meyen & Yang, 2003; Stephens & Hartmann, 2004). Also noted was a lack of willingness to create a

learning community by those who simply wanted to gain a qualification (Joyce et al., 2001).

It is clear that the availability of professional development delivered online is useful and an attractive option for busy professional educators. The any-time and any-place aspect makes this methodology useful and convenient. While incorporating many of the same advantages and disadvantages found in online learning in general, online professional development is different because of the focus of the participants, the participants' ability to see a correlation between the class and their own practice, time factors, involvement in local communities of practice and self-efficacy with the online technologies. Of particular interest to this study because the unit of analysis in this case is the group of practitioners involved in the course, the information forms a basis from which to study the way that these individuals functioned and interacted within the class.

Online Support of Professional Interactions and Growth

Participating in online discussions, both synchronous and asynchronous, can further a sense of collegiality that has the capacity to decrease isolation and allow the sharing of stories from professional practice. Harmon and Jones (2000) found that synchronous, weekly chats helped to create a sense of community even when this collaboration was fostered by a shared frustration with hardware and software problems. Zeidler and LeBaron (1997) found that the use of electronic communications for instructions and academic support gave better support to graduate students in education classes. Shotsberger (2000, p. 54) argues that the use of synchronous communication in online professional development offers a "shared human encounter" that results in just-in-time learning and a group dynamic of real time brainstorming. Gold (2001) found that students perceived online courses to offer more student participation and more student-to-student interaction than traditional face-to-face courses. Productive online discussion does not just happen, however, but must be structured and supported. Computer-mediated instruction has the potential to help students understand course material, share ideas, and engage in discussion and debate about theoretical issues but online discussions should be structured using pedagogical strategies that foster student interaction (Hara et al., 2000). Unlike traditional classes, all

voices are heard, not just the instructor or the most vocal students (Poole, 2000) and this expectation can be built into the design of the course (Zeidler & LeBaron, 1997). Poole (2000), examining computer-mediated conversations using the four focus areas of article, content, technical, procedural or non-academic, found that the majority of student postings to the discussion board focused on article and content, mentioning class readings and information related to course content. This indicated that students were interested in and focused on the content of the online course.

Not all students have found the online community environment to be helpful and useful. Carboni and Friel (2000) studied online learning communies by examining four factors identified by Hicks (cited in Carboni and Friel, 2000): common sense of purpose, nurturing environment, an extended period for the social construction of knowledge and attention to group identity and cohesion. Results of the study indicated that although students seemed to understand and agree about the purpose of participation in the discussion, in actual practice some of the students found involvement in the discussion to be more meaningful than others and that the constraints of time and technological problems operated to keep this discussion from operating as a fully functional nurturing environment. The conclusions drawn by the researchers were that the participants, whose involvement in the online discussion was voluntary, felt that the forum was positive and supportive, although the group did not attain more than the beginning levels of a fully functioning learning community. A study by Stephens and Hartmann (2004) found that an online discussion created to further a professional community failed to generate interest and participation. These researchers used the five criteria from a model developed by Levin, Kim and Riel (1990) for analysing the success of online discussions: 1) a group, unable to meet at the same place or time who share interests; 2) a well-specified task, agreed on by the group; 3) ease of access to a reliable online environment; 4) a sense of responsibility to the task and/or the group by the members of the group; and 5) strong leadership and a regulation of contribution and response. Stephens and Hartmann attributed the failure of the online discussion to the fact that only the third criterion of easy access to a reliable network was completely met and

that students never exhibited any sense of responsibility or obligation to the group or the task.

Online discussion, particularly in asynchronous forms such as threaded discussion and e-mail lists, has the capacity to facilitate reflection. McMahon (1997) found that in spite of technical difficulties and little in-depth discussion, participants reported that the on-line interactions had made them more reflective about their own practice. Zeidler and LeBaron (1997) found that use of online communication expanded the scope and quality of intellectual conversation. Hawkes' study (2001, p. 311), which endeavoured to determine what reflective content was characteristic of both face-to-face and online discourse and what factors influenced reflective dialogue, showed that the face-to-face and online communicated discourse served distinct purposes. Discussion on actual curriculum design and development was more prevalent in face-to-face discussion while exploring possibilities and/or outcomes of instructional development appeared to be more likely in an online communication environment. "Though these face-to-face discussions were infused with what independent raters determined were reflective exchanges, face-to-face discourse failed on several dimensions of analysis to reach the levels of breadth and depth that teacher reflection on network-based communication achieved."

The capacity of online professional development to effectively aid participants in the understanding of classroom instruction issues is a common topic in the literature. Unlike the stand-alone workshop approach to professional development, online professional development, through its design of sustained interaction and dialogue, has the potential to support classroom teachers as they implement change in the classroom. Zeidler and LeBaron (1997, p. 18) found that a course with an online component intensified the diffusion of learned practices. "Electronic communication encouraged the production of 'mini-papers' based on student research of the posted questions and problems." Buss and McClurg (1999) report that professional development that included web-based discussion was effective in promoting lasting change in teaching practice in terms of using the database package Geographic Information Systems in teaching/learning environments. However this professional development also

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included other variables and the researchers could not isolate the online communication as a determining factor. Nisan-Nelson (1999) found that teachers' attitudes were affected by an online course in using technology, enhancing their sense of being "professional educators." In contrast, a study conducted by Marra (2004) found that although teachers learned the constructivist concepts presented to them as good instructional strategies to use in their own classrooms, little classroom change was evident in a follow-up survey. Marra attributes this to the online delivery of the content but does not take into account the literature on change in pedagogical strategies, which notes that this type of change is complex and affected by many variables (Cuban, Kirkpatrick, & Peck, 2001; Dexter, Anderson, & Becker, 1999; Ertmer, Addison, Lane, Ross, & Woods, 1999; Maor, 1999; Marcinkeiwicz, 1993).

While not always an intended outcome, there is evidence that online students benefited from increased proficiency with the software and required tasks that made participation in the class possible (Levin, Levin, & Waddoups, 1999; Nisan-Nelson, 1999). Secondary or incident skills reported by students included manipulating course software, posting materials to the class site, using search engines and web browsers, using word processing and understanding general file management (McFerrin, 1999); learning technical skills of web design (Harmon & Jones, 2000; Zeidler & LeBaron, 1997); using Internet resources more efficiently (Saunders et al., 1997) and representing information in electronic forms (Beisser & Steinbronn, 2001). Students also reported being able to identify management techniques for dealing with large amounts of information (Saunders et al., 1997) and an increased awareness of how to use computers in the classroom (Beisser & Steinbronn, 2001; Levin et al., 1999). McFerrin (1999) found that students who reported themselves as motivated by a desire to learn more about the technology rated themselves as more successful in online courses. These students found themselves more successful in circumventing the technology problems that often occur in an online class and also expressed a strong increase in self-confidence upon completion of the course. However, not all studies found positive correlation between the learning of technology skills and online professional development. In an online professional development course designed specifically to teach technology skills, Marra (2004) found that

students regarded the learning of new technology skills in an online environment as difficult, pointing out the lack of face-to-face contact as a barrier.

There are indications that online professional development helps some students to become more independent learners and to develop problem solving skills (Beisser & Steinbronn, 2001; Benson et al., 2001; Marra, 2004). McFerrin (1999) found that students reported that they learned how to learn in an isolated setting, grew in self-confidence and self-discipline and increased their time-management skills. Students initially intimidated by the prospect of an online course, did well if they possessed basic technology skills and an expectation that they would succeed (Levin et al., 1999). Some students actively worked at managing computer hardware and access issues, some buying new equipment and some paying for better Internet access from home (Saunders et al., 1997).

Evidence that participation in an online professional development course can increase personal skills such as writing or use of computer software is contradictory. In two studies, participants reported an increase in writing and research skills (Beisser & Steinbronn, 2001; McFerrin, 1999) and students in the Beisser study identified the reason for this increase as exposure to the quality work of others. Zeidler (1997) found that the online environment encouraged students to research answers to course questions and produce mini-papers that they posted online. In contrast, a study by Saunders et al., (1997) showed that although students reported gaining computer competencies from participation in the class, only about one third of participants reported an increase in writing competencies and over half stated that the experience had not helped them to learn to write important concepts. Communicating in the text-based environment of online courses is sometimes seen as a barrier by students who have reservations about their writing skills or their ability to effectively communicate online (Stephens & Hartmann, 2004).

Conclusion

The literature has established that interactivity is important to learning. Interactions between a learner and an instructor who can scaffold learning and give appropriate and timely feedback are important to the success of the learner.

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Interactions between the learner and the content must happen so that the learner may transform the information into meaningful knowledge. Interactivity between learners is seen as a crucial element in the constructivist view of learning in a socio-cultural context. It is when these interactions are transferred to and required to be exercised in an online environment that questions begin to arise about how this virtual setting is different from, worse than, the same as or better than traditional, face-to-face instruction. Situated squarely within the technology required to sustain it, the online environment mediates interactions and can both enhance and hinder learning.

Clearly, the concept of interactivity in the online environment is complex and varied in interpretation. There are many types of interactions, many different agents that interact and many different perceptions about how the purpose and outcomes of these interactions should be interpreted. That such interactivity has a role to play in online learning environments is clear even if a full understanding of how interactivity is experienced and required both by individual students and by groups is still being explored. It is possible that some interactions are more important than others or that a heavier emphasis on one type of interactivity allows other types of interactivity to be present only marginally, or absent altogether, without negatively affecting the learning process. It is also possible that some students do not require a high degree of interactivity to learn and that the interactivity required by individual students differs. The number and type of interactions required of students in an online course creates another area that needs clear definition. Courses with greater numbers of interactions are often more complicated for students to negotiate and lead to frustration and confusion, especially novice distance learners or students with high computer anxiety. It is crucial to identify the balance needed between quantity and quality when designing and implementing courses delivered in an online environment.

Online professional development for educators, the subset of online learning which is the focus of this study, appears to be promising as a medium and method of delivery for practicing teachers, offering flexible choices of study and the capability of supporting online communities who share experiences from professional practice. Whether these courses, and the potential of the

communities found within them, develop effectively and function to support the professional development of teachers appears to be influenced by many variables.

The context of the learner appears to be an important factor in online learning and in particular, online professional development. Many students will not be successful in online classes. Participants, who are often adult learners, are drawn to online classes by convenience and independence from set times and locations for study, but often struggle within the time constraints imposed by busy professional and family lives. The amount of learning that takes place for online students depends in large part on how actively they participate in the learning process. A willingness to persevere in the face of technical problems and to explore the different aspects of learning in an online environment seem to be prerequisites for success. The interface, along with the expertise, or lack thereof, of the learner's technical skills has been correlated with participation, satisfaction and success in online courses. However, it is clear that integrating meaningful learning activities into instructional goals is important and support is needed to help students become proficient at using asynchronous communications technologies.

The theoretical underpinning of the design of online instruction appears to play an important role in the success of online professional development. An instructor who can, through design and implementation, create and sustain a constructivist approach which encourages students to collaborate, share their own work, and reflect on what has been learned through conversation with others, creates an environment which supports the students' learning and encourages the building of "presence" in the online class. From the literature, two views of presence are evident. One view is that presence results from interactivity. The second view is that presence is a precursor to interactivity and results from social, cognitive and instructor presence. It may be that both views are true and that these two concepts are mutually supportive, one supporting the other but both necessary for the success of online learning.

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The power of the online environment exists not in the ability to duplicate and imitate traditional methods of professional development, but in the capacity to recognise and create new environments for learning not possible within those traditional methods. The traditional educational paradigms must be examined in light of the new capabilities and innovation available with online technologies. The online environment has much to offer in terms of faster access to information and convenience but the real value lies in the capacity to facilitate communication and reflection, provide students with news ways to interact with information and collaboratively construct knowledge.

Relevance to this Particular Study

The examination of this literature has shown that a dilemma facing online environments is to understand how this environment functions for those who design, teach and learn within its confines, and to assess in a realistic manner the gains and losses of this new methodology, particularly in the arena of online professional development. What kinds of interactivity are present in an online professional development class? What factors influence how this interactivity is practiced for each student? How much interactivity is required by the students and which types of interactivity are crucial to students' success? Is the interactivity situated within the confines of the online environment or does critical interactivity happen outside the class in the context of the students' environment and involve others not directly involved in the online class? This study, supported by the need to answer questions such as these, investigated how the learners used the online environment, what influences on interactivity were present and in what ways the online experience impacted on the participants' perceptions of learning.

The debate about the role of interactivity in the online environment present in the literature makes clear the justification for further study. Researchers argue that interactivity can be named, categorised and placed in hierarchical models but the construct has not been adequately identified and understood as it relates to learning, and particularly as it relates to online learning. Questions arise about the types of interactivity that are present in an online class and in what ways

these types of interactivity may be related to, dependent on or are independent of each other.

Another principle that guided and supported the further examination of interactivity in this study was the idea that the interactivity present in an online class may function differently for each student. If interactivity is a psychological construct of individual students, this creates questions about the particular influences that are present in an online class for each student, how these impact on the types and forms of interactivity experienced by each student, and how these combined experiences have meaning within the context of the class as a whole.

A further concept that underpinned the need for this study was found in questions concerning where, with whom or what the interactivity present in an online class took place. Interactivity may not be restricted to the confines of the online environment but may take place outside the confines of the online class and may be an important and essential element of the students' success. It is important to understand and value the context in which the online student is located and interactions with family, friends and colleagues may constitute a considerable and necessary set of interactions for the student.

Accordingly, this study specifically sought to answer three guiding questions:

1. What is the nature of the interactivity experienced by the learners in an online professional development environment?
2. What influences are present that contribute to the interactivity experiences by the learners in an online professional development environment?
3. What extent and in what ways does the interactivity contribute to participants' perception of their learning?

Chapter Three
Design and Methodology

Introduction

This study investigated the interactivity that was practiced by a group of online learners and used a case study methodology to explore the types of interactivity that occurred in the online class; the influences that contributed to the interactivity and the contribution of this interactivity to the participants' perception of their learning. Specifically the study was concerned with the following guiding questions:

Question 1. What is the nature of the interactivity experienced by the learners in an online professional development environment?

Question 2. What influences are present that contribute to the interactivity experienced by the learners in an online professional development environment?

Question 3. To what extent and in what ways does the interactivity contribute to the participants' perception of their learning?

To answer these questions a range of data collection methods were employed including; analysis of the statistics generated by the course management software; examination of artefacts generated by the students over the duration of the course including contributions to the discussion forums, e-mails exchanged and assignments completed by the students over the weeks of the course; analysis of mid-course and end-of-course evaluations made by students; and interviews conducted after the course with eight of the students in the class.

The purpose of this chapter is to explain and justify the research design, the data collection and analysis used in this study.

Research Design

The interest for this study grew out of professional experience in working with practicing teachers in an online professional development environment. Two small, preliminary research surveys had been conducted prior to beginning this research study that helped to identify some of the issues inherent for learners in the online environment. The first examined the connection between elements of the course design and the learners' success in the online environment and found that participants were able to identify the elements of the instructional design that supported their learning (Morrow, 2002a). The second study was a survey to investigate changes in teachers' beliefs and perceptions upon completion of the online course. It identified several areas of change for course participants including confidence, leadership and attitudes toward teaching and learning (Morrow, 2002b). Both of these preliminary studies were limited by small numbers of subjects but the results did indicate that the online environment was worthy of further study, particularly in the areas of the interactivity required of teachers participating in an online professional development course and the effects that this interactivity had on the experience of online learning.

The questions that form the basis of this study called for the interpretation of participating students' experiences. Of particular importance were the reactions of participants to learning online, participants' accounts of how they experienced the interactivity in the online environment and the participants' perception of how their learning is mediated by the online environment. The researcher, who was the lecturer in the class selected for this study, was well positioned to develop an in-depth understanding of the students' perceptions and experiences. This focus on the learners' understanding of the experience of online learning called for an interpretive approach to the research.

In describing an interpretivist approach to research as a process, Denzin and Lincoln (1998) outline three, interconnected activities: ontology, epistemology and methodology, and point out that these activities are filtered through the unique viewpoint of the researcher who speaks from a particular gender, culture, race, class and ethnic perspective. This combination of ontology, epistemology and methodology forms a paradigm or interpretive set of beliefs that guide

action. Guba (as cited in Denzin & Lincoln, 1998 p. 27) defines four major interpretive paradigms: positivist/ postpositivist, constructivist, critical and feminist-poststructural. Each of these paradigms makes demands on the researcher and the importance of understanding these differences is noted by Denzin and Lincoln. The positivist/postpositivist paradigm includes "a realist and critical realist ontology and objective epistemologies and rely on experimental, quasi-experimental, survey and rigorously defined qualitative methodologies." Critical and feminist-postcultural paradigms use a materialist-realist ontology where the real world is considered to make a difference in terms of race, class and gender, a subjectivist epistemology is assumed in which knower and subject create understandings, and they employ naturalistic methodologies which assume a setting in the natural world. The constructivist paradigm, which was chosen as the best approach for this study, includes: 1) a relativist ontology, which assumes that the attempt to capture the rich complexity within the online class environment will be examined through multiple realities; 2) a subjectivist epistemology which assumes that the meanings behind the situation and setting are negotiated between the researcher and the participants as the experiences in the online environment are examined and; 3) naturalistic methodologies which assume that the theory is grounded in the data which arise from the online class as the students experience it in its natural setting.

This research study presupposed a constructivist understanding of knowledge, which emphasises the examination of socially meaningful action through observing people in natural settings. This approach seeks to understand how people create and maintain and interpret their social world (Neuman, 2003). Guba and Lincoln (1998) point out that a constructivist understanding will include multiple mental constructs which are local and specific in nature, sometimes conflicting, and dependent on the individuals or groups involved.

Case Study Approach

A case study approach was chosen as an appropriate and practicable interpretivist approach to investigating and understanding the student experiences in an online learning environment because it offered the opportunity to conduct an empirical inquiry that investigated a phenomenon within a real-life context, where the

boundaries between the phenomenon and context were not clearly evident and which relied on multiple sources of evidence (Yin, 1994). Yin further suggests viewing the strategies used in case study research as a "repertoire" from which the investigator may draw according to the situation presented in the research.

Stake (1994) offers several defining attributes of a case: it may be simple or complex, it is a specific bounded system, its behaviour is patterned and consistent and sequentialness is prominent. There are three main types of case identified by Stake. First, is an instrumental case study, undertaken in order to provide insight into an issue or refinement of theory. Second, a collective case study, undertaken in order to inquire into a phenomenon, population or general condition through the use of instrumental study extended to several cases. Third, the intrinsic case study, which is employed in this study, is undertaken in pursuit of a better understanding of the particular case. In further defining the case, Stake urges researchers to seek out both what is common and what is particular to a case with the view to finding what is unique. This uniqueness may extend to examining: the nature of the case; the historical background; the physical setting; its economic, political legal and aesthetic contexts; other cases through which this case is recognised; and those informants through whom the case can be known. Taking Stake's criteria into consideration it was judged that the nature of this case, an online professional development course, offered the opportunity to investigate a methodology that, although growing rapidly, is not yet understood in terms of the learner's experience. Historically the case was interesting because, prior to the wider availability and access of telecommunications, participants seeking professional development had choices of only traditional face-to-face classes or traditional distance education. Therefore, an examination of the transition to online learning from both of these perspectives was deemed worthy of investigation. The physical setting of this class, situated completely in the online environment was also a compelling reason for choosing it as a case because this setting presented an opportunity to investigate the perceptions of practicing teachers involved in a professional development course delivered through an online medium. Questioning the more positivist aim of choosing cases for replication or external validity, Stake further suggests that to choose cases based on potential for learning is superior to choosing cases on

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representativeness. The case in this research study was chosen because it offered the possibility of studying online professional development in a natural setting and presented the opportunity to define theoretical constructs that existed within this particular online environment.

A priori identification of constructs can be helpful in shaping the initial design of research, with the caveat that these constructs are tentative within a qualitative research design (Strauss & Corbin, 1990). Such a research design will examine material within a framework of learner-centric interactivity drawn from the models of Moore (1993), Hillman, Willis and Gunawardena (1994), and Hirumi (2002).   Moore described three modes of interactivity consisting of learner-learner, learner-instructor, and learner-content. Hillman et al. (1996) added a fourth mode of interactivity described as learner-interface. Hirumi expanded on this learner-centric model further and added learner-environment, learner-self and learner-other. These modes of interactivity were used as a framework to understand how the interactivity takes place and how the participants experience and use the different forms (Figure 3.1). The artefacts produced from these interactive exchanges were examined for evidence of reflection that indicate exchanges of ideas that led to construction of new understandings for the participant.
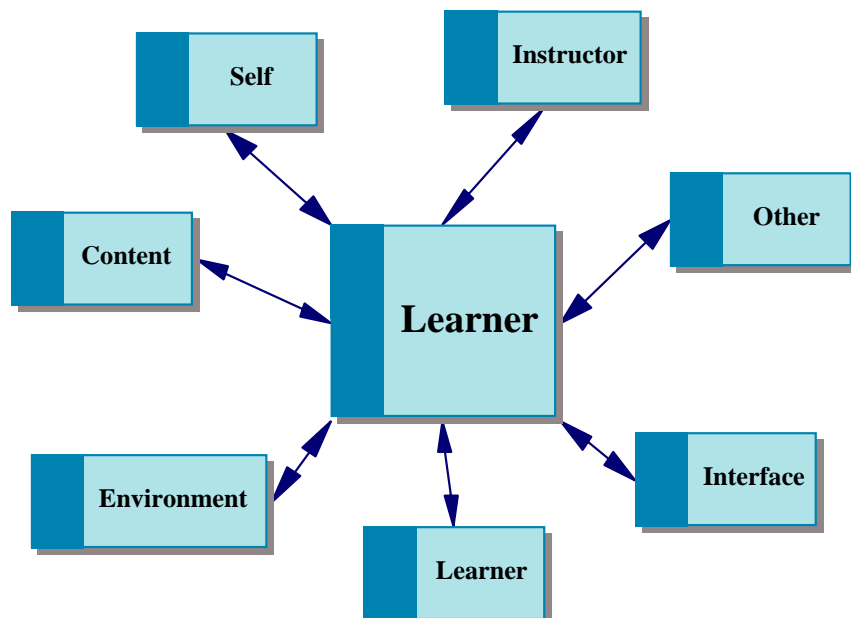
Figure 3.1: Interactivity model for the online environment

Validity of Research Design and Methodology

Yin (1994) offers four tests for judging the quality of research design: construct validity, referring to the use of correct operational measures for the concepts being studied; internal validity, which refers to the establishment of valid causal relationships; external validity, which refers to the generalizability of the data; and reliability, which refers to the replicability of the data collections procedures. Lincoln and Guba (2002) offer a parallel set of criteria from a more constructivist viewpoint: the trustworthiness of criteria of credibility (paralleling internal validity), transferability (paralleling external validity), dependability (paralleling reliability), and confirmability (paralleling objectivity). In order to ensure confidence in the methodology and analysis used in this study the following actions were undertaken.

Triangulation was used to ensure trustworthiness of the findings. Triangulation is the use of multiple methods in an attempt to reach an in-depth understanding of the phenomenon being studied (Denzin & Lincoln, 1994). The use of different types of triangulation helps to reach understanding as well as ensure validity and credibility. These types include: (1) data triangulation, using multiple sources of data across time, space and persons; (2) investigator triangulation, using multiple investigators; (3) method triangulation, using multiple methods and (4) theory triangulation using multiple perspectives on the same data set (Denzin & Lincoln, 1994; Krathwohl, 1993; Yin, 1994). Miles and Huberman (1984 p. 235) describe triangulation in this way: "Triangulation is a state of mind. If you self-consciously set out to collect, and double check findings, using multiple sources and modes of evidence, the verification process will largely be built into the data-gathering process." Although triangulation is intended to provide support for a finding it can also lead to contradiction which, through the search for an explanation, often leads to new insights (Krathwohl, 1993; Stake, 1994).

Triangulation of the data in this study occurred in several ways. First, the data were gathered from difference sources and represented different data types. Data were collected through the statistical capabilities of the course management software, which established each student's pattern of use within the online site across the duration of the course. E-mails that were exchanged between student

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and lecturer over the 15 weeks of the course were available for analysis. Students' and lecturer's contributions to the online site were archived, which provided the opportunity to examine this material in situ and helped to establish an audit trail (Yin, 1994). Mid-course and end-course evaluations provided additional information as to students' perceptions of the course at different point in the 15 weeks of the course. Interviews from selected students were transcribed and analysed after the course was concluded. Second, the data were triangulated through method. Quantitative methods were used to obtain information on the students' patterns of use within the online site. Qualitative methods included the analysis of discussion forums and interviews. Third, the findings were triangulated through theoretical checking and double-checking to ensure that theories could be replicated and confirmed through examination of different perspectives within the data.

An example of how this triangulation of data type, method and theoretical checks worked in this research study is seen in the analysis of the interactivity between learner and lecturer. This interactivity was first observed within the online site and appeared to be within normal ranges expected by the researcher. After students were interviewed it became apparent that students considered their primary relationship to be with the computer, or more specifically, with the content that they found on the online site rather than with the lecturer. A subsequent analysis of e-mails exchanged between the lecturer and the students revealed no exchanges where students asked for clarification or help with content; rather all exchanges centred around procedural and administrative types of questions. Examination of the data gathered through this chain of evidence by different methodologies and from different data sources led to the development of the theory that learner-lecturer interactivity, while important for the continuity and organisational aspects of the online experience, was less important in terms of the students' understanding of content. A further test of this theory against the base data on the students revealed that the majority of the students interviewed had experience as traditional distance learners and expected little or no contact with the lecturer beyond assessment. This correlation, while adding robustness to the theory also exposed the limitation that this theory may apply only to online learners who were previous distance learners.

Ethical Considerations

Ethical concerns have traditionally centred on topics of informed consent, right to privacy and protection from harm (Fontana & Frey, 2003; Hamnett, Porter, Singh & Kumar, 1984). For researchers who observe and interpret human actions in a situational context, these ethical issues may create a tension between the value of the research and the values placed on the participants' well-being and rights of privacy (Crano & Brewer, 2002). Referring to this tension as a costs-benefits ratio, Cohen, Manion & Morrison (2000) propose that the subject of ethics in social research is wide ranging and challenging. Particularly important in the current study was a careful analysis of the ethical issues surrounding use of the online class, both as a means of data collection and as a contextual 'place' where students interacted and were observed. Bruckman (2004) notes that the blurring of private and public experiences in the online environment is a characteristic of online research and cautions that researchers should approach this distinction with care. Echoing this caution, Markham (2004) points out the complexities of collecting data in a textual environment when she states:

> As the researcher engages in analysis of visual, verbal and interactive presentations of self online, certain elements become evident, highlighted, or passed over. Obviously we cannot pay attention to everything, so the analytical lens is limited by what researchers attend to, collect and consider as data. Reflexive attention to what we are looking at, looking for, or looking through can help us make more ethical and sensible choices, as well as inform our abilities to express our limitations in fully describing or explaining the phenomena under study. (p. 147)

Ethical concerns relating to informed consent, right to privacy and protection from harm will be discussed as they relate to this study in the following sections.

Informed consent. Informed consent has been identified by Diener and Crandall (1978) as having four components: competence, voluntarism, full information and comprehension. Competence refers to the ability of mature and responsible individuals to make correct decisions if they are given relevant information. Voluntarism indicates that participants are free to choose whether or not to take part in the research and are undertaking any risks knowingly and voluntarily. Full information implies that participants are fully informed about the purposes

and methods of the research. Comprehension refers to the participants' understanding of all aspects of the research.

Informed consent of the participants in this study was accomplished through the following methods. Before the study began, the participants were informed about the purpose and scope of the research study and invited to ask any questions needed for clarification. An information letter outlined that the research study, undertaken through doctoral study of the researcher, would examine the interactivity in an online learning environment with a view to understanding how this interactivity was experienced by the learner. The information letter made clear what participation in the study would require and outlined what data would be collected from the archived material on the online site. The information letter also explained that some students would be asked to take part in an interview, and clarified that their privacy would be protected because all participants would be anonymous and no information would be given to any other researcher or agency without their consent. Students were informed that participation in this study was voluntary and that they could withdraw at any time without penalty. All students were made aware of whom to approach should they have concerns about the research. Possible dissemination of the research through such means as conference presentations and proceedings and journal articles was made clear to the participants. Participants were also informed of the opportunity to have access to the final report if desired. Consent forms were sent to all participants. The online course originally had 15 students enrolled and all 15 consented to be part of the study. However one of the students did not participate after the first two weeks of the course and so was not included in the study.

Right to privacy. The essence of the right to privacy has been considered from three perspectives by Diener and Crandall (1978): the sensitivity of the information, the setting being observed and the dissemination of the material. Cohen, Manion and Morrison (2000) point out that the greater the sensitivity of the information collected and the more private the setting observed, the more safeguards are called for to protect the privacy of the research participant. This is particularly important in terms of dissemination of the material. The researcher should take care to ensure that information provided by the participants cannot

reveal their identity and that confidentiality is observed. Gregory (2003) cautions that confidentiality includes not revealing to others what has been revealed in confidence, making sure that confidentiality is not breached by accident or as a consequence of carelessness in the handling of the data, particularly noting the powerful investigative nature of today's search engines and extensive information available on the World Wide Web. Crano and Brewer (2002) suggest that any files that are kept in electronic formats should be identified only by code numbers with access to personal identification restricted. Williams and Robson (2002) point out that traditional procedures for storage of data and methods for keeping participants' information anonymous are complicated when the original data exist in an online site and are archived and readily available to other participants.

The participants' privacy was protected in the current study by the following means. The course site which was the object of this study was a closed and password-projected site and thus was a 'private' space for the participants. However, it was still a 'public' site within the context of the individuals who were using the space because all material posted to the site was archived and available to all members of the group. It was therefore important to safeguard the anonymity and privacy of the participants and to use archived data with care. Anonymity of the participants was assured by giving each student a code name used to organise, store and report on the data and removing any identifying information such as headings and subject lines from the original online text. The same code name was used to store and report on any information gained from interviews.

Protection from harm. Selecting a research project that is ethically well grounded is one of the first ways that researchers can protect participants from encountering harm through participation in a research study. Bailey (1996) offers several aspects for consideration: avoiding the use of deception if at all possible; ensuring that promises of confidentiality can be kept; and avoiding projects that place either participants and/or researchers in unethical situations. Although it is not possible to foresee all possible ethical situations, the researcher should take all precautions to protect participants from mental or physical stress,

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harm or danger as the research study is planned and implemented (Best & Kahn, 1998, Neuman, 2003). In writing the final report, researchers need to be sure that they have protected the confidentiality and anonymity of the participants by using coded references or pseudonyms carefully and presented the data ethically and honestly (Bailey, 2007). Neuman (2003) notes that other types of harm such as stress, anxiety or discomfort may be caused within the bounds of data collection such as interviews or surveys and stresses that researchers must be sensitive to these issues, considering possible precautions and weighing potential harm against potential benefits.

An assessment of possible harm was made in conjunction with the planning of this research study and the possibility of harm through the implementation of the case study was considered to be low. The data collected from and about students were generated within the course of normal involvement and participation in the online class. Data generated during this time were automatically archived within the structure of the course management system and nothing outside the bounds of normal class involvement was required of the students during the duration of the course.

Role of the researcher. In assessing possible harm to participants, particular attention was paid to the role of the researcher as participant observer and lecturer in the class. Participant observation has been shown to be an effective and useful method for the development of an in-depth understanding of social reality (Blalock & Blalock, 1982; Kerr, 2001; Rock, 1999; Waddington, 1994). According to Jorgensen (1989, p. 14), participant observation is especially useful when the aim is to "generate practical and theoretical truths about human life grounded in the realities of daily existence." Noting that participant observation is well suited for use in an in-depth, qualitative, case-study approach, Jorgensen proposes that the method is most appropriate when the research problem is concerned with human meanings and interactions from an insider perspective, the phenomenon is observable and capable of being addressed by qualitative data, the research setting is sufficiently limited in size and location for observation and the researcher has access to the appropriate setting.

The dilemma of reconciling the two roles of participant and observer is noted by Nandhakumar (1997) who suggests that issues surrounding observation and data collection must be balanced with sufficient participation to allow for an in-depth understanding of the situation under study. Kerr (2001) argues that the ability of the researcher to both join the group being studied but yet remain neutral is critical to success. Savenye and Robinson (1996) caution that a researcher must be careful not to influence results and should periodically examine his/her role and the influence that may result from it. Accordingly, the particular issues residing in participant observation outlined in the literature were examined and helped to form specific guidelines for operating in this capacity within the online class. These issues included: difficulty in developing specific guidelines within a fluid environment; the skill and knowledge level of the researcher; the ability to prevent personal biases from distorting interpretations (Blalock & Blalock, 1982); the generation and interpretation of large quantities of 'rich' and varied data; the credibility of informants; the researcher's role in the group (Becker, 1999) and difficulty in both participating and taking detailed field notes simultaneously (Gay & Airasian, 2000).

Various aspects of the researcher's role as participant observer have been noted in the literature. Gans (1999) classifies three possible roles of participant observation: *total researcher*, who observes without personal involvement in the situation being studied; *researcher-participant,* who though participating in the situation, is only partially involved so that he or she can step back and function as a researcher; and *total participant*, who is completely involved in the situation and who only after the experience is over becomes a researcher again and writes about what has happened. Gall, Gall and Borg (2007) describe the total participant as a researcher who studies a setting in which he/she is already a member or one who assumes genuine membership during the course of the research. In this case study the role of the researcher during the 15 weeks of the online course was that of total participant in the form of lecturer in the course. This role of total participant helped the researcher to resolve the conflict between the participant and observer roles (Gay & Airasian, 2000; Kerr, 2001; Nandhakumar, 1997) and ensured that data collection did not interfere with or

alter the role of the lecturer or the normal workings of the class (Savenye & Robinson, 1996).

The knowledge and skill as a researcher in a participant observer role (Blalock & Blalock, l982), particularly in the online environment that was the focus of this study, was aided through previous studies conducted by the researcher (Morrow, 2002a; 2002b) and through prior experiences in teaching the course in the online environment, thus ensuring a frame of reference for the role of participant observer. While the participant observer's role was deemed appropriate for this case study, special care was taken to avoid altering the normal progression of the online class (Savenye & Robinson, 1996). The online course environment, content and structure, developed and in place before the study began, were typical of all such occurrences of this course previously developed and taught prior to the study. Content, readings, discussion questions, due dates, and the structure of the online space itself were fixed and not altered once the course began.

The structure of the online environment offers a system which is closed and bounded in ways that reduce the fluidity of the research field and limit the data that can be collected, thus helping to resolve several of the issues around data collection raised in the literature (Becker, 1999; Blalock & Blalock, 1982). All exchanges between participants in this study happened inside the bounds of the online class through discussion forums or by e-mail exchanges between learners and lecturers. Subsequently, all such exchanges were sequentially archived, which allowed the researcher to concentrate on the lecturer role over the 15 weeks of the formal course   The archiving of exchanges within the online course also gave the lecturer a check against bias and manipulation (Blalock & Blalock, 1982; Savenye & Robinson, 1996) as the contributions of the researcher as an active participant were documented in the same way as the contributions of the participants in the study. The open nature of the online materials served to aid transparency in the data collection and analysis and helped establish the credibility of the participants' perspectives (Becker, 1999).

Only after the online course was complete did the researcher analyse the archived online data, which helped to ensure that the role of total participant/lecturer was maintained during the 15 weeks of the online course. Participant interviews took place after the lecturer-student relationship was dissolved, to ensure that students felt that they could freely express their opinions and describe their experiences. Participants were informed about the purpose of the interviews and were not asked any questions that were outside the scope of the research about online learning. Confidentiality was maintained by using codes for any excerpts used in the final report.

The Specific Case Study

This intrinsic case study (Stake, 1994) was undertaken to investigate the online learning from the perspective of the learners' experiences, to explore the transition for the learners from traditional face-to-face classroom and/or traditional distance education, and to study online professional development in an online setting. The online class, which was the "case" in this research study, took place over a period of 15 weeks. The students in the class were located in different geographical areas of New Zealand and were enrolled in the course for a variety of reasons: 1) to gain a qualification in information and communication technologies of which this course was a part, 2) to upgrade existing qualifications and 3) to take advantage of Ministry of Education funding for ICT professional development and enrol in a tertiary level course. All students were enrolled voluntarily.

The students, who ranged in age from 28 to 51, were representative of online learners in that they were adult learners, studying part time, predominantly female, older than traditional tertiary students and, in most cases, with family and professional responsibilities (Potter, 1998; Carr, 2000; Kretovics, 2003; Gibson, 1998a). All of the students had experience as face-to-face learners at the tertiary level and the majority of them had studied through traditional distance education where there was limited contact with the lecturer and no contact with other learners. Although some of the students had limited experience with studying online, for most this was their first fully online course, making the insights of these students valuable in understanding the transition to online learning.

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The class was taught totally online and all contact was through the online course management system or through e-mail. One exception to this was a group of six students who made up the staff of a rural school and were all involved in the course, giving them direct access to other members of the course in their group. The course began with 15 students but one student did not participate after the first two weeks and was not included in the study. The 14 remaining students completed the course requirements and passed the course. The 14 students, three male and 11 female, were all practicing teachers. The students were sent a collection of readings through the mail but the course content, in the form of weekly tasks, online information/lectures, and participatory discussions, was situated in the online environment.

Data Collection Techniques

Qualitative research is defined in the literature by Denzin and Lincoln (1998 p. 3) as a method that is "multi-method in focus, involving an interpretive, naturalistic approach to its subject matter." Strauss and Corbin, (1990 p. 17) point out that qualitative research is "research that produces findings not arrived at by means of statistical procedures or other means of quantification." Miles and Huberman (1994 p. 10) emphasise the point that qualitative data are focused on "naturally occurring, ordinary events in natural settings." Qualitative research may include ethnographies, interviews, survey research, participant observations, and phenomenological observation among other data types. The main data-gathering instrument is the human researcher in roles that range from active participant observer to concealed, non-participant observer. It helps to instruct the researcher in discovering what it is like to be in the environment being studied. The knowledge used by the researcher is tacit knowledge as well as propositional knowledge and the researcher attempts to interpret phenomena in terms of the meanings that the participants bring to them (Denzin & Lincoln, 1998; Krathwohl, 1993).

Qualitative methods predominate in case study research but do not exclude quantitative methods (Yin, 1994; Strauss & Corbin, 1999; Stake, 1994), and this case study drew from a combination of both qualitative and quantitative data.

Sampling was purposive and/or theoretical rather than random or representative. Data analysis was inductive rather than deductive and reliability and rigor of the research was sought through the use of different types of data to support and explain the interpretations with this case study.

In keeping with the interpretive nature of the case study and the constructivist paradigm that underpinned the methodology, data were gathered from a variety of sources. Evidence in this case study consisted of statistical data that were available through the course management system, the archived materials generated by the students in the form of postings to discussion forums and sharing areas, the mid-course and end-course evaluations, the e-mails exchanged with the lecturer and interviews with eight of the students from the course. The data types are explained as follows:

Statistical Data from the Course Management System

Statistical data available through the course management system consisted of records of all the students' patterns of logging in to the online course site. These login statistics showed date and time of login, a record of which part of the site students visited while logged into the course site and whether the student read or posted to the site during a particular login. Using this statistical data allowed the following to be determined:

- Total number of logins over the 15 weeks of the course
- Total time spent online
- Patterns of logins and time between logins
- Number of postings to the online site.

Archived Material from the Course Site

All materials generated during the 15 weeks of the course were archived, providing the ability to analyse the exchanges between participants. These data consisted of students contributions to the discussion forums and work shared online. Four specific discussion forums from weeks two, six, nine and 15 were examined and analysed.

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E-mail Exchanges between the Lecturer and Students

E-mails exchanged between the lecturer and students were archived and available for analysis. Numbers of e-mails and purpose of the e-mails were analysed.

Mid and End of Course Surveys

Surveys are routinely administered during the middle of the course and again at the end of the course. Information available from these surveys deals with student satisfaction and perception of having learned in the online course.

Interviews with Selected Students

Silverman (1993) distinguishes two ways of using the interview. From a positivist perspective, interview data give access to facts about the world and the primary issue is to generate reliable and valid data. Methods used to accomplish this goal include the random selection of interview samples and a set of standardized questions. From the interpretist viewpoint of this case study however, the interviewees are seen as actively constructing their social world and the main goal is to generate data that give an accurate insight into the participants' experiences. Rather than getting answers to questions or testing hypotheses, the purpose for in-depth interviewing is to understand the meaning that others make of their experiences (Berg, 1998; Seidman, 1991). The interview is seen as a useful and important tool in case study research (Stake 1995; Yin, 1994).

Holstein and Gubrium (1997, p. 113) describe interviewing as a "way of generating empirical data about the social world by asking people to talk about their lives." Whether these interviews range from highly structured to semi-structured to unstructured, they are considered to be interactional and a special form of conversation that is constructed in situ as a product of the talk between the interview participants (Fontana & Frey, 2002). As viewed by Holstein and Gubrium (1997, p. 114), the respondents are more than "repositories of knowledge – treasures of information awaiting excavation," but are co-constructors of knowledge in collaboration with the interviewer and both are

engaged in meaning-making work. This interaction between the interviewer and participants is acknowledged as inherent (Seidman, 1991) and the adaptable and responsive role of the research in the interview process is recognised (Lincoln & Guba, 1985). Using the view of Silverman (1993, p. 91), who believes that interviewees are "experiencing subjects who actively construct their social worlds," the interviews in this study were conducted in order to uncover authentic insights into the participants' experiences in the online class. The intent of these interviews was not statistical generalisation to broader populations but analytical generalisation to theoretical propositions (Yin, 1994).

Interviews can be structured, semi-structured or unstructured and the choice of interview type is often determined by the research questions, purpose of the research and research paradigm which underpins the study (Berg, 1998). The use of the semi-structured interview, based on prior knowledge of the researcher as participant-observer, was seen as an appropriate methodology for the current study. The semi-structured interview offers the researcher some flexibility yet allows a structure within which the interview can be conducted. The flow and direction of the interview determines how and when questions will be asked (Bailey, 2007). The interviewer, in seeking to understand the viewpoint of the interviewee, must be aware that it is not possible to completely comprehend the perspective of another due to complex and possibly conflicting viewpoints of his/her own. However to increase the effectiveness of the interview process the interviewer should seek to establish rapport with the respondent, practice active listening, seek clarification with follow-up questions (Berg 1998; Parrington, 2001), avoid leading questions and guard against unnecessary interruptions (Seidman, 1991). Fontana and Frey (1994; 2001) note the skill and the art of conducting effective interviews which require attention to the multiple layers of the interview process.

In the current study, eight students in the online class were chosen to take part in semi-structured interviews after the class was completed. The selection of these students was based on a cross-section of data collected: number of posts, number of logins and time in hours spent in the online class, satisfaction levels with the

online experience, and perception of having learned.   Table 3.1 shows a cross-section of this data and the students who were chosen to be interviewed.

Table 3.1 -- Data on which interview choices were based

Name	Number of Posts	Number of Logins	Time in Hours	Satisfaction Scale: 1(low)- 5 (high)	Perception of Learning Scale 1(low)- 5(high)	Interviewed
Student A	30	84	22.63	4	4	No
Student B	28	165	20.60	5	5	Yes
Student C	26	33	20.75	3.5	3	Yes
Student D	17	30	7.63	3	3	Yes
Student E	43	103	28.60	4.5	4	Yes
Student F	22	44	18.62	3	3	No
Student G	28	53	18.23	5	4	No
Student H	27	94	30.52	4	4	No
Student I	22	43	8.63	4.5	4.5	Yes
Student J	25	44	10.48	3	3	No
Student K	26	79	27.62	3	3	Yes
Student L	25	43	15.25	3	3	No
Student M	29	83	27.35	4	3.5	Yes
Student N	28	71	10.90	5	5	Yes

To ensure that those chosen to be interviewed were representative of the class as a whole, a student t-test was conducted to compare the 8 students interviewed with the 6 students not interviewed on four measures of online behaviour: number of posts, number of logins, total time online and mean time per login session. The mean scores for the two groups and the t-values are shown below in Table 3.2.

Table 3.2 Online behaviours of those interviewed and those not interviewed

	Posts	Logins	Time (mins)	Meantime (mins)
Interviewed	27.38	75.88	1140.63	17.19
Not Interviewed	26.17	60.33	1157.33	19.54
t-test results	.38	.78	.06	.52

*all t-test results are non-significant, p>.05

These tests indicated that there was no significant difference between those interviewed and those not interviewed regarding their online behaviour, and that

the students selected for interviews could be regarded as representative of the group as a whole.

Questions that guided the semi-structured interviews are show in Table 3.3. These questions were used as checklist of questions to be covered in a conversational interview. Prior to the interviews with the participants in this case study, a test interview based on these questions was conducted with a student from another online class. This test interview showed that the questions were sufficiently open-ended and effective in obtaining the information being sought.

Table 3.3 Questions that guided the semi-structured interviews

1. **Can you tell me what brought you to this particular point in your professional life?**
2. **Do you think that online learning suits you as a learner? Why or why not?**
3. **How did you find using the online course management system?**
4. **Did the other learners in the class impact on your own learning journey?**
5. **Can you describe how you dealt with the content in the online learning class – including the readings, discussions, things other people posted, online lecturers, etc?**
6. **The environment in our class was a textual one – everything we did was through writing. Tell me how you felt about that.**
7. **What impact did the lecturer have on you in this course? What do you see as the role of the lecturer in the online environment?**
8. **Is there anything else that was particularly significant to you about studying online?**

Interviews with selected students were conducted after the lecturer-student relationship was completed and dissolved at the formal end of the course, ensuring that participants knew that they could speak about experiences in the framework of researcher-informant rather than lecturer-student. These interviews were conducted in the participants' schools and were face-to-face and audio-taped with the participants' knowledge and permission.

The interviews ranged from one hour to two hours in length, depending on number of interruptions and the length of the participant's response. Since most interviews were conducted in the participants' school, sometimes in staffrooms where conditions were not optimum, a backup tape was also recorded to ensure

against any loss of quality and to increase accuracy of transmission. The tapes were then transcribed. The researcher listened to the recordings and simultaneously read the transcripts to ensure that the transcription was accurate.

Data Analysis

Miles and Huberman (1994, p.9) note that the analysis of qualitative data includes a sequential series of activities: beginning with coding of the text and the noting of any initial reflections; sorting and sifting through the data to identify similarities, differences, relationships, patterns, sequences and themes; isolating these similarities, relationships and themes and comparing and checking these concepts against existing and new data; gradually elaborating a small set of generalisations that relate to and are supported by the data in the case; and creating constructs or theories which are then compared and tested against a formalised body of knowledge.

The statistical data analysed in this case study were used to help describe the situation that existed within this online professional development course and to offer, when combined with the analysis of the qualitative data, a better explanation of the case (Birley & Moreland, 1998; Holstein & Gubrium, 1997; Miles & Huberman, 1994; Murray, 2003; Silverman, 1993). Miles and Huberman note that quantitative data can be used to inform a research study during the design and data collection stages of a predominantly qualitative research project. They suggest that, during the analysis stage of the research, both types of data work to validate, interpret, clarify and strengthen the analysis. Using this statistical login data allowed the following to be determined.

Total Number of Logins

Statistical data for individual students were isolated and printed. The total number of logins was determined by assessing the first login and following this login pattern until the student showed no activity for 30 minutes. Because the course management statistical data did not indicate when the student logged out, once a student showed no activity for 30 minutes it was assumed that the student had logged out of the site.

Total Time Spent Online

This figure was able to be determined because the time that the students arrived at each separate area of the online course site was listed. These times were computed until the student had no activity for 30 minutes. These figures were then added together to determine the total amount of time during each login. The average time per login was also determined from these figures.

Patterns of Logins and Time between Logins

The logins were listed by date and this allowed the amount of time between logins to be established and patterns of logins to be made clear.

Number of Postings to the Online Site

Counting the times that students posted to the online site and excluding the uploading of required assignments to the dropbox determined the number of postings. Excluding these required assignments meant that the remaining number accurately reflected the postings to discussion forums and peer review/sharing areas.

Analysis of Contributions to DiscussionForums

An analysis of the contributions to the discussion forums for weeks two, six, nine and 15 was completed to determine the student patterns of responding to the discussion forum over the length of the course and to demonstrate any changes that occurred in patterns of participation. Beginning with week two allowed some familiarity with the process and time to work out any technical difficulties with contributing to the discussion. The discussion contributions were analysed by number and length of initial postings, number and length of responses for subsequent postings and number of times that students accessed the discussion area to either make a contribution or to read the contributions of others.

An analysis was also conducted for weeks two, six, nine and 15 to determine the social presence that existed among the participants. This analysis was conducted using the categories of social presence model developed by Garrison and Anderson (2003). This model includes indicators for affective, communication and cohesive responses.

E-mail Exchanged with theLecturer

E-mail exchanged with the lecturer was another source of data in this case. The e-mails were counted to determine the similarities and/or differences in the numbers of e-mails exchanged across the range of students. These e-mails were also analysed to determine the purpose behind the exchange. Four purposes surfaced out of the data: procedural, technical, assignment, and personal.

Mid-course and End-course Evaluations

Information from mid-course and end-course evaluations provided information about students' satisfaction with the course and the students' perception of having learned from the course. Students were asked to rate these two constructs on a scale of one (lowest) to five (highest).

Interviews

Interview transcripts were saved as Rich Text Files and the documents were uploaded into the QSR N6 Qualitative software program. Base data nodes were set up initially to code gender, age, experience with online learning, satisfaction with online learning, perception of having learned, private participation level, public participation level and time spent online. These categories coordinated with the data obtained from the statistics available from the course management system and the mid-course and end-course evaluations. A preliminary node labelled Interactivity was set up for coding and four sub-categories, (called "child nodes" in the QRS N6 program), were created: content, other learners, interface and lecturer. These child nodes corresponded with the a priori identification of constructs that shaped the initial design of the research study (learner-content interactivity, learner-learner interactivity, learner-interface interactivity and learner-lecturer interactivity).

In the initial process of coding all statements made by students in the interviews were read a number of times in order to determine the category of best fit (Strauss & Corbin, 1990). Glaser (1978) suggests that a researcher should ask the following questions during the initial coding of data: What is the data a study

of? What category does the data indicate? And what is actually happening in the data?

Comments were coded by selecting the segment of text and coding this text by node category. Comments that fitted into more than one category were coded in two or more categories. Comments that did not fit into any existing categories were either: (1) coded into free nodes (nodes that were not yet placed in the tree structure of coding); (2) placed into new child nodes which were added under existing nodes to accommodate the comment; or (3) placed in new top-level nodes which were created to accommodate the comment. This first level of coding required a reflective process in which the categories were constantly compared and assessed as to the concepts represented, how these categories related to the research questions and what new concepts were emerging from that data. Some nodes were found to be too broad, requiring further analysis of the material coded at that node, so sub-categories or child nodes were added where appropriate. Some nodes were found to be not significant because initial understandings gave way to new interpretations and/or the data coded at these nodes were coded more appropriately in another node. As this process of coding, comparing and questioning continued it became apparent that some top level nodes were better placed as sub-categories or child nodes of other existing top level nodes. Within the QSR N6 program the nodes were easily rearranged to indicate new understandings and conceptualisations.

A function of the QSR N6 program which was useful in searching for a specific word or a specific phrase was the text search. This allowed a quick search of all documents, selected documents or all except selected documents and was used to discover commonalities among the different students' interviews. For instance, once it became apparent that several students felt anxious about different aspects of online learning, text searches were run using the words 'worry,' 'anxious,' 'afraid,' 'scared,' and 'threat.' Text searches were saved as text files and could be used to generate a report with the option to expand the coding around each word so that the context was not lost.   The coded information in the file was also available to merge with another node or attach as a node on its own if, after examining the coded text, it was considered to be relevant, important and/or new.

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Once the eight transcripts had been read, coded and compared with the node tree that had developed from the data, and the researcher felt reasonably sure that the node tree represented the concepts and categories that were present in the data to that point in the analysis, the search function of the QSR N6 program was utilised. Most useful for the next step of data analysis were the node reports, which searched and gathered all the extracts coded under that node. This was useful because it allowed the researcher to read these extracts in the context of all the other extracts coded at the same node. This allowed a comparison of what each interviewee had said about a particular concept or phenomenon and was used to identify connections and identify themes present in the data.

Another report that was useful was the document report, which pertained to a single interview and listed all coding in the right hand margin of the document. Document reports were generated that showed all the coding for a single interview. These document reports were useful for examining the narrative extract in context, which helped to avoid de-contextualising the excerpt and served as an additional check on the meaning attributed to the narrative extract during the analysis. Having all the coding listed for a document was also useful in making conceptual connections within the talk of each interviewee as it was easy to see which segments of text had been coded in more than one node. Using this iterative process of coding, running text searches and node reports enabled the researcher to pick out the themes present in the students' talk.

The results of the analysis of the data are presented in Chapters Four through Six. These three chapters pick up each of the three guiding research questions in turn.

Chapter Four
The Nature of the Interactivity in the Online Class

Introduction

This chapter examines the nature of the interactivity experienced by students in the online class and describes and discusses the types of the interactivity practiced by the students. Data for this examination were drawn from quantitative sources in the form of descriptive statistics generated by the course management software, qualitative data in the form of interviews with some of the participants, contributions made by students to the course, and observations made by this researcher, who was a participant observer and the lecturer for the online course.

Examination of the research literature on interactivity in the online environment produced a core conceptual structure of types of learner-centric interactivity (learner-content, learner-interface, learner-learner, and learner-instructor), which was used to guide the semi-structured interviews and the analysis of the data. Three additional types of learner-centric interactivity also surfaced in the data: learner-self, learner-environment, and learner-other.

This chapter examines the types of interactivity practiced by the students, beginning with learner-content interactions. The analysis of learner-content interactivity identified three themes in the students' talk as they described their interaction with the content in the online environment: situational, structural, and academic factors. Interestingly, as students discussed their interactions with the content, other types of interactivity that the students considered relevant to their learner-content interactions surfaced in their talk. It became apparent that, for the students, the learner-content interactivity was central to their experiences and was both the cause of and the motivation for other interactivity present in the online course. The other types of interactivity included: learner-interface, learner-self, learner-other, learner-environment, learner-learner, and learner-instructor. Each of these types of interactivity and its importance to the students will be examined here in turn.

Learner-content Interactivity

Factors that influenced the students' interactions with the content are organised around three basic themes: situational factors which included time, family or work responsibilities, and technical issues; structural factors which included both the structure of the course management software and the instructional design of the course; and academic factors which comprised of students' attitudes toward the content and the personal value that students placed on the content.

Situational

The first of the situational factors mentioned by the students was a comment on responsibilities to work schedules and family commitments. These students were all adult learners, and while one student had study leave, the rest were employed as full time educators and had to fit study time into busy professional and personal lives. Most students worked on the course from home during nights and weekends and several students mentioned having to 'queue' for their home computer, often sharing with other members of their family. Several students commented that the flexibility offered by the online class was important. Student K commented on the complexity of her situation and her appreciation of the "anytime/anywhere" aspect of an asynchronous online class.

I found it really good that I could go home and do it from home. With three children I can't stay for all hours after school and do it and you know I had other commitments after school. You know the swimming practice and the soccer practice. So I did most of it in the evenings and that was good to be able to log on at any time. (Student K)

The second situational factor mentioned by students was that of the technical issues, which overlapped somewhat with time commitments for students. Some students found that getting a connection to the computer, logging on to the course site and finding what they wanted was prohibitive in terms of the time they had to spend on their study. Seven out of the eight students interviewed mentioned that their home access was slow because they used dial-up access. Some of the students lived in rural areas where access to fast Internet connections was not available and most students found that working at home at night meant that they were attempting to log on and work during peak times, which meant slower access speed and longer download times.

Students also commented on their own technical skills or understanding of the technical processes required. These included: lack of typing ability; having to learn some of the programmes like PowerPoint in order to complete online presentations for class assignments; learning the procedures for uploading files to the class site; and understanding and using the discussion forum. Technical issues caused anxiety and stress for students and they sought help to solve the problems from a variety of sources. In order of frequency these were family members, colleagues, other members of the class (especially for the all-school cohort) and the lecturer. Student K, one of the cohort from the school doing the course as all-staff professional development, describes her initial attempts to understand and use the online system.

I struggled. I think initially I got quite stressed on this course. Everybody else seemed to be super efficient and I was challenged by just the task of logging on, getting into you know the StudentNet and as we sat as a group in room 5 that was tremendous because they gave me support to show me how to go through things but the thing was they are such busy people that often I'd be the last one left sitting in there typing in and then thinking how am I going to dropbox this? So I remembered my system, how are we going to do it and I'd make a mistake and [laughing] *I don't know where I'd put it and it would be out in cyberspace and I wouldn't know where it had gone and I'd try to retrieve it and I'd lose it and I'd have to retype it because I didn't know the system had saved it, so I was very stressed initially.* (Student K)

It was evident through the student talk that learner-interface issues, whether in the form of getting access to the computer and class site or acquiring and using the required technical skills, initially constituted an unfamiliar yet important interaction for students as they worked with the content. At best the interface was seen as the gatekeeper that students must successfully negotiate to access content and at worst as an obstruction to functioning successfully as an online learner.

Structural

The issues about interactivity with content that students tied to the structure of the online environment included both the structure imposed by the course management software and the structure imposed by the design of the course.

The course management system used to deliver the course to the students both constrained and enhanced the students' interaction with the content. Students

remarked on the frustrations of having to log on to read or download course materials, initially finding the format unfamiliar and hard to navigate. One student remarked on the inconvenience of having content online as well as in a printed course book, preferring the printed material to content that had to be deliberately accessed via the online course. Student D, who did not print course materials for reference and did not log on frequently, found the online environment to be inconvenient and confusing.

And sometimes it was kind of like, do I really want to, you know, you think, I need that piece of information but oh now I've got to go online, the computer's not on, I've got to get a connection, I've got to find the site, then I've got to, I actually find, I don't know whether it's just me, I mean this is something I'd be interested in, the actual navigation of the site is quite, can be quite confusing the way things have been set out on the site, it's not as straight forward as I could have thought it would be. (Student D)

Students also commented that the asynchronous structure of the online course inhibited spontaneity, mentioning that there was no opportunity to ask a question and receive an immediate answer or to engage in a face-to-face dialog with other students. Student D expressed it this way, commenting on both the spontaneity of a "natural" discussion and the lack of spontaneity she sees in the type of responses available in the online environment.

And the natural, a natural discussion the kind of you know you're reading something and something strikes you as funny or strange or whatever and you've got someone who's right there that you can kind of say, 'well hey what did you, when you were reading this what did you think?' and then you get it straight back rather than a sort of formal pre-thought. (Student D)

Student N echoed the same perception of the lack of connectedness in the online environment and suggested that face-to-face discussions about content would be more meaningful.

You probably would have got deeper into the discussions with people I think because when you are face to face you can relate the issues so you can hear their tone of voice and see how they are feeling about things. (Student N)

Student I also commented on the lack of spontaneity found in the use of the interface that mediated the communication about content between other learners and the lecturer.

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I felt that it curbed maybe some of the interaction whereas you might fire a question at somebody when you were able to get an immediate answer, again the idea of having to go 'oh I wonder, oh I mean I've got to type it out' that type of thing or 'I've got to go back online' and you have to go through that procedure again. (Student I)

Themes that surfaced in the talk about the spontaneity in the online environment indicated that students saw the learner-interface required by the structure of the online environment as a barrier to communication that had to be overcome in order to access the content.

Not all comments about the structure of the online environment were negative. Students did find reasons why the structure of the online environment enhanced their interactions with the content. As they became more familiar with the course management system, students came to appreciate that the software used to manage the course was designed to help them function efficiently, allowing them to see immediately after they logged on whether anything new had been added to the site and, with a click on the relevant link, navigate to the newer material. This saved time because they did not have to check all areas for new postings or content. Students also appreciated that the material was archived so that they could read online comments in the discussion areas and peer review/sharing areas any number of times that they wished and when it suited them.

Another aspect that enhanced interactivity with the content was the design of the weekly lessons in the course. Students found the order and consistency from week to week to be a benefit and one student correlated it to her own classroom structures and organization.

Yes, it was very - what is the word- it kept it very tidy. You knew that each week it was a wee bit like anything in the classroom. We're all pretty structured, sort of. We follow structures as teachers don't we? So it was just like, yeah, hit the spelling test done this week before you could go on to the next lesson. It was like being back at school. (Student M)

Students described the design components and processes of the course that appealed to them. Because the course was designed to look at different ways that ICT could support teaching and learning, the scope and sequence of the course

was broad and looked at different learning theories, different teaching approaches and different technologies. Students liked the overview approach and that each week presented a topic that was self-contained but that built on information presented in previous weeks.

I liked that – I liked the bird's eye view. That surface look at something so that if I was more interested I could go into that further or if I wasn't' catching on I could spend more time on it. I liked that the whole picture – you know like it was giving me all those little pieces. (Student E)

Students felt that this overview approach had a purpose and was working toward an end of helping students see the bigger picture of ICT used to support teaching and learning. Student M mentioned her understanding of how this supported a connection to her own classroom.

And we had to go through and learn about a lot of different things but you know looking back reflectively as I say it was all fitted in to the system. And it worked well because at the end of it we did have access to all those different ways of using the computer and tie it with our classroom activity. (Student M)

Overall the structure of the course design was seen as positive by most of the students and they indicated that this structure was helpful to them as they progressed through the course.

Academic

In discussing their interactions with the content students in the class presented a range of attitudes and perceptions about the content. Initial apprehension about their ability to understand and process the material presented each week was a strong theme that ran through the students' comments. A perceived lack of prior knowledge about the content was mentioned by Student E who described herself as having been in teaching for a long time and *of advancing years* and who worried that she wouldn't have the knowledge base to make sense of the content.

You did feel little bit vulnerable making comments. You know you sort of thought well because I only know a little bit of this – if I get the wrong end of the stick – but you had to overcome that – basically anyway. It was real deep-end stuff you know. (Student E)

Several students expressed apprehension about their ability to communicate their ideas within the online learning environment. Student K worried about her ability to express her ideas, describing herself as someone for whom language doesn't *flow easily*.

I found it very hard to put my thoughts into the computer – and every time I did I thought – oh no you know my – my comments are nowhere near as well done as everybody else's. (Student K)

Student M described feeling fearful of saying the wrong thing in the online discussions and summed up the feelings of many of the students when she described it as a self-esteem issue.

It is quite an esteem thing isn't it – a self-esteem thing – you almost sort of feel, you know, I'm letting myself down here. Do I look like I'm a ning-nong for saying this sort of stuff? I think – I think – you don't want to appear like a fool in front of someone you don't know. (Student M)

In all the comments there was an element of awareness of how they would be perceived or judged by other learners in the class. Whether it was the "wrong end of the stick," or "nowhere near as well done as everybody else's" or appearing "like a fool" the students were concerned about how their own interpretations of the content would measure up to those of others in the class.

Two of the students expressed confidence in their ability to deal competently with the content but expressed reservations about other issues. Although Student I was confident in his technical and analytical skills he described himself as sceptical about the content that focused on using information and communication technologies to support teaching and learning.

I really wanted some answers as to where ICT could develop and I was prepared to, you know, be tunnelled visioned about it, if you like, until I could see, you know, in what regard it could be used or to what benefit. (Student I)

Student D expressed her belief that online learning was not good for her as a learner and stated that she found it difficult to take things that she read online as serious content.

With the online thing, and maybe that was my perception of it at times, it was kind of easy to go online and sort of skim through what was there and not really

take anything in and then you realise, oh hang on, I was actually meant to be focusing here. (Student D)

Some of the students, particularly those who were apprehensive about their abilities to process the materials and present their views back to the group, sought assurance from others outside the course. Family and work colleagues were used to proofread writing for both grammar and syntax as well as coherency before it was submitted to the class site.

Before I would submit something I'd often get him to have a look at it and kind of say 'well, what do you think' and stuff like that and he was always really good at doing that. (Student D)

Another issue for students in interacting with the content was a distinction between content that they perceived as practical and useful and content they perceived as more theoretical. It was obvious through the students' description that they felt that the practically oriented content was of more value to them and was easier for them to understand, process and use.

I guess there's kind of two, in terms of the learning as such, the just knowledge-for-knowledge-sake type learning, the printed stuff, because it's easier for me …but for stuff that's going to perhaps be more useful in the classroom, the links and things like that because they are what . . .you know I mean I can't, I'm not going to use my book of readings in my classroom. . .but if someone's posted a link to something that's useful that I can actually use in my classroom then I'd use that, so I guess for me I looked at thinks from two different perspectives, you know, my personal learning and then stuff that's useful. (Student D)

Like Student D, several of the students used the term "personal learning" to describe the theoretical content that they considered as "non-practical." Student M further defined her concept of "personal learning" by relating it to the "formal" system of education.

So there were two sort of different aspects of it for me – there was the personal learning side of things which lined up with the – the formal system – but there was also me as the teacher – that looked it up from a different perspective which I could use now perhaps." (Student M)

These judgements did not appear to be negative on the students' part but did present an interesting comment on their concept of categorisation of content and

learning and the importance and place of theory in informing their practice. Most students felt that the content that they perceived as of practical use to them was easier to relate to and see as relevant. Student N stated it this way.

I probably related most of it back to my own experience, that's how I learn best, because when it's relevant to what I am doing. Some of the theoretical ones I had a bit more trouble with it because I couldn't see it working in practice, if I can't see it working in practice it's very hard to get anything out of it. (Student N)

The talk about the practical application of content pointed to the existence of learner-environment interactivity. There was evidence that students took the concepts from the course and put them into place in their own classroom environments. Student B discussed using concept mapping with her own students and also hinted that she was beginning to go beyond the "practical" content and think about some of the theoretical aspects as it related back to her own practice.

I have done a bit before but not a lot and we actually picked up on that and have used it a number of times since and I've only got year one and twos but they're quite good at it. So there are things that have actually been very useful in the classroom which is always good for a course if you can get practical things out. I also liked the fact that it did make me think about my own um teaching as well. I'd never heard of constructivism and directed - learning before, probably because I did my training so long ago, I don't even recall if they had those terms then but just making you think about your own teaching practice I found quite good too with a lot of the stuff we did. (Student B)

Discussion of Learner-content Interactions

As students talked about the content, it was apparent that they regarded the learner-content interactions as core to their involvement in the course, both central to and the cause for the other types of interactivity. A strong sense of what Moore (1994) describes as personal learner autonomy was present in the students' descriptions of their interactivity with the content. A sense of learner-self interaction was evident as students planned and scheduled time for study around family and work commitments and applied their own organizational structures to deal with the management of the content. The work habits exhibited by students in this class matched the profile of online learners

identified in previous studies (Diaz, 2002; Levitch & Milheim, 2003; Pachnowski & Jurczyk, 2000) where taking responsibility and self-directed behaviour were indicators of success. Even though they struggled initially to understand how to function within the online learning environment it was evident that students were aware of the necessity of solving the problems and functioning efficiently within the online class.

The technological interface was seen as the gatekeeper to the content, both because it allowed access to the content itself and because it mediated how other interactions about the content occurred. Students found the learner-interface interactivity to have both positive and negative aspects. On the one hand it provided organised content and the access to other learners and the lecturer but on the other it required of the students a weekly commitment of time and energy and dictated to them the form and method of their interaction with content. However, as interaction with the interface was required to access the content, the students showed a strong sense of commitment to working out the technical issues. Solving these technical problems stimulated interactivity with the lecturer and with others outside the class as students sought help from colleagues and family to solve technical problems and give them feedback on work before it was submitted for the scrutiny of other learners and the lecturer. This need for assurance indicated that students considered interaction with the content important, and appeared to be driven particularly by the course requirement to share work in the public forum of the online class. Turoff, Hiltz and Balasubramanian (1994) note the importance of students' creating and sharing material produced as they work with the content. In the present study, this sharing of work was a catalyst for interaction with the content, interaction within the local community, interaction with the lecturer and interaction with self. As they worked with content, students sought this understanding by creating interactions that, although stimulated by the online class, functioned outside it. The learner-environment interactivity present in the students' interactions with content, also supported this concept, represented by students' descriptions of practical trials of content within their own classroom and the value they placed on the content they saw as useful within their own situation.

This examination of learner-content interactivity pointed out the interconnectedness of all the types of interactivity present in this online group of learners. The interactions with the content drove other types of interaction for the students and formed a structure within which to examine the students' experiences in the online environment. Each of these different types of interactivity will be explored in more depth in order to clarify the students' perceptions.

Learner-interface Interactivity

As reported in their comments on interacting with the content, students initially found that the interface presented an obstacle for them because it represented the first step in becoming an online learner and required a new set of skills and knowledge. For seven out of the eight students interviewed this represented their first fully online course, so learner-interface knowledge and experience was low. Students' comments concerning their experiences with the interface revealed that initially they felt a distinct lack of control. For some students the lack of control was centred on their inexperience with the course management software and their lack of technical skills and understanding needed to solve the problems they encountered. The process involved in gaining access to the course site included getting a connection to the Internet from their own computer, navigating to the correct address on the World Wide Web, putting in the correct username and password to access the site, then navigating to the proper class link. Once into the course site, students needed to access the appropriate folder containing the week's work. This folder included such tasks as viewing hyperlinked materials, accessing content placed on the site by other students, and placing their own comments and work on the site. In the beginning the students, many of whom were traditional distance learners, found the process unfamiliar and complicated. One student described her experiences.

So once I got my password and could get on to StudentNet – the process through that was a like a major hurdle – it took a while to go through the process and clicking into the different IT701 areas and then reading the diary and then where do you go from there, where do you go from there – oh, you go down to here, oh okay – and clicking onto the week's assignment or the week's readings or then into people's presentations. From the logging on process through all that actually took me a while to come to grips with. (Student C)

For others, who felt confident in their technical abilities and knowledge, the control issues centred on losing power over what they posted to the online course site. "Pushing the button" was a descriptive phrase that several students used to explain the phenomenon of uploading material to the course site. Students described preparing the material then waiting, reviewing the material, making changes, asking others to read what they had written and then finally pressing the button to upload. One student described the feeling this way.

Initially I think we all found it quite threatening. It was quite – oh yeah – threatening is a really good word. I think we were all a bit concerned about how it was going to go. It was that discomfort of once you had pushed the button on the computer and sent it – that you done it – you couldn't get it back. (Student M)

Even though the interactions with the interface initially caused the students concern, all eventually overcame their problems and became adept at uploading and downloading files to the course site, posting their comments to the discussion and understanding the structure and capabilities of the course management system. The paths to gaining the skills, knowledge and experience they needed were varied. Most students sought help from family members or colleagues, preferring local help in the first instance over more distant helpdesk or lecturer support. Students mentioned that the consistency that they found, which allowed them to repeat the same procedures from week to week, helped them gain confidence. Also important were onsite instructions which students were able to print out and have on hand as they went through downloading or uploading files to the course site. As they gained experience and had a number of successes students found that their skills, confidence and sense of control increased.

I could even go in, make a comment, read it – realise that I'd stuff it up – delete it or go back in and change it you know. And so it's – they're all the little skills I was developing. (Student E)

As students' abilities to deal with the interface increased they began to recognise some of the advantages of the online environment. One student mentioned the advantages of multitasking on the computer by keeping several windows open in

order to go back and forth between different screens of content. Another student recognised that communicating online was different but still effective.

Once I got used to the system of responding, and that was short and sharp, but once I got into a rhythm of reading and getting on top of that I actually didn't find it too onerous at all. I started to enjoy it. (Student C)

Students also recognised that the interface facilitated a communication between lecturer and student that was efficient and reliable. Quicker than the post that many of the students were accustomed to with traditional distance education, they also found it be more accessible than a lecturer seen in person only once a week.

The fact that I can't go and see you face to face didn't actually matter in the end and perhaps in some ways made it easier, easier to send an email than to go and knock on a lecturer's door in some respects. (Student D)

Several students also recognised that the online interface offered more than just an organised listing of the content, since it allowed them, through the advantages of archived material and asynchronous responses, to have time to reflect and make a careful and thoughtful response.

I just see that it can be such a positive and powerful thing to use that I'm more enthusiastic towards it and um, yeah, yeah, but I think in terms of cognitive processes with doing an online paper I'd definitely do another one, because of the receptive purposes it gave me . . . and the reflective options. (Student C)

Discussion of Learner-interface Interactions

Students initially found the interface unfamiliar and stressful to use. They reported feeling a lack of control over the technical skills required to login to the course site, download content and upload their own materials. However, because it delivered the content of the course and provided communication between members of the class and the lecturer, it was necessary for the students to persevere and to solve their problems. All of the students did this by a variety of means. Most students got help from family members or colleagues, some from other members of the class locally and some from the lecturer. It appears that students sought help first from those in their own community where they could sit with another person to work through problems. Several previous studies have noted that confidence in using both a technological interface and a course

management system is essential to the student's success with other types of interactions required by the online environment and the experiences of the students in this course were consistent with these findings (Hillman et al., 1994; Ross, 1996; Tsui & Wing, 1996). Swann et al. (2000) point to the relationship between the uniformity and regularity of course modules and student satisfaction and success in the online environment. The experiences of the students in this class confirm this view. Students reported that they were able to see benefits within the online interface and noted that they found online instructions helpful and appreciated the logic and consistency of the online structural design. Once students began to be more comfortable with the online interface they began to gain confidence and learn skills that gave them greater control over their submissions to the course. They also recognised the efficiency, the communication advantages and the reflective options of using the interface. Clearly the examination of the learner-interface interactivity found in this course highlights the interdependence of the system interactivity and the instructional interactivity (Wagner, 1994), and points out a strong need for student support in order to gain confidence in using the online interface.

Learner-self Interactivity

As shown in the discussion of the learner-content section, the learner-self interactions described by the students were an important and critical element contributing to the students' success. Two areas of learner-self interactions surfaced in the data: self-regulation and reflection.

Self-regulation
Student in this class showed a strong sense of self-regulation over the weeks of the online course and this was evident in their approaches to managing their time and materials.

To understand how the students managed their time online, the statistical data available through the course management system were examined to provide a picture of students' patterns of use and interaction. These data provided dates, times, and duration of student login patterns over the period of the course as well as showing areas students visited while logged in to the course site. These statistics provided baseline information about how each student used the online

site, allowing the patterns of use of students to be compared. These data, collected for the fourteen students in the class, all of whom successfully completed the course, showed differences in patterns of use between individual students.

Table 4.1 shows the number of times, over the 15 weeks of the course, that each student logged into the class site, the total number of hours spent online and the rank of these numbers for each student in the class. These interactions by individuals are not apparent to other members of the class and, being hidden from others, made no direct impact on the structure or content of the class site. This information is of interest because it displays the differences in how the students interacted privately with the course site. The number of logins ranged from a low of 30 to a high of 165 and the hours online ranged from a low of 7.63 hours to a high of 30.52 hours. The wide range of these numbers across the class indicates that students required and made use of different amounts of interaction with the class site and the content contained within it.

By examining the number of logins by rank within the class and by comparing this to the ranking of the amount of time spent online, it is evident that for most students the number of logins and the amount of time spent online were positively correlated (indicated by a range of 3 or less between the two rankings). However data gathered for students B, C and N showed a greater range of difference, indicating that these students did not follow the pattern for the group as a whole. Student C for instance, logged in 33 times (with a ranking of 13) but spent a total of 20.75 hours online (with a ranking of 6). This indicated that this student did not log on as frequently as most in the group but spent more time online than 50 per cent of the class. Conversely, student B logged on 165 times (with a ranking of 1) and spent a total of 20.60 hours online (with a ranking of 7). This indicated that this student logged on frequently but may have spent less time during each login. Student N followed a pattern similar to Student B.

Table 4.1: Student login patterns showing number of logins, hours online, rankings and range between rankings

Student	Number of logins	Rank	Hours online	Rank	Range
Student B	165	1	20.60	7	6
Student E	103	2	28.60	2	0
Student H	94	3	30.52	1	2
Student A	84	4	22.63	5	1
Student M	83	5	27.35	4	1
Student K	79	6	27.62	3	3
Student N	71	7	10.90	11	5
Student G	53	8	18.23	9	1
Student F	44	9	18.62	8	1
Student J	44	9	10.48	12	3
Student L	43	11	15.24	10	1
Student I	43	11	8.63	12	2
Student C	33	13	20.75	6	7
Student D	30	14	7.63	14	0

Most students reported logging on at the beginning of each week to assess what would be required during the week and then planning how they would deal with the requirements of that week. Three of the students interviewed were members of a school whose staff of six were enrolled in the online professional development. These teachers found that the all-staff involvement superimposed an additional structure to their own personal organization. These six members met each Monday after school and formally reviewed, read and discussed the material presented during that week's class. If the staff members felt it necessary they met again on Wednesday afternoon. The work was done individually after reading and discussing the material in the weekly sessions with other staff. All students mentioned the need to log on additionally once or twice during the week. One student stated it this way.

I went in each day and – I'm sort of quite an organized sort of a person – I mean that's just me personally – so I would I would often just go in to check that there

was nothing I had to – that I could do today that I didn't have to do tomorrow – that sort of thing. (Student M)

Other students who were not part of an organised cohort reported that they followed a similar pattern, planning their week of study by logging in to see what readings and tasks were required for that week, then logging in at least once or twice later in the week. An examination of the statistical data for login practices confirms this pattern of use. Although the logins of each of the 14 students showed a random pattern over the 15 weeks of the course, the statistical data did show that on average most students made an initial login during the week and then logged in at least once more during the same week. Half of the students showed a pattern of logging in to the course site three or more times a week. The lack of any consistent pattern within the days of the week indicates that students fitted the study around times convenient to their schedules. Six of the students missed logging in during at least one week of the course, with Student I and Student C missing 2 weeks, and Student D missing three weeks. Over half the students had two or more weeks during the course when they logged only once during the week. These login statistics over the 15 weeks of the course are shown in Table 4.2. The number of logins represents only the 15 weeks of the course and excludes the pre and post weeks and two weeks of holiday.

Table 4.2 Average number of logins over over the 15 weeks of the course; number of weeks with no logins, 1 login, 2 logins or 3+ logins (excludes pre/post and holiday weeks)

	Student													
	B	**E**	**H**	**K**	**A**	**M**	**N**	**G**	**F**	**L**	**I**	**J**	**C**	**D**
Total logins	157	100	85	79	77	76	69	49	43	42	41	33	30	26
Average logins	10.4	6.6	5.6	5.2	5.1	5	4.6	3.2	2.9	2.8	2.7	2.2	2	1.7
0 logins/wk	0	0	1	0	0	0	0	0	1	0	2	1	2	3
1 login/wk	0	0	0	0	1	0	0	2	3	3	2	5	3	3
2 logins/wk	0	0	1	0	0	1	2	4	3	3	3	3	4	5
3+ logins/wk	15	15	13	15	14	14	13	9	8	9	8	6	6	4

Not surprisingly, this table shows that, as login numbers decrease, the pattern of participation during the weeks becomes more irregular. Whereas students with higher numbers of logins consistently visited the course site three or more times a week, students with lower login numbers showed patterns of not logging in at

all, or logging in only one time during the week. These data highlighted and further clarified the differences in student interaction with the course site and course content. Considering that all these students successfully completed the course, it is apparent that different amounts of interaction were sufficient to allow students to meet the course outcomes. However, these data did raise the question of whether the login patterns influenced the dynamics of the course as a whole or the satisfaction with the online learning experience by individual members of the class.

A need for organization of materials was a thread that ran through all the student interviews and was evident in the student descriptions of their approach to managing the materials associated with the online course. In addition to the printed material in their readings book, content for the course information was also posted online (online lectures or explanatory content; links to websites or PDF files; and materials posted by students themselves) and required that students visit the course site regularly to obtain this material.

Six out of the eight students interviewed reported printing out the materials needed each week and several mentioned keeping the materials in folders and notebooks. Reasons for this included: needing to highlight and make notes on the hard copy to aid understanding and enhance retention; needing to keep an archived set of materials for reference; the convenience of having the materials available to read anytime and anywhere; and avoiding reading materials on screen because it was tiring. The methods described by these six students indicate that they were still using study techniques based on print materials and that they were adapting the online course to methods that were familiar and useful.

Of the two students interviewed who did not print out the materials, one logged on and downloaded everything to a personal computer because she did not have an available printer, and then logged off and read the material on the screen.

So I followed the guidelines as to what the reading was to done for the week and that sort of thing and then married up the two as far as online content and written [printed] *content, and then as far as looking at other people's work was*

concerned, it was a download of whatever, whoever's PowerPoint and I had a flick through and generally it was obviously related to what we were to look at as well. (Student I)

Student D, the second student who did not print course materials, said she preferred to work on the screen and thought the printing of all the materials would be expensive. In the class rank for number of logins and time spent online these two students spent the shortest amount of time online and in Student D's case, also had the fewest logins.

The data show that students planned by accessing the work for each week and setting aside time to complete it. They logged onto the course site on a regular basis and uploaded required work. Even though they were initially apprehensive about using the interface and contributing publicly to the online class, they grew in confidence and began to recognise that the online class benefited their individual study. Among the advantages they mentioned were: access to the course materials which allowed them to look back in review or forward for planning purposes; consistency of the weekly procedures and tasks; archived contributions by other learners; and being able to study and respond in their own time during the week. The learners approached the organisation, timing and procedures of study differently, but all were successful in meeting the outcomes of the course. One of the students described her approach to making it work in this way.

I found because you lead a busy life I – I I get home five – five-thirty – I cook the tea – I do you know organize the washing – all of those kinds of things – sit and watch television perhaps for half an hour then you start all over again and probably the online learning did contribute to that being a little bit easier – because it – it is – it was a physical environment initially – where you had to get in there and you had to log on – and you had to flick around the place – see what everybody had said before you actually went back to the box or to the pen and paper so that aspect of it probably made it a little bit easier. I basically had to bite at the cherry sort of each night until I got until I got there you know. (Student E)

It was apparent from the students' approaches to managing time and materials during the course that self-regulation was required due to the independent and asynchronous nature of online study. Although students exhibited different

methods of coping with the demands of the online environment, all students were able to articulate their strategies of self-regulation. A sense of responsibility and self-regulation for their own study came through strongly in the students' comments about their approach to organising time and materials. Each student was aware of the time and effort required to meet the weekly requirements of course readings and contributions to the discussions.

Reflection/understanding

It was evident in the students' talk and in their comments posted online during the course that learner-self interaction was embedded in the students' processing of the content and that this reflective processing was an important mechanism used to help them make meaning from the content.

Certainly, that's what I quite liked about it, it really gets your brain going and I would often say be peeling the vegetables and be thinking about what I'd just read or something like that and think oh well, you know and enjoy thinking about it, so I guess that learning was happening really without me knowing it. (Student E)

Several students, in describing the learner-self reflection that occurred, noted that the asynchronous structure of the online environment provided advantages that allowed and encouraged reflection. Student B pointed out that she felt that she was provided with time to think and make a thoughtful response to the material.

It was great for me, yes I would often read what I had to do for the week or print it off and read it and think about it for a couple of days before I would go and make my comment. Yeah and I found that really good with the online thing that you didn't have to come up with an immediate answer – you could actually think about it. (Student B)

Student C also commented on the advantages of the asynchronous environment but specifically interpreted this as being in control.

Cognitively yeah, you'd be challenged by thought, I'd think about it, I'd go to write a response and go no and I'd delete it and I'd think again, now that's not possible in certain situations so for me that was great, so I could really give it some thought. I could delete, I had power, great, I'll read through and I'll rephrase it, I'll work on it, I'll ask some questions of people 'well what do you think about this' so um I think it's probably more powerful than a lecturing situation. You never get a second chance usually whereas here it's a bit more

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flexible, there's more options for your own thinking to take different roads, you know. (Student C)

Even though students were initially intimidated by having to make an online contribution, this quotation from Student C showed that, by the end of the class, she recognised a difference between a traditional and an online class, namely that of controlling the 'what' and 'when' of her response. She points out that this flexibility allowed her to try out different ways of thinking about the content, possibly getting input from others before she formulated her own contribution.

Student comments revealed that the structure of the online course, which required a regular and public response in order to demonstrate their processing and understanding of the content as they progressed through the course, meant that for most students a period of time spent reflecting on the content was a part of their routine.

Discussion of Learner-self Interactions

The students in this class showed evidence of learner-self interaction through self-regulatory activities such as organising time to study, finding time to be online and completing assignments and, also through reflection on the content presented in the course. The importance of this self-regulation has been shown to be especially important to those who learn through online or distance education (Hirumi, 2002) and it was apparent that this self-regulation and reflection was an significant part of the process for students and contributed to their successful completion of the course. Students in this class discussed ways that they internally processed the content, confirming the idea of an internal didactic conversation (Holmberg, 1983; Moore, 1993) that helped them to make meaning from the material presented in the course.

Control and flexibility within the online course environment have also been found to be significant in allowing students to develop and exercise these self-regulatory and reflective behaviours, particularly in terms of managing and monitoring their own methods of online study (Lee & Gibson, 2003). The data for the present study show that the students employed a variety of techniques. They employed different ways of approaching the task of online study to fit their

professional and personal lives and adapted successful study techniques to the online environment. A high level of motivation and learner initiative was evident from the students' comments, traits that have been linked to successful completion of online courses (Diaz, 2002; Levitch & Milheim, 2003; Pallof & Pratt, 2003, Pachnowski & Jurczyk, 2000). All the students showed evidence of taking this individual responsibility seriously although the login patterns and time spent online varied considerably. Since all of these students were successful in meeting course learning goals and completing the course requirements, it must be concluded that the amount of time spent online and the number of times that a student logs in to a course site can vary quite significantly according to the needs and preference of the individual student as they attempt to make the environment work successfully for themselves (Moore, 1994).

Learner-other Interactivity

Interactivity with others who were not students in the online course played an important role for the students in the class. Seven of the eight students interviewed reported that they interacted with colleagues and/or family on a regular basis and depended on these interactions for technical, emotional or intellectual support.

For three of the students interviewed, the interaction was with colleagues and was ongoing. Student B described getting feedback from two staff members from her school who had taken the course previously, often asking them to read through assignments before they were submitted in order *to have a look and see if they thought it was alright*. Student D, meeting in *weekly get-togethers* with a colleague who was also enrolled in a distance course, described mutual support given and received, which helped keep up the motivation for studying at a distance. Student N mentioned that she was able to discuss technical issues with a colleague and that sharing problems was beneficial.

Students' families offered support in a number of ways during the course. Student D, recognising the "time and space" needs of those engaged in online learning, described it this way.

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My husband as well – he's pretty good. He's – he knows just when to leave me alone or keep me supplied with drinks or whatever and things like that. (Student D)

Both spouses and the participants' children gave technical help. The help ranged from assistance with specific programs such as PowerPoint, help in solving problems with downloading or uploading files, and help in locating things on the World Wide Web. Student E described help she received from her daughter.

Well my daughter who's very computer savvy, but she isn't what you would call a patient person so support is probably not a good word for it. But because she knows – she knew how to do them, she had to help me to send my first assignment. (Student E)

Five of the students interviewed relied on spouses to get feedback on their ideas before responding to weekly assignments and discussions. From proofreading to advice on phrasing and content, students relied heavily on input from their spouses. Students sought out this help from spouses because of anxiety about posting a written response in sharing areas or discussion forums. One student described relying on her husband's help.

I never have any trouble saying anything but when it comes to writing it down – my gosh, it's all of those forgotten skills, your grammar and your, you know your syntax and all of that and my husband is – it's not one of my strengths. My husband's been an English teacher for a few years and he's – he's a bit of a perfectionist about writing and things like that. So at the beginning I had to get him to check it for me. It was this big adult stuff here! (Student E)

In addition to help with proofreading, Student E also described the influence of her husband on her growing belief in her ability to make a valuable contribution to the class.

I needed him to check and his comment was 'you, you have really improved during this course' he said, 'you have really got your skill honed – your skills back again' and a couple of times he even said to me, 'I really like the way you said that. I couldn't have said that better myself.' It was – that was real – you know? (Student E)

Discussion of Learner-other Interactions

There is evidence that learner-other interactions found outside the online environment were important to the students interviewed and that these interactions supported the students locally in a way that the lecturer could not. Because the "venue" of the online class was the students' home or school computers it is reasonable to assume that students would seek technical, emotional and intellectual support locally. The need for such support, however, seems to be a function of the online environment which has been found to be complex in terms of participation and involvement, and to require attention to different kinds of detail compared with traditional face-to-face classes (Davis and Ralph, 2001). Most students required help with the unfamiliar technical interface and in learning to download and upload documents necessary to the course. In particular, students' worries over how their written comments and ideas would be received in the public forum of the online class produced a need for intellectual support for both the mechanical aspects and the substance of their textual contributions. It was apparent that the community in which the students lived, worked and studied was an important and rich resource for them, and that they drew on the available expertise and support as needed. This is consistent with the work of Gibson (1998a, 1998b) who found that family, work and social communities exert considerable influence in terms of emotional, logistical and educational support.

Learner-learner interactivity

Learner-learner interactions within the online class took place in the public discussion forums and peer-review/sharing areas where individual and small group work was shared and critiqued. Data examined to help explain the learner-learner interactions were the descriptive statistics available from the course management system and interviews with the students. The descriptive statistics showed the pattern of public participation that took place in the online class and allowed these patterns to be analysis and compared. Student interviews were used to understand students' perceptions and attitudes toward interacting with other learners in the class.

Number of Postings to Online Forums and Peer Review/sharing Areas

The archival nature of an asynchronous online course, where all exchanges are saved and available, allowed the examination of these postings for analysis and comparison. Figure 4.1 shows the number of posts per student in the online class.
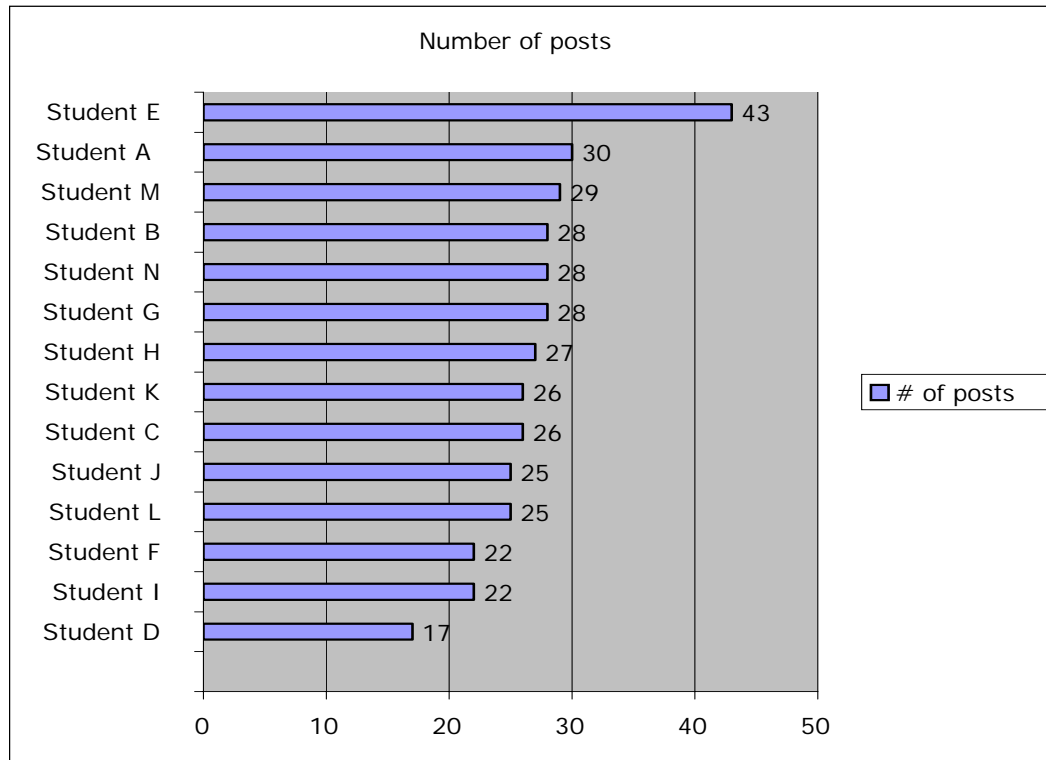
Figure 4.1: Number of postings in public discussion forums and peer review/sharing areas

The range of posts from a low of 17 to a high of 43 indicates that the students had different experiences in the online class in terms of public participation. While most students fell into the range of 22 to 30 posts Student D posted the minimum number of times to pass while the contribution of Student E was two and half times greater.

Examination of Online Discussions

To further clarify the patterns of contributions, four discussion forums, weeks two, six, nine and 15, were chosen for analysis because they represented a sample of the discussions over time and each comprised a discussion centred around a question based on content delivered in the course. Beginning with week

two ensured that most login problems had been solved and that students had some familiarity with contributing to the discussion forum.

Week two. In the first of these discussions from week two, students were asked to respond to a prompt about schools of the future and describe how they thought these schools would operate. This question was based on two articles which students read that outlined different possible scenarios for schools of the future. Students were encouraged to participate and reminded of a requirement that they respond to two other students' posting by the end of the week. This requirement was put into place in the first three discussion forums in an attempt to encourage students to overcome any reluctance they might be feeling about participating and to generate enough responses so that the discussion was viable and interesting. Table 4.3 shows the descriptive statistics for week two.

Table 4.3: Week Two Discussion Descriptive Statistics

Student	Number of posts and responses	Length of responses in words	Day of initial posting	Day/number of responses to others	All logins during week listed by day Entry to discussion forum in bold
Student A	2	277,190	2	2/1	**1**,**2**,**2**,**4**,**4**
Student B	3	270,146,197	2	3/1; 4/1	1,**2**,**3**,**3**,**4**,**4**,**4**,**4**,**7**
Student C	3	79,200,77	1	4/2	**1**,**1**,**4**
Student D	1	259	1		**1**,5,7
Student E	4	88,293,107,67	2	6/3	**1**,**2**,**3**,**6**,**6**,7,**7**
Student F	3	81,175,88	1	4/1; 7/1	**1**,**4**,5,5,5,**7**
Student G	3	45,275,71	2	4/2	**2**,2,**4**,4,7,7
Student H	3	143,457,316	7	7/2	2,4,**4**,6,6,**7**,**7**,7
Student I	2	19,482	1	4/1	1,1,**1**,4,**4**,7
Student J	3	298,90,92	1	7/2	**1**,**7**
Student K	3	265,33,63	1	4/2	**1**,**2**,**4**,**6**,6,**7**,7
Student L	3	155,49,66	1	4/2	**1**,**3**,**4**,5,5
Student M	3	322,81,115	1	4/2	1,**1**,1,**2**,4,**4**,5,**6**
Student N	2	44,340	4	4/1	**3**,**4**,4,**5**

Participation = 100%
Total responses = 38
Responses per person 2.71
Average length of response = 458 words

Nine students, 64 percent of the class, followed the suggested pattern of making an initial posting early in the week and then returning to the discussion later in the week to respond to messages posted by their peers. Two students posted their initial message later in the week and then responded to others' messages on the

same day. One student made an initial posting but did not respond to other messages.

Although all students participated in this discussion, most of the students posted the required three messages, which consisted of an initial posting and two responses. Only one student posted more than the required three messages. By examining the login patterns of the students during week two it can be seen that in addition to the days on which they posted messages, eight students (57 percent) entered the discussion forum additional times during the week, indicating that they were checking back to monitor the discussion, but did not post any additional messages during these times. Six of the students (42 percent) posted initial messages and responses but did not login to the forum at any other time during the week, which indicated that they did not follow the discussion as it developed.

Week six. The discussion in week six, presented in Table 4.4, focused on a question based on the week's reading about directed and constructivist approaches to teaching and learning. The question "how do students best learn?" was presented by the lecturer. In preparation for taking part in the discussion, students were encouraged to reflect on their own best and worst learning experiences and to analyse these in order to identify possible causes of either success or failure. While a contribution to the weekly forum was part of the weekly tasks, no quotas were given as to numbers of responses required. Students were encouraged to check back during the week and to follow and respond to the ongoing discussion.

Participation in the discussion forum from week two to week six dropped to 92 percent with one student not contributing. Thirteen students made one posting and although 69 percent of the student entered the discussion forum more than once during the week to read responses, no student made a second posting. The average number of postings per student dropped from 2.7 to one over the four-week period from week two to week six and the average length of responses dropped to 202.5 words.   Both the number of responses and the average length of response dropped over 50 percent and a pattern was established here that

continued throughout the rest of the course. Students began to use the discussion forum as a bulletin board where they posted their required comments to the discussion but did not respond or comment on any other postings.

Table 4.4: Week Six Discussion Descriptive Statistics

Student	Number of posts and responses	Length of responses in words	Day of initial posting	Day/number of responses to others	Logins during week/by day Entry to discussion forum in bold
Student A	1	175	5		**1**,2,2,**5**,5,7
Student B	1	153	4		1,**3**,**4**,**4**,**7**
Student C	1	212	3		1,**3**,7
Student D	0				7
Student E	1	259	7		**1**,3,4,**7**,**7**,**7**
Student F	1	177	4		2,**4**
Student G	1	172	4		**3**,**4**
Student H	1	358	6		1,2,5,**6**,**7**,7
Student I	1	248	4		2,2,4,**4**
Student J	1	254	4		1,**4**,4
Student K	1	125	2		**1**,**1**,**2**,**2**
Student L	1	181	2		**1**,**2**,4,
Student M	1	174	3		**1**,**1**,**3**,**4**
Student N	1	145	3		**3**,**3**,**3**,**5**,**7**

Participation = 92%
Total responses = 13
Responses per person 1
Average length of response = 202.5 words

Week nine. The data for week nine are shown in Table 4.5. The discussion for this week centred on course readings that presented the concept of using computers as "mindtools" to support and extend the thinking and learning of students in the classroom (following Jonassen, 2000). In preparation for contributing to the week's discussion, students were asked to consider whether computers were being used as a mindtool in their own classroom or in their school. The discussion was based on examples from the students' experiences and students were encouraged to explain why they believed the examples they gave should be considered as a positive use of the mindtool concept.

Both participation and responses continued to fall in the week nine discussion forum. Participation was 78 percent with four students in the class not contributing to the discussion. Responses per person remained at one but average length of responses continued to decrease to 181 words. Students

continued their pattern of logging into the discussion forum additional times after they had posted, but no student posted an additional message after the initial posting. Two students did not post their responses during the week of the discussion, with one student posting one day after the end of the week's discussion and the second posting 11 days after the discussion had ended.

Table 4.5: Week Nine Discussion Descriptive Statistics

Student	Number of posts and responses	Length of responses in words	Day of initial posting	Day and number of responses to others	Logins during week/by day Entry to discussion forum in bold
Student A	0				1, 1, 2, **5**
Student B	1	168	8 (late)		**1**,2,**3**,4,5,6,**7**
Student C	1	170	1		**1**, 4
Student D	0				
Student E	1	163	7		1,2,**4**,5,**7**
Student F	0				**3**
Student G	1	108	5		2, 4, **5**
Student H	1	143	7		1, 2, 3, 6, **7**
Student I	0				1, 3
Student J	1	304	1		**1**
Student K	1	83	1		**1**, 2
Student L	1	219	1		**1**, 5
Student M	1	226	1		**1**, 2
Student N	1	230	18 (late)		**3**. 5

Participation = 78%
Total responses = 10
Responses per person 1
Average length of response = 181 words

Week fifteen. The discussion in week 15, presented in Table 4.6, centred on the idea of meaningful and powerful learning. In preparation for the week's discussion students were asked to think about any perceptions they had formed, altered or reaffirmed over the 15 weeks of the class.

Participation in the discussion forum for week 15, the last of the course, rose to 85 percent with two students not contributing to the discussion. Students who did contribute to the forum posted only the one required message, but the average length of each response rose slightly to 202 words. One student contributed to the discussion three days after the end of the week. As in previous weeks, students logged in to the discussion more than the one time that they

posted their message, indicating that they were reading the messages posted by the group, but no student posted any additional messages to the forum.

Table 4.6: Week 15 Discussion Descriptive Statistics

Student	Number of posts and responses	Length of responses in words	Day of initial posting	Day and number of responses to others	Logins during week/by day Entry to discussion forum in bold
Student A	0				2
Student B	1	248	7		1,**2,3,3,4,4,5,5,6,7**
Student C	1	186	1		**1**, 7
Student D	1	244	3		1, **3**
Student E	1	260	7		1,2,4,**5,7**,7,7,**8**
Student F	1	111	7		1, 5, **7**
Student G	1	162	7		1, 5, **7**
Student H	1	269	7		1, 2, **7**
Student I	0				
Student J	1	179	10 (late)		1, 4, 6, 7
Student K	1	100	7		**1, 3, 5, 7**
Student L	1	199	3		1, **3**
Student M	1	279	6		1, **2**, 3, **6**
Student N	1	193	6		**1**, 1, 1, **6**

Participation = 85%
Total responses = 12
Responses per person 1
Average length of response = 202.5 words

The analysis of the contributions to the discussion forums over the four weeks shows that students did not interact in any significant way with other students online. The discussion forum operated as a repository for students' required weekly posting but little or no interaction comment or response between students. Student did however, show a strong pattern of going back to read the responses of other students, indicating an interest in and value for the opinions of others in the class.

Feeling Connected to Other Learners in the Online Environment
When asked if they felt "connected" to the other learners in the class, seven out of the eight student interviewees responded with a negative. *Not particularly; no, no, not really; no, not in the class sense; no, not as much as I would have liked,* summed up the feelings of most of the students. Student M's portrayal of how she saw the interaction with other learners was that it lacked portrayed social connection and personal knowledge between members of the class.

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Well not really – not really connected because it was sort of like we're all observing each other. We're like observers. I'll observe what you wrote and think about it and sort of wonder what she might be like or what he might be like and he probably or she probably would do the same thing to me – it's sort of a question. You're observing – and there's a question in the in the air all the time you know. I wonder what his class is like or I wonder how she is or I wonder what she's doing. So really you're connected only by what you write. (Student M)

Student B, who logged in frequently, consistently read messages in the discussion forum and responded to others' postings more often than most students in the class, was the only student who said that she felt a sense of connection to the others in the class. She described a sense of connection informed by her own projections of 'online personas' for the students in the class. Even though she asserted that she felt connected to the online group, she expressed disappointment and resignation at the lack of interactivity between the learners in the class and admits the connection she felt was not reciprocated.

Well I felt as though I was part of a group and as I said I assigned personalities to people, probably because of the way they wrote and that little bit we had to put in right when we introduced ourselves. I think I even assigned ages and things like that. But I did feel part of the group. I think I said in my remarks right at the end of the course evaluation sometimes I was bit disappointed in the fact that – even though I felt part of the group, if you posed questions or things, they weren't answered by other group members. You know, you would – sort of think "well I wonder what they'd think about this?" But then you never found out. (Student B)

Creating online personas for other learners in the class was a theme found in the talk of all the students who were interviewed. Students tended to make judgements about the experience and knowledge exhibited in others' comments.

As far as perceptions go I sort of perceived from the way people interacted and the tone of what they'd written as whether they either knew what they were talking about or they were coming from a pretty much beginning background and I think the combination of everyone was good. (Student I)

Some students also made some judgements about lifestyle issues based on the length or depth of others' contributions to discussion forums and peer-review areas.

There were certain persons on the group that I would zero in on and comment that "oh gosh, they've written another long comment." [laughing] and so then I started to put them into categories of what type of person they were and whether they had time on their hands to write these things and I'd think "oh so and so, oh no they must be working part-time or else have that sort of study time. Here look at the response here, there's so much depth!" (Student C)

Students tended to imagine what other learners in the class would think or say about their contributions to the discussions or peer review areas. As shown by students' fears about their academic competence described in the learner-content section, students were apprehensive about sharing their thoughts and ideas in the online class. They feared *looking like I didn't know what I was talking about*, or that their comments would be *no where near as well done as everybody else's*. Student K expressed how this influenced her interactivity within the online class.

I was very reluctant to go back and read everybody else's because I knew that mine wouldn't be as strong. I found it really threatening. (Student K)

Student N, who was confident in her writing and knowledge of the content but who feared the opinion of others in the class, expressed another reason for lack of interactivity.

And no-one else was doing it, so you don't do it either, you might perhaps get – that people might think that "she's always got something to say" (Student N)

A strong sense of not wanting to appear outside the "norm" of the group by posting more often or at great length appeared to inhibit Student N's participation.

Another theme that ran through comments about perceptions of other learners was a strong sense of comparison of their own contributions with those of the other students in the class. Student B's comment illustrates an example of this type of assessment.

I also used to really enjoy reading what other people wrote as well and um sometimes when they got a bit high powered [laughing] I used to think "oh they must be quite brainy" [laughing]. I enjoyed those, I did but sometimes, you

wonder about the quality of your own contribution sometimes don't you, and worry whether you know, whether they are, well not appropriate but whether they're up to the mark I suppose. (Student B)

It is apparent through the comments of the students that interactivity was curtailed by fear of being judged by the other learners. That all students judged others' written comments was also apparent in the interviews, so their apprehension was probably driven by their own practice and expectations. Students tended to post the minimum amount required and not interact publicly by questioning or commenting on the views of others. Although no criticism or disagreement was ever evident in the online comments, the behaviour of the students appears to act as an unstated collusive defence against interaction of this type. Student B described her feelings in this way.

I remember thinking though – at some stage "oh I don't really agree with that" but probably wasn't brave enough to go online and say so. (Student B)

Vicarious Interaction

Even though students did not feel connected to other learners in the class and did not interact with them online in any significant way, all students reported that they found the online contributions of other learners to be an important part of their understanding of the issues. Students read the writing of other learners in the class and engaged in a type of vicarious interaction with the ideas, opinions and perceptions, reporting that they appreciated being presented with different perspectives on issues. They also commented on how important they found reading about the different ways that students had applied aspects of the content in practice and agreed that this added a valuable dimension to the course.

I think getting their opinions about things, they, people do think about things in different ways and when they put their ideas on I often thought " oh I hadn't thought of that" and I thought it was good because it gives you a very broad range of ideas about the same thing and whereas I might have looked at it that way, several other people might have had similar ideas about some of it but then brought in another aspect that perhaps I hadn't thought of at all. (Student M)

Students also used the writing of others to decide if their own writing was on target. Several of the students reported waiting to post their contributions until they could read some several others and make sure that they didn't want to

change what they had written. Student D, describing how she used the writings of other learners, echoed this view.

I'm one of those people who always find it really interesting to see what other people have done, I guess I'm a bit of a magpie and take things from what they've done and things like that so – it would be – it would be really useful for me sometimes to be able to – there were times where it was useful for me to say read what someone else had done or look at what someone else had done and use it as a reference point perhaps to make sure I was on the right track. (Student D)

Discussion of Learner-learner Interactions

Learner-learner interactivity was not overt for the students in the class. They interacted with one another only when it was a stated requirement. Otherwise they tended to make a posting of the required material for the week or answer the required question in the discussion forum, using these online spaces as bulletin boards where material was posted. This is consistent with the findings of Pawan et al. (2003) who showed that students were sharing information but not challenging the ideas of others. Although students valued and consistently read the contributions posted by fellow students, they did not question or comment on any of the ideas in these writings. They expressed fear about how their own writing would be received and did not actively seek to create an environment that would foster any reciprocal discussions. The impact of learner confidence on online participation is well documented in the literature (Gibson, 1998b; Lim, 2001; Nisan-Nelson, 1999; Russo & Campbell, 2004) and appears to be a factor in the low learner-learner interaction among this group of students. Even though a culture of acceptance was fostered in the online class and students told that there were no 'wrong' or 'right' answers, it was obvious that students did not intrinsically believe this to be true. Fear that their writing would not be 'good enough' or would be criticised by others indicated a lack of trust among the students in this online class. The comparisons they made with others' writing, often waiting to post until they could evaluate their own comments against others in the class, acted to ensure conformity and to decrease the likelihood of diverse opinions and ideas being presented. The tendency of students to create one-way monologues, and use the discussion forum to post their own ideas rather than to challenge the ideas of others has been linked to less complex and critical

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exchanges (Angeli, Valanides & Bonk, 2003; Jonassen, 2000; Angeli, Valanides & Bonk, 2003) and this phenomenon was evident in this study. However, even though students did not interact or relate feeling connected in any significant way to other students in the class, they reported that the ideas and perspectives of the other learners were useful and provided valuable insights to their own understanding of the content. This finding would seem to indicate that even though functioning on the lower end of the scale of interaction, without criticising or challenging others' ideas, the students found the discussion effective.

Learner-lecturer Interactivity

The examination of the interactivity between learners and the lecturer used an analysis of the interviews with the students, an analysis of e-mails exchanged between the learners and the lecturer during the online course and data collected from the end of course evaluations.

Contact between lecturer and students was initiated by the lecturer on a regular basis. An information note was posted on the online course site by the lecturer at the beginning of each week, outlining the topic and tasks for the week. In addition the lecturer communicated with the class by group e-mails and responded to e-mails initiated by the students.

Students showed through their comments that they felt the lecturer to be approachable and helpful. They were consistent in their approval of the availability of the lecturer, the timeliness of the responses to their questions and the positive help that they received. Student B expressed it this way.

I found it very valuable because if I ever had a question you answered it virtually immediately, which was great because I felt being a first time online learner maybe I needed a little bit more support than other people who had experience of it before and know that those questions were going to be answered straight away was really good and very valuable, no matter how silly they were – you were always very good at answering them in a constructive way. (Student B)

Most student-initiated contact with the lecturer was done through e-mail. E-mails that were sent to the lecturer by students numbered 90 over the 15 weeks of

the course, and fell into four main categories: procedural, technical, assignment and personal. Procedural e-mails dealt with the 'housekeeping' or administrative procedures such as questions about missing or incomplete course materials, informing the lecturer that an assignments had been uploaded to the electronic dropbox, checking to see if assignments had been received, signing up for presentation dates, or e-mailing of the course evaluation. Procedural e-mails accounted for slightly over half of the e-mails from students to the lecturer. Technical e-mails included questions about the course site such as uploading and downloading problems, login problems and navigation problems. Assignment e-mails included questions about completion of assignments, but did not include any substantive discussion or questions about the content. Technical and assignment e-mails were represented equally in the e-mails from students. The personal category included instances where students wrote to explain a personal situation such as illness or family situation that required an extension of work due in the class. Six e-mails out of the total of 90 were of this type. Table 4.7 shows the breakdown of types of e-mails sent by students.

The data in Table 4.7 show that while all students exchanged e-mails with the lecturer over the 15 weeks of the course, the numbers varied from a low of three to a high of 12. This averaged to be less than one a week even for Student E who sent the highest number of messages. All the e-mails sent to the lecturer were pragmatic exchanges dealing with the business of completing the online course No exchanges asked for clarification or further discussion of content.

It is possible that the regular group communications from the lecturer and the weekly notes that were posted on the online course site pre-empted students' questions to the lecturer. It is also possible that the structural and pedagogical design of the course, with its archived explanatory notes, hyperlinks to further information, and student-generated content, provided sufficient depth for students' understanding. However, the insecurity and apprehension that students admitted feeling about their own interpretations and contributions, seem to belie this conclusion. While students felt that the lecturer was approachable, friendly and helpful they did not seek out the lecturer for help with content. One possible

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Table 4.7 Student-initiated e-mails sent to lecturer (total by student by type)

| | | Types of e-mail | | | |
		Procedural	Technical	Assignment	Personal
Student	Total e-mails				
A	8	5	1	2	0
B	9	3	2	4	0
C	7	2	3	1	1
D	9	5	0	2	2
E	12	5	4	3	0
F	6	5	1	0	0
G	6	3	3	0	0
H	3	2	0	0	1
I	6	2	1	2	1
J	4	2	1	1	0
K	3	2	0	1	0
L	5	3	1	1	0
M	5	3	1	1	0
N	7	4	1	1	1
Totals	90	46 (51%)	19 (21%)	19 (21%)	6 (6%)

explanation lies in the background of the students. The interviewed students, all of whom were independent, adult learners whose experiences with lecturers were based on the traditional distance model, were not in the habit of seeking or receiving much contact with lecturers. Student I described her previous experience as a distance learner.

You had no interaction with anybody other than your tutor and in the past I generally haven't contacted them for any reason. I could probably count on two fingers the number of times I've contacted tutors in the past with regards to questions and things. (Student I)

The learner-lecturer contact for these students before this online course, had been limited to assessment. As Student B described, *you send them your assignment and they send it back and that's the extent of the interaction with the tutor.*

Discussion of Learner-lecturer Interactions

The easy access to the lecturer found in the online environment was appreciated and utilised by the students to obtain answers to procedural and/or technical problems. In terms of understanding content however, the interactions between

the learner and the lecturer did not appear to be a dominant or crucial type of interactivity for them.

Moore (1991) has asserted that when interactions between lecturer and learner about content are not high, the learners must take on more responsibility for understanding the content, remaining motivated and setting an appropriate pace for learning. It appears that the results of data collected from students confirm these findings. Student responsibility was high and therefore interactivity with the lecturer about content was low. However student responsibility and independence can also be viewed as a possible cause for low interactivity about the content. The learners in this study, who came to the online environment from a strong traditional distance-learning background, began the class as independent, motivated learners whose expectations of learner-lecturer contact were not high. In this case study lack of interaction about the content may have stemmed from both low expectations and well-established independent learning styles. While students in the class did not interact with the lecturer in any significant way about the content in the course, they were aware that the lecturer was available and they made use of this function in the online environment to seek answers to questions about process, technical and assignment issues. These findings are consistent with studies by Harmon and Jones (2000) and Nisan-Nelson (1999) who found that accessibility of the lecturer was an important factor in satisfaction and success in the online environment. Students in the present study indicated satisfaction with their perception of the availability and experience of learner-lecturer interactivity. This is consistent with Swan et al. (2000) who found a correlation between students' perception of the learner-lecturer interaction, satisfaction with the online experience and perception of having learned.

Learner-environment Interactivity

Evidence that students made connections between the course and the environment in which they worked were found in the comments made by students in the discussion forums and sharing areas. One assessment for the course required that students plan and implement a lesson that used some of the content and techniques relating to the use of ICT found in the course content.

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While this assessment was the source of some of the comments about learner-environment interaction, it was clear from student comments in the interviews that their use of the ICT within their own environments was ongoing and extended beyond this assignment. Frequent mention of the use of software, hardware and teaching strategies in their own classrooms showed that students in the course were using this type of interactivity to help them understand and process the course content. Comments from the interviews also demonstrated that learner-environment interactivity was both a motivating factor as well as an expected outcome for the students in the class.

The learner-environment interactivity took different forms as students attempted to put the ICT strategies from the course into place in their own classrooms. Some students worked with small groups. Student D remarked that she was using a *target group* of four children on which to trial her ideas. Some students implemented a more informal approach. Student M described a *queue at the computers each morning before school since we have begun our weekly ICT learning/exploring time.* Some students reported on overall attempts to integrate ICT into their teaching. Student B described an instance where she looked around her classroom and realised that she had created a situation where *all the resources at my disposal were being meaningfully used.*

Comments made by the students indicated that the learner-environment interactivity resulted in awareness and insights made possible by the students' experiences in their schools and classrooms. Students reported on observations made as they attempted to put the theories, strategies and skills in place within their own classroom environments. Students mentioned that they were surprised by the motivation and interest shown by children in their classrooms, were pleased with how quickly and how much the children learned, were pleased that children were taking the initiative and going beyond what the teacher had introduced. Several students mentioned that children in their own classrooms learned from one another, through experimentation and collaboration.

Increased confidence and understanding of how the children reacted to the introduction of ICT into the classroom as well as a growing awareness of how

the ICT changed the dynamics within the classroom were also evident. Student L found that some students were more advanced in their knowledge than he was but also made the discovery as he worked with ICT in his own classroom that this phenomenon was acceptable and worked to the advantage of both the teacher and the students.

They learn so much from each other and if you have one expert in your room then that can quickly turn to 8 or 10. When doing assignments three of the children are far more advanced than me and that's okay. (Student L)

This type of discovery, which resulted in a perceptual change for this student, could not have happened without the learner-environment interactivity in which he engaged.

Students also commented on their goals for the future such as increasing the size and number of the groups of children using ICT or branching out into a broader use of ICT strategies within their classrooms. Among these comments students remarked on the use of software, hardware and learning strategies that they saw themselves implementing in the future. Students liked the assignment that required them to plan, implement, observe and reflect on a classroom activity that incorporated the use of ICT to support teaching and learning and commented that the increase in their experience, self-confidence and personal expertise encouraged them to engage in further learner-environment interactions of this kind.

Another form of learner-environment interactivity was evident from the students' comments about discussions they had with colleagues about the content of the course. Student K, a member of the all-staff cohort taking the online course, mentioned the *camaraderie of the staff* as another way that learner-interactivity happened during the course. Members of this cohort described how useful this support was in processing the content and explained that they often discussed the theoretical ideas in the context of their own teaching situations within their school. Others in the class, who did not have the advantage of such a cohort, nevertheless mentioned that they often discussed the ideas with colleagues, which gave them a perspective grounded in the reality of their own

environments. This interaction with others, first mentioned in the previous section on learner-other, is an example of how the different types of interactivity are related and overlapping.

Discussion of Learner-environment Interactions

The use of learner-environment interactivity was an important part of the interactivity in the class and one that was sought out by the students. Gibson (1998) has noted the importance of considering the multiple environments in which online learners exist and function. It appears that the students in this course used their professional, community and family environments as a resource on which they drew for emotional, technical and academic help, seeking out and creating interactions that existed within these multiple environments but existing outside the online environment.

The nature of an online professional development class would seem to imply that students would make use of the available resources of their own classrooms to trial and process the material presented in the course. Consistent with findings by Hawkes (2001), Hawks & Dennis (2003) and McMahon (1997) who found that participants in online professional development courses were interested in information they saw as relevant to their own classroom situations, students in the present study reported that they used skills and techniques in their working environments which provided them with an opportunity to make the content meaningful on a personal and practical level. Interaction about the content with others in their professional environment was another important aspect of their processing and mastering of the material. Findings from this study support the assertion by Hirumi (2002) that learner-environment interactions allow learners to access and acquire knowledge from sources external to the online environment. For those who had access to class members in a face-to-face environment, this support was seen as very important and a crucial element as students progressed through the course content. Most students relied also on non-members of the class such as colleagues or family members to give technical aid or to act as a 'dry run' for work they planned to submit to the class site.

Discussion

The examination of the learner interactivity present in this online class was based in part on the theoretical models presented by Moore (1989) and Hirumi (2002). Although Moore and Hirumi did not attach greater importance to any one of these learner-centric types of interactivity, it is apparent from this study that some of the interactions were more significant than others for the students involved. For these students the learner-content interactions not only were the most important, they were what drove all other interactions. A hierarchy became apparent as students described their interactions within the online class and it was evident that, in the students' view, interaction with the content was the focus and all other forms of interactivity served this learner-content interaction. As students discussed and described their interactions with content they included learner-interface, learner-self, learner-other, and learner-environment as important and significant interactions to their successful progression through the course. They also described instances of vicarious interaction, interpreted within these results as a subset of learner-content interaction, as well as learner-lecturer and learner-learner interactions. These last two types of interaction, while mentioned as somewhat valuable by the students, were not seen as essential types of interactivity, particularly as students interacted with the content. Figure 4.2 represents in visual format the hierarchy of these interactions as interpreted through students' comments and actions.
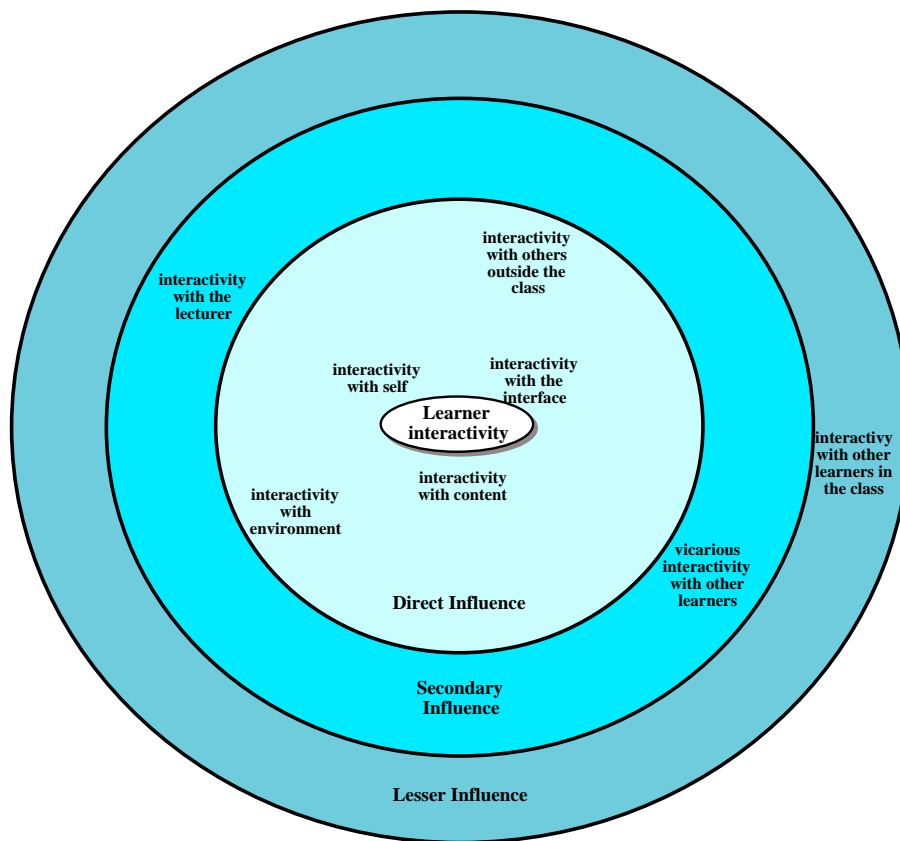
Figure 4.2 Influence of types of interactivity on students in the online environment

An explanation for this hierarchy can be found by examining the way in which the online environment mediated the students' behaviour in this course. First the online environment required that students interact with the computer interface to both obtain course materials and to communicate with others in the class. The interface was the gatekeeper and learner-interface interactions initially were seen as intrusive at best and an obstruction at worst. Students struggled with the technical issues of getting logged on to the site, finding the course materials, uploading their own contributions and interacting with others. Since the online environment required this learner-interface interactivity the students were compelled to solve the problems and interact with the interface on a regular basis. This interactivity was the catalyst for many of the learner-other interactions and some of the learner-lecturer interactions as students sought help to solve technical issues.

Second, the students were required to access and interact with the content in ways that were mediated by the online environment. The content, in the form of

written explanation and instructions from the lecturer, weekly tasks, readings, and links to relevant sites on the Internet, was housed online, thus requiring regular and deliberate connections to the online course site. In addition, as the course progressed, the constructivist design of the course required that content, created by the students in the form of presentations and contributions to discussion forums, be uploaded and shared with others, thus creating a public arena for the documents and discussions that represented the meaning that students were making from the content in the course.

Third, the online environment required that students be self-regulating and independent. The asynchronous nature of the course meant that there was no physical location or set time to attend class, thus requiring students to impose their own structure. As shown from the results of the learner-self interactions in this study, students in this course did regulate and structure their own study, adapting study times to their own personal and professional lives. Although the students' approach to managing the times and materials in the class varied from student to student, the underlying requirement that they exercise learner-self interactivity was core to the students' success as learners in the online class.

These three areas of learner-interface, learner-self and learner-content were required interactions for the students if they were to be successful, meet the course requirements and pass the course. Although students' responses varied in *how* they approached these interactions, the online environment demanded that these interactions take place. On a matrix of least-student-control to highest-student-control, shown in Figure 4.3, these three interactions represented low control but high involvement for students.

Other types of interactivity found in this online course granted the students more control and it is by examining these interactions that it is possible to understand the importance of these interactions to the students' success in the course. Learner-other interactions and learner-environment interactions were not required by the online environment but were sought out and engaged in by the students as ways of helping them to work through the technical demands of the course, understand and make meaning from the content and increase their

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confidence in participating in the online environment. The fact that students willingly sought out and engaged in these interactions indicates that these were useful and important to the students.

Learner-lecturer and learner-learner interactions, while encouraged by the online environment, were required only in general terms with the lecturer and only in the first two weeks of discussions with other learners. The amount of interactivity and the substance of these interactions were controlled by the students. The learner-lecturer interactions, while numerous, served a functional rather than an academic purpose for the students, helping them to solve technical and procedural problems but not related in any substantial way to the content in the course. The learner-learner interactions were for the most part vicarious rather than actual and for the students represented mainly by their reading and processing of others' comments in the discussion forums. While students reported this vicarious interaction as important to their understanding of the content, the interaction itself was more of a learner-content rather than a learner-learner interaction.

Shearer (2003) takes the position that adult learners who are motivated and self-directed may not find that a high level of interactivity in an online environment to be crucial to their success. He argues that minimal online interactivity that is meaningful and authentic to the learner may be sufficient. It is clear in the present study that students chose the types of interactivity that were authentic and meaningful to them, either because they recognised the importance of the interactions to their success or because they created the interactions to further their understanding of the online content and the online environment. The matrix shown in Figure 4.3 depicts visually the relationship between the control and the involvement in the various types of interactivity present in the online class.

High Involvement

Learner – other
Learner – environment

Learner – content
Learner – interface
Learner - self

High Control/Choice

Low Control/Choice

Learner – lecturer

Learner - learner
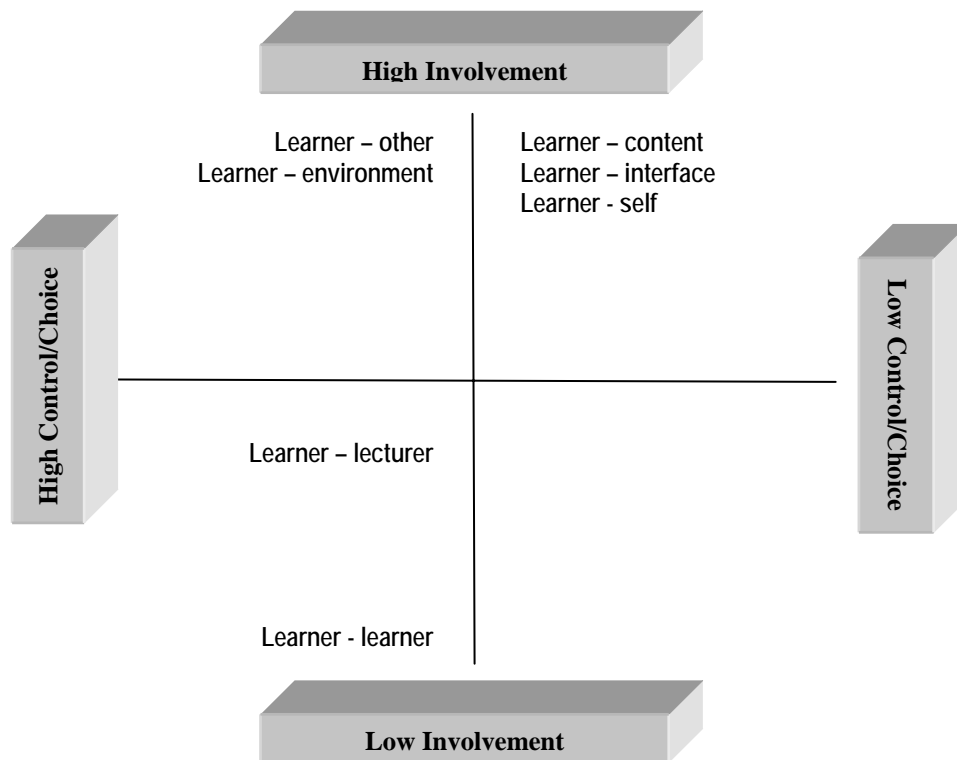
Low Involvement

Figure 4.3 Matrix of control and student involvement represented in types of interactivity

Anderson (2003) offers an equivalency theorem that meaningful learning can be supported as long as either learner-content, learner-learner or learner-lecturer are present at a high level. This theorem seems to be supported here. While overt learner-learner interactivity was not strong and learner-lecturer interactivity was supportive of the "housekeeping" types of details rather than the more substantive understanding of the course concepts, the learner-content interaction was found at a high level and furthermore was the base for a rich and interconnected web of other interactivity that students deemed important for their success.

The viewpoint of Anderson and Garrison (1998) that interactivity is a reciprocal, consensual and collaborative communication that furthers and facilitates the making of meaning, was demonstrated here as students actively sought interaction that they thought important to meeting the requirements of the online course. In examining the interactivity present in this course, it is clear that the students found some types of interactivity more crucial to their success than

others. When given a choice they created opportunities for meaningful interaction that, although stimulated by the online environment, existed outside it.

This chapter has examined the nature of the interactivity within the online course, describing the types of interactivity present and the level of the students' involvement in the various interactions. The following chapter will examine some of the influences that were present in the online course that had an impact on the overall interactivity: the influence of the textual nature of the online course, the social presence in the online course and the students' perceptions of the online environment.

Chapter Five
Influences on the Interactivity in the Online Class

In Chapter Four the types of interactivity were discussed, identifying the 'what' and the 'who' and the 'how often' inherent in the interactivity. This chapter focuses on the 'why,' identifying the influences that contributed to the ways that students interacted. Within this study three major influences were present that contributed to the way the students interacted in the class: 1) the mediation of the textual environment; 2) students' perceptions of the roles of the learner and lecturer in the online environment; and 3) a lack of social presence. These influences are discussed in the following sections.

Textual Context of the Online Environment

It is clear that the textual environment of the online class had an impact on the students' interactivity. As shown in Chapter Four, these students expressed concern about posting their own writing to the class site and this apprehension showed as they interacted with the content, with other learners and with others outside the class. All the students interviewed commented on the impact of communicating by writing in the online environment. While the level of comfort and skill in expressing themselves in writing differed among the students, all had reservations about the textual environment, and their concerns, while varied, pointed out some important ways that the textual environment mediated the experiences of the students in the class.

Different levels of ease and comfort with written communication were apparent in the remarks from the interviewed students. Three of the eight students interviewed spoke of a lack of confidence in their writing abilities, expressed either as a worry about their use of grammar, syntax and spelling or a concern about finding the right words to articulate their meaning.

Student B, who described herself as someone who tended *to write things in very ordinary language* was concerned about how her writing would compare with that of others in the class. To help reduce this concern, she would occasionally check with colleagues, who read what she had written and gave their input before she uploaded it to the class site. Even though the worry over comparing herself

to others lessened as she gained more experience, she described her initial fear of not wanting *to sound thick* to others in the class.

Student E, who worried over mechanics such as spelling and punctuation as well as substance in her writing, felt that she had lost her writing skills, and depended heavily on her husband to proofread and give her feedback on the content of her writing before she submitted her work to the class. Again, she felt that this support was important and allowed her to regain her confidence as a writer.

So um – it was a start – getting that verbosity that I do have with all language back into my writing again 'cause I used to love writing – and I used to be one of the best writers at primary school – but putting me back into the environment – I'm not a writer any longer – you know um but you could – it was amazing once you got started how your brain would – would get going and what would come to mind and how the pieces fitted. (Student E)

Student K, another student who worried about her ability to express herself in writing, described herself as *threatened* and *insecure* as she prepared her weekly contributions to the class discussions.

I'm not a linguist – as such. I mean language doesn't – as you probably noticed already – language doesn't flow out easily and I found it very hard to um put my thoughts into the computer. And every time I did I thought – oh no you know my – my comments are nowhere near – not as well done as everybody else's. I don't have the vocab that a lot of other people have and yeah – I found that very threatening. (Student K)

A theme that ran through all three of these students' comments was that of comparison with others. The impetus behind the apprehension was the public forum in which the students' thoughts and opinions would be on display. The fact that the text was archived and available for others to view and review was also a factor that created anxiety for some students.

It's the idea of putting it into print you know. Because if you say it and it was a silly idea then people can sort of go "ha ha ha ha – where is she coming from?" and it's over. But when you've got it written in print then people can go back you know. And then you think well if that's in print some clever person's going to come along and say "Well that's a load of rubbish." But that never did happen. (Student B)

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Other students described themselves as comfortable with writing as a form of communication but still outlined reasons why this method was a barrier in the online environment. Student I, who declared himself confident in his writing abilities and did not express any apprehension about how his words would be received, nevertheless felt that writing was not his preferred method of communicating. In his statement below he indicated that the time it took to physically get a connection and type in a response acted as a barrier as did the lack of spontaneity he found in the asynchronous nature of the online class.

Frequently you would be confounded by the fact that you couldn't get a connection or something and then you say "oh well, stuff it, I'll try again later" or do something else or something like that so I think it was just a physicality of all those issues and that you – not everyone was obviously logged on at the same time so you couldn't have you know kind of a chat, a chat situation whereby you know you could get some instantaneous response – well relatively instantaneous response. I think it was probably more a combination of the, of the access and um I mean I'm a reasonable two or four finger typist and I've got a hell of a lot better this year but um, certainly not you know, not to any great extent where I could feel like I've got a thought in my head I'm just going to whack it out in a minute. (Student I)

Student D, though comfortable with expressing herself in writing, also indicated a low preference for the method. Her words also point to another dimension of how the textual nature of the online environment mediates the students' experience.

It's um, it's not my preferred – I'll make that clear – it's not my preferred way of expressing myself but I'm happy to do it, you know, and I think that in terms of expressing yourself to people who are basically strangers, to do it in written form is quite safe because you can always read it before you post it and change anything that you want to or you can save it and have another think about it and post it later whereas once the words have been said you can't take them back. (Student D)

Student D makes an important observation about the dynamics of the online class environment when she describes text as a *safe* way to express herself to strangers. For this student, the online class did not represent a spontaneous atmosphere where students could express themselves casually; but rather was a place where she felt the need to think carefully about her words and where she recognised the advantages of rereading and revising her writing. As noted in Chapter Four, Student D described this as a type of *formal prethought*.

Student C, who expressed herself as *word smart* and comfortable with expressing herself, still felt that the written environment was quite stressful. She described the experience of uploading her written comments in this way.

I found that quite stressful. The fact that once I let it go I'd lost my power over it and I found that very stressful. So I would reflect and say "did I say that, did I say this?" and I'd go back and read what I'd written in terms of the larger assignments and think "oh I could have included such and such" or "I didn't really get that piece of information out there." So I found that daunting. (Student C)

Student C's comments about her writing point out an interesting aspect of the textual environment in which the students in this class operated. She describes *losing power over it* as though the writing, once uploaded to the course site, would become an entity in and of itself, a representation of that individual within the online space. Her words, once they were uploaded to the site, became the representation of Student C herself. Her writing became the method by which other learners would perceive who she was and what she thought.

A comment by Student N reinforces the concept that the words that a student writes become the online representation of that student and shows yet another dimension to the way that the textual environment inhibited students' interactivity. Even though there was no restriction placed on length of comments in the discussion forums or peer review/sharing areas, she felt constrained by the length of her contributions within the written environment.

And you might have perhaps felt free to write more, I mean when you are writing a comment you're restricted to a certain number of words so when you're talking you might have said a lot more because you wouldn't have been restricted to a "keep it to this size" (laughing). *You are always aware of how long it is aren't you, even when you're making a comment in the forums, you don't want to go on and on and take over the whole forum so you only make small comments, whereas if you were in a conversation you can talk for quite a while.* (Student N)

Student N indicated an awareness of how others might perceive a long post as an attempt to dominate the forum. Interestingly she did not see the same constraints on talk in a face-to-face discussion even though it is possible for one person to dominate a face-to-face discussion with too much talk. In the online environment there are none of the normal visual clues that act to keep

participants in a face-to-face discussion aware of the perceptions of the other members of the exchange. Body language, tone of voice or eye contact are missing in the textual environment. The only feedback available in the online discussion is also textual and would appear in the form of a response to a posted message. Student N's comments indicated that she did not see or experience the give and take that would be present, and possibly a mediating force in a face-to-face conversation. Without these visual clues, which help to mediate the "turns" of talk, the online student is isolated without a clear idea of how words are being perceived and processed by the other members of the class. With little or no comment from the other students in the class, there was no way for Student N to get feedback about the appropriateness of her contribution.

In summary, several reasons can be identified that indicate that the textual environment exerted an influence on the students in the class. First, some of the students did not find writing comfortable as a means of communication and the public nature of the posting created the potential for criticism and judgement by others that further increased their anxiety. The writing was displayed in a very public arena where it was read by others, archived so that it could be reread at other times and perceived as available for comment or disagreement by other students and the lecturer. Second, even students who were comfortable with their ability to communicate through writing were restrained by the interface and mechanics of getting the comments uploaded to the course site. This confirms Hirumi's (2002) position that the time that it takes to accomplish things in the online environment, where reading and writing are the predominate forms of communication, can act as an inhibitor to interactions for the students. Typing the response, getting a connection, logging on to the course site, navigating to the discussion forum and uploading the material were seen as physical barriers, while the asynchronous nature of the online class was seen as a barrier to effective communication. Third, the lack of interaction within the forum itself ensured that students operated in isolation and that no collaborative understanding of how the forum should operate ever developed. This led to the "bulletin board" type of posting, described by Paulus, Yalcin & Chang (2003) and Angeli, Valanides and Bonk (2003), where students uploaded their carefully

constructed comments and reflections but which did not lead to an exchange or challenge of ideas.

The online environment, textual and mediated through a technical interface, demands a level of individual participation that both isolates and exposes the student in a way that most face-to-face classes do not. Tu (2000) found that the more public that students perceived a medium to be, the lower the social presence, and this finding was supported by the present study. The archived and synchronous nature of the discussions, which allowed continued access, created a public forum that many students found difficult. In an online environment, the student's words represent him or her; to be 'present' the student must write and submit that writing, which then becomes a textual persona. Lacking the instant feedback and body language, facial clues and tone of voice that normally inform a face-to-face discussion of ideas, students find themselves presenting their ideas and opinions for the scrutiny of a group of individuals whom they know only through their respective online personas and for whom they may have developed little trust. Shy or reticent students or those lacking confidence in their ability to interpret the content or express this interpretation in writing, find this exposure to be especially problematic.

On the positive side, the textual nature of the online environment did mean that each student had the opportunity to read and process the ideas and thoughts of the other students, allowing them to reflect on and respond to material and messages before submitting their own responses. All the students noted this as a positive feature of the online class and credited this as an important part of their own learning. Although evidence that participating in an online course increases students' writing skills is contradictory (McFerrin 1999; Beisser & Steinbronn 2001; Zeidler, 1997; Saunders, 1997; Picciano, 2002; Stephens & Hartmann, 2004), students in this class reported that they gained confidence in expressing themselves through this medium as the course progressed. The exposure to the writing of others (Beisser & Steinbronn, 2001), or to the practice of writing required by the online environment (McFerrin, 1999; Zeidler, 1997) have been shown to have positive effects and these constructs were found to be contributing factors in the present case study. By the end of the course, students had become

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more comfortable operating within the textual environment of the online class, finding increased confidence in their ability to express themselves in writing and creating a comfortable level of response within the group that did not invite response or generate overly critical analyses of their comments.

Perception of the Roles of the Learner and Lecturer in the Online Environment

For all the students interviewed, the course represented the first fully online class that they had attempted. These students brought to the online class a combination of previous distance learning experiences, where they received the course materials in the mail, completed assignments and returned them to be marked; and traditional face-to-face experiences where they attended classes at regular and appointed times. The different perceptions that students held about the online environment and the ambiguities within their talk, pointed out the lack of any clear and commonly held idea about the nature of the online environment. It is interesting that many of the students seemed to fault the online environment because it lacked the components provided by a face-to-face class such as spontaneous discussions, eye contact, visual cues, and face-to-face lectures; but they also faulted it for some of the features that were added, such as weekly deadlines and required interaction, that did not exist in traditional distance learning.

It's kind of like there's the online learning because it's in the middle, because it's – I can cope quite well with just having my course notes and my textbook and just reading everything and sending it off and the face to face thing is great, but the online is kind of this funny mixture of the two and doesn't yeah doesn't sort of sit quite so nicely, well it didn't, but maybe it's because it's just different.
(Student K)

The students in this class were adult learners, self-directed and motivated, who brought with them successful experiences as traditional distance learners. These students had proved themselves capable of learning within a system that did not include contact with other learners and one in which contact with the lecturer happened only through the return of marked assignments. For these students, a weekly requirement involving interactivity with other students and a lecturer was not one that all students found to be positive. Student I, noting that *I don't think*

you are on there to make friends, and *I could probably count on two fingers the number of times I've contacted tutors in the past with regards to questions and things*, indicated that interactivity was not a usual occurrence or something that he necessarily required as a learner. This lack of interactivity with a lecturer or other students, normal for traditional distance education students, required that students be self-motivated, independent learners to be successful and is a factor which could explain in part the lack of any real depth in the interactions between students or the lecturer. While the students did value having access to the ideas and opinions of others through the discussion forums, this interaction was more of a learner-self interaction rather than a learner-learner exchange.

The students' perception of the role of the lecturer in the online class was demonstrated by the responses to a question about the lecturer's involvement with the content. Interestingly, the question itself seemed to confuse the students. When asked what interactivity they saw between the lecturer and the content, five of the students asked for clarification of the question and a sixth student asked that the tape recorder be turned off so that she could contemplate the question and formulate an answer. Of the eight students interviewed, two saw and spoke of a connection between the scope, sequence and choice of the content, and the lecturer. The majority of the students however answered with statements such as *no, not really, no* or *none at all really*. This separation that the students saw between the content and the lecturer in the online course was demonstrated as the students talked about their own learning in the course.

As I say I'm sort of quite analytic in this sort of style of learning – I enjoy being able to go through that – the very structured process that they – um – the StudentNet had. (Student M)

Student M began by referring to the structured process of the course that *they* had, but then corrected herself after a short pause and attributed the structured process to *the StudentNet*. The initial 'they' denotes both a sense of distance from the student and a sense of disconnectedness with the lecturer, who although sitting with the student at the time, was not seen as being the author of the *very structured process*. The correction to *the StudentNet* further depersonalises the

online environment, and moves the control of the process to course management software.

Another student, speaking more directly about the depersonalisation she sensed in the online environment compared how she saw her involvement within the online environment versus a face-to-face class with a lecturer. She identified this as a situation that provided more control for her as a student and correspondingly less for the lecturer.

As compared to a lecturing situation I find the computer probably less intimate, I think if you like, um, yeah, your relationship is with the computer, it's not necessarily with the person who's driving what the computer is giving to you, so um, because you have that control over the computer, oh I can just say no I can do it tomorrow. If you've got a lecturer you have to attend that lecture there and then and so online's more flexible in that respect. (Student C)

Student I, who compared the online class to face-to-face learning experiences, mentioned another aspect relating to the lecturer's role in the online environment. He rated the online class as better than bad face-to-face but worse than good face-to-face, particularly noting the ability of the lecturer in the face-to-face class to control the student's time and attention in a way that an online lecturer cannot.

If I was to compare the good [face-to-face] *with online then I very much enjoyed the interaction of the face-to-face, if I was to compare the bad* [face-to-face] *with the online then I would say online – go for it – because I wouldn't have to put up with the nonsense of sitting around half bored each day.* (Student I)

These examples point to the concept of learner autonomy that surfaced in students' perceptions of study by distance, online or face-to-face. Students saw the greatest autonomy in the traditional distance environment and the least autonomy in the face-to-face class but struggled to define where in this hierarchy to place the online study. When comparing the online class with the almost total autonomy of traditional distance study, several of the students indicated that they found the autonomy of the traditional distance course preferable to the weekly requirements of the online class.

I probably found the ones by distance easier to do than the online one because I could do the bulk of it when it suited me to do the bulk of it. I wasn't required to do – have to do – some every week and that was quite a challenge some weeks when you're trying to juggle other things plus you know if you were sick or the children were sick. (Student K)

However other students, viewing the online course through the lens of a face-to-face class, recognised the increased autonomy that the online offered.

I liked it particularly because whenever you felt like doing something you could just go and do it. You didn't have to set aside three hours a week to go to a face to face course, it just, you could fit it around your lifestyle and what you were doing. (Student E)

For some students accessing the content through the computer interface was described as a barrier, indicating that they struggled to fit the use of the computer into their preferred method of study. Also noting the complexity of dealing with the computer interface required by the online environment, Student K drew a comparison with what she perceived as the simplicity of the distance education approach.

I actually found it really hard – um – and after having done the nine before – that is the readings arrive in the mail and you read them and then you do your assignments in the back. I kept finding myself printing off stuff so that I could read it. I found it very hard to do – to look at one thing and then have to reduce that screen and blow up another one. We had to have the pieces – I prefer to have the piece of paper all sitting in front of me. Um – so in that respect we were kind of - I felt like I was doubling up because the information I had was in two places. (Student K)

From her comments, it is clear that Student K was attempting to adapt her study methods in the online course to the distance education methods with which she was comfortable, in this case having all the materials in print and available to her. As noted in Chapter Four, many of the students did print or download the materials, the effect of which may have been to require fewer login times and may have provided less opportunity for interactions with other students.

Student D also compared the computer interface of the online course with her traditional distance study and pointed out the most significant problem from her perspective.

Yep, um, any content that was online rather than a printed form tended to be a lot harder to take seriously I guess to actually really kind of think yes, I'm studying here rather than just kind of you know reading, so that would probably be the biggest one. (Student D)

Student D's comments indicate that like Student K, she found that having the content delivered via the computer was somewhat problematic and a method that did not fit into her usual study methods.

Student N viewed the online class through the lens of a traditional face-to-face class and her comments indicated that students' perceptions of the roles of the students and lecturers in the online class were still evolving.

Um, and I mean obviously with face-to-face there's room to expand on things, so if there's somebody who's confused or if you've got a query or something you can actually ask for clarification and get it whereas you can't when you're online. Well you can I suppose through an email but it's not quite so easy. (Student N)

In summary, Figure 5.1 shows the perceptions of the students as they attempted to categorise the online environment, using as a frame of reference either a traditional face-to-face class or study by traditional distance education.

As seen from this diagram, when students compared the online class to a face-to-face class the items they mentioned as positive were aspects that were already present in their distance classes. The items the students mentioned as negative were expressed as aspects that were missing such as no eye contact, no instant answers, no spontaneous discussion, present in a face-to-face class but absent from both traditional distance and online classes. When comparing the online class to a traditional distance class, students commented positively about some aspects, different from the distance, class that seemed beneficial to them as students. These included greater access to the lecturer, accessing the opinions of others and having a structure to guide their study. However the negative aspects mentioned by students were, in some parts in opposition to these ideas, where the structure of the weekly requirements and the interaction were seen as a loss of autonomy, the sharing of work and ideas in a public forum was seen as stressful and obtaining content through a computer interface was seen as a barrier.

Student perceptions of the online environment

Comparing online to traditional face to face

Comparing online to traditional distance education

Pro

Con

Pro

Con

Comparing online to traditional face to face — Pro

1 Increased autonomy
2 Not bound by location or time
3 Can avoid boring or bad lectures

Comparing online to traditional face to face — Con

1 No spontaneous discussions
2 No ability to get instant answers to questions
3 No eye contact, facial expressions, body language clues

Comparing online to traditional distance education — Pro

1 Having access to the thoughts and opinions of others
2 Structure of weekly work
3 Access to the lecturer

Comparing online to traditional distance education — Con

1 Public sharing of ideas/work
2 Loss of autonomy - having to meet weekly requirements
3 Accessing content through technical interface

Figure 5.1 Comparisons by students of online education to face-to-face and traditional distance classes

Anderson and Garrison (1998) point out that learning in a networked world requires an understanding of new roles and responsibilities, and suggest that the interactive communication possible in this environment will create reciprocal, consensual and collaborative elements inherent within the structure on learning online. These elements appeared to be only at a nascent stage among these learners. There is evidence that students recognised the differences they found in the online environment but did not develop a sense of themselves as a community of learners or a clear understanding of the online learning environment as an entity in itself. They described the online environment as a curious mix between traditional distance education and face-to-face instruction. While they recognised access to the lecturer as positive, they also struggled to describe the role of the lecturer in the online environment. While they

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acknowledged that access to other students' ideas and perceptions supported their learning, they did not engage with other learners in any substantial way. This pattern corresponds with the position taken by Pawan et al. (2003) who argue that in many cases students are engaged in information sharing rather than the reciprocal, collaborative construction of knowledge. Although researchers have begun to suggest that the theory underpinning online learning may transcend that of more traditional approaches, requiring more than a comparison to either traditional distance education or traditional face-to-face education (Blanton et al., 1998; Jonassen et al., 1995; McIsaac & Gunawardena, 1996), it is clear that students in this study struggled to define themselves as online learners.

Lack of Social Presence

A third factor influencing the interactivity in this online class was that of social presence, or more particularly, a lack of social presence. Unlike a face-to-face class where facial expression, tone of voice, body language and physical presence combine to create social presence automatically, the online environment is missing such cues and participants must rely on interaction through textual messages to create an online presence and be seen as 'real' by the other students. The place where such interaction between students was designed to take place was in the weekly discussion forums. In these discussions, students were provided with the opportunity to present their views and respond to the comments of others in the class. Chapter Four showed that very little learner-learner interaction within these forums took place. Instead, students posted their comments as though the forum was a type of bulletin board. The postings of the students read like mini-essays, with very little reference to comments posted by other students. With the exception of the discussion in Week Two where students were required to respond to at least two other students' posts, there were no responses between students in any of the other weeks that were examined. Although it is clear that students were logging on and reading the responses in the forums, they did not over the 15 weeks of the course, begin to interact with one another in the discussion. The quotation below demonstrates the impersonal nature of most of the replies.

I agree that schools will still always have a place in society, although the whole organization could potentially be very different. It would broaden the opportunities for students because there would not be total dependence on the teachers who is physically present. Technology would enable students to have access to many other 'teachers' and learners. Information and feedback could be shared much as we are doing now. Many secondary age students are communicating with each other now as they could before the likes of cell phones and MSN. (Student F)

Using the categories of social presence developed by Garrison and Anderson (2003) which include indicators for affective, communication and cohesive responses, the four representative discussion forums for weeks two, six, nine, and 15 were examined. The analysis, shown in Table 5.1, indicates little evidence of social presence among the group of 14 students.

As can be seen from this analysis of the four discussion forums, there was little evidence of affective input, the first of Garrison and Anderson's categories. The expression of emotion or use of humour was negligible. Of self-disclosure, the last indictor in the affective category, student responses fell into two categories: 1) explanations of personal experience within their professional lives and 2) expressions of personal interaction with and perceptions of the content. Within this second category were found comments that indicated expressions of vulnerability and a willingness to share these insights with other members of the class. Out of a total of 74 postings, there were 24 incidences of self-disclosure across the four forums indicating that the majority of the postings were written in a more impersonal format rather than one that disclosed personal information about and experiences of the writer.

In the interactive category, designed to identify evidences of students' involvement with one another in the discussion, this pattern of non-involvement was repeated. Students used the reply function of the forum only in the week two discussion, where replying to two messages was required. Over the four weeks only three students made explicit references to others' messages, two students complimented other class members, and 14 students expressed agreement with others by specifically calling them by name or (week two only) referring to them as 'you' when replying to a specific post.

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Table 5.1 Social presence classification and indicators for Weeks 2, 6, 9, 15 discussions (adapted from Garrison & Anderson (2003))

Category	Indicators	Definition	Wk2	WK6	Wk9	Wk15	Comments	Examples
Affective	Expression of emotions	Conventional expressions of emotion, or unconventional expressions of emotion, includes repetitious punctuation, conspicuous capitalization, emoticons	5			2		'We are becoming used to change!' 'I found the first article by David Moursund fascinating.' 'I whole heartedly agree…' 'It amazed me too…' 'I have to now use the information that I have gleaned and put all my fears aside and just do it!'
	Use of humour	Teasing, cajoling, irony, understatement. sarcasm	1	1				'You'll have to excuse my cynicism at this stage. I can be converted and believe it or not I have an open mind!" 'As Max said in Where the Wild Things Are…"Let the wild rumpus begin!" It seems quite reflectively appropriate somehow.'
	Self-disclosure	Presents details of life outside of class	1	7	2	1	In week 6 students were asked specifically to contribute specific examples from their own classroom or school	'I have used Inspiration in the past but must admit I found utilising MS Word textbox features achieved similar results, at considerably less expense.'
		Expresses vulnerability	3	1	6	4	Evidences of self-disclosure fell into two categories: 1) explanations of personal experience in professional lives and 2) expressions of personal interaction with and perceptions of the content. It is the second category that produced expressions of vulnerability.	'After completing the readings and having a discussion with my husband on this topic, I seemed to come up with more questions than answers.' 'I have attempted in the past to use the computer as a mindtool – with varying success!'
Interactive	Continuing a thread	Using reply feature of software, rather than starting a new thread	22				Responding was required for the discussion for weeks 2 but not for weeks 6.9 or 15.	
	Quoting from others' messages	Using software features to quote others' entire message, cutting and pasting selections of others' messages						
	Referring explicitly to others'	Direct references to contents of others' posts	1	2				'I thought your comment "teaching may well be lost if it is not personalised" was fantastic.'

						Notes	Examples
	messages						
	Referring to others' messages in global terms	Indirect references to contents of others' posts, general references to group content	1	1			'Several people commented on the need for funding and Ministry input …' 'I can certainly see the advantages of this approach, however, as stated by others, …'
	Asking questions	Students ask questions of other students or of moderator	5	1	1	Questions were not directed at particular students or lecturer – were encouraged in the discussion in Week 2	'Perhaps the lack of rate of change in using ICT is because of those adults who are technophobic?'
	Complimenting, expressing appreciation	Complimenting others or contents of others' messages	2				'I thought your comment "teaching may well be lost if it is not personalised" was fantastic.' 'I liked the way you explained how you saw the future of education…'
	Expressing agreement – General no names used	Expressing agreement with others or content of others' messages	5		2		'I also thought …' 'I agree that …'
	Expressing agreement – using names/specifics	Expressing agreement with others specifically by using names or personal pronouns or with specific content of others' messages	11	2	1	Responding to a thread implies that student was agreeing with specific person even though the person's name was not used in the comment	'I liked your idea…' 'I agree with you Susan and James.' 'I agree with Lisa about intrinsic and extrinsic rewards.'
Cohesive	Vocatives	Addressing or referring to participants by name	4	2	2		'I was interested to read Ella's comments …'
	Addresses or refers to group using inclusive pronouns	Addresses the group as *we, us, our* group	1	1		Only one student use "we" to refer to another member of the class	'…it seems that we are thinking along the same lines.'
		Uses *we* to refer to the broader group of teachers	12	3	3	Students who used "we" or "us" referred to the larger group of teachers – not to this particular class.	'The reality from a teacher's perspective is that we will not 'reach' every child equally.' 'We as teachers must ensure …' 'Setting our students up for success is not easy…'
	Phatic, salutations	Communication that serves a purely social function, greetings, closures					

The third of Garrison and Anderson's categories, used indicators designed to identify cohesion among the group. Again, the examination of the four weeks of discussion showed lack of cohesion. The use of vocatives to refer to students by name happened six times and only in weeks two and six. While many students use the pronoun 'we,' examination of the context revealed that the pronoun referred to the global group of teachers in general rather than the 'we' of this particular class. Only one student used the pronoun 'we' to refer to a member of the group: *...it seems that we are thinking along the same lines.* There was no communication in any of the four discussions that served as a purely social function such as a greeting or closure.

In summary, social presence, defined as the extent to which others seem real or present to the members of an online class (Garrison et al., 2000), did not operate in this class. The findings from this analysis of the discussion forums show that little social presence existed among these online learners. They support the conclusions from other data in this case study indicating a lack of substantial interaction among the students. Students expressed anxiety about sharing their writing in the discussion forum, indicated that they felt little or no connection to others in the class, feared the judgement of their peers and in general avoided making contact with one another.

Studies have identified those traits and characteristics that encourage social presence in online environment including frequency of interaction responsiveness and communication styles (Russo and Campbell, 2004), use of humour, self-disclosure, quoting from others, using others' names or salutations, and expressing agreement (Rourke et al., 2001). These characteristics were missing or used infrequently in the present study.

Stephens and Hartmann, drawing on the work of Riel and Levin (cited in Stephens & Hartmann, 2004), define criteria for a successful online community and among these are existence of a shared interest, agreement on the nature of the task and acceptance of a shared commitment within the group. In this group of online learners a shared interest did exist which was learning how to support teaching and learning with technology. However, a commitment to sharing experiences about this interest was never evident. Students appreciated being able to read the opinions of others but

showed little interest in engaging one another in the discussion. The task, as defined by the students' mode of participation, was to meet the requirement of the class to post something to the discussion board each week. A commonly defined task or any kind of shared commitment did not appear to be part of the students' agenda and social presence remained low throughout the course.

Rourke, et al. (2001, p. 1) refer to social presence as "the ability of learners to project themselves socially and affectively into a community of inquiry." For the students in this case study, a sense of an identity in the online environment did not appear to be strongly developed either in the students' perception of their own identity within the group, or in the students' perception of others. The few who did comment on their perceptions of others in the class, formed these perceptions on their own assumptions about the individuals based on indicators such as length of written responses, number of responses, and depth of responses. Most students however, like Student M who felt that everyone was just "observing" everyone else, did not feel an understanding or connection with other members of the class. Student N captured the essence of this lack of social presence this way.

I think that's what it's like when you're online really – it's a bit like watching the world news on TV isn't it? It's sort of distant from you and yet you are taking it in – you're taking it in but it's sort of still distant from you and whatever happens. (Student N)

Discussion

The influences present in this online class deemed to have an impact on the interactivity, particularly the learner-learner interactivity, were the mediation of the textual environment, the concept of learner and lecturer roles held by students in the class, and a lack of social presence. Clearly these influences were related. Social presence, identified as important in helping people regard others as real and viable in the online environment (Lombard & Ditton, 1997; Short et al, as cited in Rourke et al., 2001; Russo & Campbell, 2004), was both a cause and an effect of the levels of interactivity among the students in this course. Had students been less fearful about censure or more convinced that communicating through the textual environment could be a powerful means of developing a community of learners, they might have been more open and willing to share experiences, and more likely to engage other students

through critique or debate. Tu and McIssac (2002) argue that being able to express themselves in the textual environment of online learning is an important part of developing social presence for online students. If students had been more experienced as online learners they might have recognised the importance and worth of such interactivity and been more willing to risk sharing their opinions and challenging the ideas of others.

Understanding the unique features of the online learning environment has been linked to students' ability to adopt suitable learning approaches that in turn increased their readiness and success online (Gunawarden and Duphorne, 2000). In the present study however, a lack of a clear definition of themselves as online learners, due both to their lack of experience in the online environment and their strong, independent learning styles, contributed to low social presence among the students. Previous experiences as distance learners contributed to the perception of the roles of learner and lecturer in the online environment, meaning that students had low expectations of online interactions with others in the class and did not see online interaction as necessary in order to learn. Learner-learner interactivity, which in the present study was primarily through the discussion forum, was conducted in a textual environment that served as the main vehicle for building social presence among the students and lecturer. The fact that students saw participation through this textual environment as problematic, particularly in the beginning of the course, contributed to a very low social presence.

Social presence, defined by Tu and McIsaac (2002, p. 131) as "the measure of the feeling of community that a learner experiences in an online environment," did not develop among the students in this study and was not available as a positive influence to help students develop the trust needed to become a community or to change their perceptions about the value of interactivity with others in the online environment.

Even though social presence has been found to be a strong predictor of students' sense of satisfaction with the online learning experience (Gunawardena and Zittle, 1997) and students' perception of having learned (Richardson and Swann, 2003), students in this study were not dissatisfied with the overall experience. Their comments about elements of the online experience that they found positive and useful such as reading the comments of others, improving their technical skills, growing more confident in

their writing abilities, having time to reflect on the content and having easy access to the lecturer indicated students found things within the online environment that supported their learning. These aspects of the course will be discussed in Chapter Six.

Chapter Six
Students' Perception of their Learning

This chapter focuses on the students' perception of their learning within the online class and examines the different types of interactivity from the point of view of student satisfaction and the sense of support they received from different types of interactivity. Data for this examination are drawn from end-of-course evaluations and interviews with the participants.

The examination of the data is divided into two sections. First, evidence is presented that demonstrates the students' perceptions of their learning within the environment of the online course. Second, evidence is presented that demonstrates what types of interactivity students felt supported their learning.

Recognition of Having Learned

All of the interviewed students felt that they had learned in the online class. Table 6.1 shows end-of-course evaluation scores for satisfaction with the online class and scores for perception of having learned, with all students reporting a score of three or more on a 1-5 scale. It is clear from this Table that the scores in the scale of satisfaction perception of learning are closely aligned.

Table 6.1 Scores for student satisfaction and perception of having learned

Student	Satisfaction Scale 1-5	Perception of Learning Scale 1-5
Student A	4	4
Student B	5	5
Student C	3.5	3
Student D	3	3
Student E	4.5	4
Student F	3	3
Student G	5	4
Student H	4	4
Student I	4.5	4.5
Student J	3	3
Student K	3	3
Student L	3	3
Student M	4	3.5
Student N	5	5

When asked to describe the learning that they perceived within the online class, students' comments fell into three categories: changes in technical skills, changes in perception about using ICT in education and changes in pedagogical knowledge.

Technical Skills

Students remarked on the increased competence they felt both personally and professionally when using the computer for routine tasks.

I use the computer more actively now at home to access all sorts of information. I'll go on websites that kids will come and give me and I'm just more adept at accessing information. I normally would have not bothered to because it would have been such a hassle. I'll actually go to the Internet now rather than a book these days. (Student C)

Student B remarked on how the instructions included in the online course content helped her complete technical tasks until her skills gradually increased to the point where she no longer needed to refer to them.

I need those scaffolds, if you like, for using computers, the more I have of them the better I am and the more I use them – then I get rid of the bits of paper and they get filed into the document on professional development folder and I can just refer to them when I get a bit rusty. (Student B)

Clearly, the students' understanding of the technical aspects of using information and communication technologies grew over the weeks of the course. Students became more comfortable using the online course management system, using the Internet to find information, and using productivity tools such as word processing or presentation software to complete the assignments in the course.

Pedagogical Knowledge

Students commented on an increased knowledge of pedagogy that they attributed to the online course. Student K commented on how the content of the online course had resulted in an examination of her own practice.

It made me think about my own teaching as well. I'd never heard of constructivism and directed learned before. (Student K)

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Students were also able to see how the learning theory included in the content of the course was evident in the ICT approaches introduced in the course.

We talk about higher-level thinking and problem solving and different approaches to teaching and how it compared to traditional, and that WebQuest met the criteria beautifully. (Student I)

Although, as seen in Chapter Four, students initially divided the content between the theoretical and the more practical, hands-on type of experiences, by the end of the class they were able to see pedagogical theory as underpinning their own practice and existing within the different ICT tools that they put into practice in their own classrooms.

ICT in Education

Perhaps the biggest perceptual change occurred for the students as they began to examine their beliefs about ICT in education. Many students began the course without a clear understanding of how information and communication technologies could be used for teaching and learning. At the end of the course they were able to express how this had changed for them.

I certainly had it glorified, but when I see it as a learning tool it puts it in perspective in the classroom and I don't feel so threatened by it. (Student C)

Students also pointed out that they now had a more realistic idea of how ICT tools and strategies could be implemented in their classrooms.

So I think what it's done is it's kind of given me more ways to use ICT and so I guess in a way it has shifted my perception – I think in terms of that it doesn't have to be something that's way out there to actually be worthwhile and so that would probably be the biggest thing. (Student D)

As students talked about their changes in perception about the use of ICT in education they also noted how the online environment had contributed to this understanding.

You got ideas from what other people were talking about or doing. For example in one of them, they were talking about using PowerPoints and they'd used to for an alternative way of learning and I suddenly realised that in the classroom I could put basic words in a PowerPoint and you know that's another way of

learning basic words or sounds . You know it just opened up a whole new avenue. I thought you know, when I have a few moments that would really easy thing to do and there's no reason why the children in that room couldn't actually be taught to make those themselves. And that was the highlight for me – that was the best thing – I suddenly realised that yeah – there are alternatives here and seeing ways that it could work for you. (Student K)

Setting goals for the future and a willingness to continue learning was also evident in student comments. One of the students expressed it this way.

I want to take it further, I want to use it as a tool for other things. I want to integrate it into reading and writing. (Student C)

Overall the students' perceptions of having learned in the online course were positive. They were able to describe specifically the areas in which their knowledge had increased and/or changed. Although, as seen in Chapters Four and Five, they were initially anxious and unsure of themselves in the online environment, by the end of the course they were more confident and satisfied with the experience.

What Supported Students' Learning

When asked to describe the different features that supported their learning through the 15 weeks of the online course, students' answers were divided into two areas: support structures that functioned outside the online course environment and support structures that were found within the online environment.

Support Structures that Functioned outside the Online Environment

When asked what supported their learning through the 15 weeks of the course, seven of the eight interviewed students remarked first on some aspect of their local community: help from family, collaboration and discussion with colleagues, and trying things in their own classrooms.

Discussing things with colleagues was mentioned frequently as a way to help students process and understand content. They remarked on discussing course content, including new ideas and new skills in staff rooms and with other teachers in their schools.

You could exchange ideas and talk about the different things that you came across and then the conversation would digress like "oh look I've used that and it worked really well" and "oh have you tried this?" (Student B)

From the above comment it is apparent that these conversations were important to the students' learning because they extended the discussion beyond the members of the class and provided opportunities to gain knowledge locally through the sharing of ideas and practical examples.

Students also identified interaction with their families as another support for their learning. As seen in both Chapters Four and Five of this report, families provided emotional, technical and intellectual support that students needed in order to be successful in the online course. One student described her reliance on her husband in this way.

So you know I would often say to him – well how do I do this – what do I do now ? He would say "Well you can go to find such and such" and yeah he was really good – I used him a lot. (Student B)

Students recognised the influence of this collegial and familial support on their learning and tied it strongly to their own motivation and learner-self interaction. Student C summed it up in this way.

It would be two factors – three factors – would be my husbands's support, my collegial support and my self-motivation to complete it. I suppose the children were too because it drove me along to complete it seeing something through to completion, conquering problems. I am determined to make this work and that's what I would say to myself. I am determined too be happy about this. So lots of little factors there. . . I think the human element was the thing that kept me going, definitely. (Student C)

The students also mentioned learner-environment interactions as an important part of their learning. Testing ideas and theories in their own classrooms helped students to process and understand the content and provided a relevant context for the theoretical and practical applications introduced in the course.

I think I can learn a great deal in terms of applying that as a teaching tool with the kids. As we progressed through I definitely became more confident as I got

feedback – I definitely gained confidence. I feel much happier about using the computers now in the room than I did at the end of last year. (Student C)

Support Structures that Functioned Within the Online Class

Support received from within the structure of the online environment was also mentioned by the students as important to their learning. It fell into three categories: support from other learners, support from the design of the online class, and support from the lecturer.

Learner-learner interactions were mentioned by five of the eight interviewed students as making significant contributions to their learning. Students mentioned that they valued the ideas and opinions of other learners and that the access to the postings of others was an important structure available to them in the online environment. Even though students did not interact overtly with one another in the discussion forum, they still rated the contributions from other learners to be a strong basis of support for their learning within the online environment, and most appeared satisfied with the amount of interaction within the discussion forums.

It was functional I think, it served the need I had. It was good to be able to reflect on what other people were contributing, and that, you know, sparked some thoughts. I think the idea of combining it with the study guide as well as selected readings and those sorts of thinks – I think it served its function. I got some interaction albeit non-verbal but, yeah, it felt like there were other, you know, it sort of felt like there were others out there as well although I didn't have any close contact with them. (Student I)

Students commented on how the ideas and opinions of others helped them to reflect on and develop their own understandings of the content.

Reading other people's comments that they'd put in – I learned an awful lot from just reading them and how they had their perceptions of the articles and whatever they'd found. That was really good. (Student B)

Students also remarked on how reading the comments of other students helped them to see different perspectives and opened up new ways of thinking about the issues in the content of the course.

Sometimes looking at what other people has said you a picture in your mind about what this was all about and you really needed to say "well was that how other people are perceivng this?" and that was helpful. (Student E)

It is clear from these comments that students valued the contributions of other students and felt that this access to others' opinions and ideas strongly supported their own understanding and subsequent learning in the course.

A second area identified by students related to how the design and function of online environment itself helped to support their learning. Students mentioned the diversity of the content they received through the online course: readings, hyperlinks, access to comments from the lecturer, and the access to the ideas of other learners.

I really liked that approach, it really kept me focussed and going and it really gave me momentum to see it through and that's what gave me the enthusiasm. (Student C)

Students commented that the design of the online class – both the weekly tasks and the structure and layout of the course site itself supported their learning.

Knowing that you had to do something weekly, I found a help.
I found the weekly, yeah, the weekly submission was good – having your weekly submission times were definitley beneficial (Student I)

It was a wide ranging, especially with those weekly tasks, it was good because there was something different every week and I really liked the fact that every week it was like a fresh start. (Student B)

Consistency of the online structure was also mentioned by students as a positive influence. Although most students mentioned that figuring things out initially was difficult, once they understood how the online interface worked and how the class was structured, they appreciated that each week was similar in design.

I found it really easy to follow – very self-explanatory once you worked out where everything was it was fine. (Student D)

The textual and asynchronous environment of the online class was also noted by students as giving them time and purpose for reflection

You *know I could do it in my own time – I could go and find out more things if I needed to.* (Student K)

Student K also commented on another aspect of the online structure by noting that the online class required participation from students in a way that would not have been required in a face-to-face class.

I'm not a person who puts themselves forward so [in a face-to-face class] *I would probably sit at the table and say nothing. But you have to respond when you're online because it's expected of you.* (Student K)

While this participation may have put pressure on more reticent students, such as Student K, there is evidence that this required public posting of opinions and ideas created a strong interaction with the content for students.

Students also made comments that pointed out that they considered the structure of the course and the design of the assignments to have meaning within the context of their professional lives.

It was purposeful and so because it was purposeful it was powerful and the way that last assignment – the way it flowed I think was a powerful way of doing it for me and marrying the whole thing up and thinking it through and thinking through and coming through from a teaching perspective – teaching theory – and how were you applying it. (Student M)

These comments about the structure of the online environment indicated several aspects of experience that students found supportive of their learning, including the structure and continuity of the design of the online class, the diversity of the content, the opportunity for reflection and the ability to relate the assignments and content to their professional lives.

Several students noted the support of the lecturer as a third element in the online environment that supported their learning. Although students relied on the lecturer for more administrative and technical help rather than help in understanding content, all were satisfied with the learner-lecturer interactions and felt that the responsiveness and support of the lecturer was a contributing factor to their success in the course.

Probably knowing that, you know, the tutor was there at the end of the e-mail, knowing that that contact was possible. (Student D)

Student C compared the support of the lecturer in an online environment with previous experiences with traditional distance education and described the lecturer as an anchor.

The online lecturer is your support system – the anchor and without that like when I think of my papers I think going back to previous papers where I wouldn't have known my lecturer, I really wouldn't have known their personality or whatever. On the online situation I really felt supported, I felt like there was somebody there who was supporting me. I initially felt threatened because of my ineptness but I grew more confident and there was a time where I did feel adequate. (Student C)

Students recognised the role of the lecturer in orchestrating the events within the online course and creating a structure which supported the students in the class. Several students described this management as 'driving the course' or being a 'driver.'

I guess the initial driver was yourself, maybe through posing of questions or disseminations of some thoughts or some information or something like that. I know that if I was left to my own devices to find stuff on the Internet that would be very demoralising because you can go to so many places and not end up with the right thing so to have some directive was good, having some initial backgrounding from your point of view was good. (Student I)

The students' comments show that there were specific elements within the online environment that they felt had supported their learning: the opinions and thoughts of other learners, the structure of the online course and the availability of the lecturer.

Discussion

This examination of students' perception of having learned in the online environment and their overall satisfaction with the experience is valuable not in the novelty of the information presented, for it complements and reinforces information presented in Chapters Five and Six. Rather, the value of this information rests with the students' perceptions and rankings of the support they perceived for their learning both within and without the online course. The

support from their local community was mentioned first by most of the students in this study, followed by several specific elements from within the online course.

It is clear from end of course surveys and interviews that students were satisfied with the online experience and felt that they had learned in the online environment. They spoke of an increased competence in technical skills, an increased understanding of using information and communication technologies in educational settings and an increase in their knowledge of teaching and learning approaches. These findings are consistent with previous research studies that have concluded that there is little or no difference in online and face-to-face study in terms of learning outcomes and achievement (Carr, 2000; Diaz, 2002; Johnson et al. 2000; Navarro & Shoemaker, 2000, Russell, 2003). However, the experience of studying in an online environment does demand that students employ different skills and be aware of different details in order to be successful (David & Ralph, 2001). In the present study, the most prominent place where students adapted and built new learning supports in response to these different needs was in their own communities. Students in this class developed a strong network of support within their own community and drew a correlation between this support and the motivation that sustained them to complete the course. They sought connections with colleagues, depended on input from their families and extended their learning into their own teaching environments by testing new ideas and techniques in their classrooms. This network of support existed outside the online class but was obviously an important source of assistance and encouragement. These findings validate those of other researchers who propose that successful online professional development for educators must not be created in isolation from the local community of practice (Hawks, 2001; Hawkes & Dennis, 2003; Meyen and Yang, 2003; Schlager and Fusco, 2003).

Although students did not overtly interact with one another in the online discussion, they still reported the comments posted by others as supportive of their own learning. Studies linking participation in online discussions to student satisfaction and high perception of learning are not conclusive. Wu and Hiltz (2003) found a positive correlation between students' perceived learning and

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their motivation and enjoyment of online discussions. Rovai and Barnum (2003) found a positive correlation between higher perceptions of learning and the number of times that students participated in online discussions, but no correlation between passive interaction (reading but not interacting) and perceived learning. Jiang & Ting (2000) however, found that while making the discussions a required activity for students increased the students' perceptions of having learned, there was no correlation to the number of responses in the forum and students' perceived learning. The experiences of students in the present study somewhat contradict the positive correlation between higher perception of learning and high involvement and enjoyment of online discussions. Although students in this class did participate in the required online discussions, their involvement was limited to an initial posting and they seldom responded to or commented on others' opinions, indicating a low sense of motivation and enjoyment. However, most were satisfied with this arrangement and reported that reading the ideas and opinions of others contributed strongly to their understanding of the content and their ability to see different sides of an issue. It the present study, it was the sharing of the ideas presented in the discussion and not the overt interaction between learners that was the most powerful support for learning.

It is clear that students considered the overall online experience a positive one and were able to articulate what they learned and what had supported them as they learned. It is also clear that students made choices about how they approached online study, developing a strong network of support in their local community and choosing only minimal interaction with others in the online class. However, the availability of the interaction with the lecturer and the "vicarious" interactivity with other learners were identified by students as important supports for their learning and these two elements provided sufficient interaction to produce in students a sense of satisfaction with the online experience.

Chapter Seven
Conclusions and Implications

Introduction

This case study of an online professional development course investigated the ways that interactivity in an online environment impacts on the students' experience of online learning. The three guiding questions that structured this study were:

1. What is the nature of the interactivity experienced by the learners in an online professional development environment?
2. What influences are present that contribute to the interactivity experienced by the learners in an online professional development environment?
3. What extent and in what ways does the interactivity contribute to participants' perception of their learning?

Findings

Nature of the Interactivity

Question one was examined and discussed in Chapter Four. It was shown that students did engage in learner-centric interactivity, specifically learner-content, learner-interface, learner-instructor, learner-learner, learner-self, learner-other, and learner-environment. Learner-content interactions were core to the students' involvement in the online course and all other types of interactivity were shown to be related to students' interaction with content. Some types of interactivity were more prominent than others in the students' experience within the online class. Along with learner-content, the students indicated that learner-interface and learner-self interactions exerted a strong direct influence. They emphasised the importance and interconnectedness of the content, the learner-self interactions and the interface, which acted as a gatekeeper to the content. Also seen as a direct influence by the students were the interactivity with the environment and the interactivity with others outside of the class. These indicated the presence of a strong connection with their local communities that existed outside the online environment. Interactivity with the lecturer and vicarious interactivity with other learners were viewed as having a secondary

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influence, while direct interactions with other learners were deemed to be of lesser influence.

Influences on Interactivity

Question two was examined and discussed in Chapter Five. Three major influences were described that contributed to the ways that students experienced the interactivity in the online course. First, students saw the textual environment of the online class as a barrier. This initially caused anxiety and resulted in students seeking assistance within their local communities for help with mechanics and meaning in their writing. Although students' ability to communicate through writing did appear, by the end of the course, to be less of a problem for students, the writing remained formal and did not encourage social interaction. The second influence, a lack of social presence, was evidenced by the lack of any connection between students in the online discussion, the medium where, within the online environment, students have the opportunity to share, explore and challenge ideas. Third, the students' conceptions of what it means to be a learner in the online environment were unformed. Students compared the online class and the experience as an online learner to either a face-to-face class or a traditional distance class. They described the online experience in terms of what it was not, rather than being able to point out the unique aspects of this mode of study.

Perceptions of Learning

Question three was examined and discussed in Chapter Six. It was shown that students' perceptions of their learning were specific and positive. Students outlined three areas where they felt they had improved in skills and knowledge: understanding ICT in education; technical skills; and pedagogical knowledge. Support for their learning in the online environment was divided into two major categories. First were support structures that functioned outside the online environment, including support of friends, family and colleagues and the ability to trial new ideas and knowledge in their own classrooms. Second were support structures that functioned within the online class, including the capacity to read others' ideas and opinions in the discussion forums, the design and structure of the online environment itself and the support from the lecturer.

Conclusion

From the investigation of these three questions, conclusions may be drawn about how the students experienced the interactivity in the online learning environment. These conclusions are examined in the following sub-sections, each headed by a summary statement of the conclusion drawn.

The textual nature of the online environment had a strong influence on the way students experienced online learning.

Several important dimensions of the textual nature of the online environment were established in this study. First, most students were concerned about their writing abilities, including mechanical details such as grammar, punctuation and spelling, and more fundamental details such as clarity, content and meaning. This concern resulted in students seeking support for their writing skills within their local communities. It produced rather formal essay-type posts to the discussion forums. Second, most students found that the public nature of the textual environment, where ideas were archived and shared, caused concern because this created a forum where other students could judge their writing. Referred to as "evaluation anxiety" by Russo & Campbell (2004, p. 228), this phenomenon results in a reluctance to make a public and lasting comment. No longer writing just for the lecturer in a traditional distance or face-to-face class, students now were sharing ideas, opinions and understandings with the other students in the class. Indeed, students felt that their words created an "online persona" that represented them in the class. Many expressed fear of criticism or challenge. Third, these concerns about the textual nature of the course had several flow-on effects. Students did not interact with one another in any significant way in the discussion forums and as a result, social presence, the awareness of other students as real individuals in the class, was low. There was also no give and take between students which might have resulted in new understandings had they questioned one another about their ideas.

Perhaps it is important to try, as much as is possible, to remove the barriers of the written interactions in the discussion forums and to mimic the more spontaneous form of the face-to-face interactions. For instance, asking students to answer specific, content-based questions posed by the lecturer in the discussion forum

meant that students, who must respond to be considered present in the discussion, focused on a response to this "starter" question, rather than on responding to a more naturally evolving discussion. In a face-to-face discussion, even one where all students were expected to respond, it is unlikely that all students would have to give an answer to the same question. A more likely scenario would be that the discussion would move on from the starter question, allowing students to choose to respond to new questions or make comments for which they felt they could give an appropriate or useful comment. Allowing students to post comments along the lines of "with what did you agree/disagree?" or "what questions arose for you as you read this week's text?" would encourage a more spontaneous and natural response and would appear to be appropriate particularly early on when students first begin contributing to an online forum. Tu and McIsaac (2002) support this position, stating that the text-based environment for those who feel that their computer literacy skills are low creates anxiety, which can be partially alleviated by light or casual topics as students become more familiar with the online culture. This also makes the discussion more personally relevant to the students, because they are responding in a more natural, experienced-based way and the possibility exists of relating the discussion back to their own teaching (Hawkes, 2001; Hawkes & Dennis, 2003; McMahon, 1997; Meyen and Yang, 2003).

On a more positive note, the fact that students were required to contribute their ideas in a public forum meant that students engaged with the content and took seriously the creation of the written material that they posted to the online class. This was shown by their description of the process, which involved having others check and evaluate their work before it was posted to the online forum. Even though students did not interact with others in the discussion forum, this engagement with the content may have made them more receptive to the ideas of others, for they noted that the ideas and opinions of others were a strong support for their own learning.

The sharing of student-produced content through a constructivist design was seen by students as a positive element of the online experience.

The creation and posting of student-generated materials was found to be an effective way to share and archive the knowledge being constructed by individuals as they interacted with the content In this class the content comprised readings, research articles and online material posted by the lecturer as well as materials produced by the students themselves as they worked with the content of the course. Although this public sharing of work generated some anxiety for the students it also served as a catalyst for interaction with the content, interaction within the context of their local community, and was reported by the students as a positive support for their own learner-self interaction and subsequent learning in the course. This conclusion is in accord with that of Turoff, Hiltz & Balasubramanian, 1994. Berge's (1998) concept of a transformation framework, where learners can generate hypotheses and construct knowledge either individually or through social interaction is also relevant here. Although in the present study, students' interaction with other students was vicarious rather than overt, the students reported that the ideas and opinions of others were important to their own developing understanding of the principals, theories and concepts about using ICT in the teaching and learning process.

Jonassen et al. (1995) describe a constructivist learning environment as one that exists within a meaningful context and allows reflection about what has been learned through collaboration and conversation with other learners. Several aspects of the online environment seem particularly well suited to support such a constructivist approach to learning. Because all materials used and created in the course were sequentially archived, students had the opportunity to reflect on these materials at will, revisiting them as often as necessary in order to process and understand the content. Intrapersonal interactions, or the processing of the content inside the learner's own head, has been described by Weller (1988) as necessary for the construction of meaning. The time and place independence that is offered by the online environment ensures that students have time for this processing. The posting and archiving of other students' work was particularly powerful because this added a practical, peer-based response against which students compared and contrasted their own ideas. Although students in the

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present study processed and made meaning from the content without interacting directly with other students, they reported this as a strong support of their own understanding and learning. It is not clear whether having more interaction among students would make this experience more useful and powerful or whether the added time it would take to interact with others would negate the benefits in the students' perceptions. However, it is clear that the constructivist design supported by the online environment was a useful one that was valued by students.

Students' understanding of the unique features of the online environment was not well developed.

The online environment is different. Although it shares some aspects of traditional distance and traditional face-to-face forms of instruction, it cannot be easily defined as a subset or evolution of more traditional methods, as students in this case study found as they tried to categorise their experiences. Hirumi (2002) points out that the amount of time that things take to accomplish in an online class differs from a traditional class. Learner-learner interactions that can be accomplished quite quickly using speaking and listening in a face-to-face format require much more time in an online class because these same interactions must be accomplished through reading and writing, which are the predominant forms of communication in the online environment. Students in this class noted this difference, pointing out that taking the trouble to log on, find and read the comments and formulate and type a response took up a significant amount of time and lacked spontaneity, which they found to be a barrier to their engagement. From the perspective of traditional distance learning, the online environment also represented an extra commitment of time. Moving from a traditional distance format, which demanded only that students complete and return an assignment by a due date, to a format where weekly requirements were the norm, the online class made demands of the students that they had to fit into busy professional and personal lives.

The role of learner and lecturer in the online environment needs to be more clearly understood. Anderson (2003, p.4) argues that online lectures and multimedia presentations prepared by the lecturer become "teacher agents" and

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migrate to the learner-content arena. Thus this type of lecturer input is seen as content rather than as teacher interaction and, from the student's perspective, changes the balance of the learner-lecturer relationship in the online environment. The student controls when and how often he or she accesses the material posted by the lecturer and can perceive it as an interaction with the computer rather than with the lecturer. In the present study students struggled to define the role of the lecturer in the online course and used interactions with the lecturer to solve administrative and technical issues rather than to seek help in understanding the content. The input from other learners also was viewed as content to be analysed and evaluated in a learner-self interaction rather than that of learner-learner. This points out a need to clearly understand the roles of the lecturer and learner in the online environment in order to make the experience more effective.

Although students were able to recognise aspects of online study that supported their learning, such as time and place independence, increased opportunity for reflection, and having access to other learners' ideas, it was also clear that students did not have a fully developed understanding of how the online environment could support them as learners, where they could understand and capitalise on the positives and, as much as possible, adapt to and overcome the negatives. Gunawaredena and Duphorne (2000) suggest that once students understand the unique features of the online environment, they can adapt their learning approaches, which results in a higher level of satisfaction with the experience. While students in this class did describe changes in their learning approaches due to the online environment, these changes appeared to be haphazard and often arrived at by trial and error rather than supported by an understanding of online learning.

Clearly, support for online learners, particularly first-time online learners like the students in this class, is called for. In the present study, students had access to 'frequently asked questions' and tips for online learners as well as a student forum where these types of questions were encouraged. However, these attempts at clarifying the role of the learner in the online environment were passive and depended on students reading material and/or instigating questions. It has been

argued that strong student support should be an integral part of services for online students and could help overcome barriers (LaPadula, 2003; Stein & Glazer, 2003). Proactive support in the form of feedback surveys, discussion forums available before the class formally starts, and opportunities for learners to share problems and solutions might help students to more completely understand and more effectively manage the online learning environment.

Students' local communities provided input and support and contributed to the successful completion of the online course.

Because the venue for the online class was situated within the context of the students' professional, personal and community life, it is important to consider, particularly for online professional development, that the student would develop a network of support locally and that for each student these connections would have an impact on the online experience. Gibson (1998a), describing the multiple contexts in which learners exist, suggests that when the learner's world of friends, family, or work, intersects with the learner's world as a student, the results have the potential to enhance or inhibit learning. Students in the present study developed strong connections within their professional and personal communities, which supported and sustained them while completing the online course. This may have contributed to the lack of learner-learner inactivity within the class. The socio-cultural viewpoint of learning (Salomon & Perkins, 1998), which values the learner's contact with other learners and the instructor, was not strongly evident in the online interactions in this professional development course. It is possible that students found the social contact they needed in the local community and did not necessarily seek this with learners in the online environment (McMahon, 1997). Students were successful in meeting the learning outcomes of the course without a great deal of direct interactivity with other online learners.

It is important to see the learner in context and to realise the complexity and richness of the local communities in which the learners exist. In the present study the interactions with and support from these communities was not visible within the online class and only became apparent when students were interviewed after the end of the course.   Although stimulated by the online class, these alliances

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functioned outside it. Yet this "behind the scenes" support of the students'
families, friend, colleagues and local work environments made contributions that
increased the effectiveness of the individual student's experience and at the same
time enriched the experience for others in the course.

The experience of interactivity in the online environment was driven by student choice.

The students in the present study, being highly motivated adult learners,
interacted with the interface, the content, the lecturers and others learners in
ways that furthered their goals of successfully completing the course. While the
patterns of interaction varied, all students successfully met the learning outcomes
and passed the course, so it must be concluded that the interaction that each
student chose and employed was appropriate for that student. It is clear,
however, that the online course with its structures and requirements was only a
part of the overall learning environment existing for the students in the class.
These students also interacted with others in their local communities and made
practical application of the skills and knowledge within their local environments.
Therefore, it is important to ensure that the online course does not function in
isolation from the student's local community. It is important that opportunities
exist for students to interact with their local communities and to recognise this
knowledge and experience as a valued addition to the online course.

The findings from this study highlight the autonomy of the online learner,
particularly motivated adult learners engaged in online professional development
who, as independent learners, make well-informed decisions to help them meet
their goals (Diaz, 2002; Hawkes, 1999; Moore, 1994). This suggests, as Shearer
(2003) argues, that course lecturers should ensure that course structures support
this autonomy, carefully assessing each required interaction as to time-
commitment, relevance, and overall furthering of the course objectives.

Yacci (2000) suggests that interactivity is a psychological construct of each
student, implying that lecturers must develop an understanding of and respect for
the individual student's need for varying types and amounts of interaction. This
suggests a strong need to make sure that the interactivity that exists within the

online course itself be well-structured and meaningful to the students and that the students are prepared to participate and recognise the need for and the benefits of such interactions.

Areas for Further Study

This study has shown that the particular elements of the online environment had a strong influence on how the students experienced the online learning. A better understanding is needed of the impact that the textual environment has on the learners in an online class in terms of self-efficacy, participation and success. As seen in this study, being required to communicate through a textual environment, initially produced anxiety and lessened participation. Further study of ways that this barrier can be lessened for students in an online class is needed..

Further investigation is needed also to better understand the ways that each learner's local community contributes to the overall experience of learning in an online class. The online environment isolates students physically from others in the class while requiring new technical skills and different means of communication. It is not surprising that this scenario would cause students to develop a local system of support. This support system needs to be better understood both in terms of how it assists the student and how it can be used to enhance the experience of online learning.

This study included a small group of learners experienced in traditional face-to-face instruction and traditional distance education, but new to online learning. Further study would be useful to examine how even more skilled online learners experiences and interacted with the online environment.

Concluding Thoughts

The interactivity present in this study took place both within and outside the online environment (Figure 7.1). When asked to describe the experiences in the online class, it was apparent that students focused on learner-content interactions and considered the interface as a gatekeeper to their access to that content. For the students, learner-learner and learner-lecturer interactions, present in the online class as text, were also considered to be content. Students made choices

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about which forms of interactivity furthered their understanding of the content and ultimately helped them succeed.

Interactivity outside the online environment, which included learner-environment, learner-other and learner-self interactions, was also focused on the goal of understanding the content and successfully completing the course requirements. Students used input from their classrooms, schools and communities to help them succeed. Table 7.1 illustrates how the interactivity from inside and outside the online environment supported the students to process and make meaning from the content.
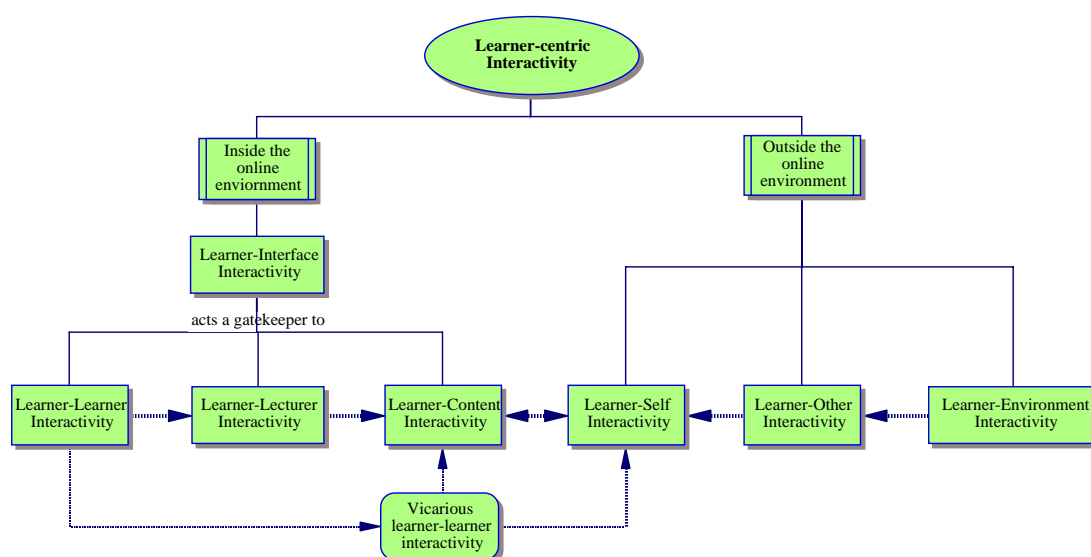

Figure 7.1 Interactivity in the online environment as described and practiced by learners

The autonomy of the adult learners involved in this online professional development course came through strongly in this research study. Although the participants found that aspects of the online environment created barriers for them, engaging them in forms of interaction that were unfamiliar, they made choices that worked for them as learners and created support structures that helped them to be successful.

References

Abdal-Haqq, I. (1996). *Making time for teacher professional development*. Washington: ERIC Clearinghouse on Teaching and Teacher Education.

Allen, I. E., & Seaman, J. (2003). Sizing the opportunity: The quality and extent of online education in the United States, 2002 and 2003.   Retrieved Sept, 2003, from http://www.sloan-c.org/resources/overview.asp

Althaus, S. (1996). *Computer-mediated communication in the university classroom: An experiment with on-line discussion.* Paper presented at the Annual meeting of the American Political Science Association, San Francisco, CA.

Anderson, T. D. (2003). Getting the mix right again: An updated and theoretical rationale for interaction, *International review of research in open and distance learning* (Vol. 4).

Anderson, T. D., & Garrison, D. R. (1998). Learning in a networked world: New roles and responsibilities. In C. C. Gibson (Ed.), *Distance learners in higher education: Institutional responses for quality outcomes* (pp. 97-112). Madison, WI: Atwood Publishing.

Angeli, C., Valanides, N., & Bonk, C. J. (2003). Communication in a web-based conferencing system: The quality of computer-mediated interactions. *British Journal of Educational Technology, 34*(1), 31-43.

Bailey, C. A. (1996). *A guide to field research* Thousand Oaks: Pine Forge Press.

Bailey, C. A. (2007). *A guide to qualitative field research* (2nd ed.). Thousand Oaks: Pine Forge Press.

Ball, D. L. (1996). Teacher learning and the mathematics reforms: What we think we know and what we need to learn. *Phi Delta Kappan, 77*(7), 500-508.

Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudra (Ed.), *Encyclopedia of human behavior* (Vol. Vol. 4, pp. 71-81). New York: Academic Press.

Bates, A. W. (1995). *Technology, open learning and distance education*. London: Routledge.

Beisser, S. R., & Steinbronn, P. E. (2001). A hybrid online course to enhance technology competencies of school principals. In C. Crawford (Ed.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2001* (pp. pp. 131-135). Chesapeake, VA: AACE.

Benson, A., Guy, T., & Tallman, J. (2001). Viewing online learning through the lens of perspective transformation. *International Journal of Educational Telecommunication, 7*(3), 251-269.

Berg, B. L. (1998). *Qualitative research methods for the social sciences* (3rd ed.). Boston: Allyn and Bacon.

Berge, Z. L. (1998). Conceptual frameworks in distance training and education. In D. A. Schreiber & Z. L. Berge (Eds.), *Distance training: How innovative organizations are using technology to maximize learning and meet business objectives*. San Francisco: Jossey-Bass Inc.

Berge, Z. L. (1999). Interaction in post-secondary web-based learning. *Educational Technology, 39*(1), 5-11.

Berge, Z. L., & Collins, M. P. (1995). *Computer-mediated communication and the online classroom: Overview and perspectives*. Cresskill, NJ: Hampton Press, Inc.

Best, J. W., & Kahn, J. V. (1998). *Research in education*. Boston: Allyn and Bacon.

Birley, G., & Moreland, N. (1998). *A practical guide to academic research*. London: Kogan Page Limited

Blalock, A. B., & Blalock, H. M. (1982). *Introduction to social research*. Englewood Cliffs: Prentice-Hall.

Blanton, W. E., Moorman, G., & Trathen, W. (1998). Telecommunications and teacher education: A social constructivist review. In I.-N. Pearson D (Ed.), *Review of research in education* (Vol. 23, pp. 235-275). Washington, D.C.: American Educational Research Association.

Branzburg, J., & Kennedy, K. (2001). Online professional development. *Technology and Learning, 22*(2), 18-27.

Broady-Ortmann, C. (2002). Teachers' perceptions of a professional development distance learning course: A Qualitative case study. *Journal of Research on Technology in Education, 35*(1), 107-116.

Bruckman, A. S. (2004). Introduction: Opportunities and challenges in methodology and ethics. In M. D. Johns, S.-L. S. Chen & G. J. Hall (Eds.), *Online social research: Methods, issues and ethics*. New York: Peter Lang.

Bruner, J. (1996). *The culture of education*. Cambridge, Massachusetts: Harvard University Press.

Buss, A. R., & McClurg, P. A. (1999, March 28-31). *Initiating the use of GIS technology in Wyoming Public Schools through in-service workshops.* Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, Boston, MA.

Carboni, L. W., & Friel, S. N. (2000, April, 2000). *The use of technology in building a learning community: Possibilities and challenges.* Paper presented at the 2000 Annual Meeting of the American Educational Research Association, New Orleans, LA.

Carr, S. (2000). As distance education comes of age, the challenge is keeping the students. *The Chronicle of Higher Education, 43*(23), 39-41.

Cereijo, M. V., Young, J., & Wilhelm, R. W. (2001). Factors facilitating student participation in asynchronous web-based courses. *Journal of Computing in Teacher Education, 18*(1), 32-39.

Clark, D. (2003). The markets for e-learning.   Retrieved November, 2004, from http://www.epic.co.uk/content/about_us/downloads.htm

Clark, D. (2004). Higher education and e-learning.   Retrieved November, 2004, from http://www.epic.co.uk/content/about_us/downloads.htm

Cochran-Smith, M., & Lytle, S. L. (1999). Relationships of knowledge and practice: Teacher learning in communities. In A. Iran-Hejad & P. D. Pearson (Eds.), *Journal of Research in Education* (Vol. 24, pp. 249-305). Washington, DC: American Educational Research Association.

Cohen, L., Manion, L., & Morrision, K. (2000). *Research methods in education*. London: Routledge/Falmer.

Collins, A. (1991). The role of computer technology in restructuring schools. *Phi Delta Kappan, September*, 28-36.

Collis, B., & Gommer, L. (2001). Stretching the mold or a new economy? Part 2: Realizing the scenarios for the university in 2005. *Educational Technology, 41*(4), 5-14.

Crano, W. D., & Brewer, M. B. (2002). *Principles and methods of social research* (2nd ed.). Mahway, New Jersey: Lawrence Erlbaum Associates, Inc. .

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal, 38*(4), 813-834.

Davis, M., & Ralph, S. (2001). Stalling the learning process: Group dynamics in cyberspace. *Studies in the Education of Adults, 33*(2), 217-229.

Dede, C. (1996). The evolution of distance education: Emerging technologies and distributed learning. *The American Journal of Distance Education, 10*(2), 4-36.

Denzin, N. K., & Lincoln, Y. S. (1994). Introduction: Entering the field of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research*. Thousand Oaks, California: Sage Publications, Inc.

Denzin, N. K., & Lincoln, Y. S. (1998). Introduction: Entering the field of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The landscape of qualitative research: Theories and issues*. Thousand Oaks, California: Sage Publications, Inc.

Dewar, T., & Whittington, D. (2000). Online learners and their learning strategies. *Journal of Educational Computing Research, 23*(4), 385-403.

Dewey, J. (1933). *How we think*. Chicago: Henry Regency.

Dexter, S. L., Anderson, R. E., & Becker, H. J. (1999). Teachers' views of computers as catalysts for changes in their teaching practice. *Journal of Computing in Teacher Education, 31*(3), 221-239.

DfES. (2002). *Get on with IT: The post-16 learning strategy strategy task force report*. London: Department for Education and Skills.

Diaz, D. P. (2002). Online drop rates revisited. *The Technology Source* May/June. Retrieved January, 2004, from http://ts.mivu.org/default.asp?show=article&id=981

Diener, E., & Crandall, R. (1978). *Ethics in social and behavioral research*. Chicago: University of Chicago Press.

Duffy, T. M., & Cunningham, D. J. (1996). Constructivism: Implications for the design and delivery of instruction. In D. Jonassen (Ed.), *Handbook of research for educational communication and technology*. New York: Simon and Shuster McMillan.

Duvall, C. K., & Schwartz, R. G. (2000). Distance education: Relationship between academic performance and technology-adept adult students. *Education and Information Technologies, 5*(3), 177-187.

Ertmer, P. A., Addison, P., Lane, M., Ross, E., & Woods, D. (1999). Examining teachers' beliefs about the role of technology in the elementary classroom. *Journal of Research on Computing in Education, 32*(1), 54-71.

Fontana, A., & Frey, J. H. (1994). Interviewing: The art of science. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research*. Thousand Oaks: Sage.

Fontana, A., & Frey, J. H. (2002). The interview: From structured questions to negotiated text. In N. K. Denzin & Y. S. Lincoln (Eds.), *Collecting and interpreting qualitative materials*. Thousand Oaks, CA: Sage Publications.

Fullan, M. (1993). *Change Forces*. London: The Falmer Press.

Gall, M. D., Gall, J. P., & Borg, R. B. (2007). *Educational research* (8 ed.). Boston: Allyn and Bacon.

Gans, H. J. (1999). The participant-observer as a human being: Observations on the personal aspects of field work. In A. Bryman & R. G. Burgess (Eds.), *Qualitative research* London: Sage Publications.

Garrison, D. R. (1993). Quality and theory in distance education: Theoretical consideration. In D. Keegan (Ed.), *Theoretical principles of distance education*. New York: Routledge.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2-3), 1-19.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *The American Journal of Distance Education, 15*(1), 7-23.

Gay, L. R., & Airasian, P. (2000). *Educational research: Competencies for analysis and application.* Upper Saddle River, NJ: Prentice-Hall, Inc.

Gibson, C. C. (1998a). The distance learner's academic self-concept. In C. C. Gibson (Ed.), *Distance learners in higher education: Institutional responses for quality outcomes* (pp. 97-112). Madison, WI: Atwood Publishing.

Gibson, C. C. (1998b). The distance learner in context. In C. C. Gibson (Ed.), *Distance learners in higher education*. Madison, WI: Atwood Publishing.

Gilbert, J. (2005). *Catching the knowledge wave? The knowledge society and the future of education.* Wellington: NZCER Press.

Gilbert, L., & Moore, D. R. (1998). Building interactivity into web courses: Tools for social and instructional interaction. *Educational Technology, 38*(3), 29-35.

Gold, S. (2001). Teaching on the web: A constructivist approach to faculty development. In C. Crawford (Ed.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2001* (pp. 675-680). Chesapeake, VA: AACE.

Graham, M., & Scarborough, H. (1999). Computer mediated communication and collaborative learning in an undergraduate distance education environment. *Australian Journal of Educational Technology, 15*(1), 20-46.

Gregory, I. (2003). *Ethics in research*. London: Continuum.

Guba, E. G., & Lincoln, Y. S. (1998). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The landscape of qualitative research*. Thousand Oaks, California: Sage Publications, Inc.

Gunawardena, C. N., & Duphorne, P. L. (2000). Predictors of learner satisfaction in an academic computer conference. *Distance Education, 21*(1), 101-117.

Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research, 17*(4), 365-429.

Gunawardena, C. N., Lowe, C. A., & Carabajal, M. A. (2000). Evaluating online learning: Models and methods. In C. Crawford (Ed.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2000* (pp. 1677-1684). Chesapeake. VA: AACE.

Gunawardena, C. N., & Zittle, F. H. (1997). Social presence as a predictor of satisfaction within a computer-mediated conference environment. *The American Journal of Distance Education, 11*(3), 8-26.

Hall, R. H., Watkins, S. E., & Ercal, F. (2000). *The horse and the cart in web-based instruction: Prevalence and efficacy.* Paper presented at the Annual Meeting of the American Educational Research Association (April, 2000), New Orleans, LA.

Hamnett, M. P., Porter, D. J., Singh, A., & Kumar, K. (1984). *Ethics, politics, and international social science research: From critique to praxis*. Hawaii: University of Hawaii Press.

Hara, N., Bonk, C. J., & Angeli, C. (2000). Content analysis of online discussion in an applied educational psychology course. *Instructional Science, 28*(2), 115-152.

174

Harmon, S. W., & Jones, M. G. (1999). The five levels of web use in education: Factors to consider in planning an online course. *Educational Technology, 39*(6), 28-32.

Harmon, S. W., & Jones, M. G. (2000). *A qualitative analysis of situated web-based instruction.* Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.

Hawkes, M. (1999). Exploring network-based communication in teacher professional development. *Educational Technology, 39*(4), 45-52.

Hawkes, M. (2001). Variables of interest in exploring the reflective outcomes of network-based communication. *Journal of Research on Computing in Education, 33*(3), 299-315.

Hawkes, M., & Dennis, T. (2003). Supporting and assessing online interactions in higher education. *Educational Technology, 43*(4), 52-56.

Henri, F. (1992). Computer conferencing and content analysis. In K. A. R/ (Ed.), *Collaborative learning through computer conferencing: The najaden papers* (pp. 115-136). New York: Springer.

Hillman, D. C. A., Willis, D. J., & Gunawardena, C. N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *The American Journal of Distance Education, 8*(2), 30-42.

Hirumi, A. (2002). A framework for analyzing, designing, and sequencing planned e-learned interactions. *The Quarterly Review of Distance Education, 3*(2), 141-160.

Holmberg, B. (1983). Guided didactic conversation in distance education. In D. Sewart, D. Keegan & H. Borge (Eds.), *Distance Education: International Perspectives.* London: Croom Helm Ltd.

Holstein, J. A., & Gubrium, J. F. (1997). Active Interviewing. In D. Silverman (Ed.), *Qualitative research: Theory, method and practice.* London: Sage Publications, Ltm.

Honey, M., Culp, K. M., & Carrigg, F. (2000). Perspectives on technology and education research: Lessons from the past and present. *Journal of Educational Computing Research, 23*(1), 5-14.

Hough, B., W., Smithey, M. W., & Everton, C. M. (2004). Using computer-mediated communication to create virtual communities of practice for intern teachers. *Journal of Technology and Teacher Education, 12*(3), 361-386.

Jiang, M., & Ting, E. (2000). A study of factors influencing students' perceived learning in a web-based course environment. *International Journal of Educational Telecommunications, 6*(4), 317-388.

Johnson, S. D., Aragon, S. R., Shaik, N., & Palma-Rivas, N. (2000). Comparative analysis of learning satisfaction and learning outcomes in online and face-to-face learning environments. *Journal of Interactive Learning Research, 11*(1), 29-49.

Jonassen, D. H. (1985). Interactive lesson designs: A taxonomy. *Educational Technology, 25*(6), 7-17.

Jonassen, D. H. (2000). *Computers as mindtools: Engaging critical thinking* (Second ed.). Upper Saddle River, NJ: Prentice-Hall, Inc.

Jonassen, D. H. (2002). Learning as activity. *Educational Technology, 42*(2), 45-51.

Jonassen, D. H. (2003). *Learning to solve problems with technology.* Upper Saddle River: Merrill Prentice Hall.

Jonassen, D. H., Davidson, M., Collins, M., Campbell, J., & Haag, B. B. (1995). Constructivism and computer-mediated communication in distance education. *The American Journal of Distance Education, 9*(2), 7-26.

Jonassen, D. H., Peck, K., & Wilson, B. G. (1999). *Learning with technology: A constructivist perspective*. Upper Saddle River, New Jersey: Merrill/Prentice Hall.

Jorgensen, D. L. (1989). *Participant observation: A methodology for human studies*. Newbury Park: Sage Publications.

Joyce, B., & Showers, B. (1995). *Student achievement through staff development: Fundamentals of school renewal* (Second ed.). White Plains, NY: Longman Publishers.

Joyce, D., Nodder, C., Williamson, A., & Young, A. (2001). Using an electronic discussion board to supplement classroom sessions with post graduate students. In C. Crawford (Ed.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2001*. Chesapeake, VA: AACE.

Kanuka, H., & Garrison, D. R. (2004). Cognitive presence in online learning. *Journal of Computing in Higher Education, 15*(2), 30-49.

Kerr, S. T. (2001). Toward a sociology of educational technology. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology*. Mahway, NJ: Lawren Erlbaum Associates.

Krathwohl, D. R. (1993). *Methods of educational and social science research: An integrated approach*. White Plains, NY: Longman Publishing Group.

Kretovics, M. (2003). The role of student affairs in distance education: Cyber-services or virtual communities. *Volume VI, Number 3*   Retrieved 3, 6, from http://www.westga.edu/~distance/ojdla/fall63/kretovics63.html

Lai, K. (1999). *Net-working: Teaching, learning & professional development with the Internet*. Dunedin, New Zealand: University of Otago Press.

LaPadula, M. (2003). A comprehensive look at online student support services for distance learners. *The American Journal of Distance Education, 17*(2), 119-128.

Leach, J. (2000). Breaking the silence: the role of technology and community in leading professional development. In B. Moon, J. Butcher & E. Bird (Eds.), *Leading professional development in education*. London: RoutledgeFalmer.

Lee, J., & Gibson, C. C. (2003). Developing self-direction in an online course through computer-mediated interaction. *The American Journal of Distance Education, 17*(3), 173-187.

Leonard, D. C. (1999). The web, the millennium, and the digital evolution of distance education. *Technical Communication Quarterly, 8*(1).

Levin, J. A., Kim, H., & Riel, M. (1990). Analyzing instructional interactions on electronic message networks. In L. Harasim (Ed.), *On-line education: Perspectives on a new environment*.

Levin, J. A., Levin, S. R., & Waddoups, G. (1999). Multiplicity in learning and teaching: A framework for developing innovative online education. *Journal of Research on Computing in Education, 32*(2).

Levitch, S., & Milheim, W. D. (2003). Transitioning instructor skills to the virtual classroom. *Educational Technology, 43*(2), 42-46.

Lim, C. K. (2001). Computer self-efficacy, academic self-concept, and other predictors of satisfaction and future participation of adult distance learners. *The American Journal of Distance Education, 15*(2), 41-51.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.

Lincoln, Y. S., & Guba, E. G. (2002). Judging the quality of case study reports. In M. A. Huberman & M. B. Miles (Eds.), *The qualitative researcher's companion*. Thousand Oaks, California: Sage Publications, Inc.

Lobry de Bruyn, L. (2004). Monitoring online communication: can the development of convergence and social presence indicate an interactive learning environment?, *Distance Education* (Vol. 25).

Lombard, M., & Ditton, T. (1997). At the heart of it all: The concept of presence, *Journal of Computer-Mediated Communication Vol 3 No 2* (Vol. 3).

Loucks-Horsley, S. (1999). Research into practice. *School Science and Mathematics, 99*(5).

Lu, A., Zhu, J., & Stokes, M. (2000). The use and effects of web-based instruction: Evidence from a single-source study. *Journal of Interactive Learning Research, 11*(2), 197-218.

Lucking, B., Rovai, F., & Ireland, M. (2001). Classroom community in post-secondary classes: An examination of traditional and distance learning environments. In C. Crawford (Ed.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2001* (pp. 2381-2382). Chesapeake, VA: AACE.

MacGregor, C. J. (2002). Personality differences between online and face-to-face students. *The Journal of Continuing Higher Education, 50*(3), 14-23.

MacKinnon, G. R. (2000). The dilemma of evaluating electronic discussion groups. *Journal of Research on Computing in Education, 33*(3), 125-131.

Many, J. E., Wallace, F. H., Stephenson, J., & Eickholdt, L. (2004). I know them better than students in my on-campus courses. *Reading Online, 8(2)* Retrieved October, 2004, from http://www.readingonline.org/articles/many/

Maor, D. (1999). Teachers-as-learners: The role of a multimedia professional development program in changing classroom practice. *Australian Science Teachers Journal, 45*(3), 45.

Maor, D. (2003). The teacher's role in developing interaction and reflection in an online learning community. *Educational Media International, 40*(1/2), 127-136.

Marcinkeiwicz, H. R. (1993). Computers and teachers: Factors influencing computer use in the classroom. *Journal of Computing in Teacher Education, 26*(2), 220.

Markham, A. M. (2004). Representation in online ethnographies: A matter of context sensitivity. In M. D. Johns, S.-L. S. Chen & G. J. Hall (Eds.), *Online social research: Methods, issues and ethics*. New York: Peter Lang.

Marra, R. M. (2004). An online course to help teachers use technology to enhance learning: Successes and limitations. *Journal of Technology and Teacher Education, 12*(3), 411-429.

Martinez, M., & Bunderson, C. V. (2000). Building interactive world wide web learning environments to match and support individual learning differences. *Journal of Interactive Learning Research, 11*(2), 163-195.

McDonald, J., & Gibson, C. C. (1998). Interpersonal dynamics and group development in computer conferencing. *The American Journal of Distance Education, 12*(1), 7-25.

McFerrin, K. M. (1999). Incidental learning in a higher education asynchronous online distance education course. In J. D. Price, J. Willis, D. A. Willis, M. Jost & S. Boger-Mehall (Eds.), *Proceedings of Society for Information Technology*

and Teacher Education International Conference 1999 (pp. 1418-1423). Chesapeake, VA: AACE.

McIsaac, M. S., & Gunawardena, C. N. (1996). Distance education. In D. Jonassen (Ed.), *Handbook of research for educational communication and technology*. New York: Simon and Shuster Macmillan.

McLester, S. (2001). Top 10 technology breakthroughs for schools. *Technology and Learning, 22,* 16-32.

McMahon, T. A. (1997, March 24-28, 1997). *From isolation to interaction: Network-based professional development and teacher professional communication.* Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, Illinois.

Meyen, E. L., & Yang, C. H. (2003). Barriers to implementing large-scale online staff development programs for teachers, *Online Journal of Distance Learning Administration, 6(4)* (Vol. 6).

Meyer, K. A. (2004). Evaluating online discussions: Four different frames of analysis. *Journal of Asynchronous Learning Networks, 8*(2), 101-114.

Miles, M. B., & Huberman, M. A. (1984). *Qualitative data analysis: A book of new methods*. Beverly Hills, California: Sage Publications, Inc.

Miles, M. B., & Huberman, M. A. (1994). *Qualitative data analsis: An expanded sourcebook* (2nd ed.). Thousand Oaks: Sage Publications.

Moon, B. (1998, April 13-17, 1998). *Toward a New Generation of Open Learning Programmes in Teacher Education: Lessons for Us All.* Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Moore, M. G. (1989). Three types of interaction. *The American Journal of Distance Education, 3*(2), 1-6.

Moore, M. G. (1991). Editorial: Distance education theory. *American Journal of Distance Education, 5*(3), 1-6.

Moore, M. G. (1993). Three types of interaction. In K. Harry, M. John & D. Keegan (Eds.), *Distance education: New perspectives* (pp. 21-24). London: Routledge.

Moore, M. G. (1994). Editorial: Autonomy and interdependence. *The American Journal of Distance Education, 8*(2).

Moore, M. G. (1998). Introduction. In C. C. Gibson (Ed.), *Distance learners in higher education: Institutional responses for quality outcomes*. Madison, WI: Atwood Publishing.

Moore, M. G. (2000). Welcome to the for-profit providers--but with some concerns. *The American Journal of Distance Education, 14*(2), 1-3.

Morrison, J. (2003). U. S. higher education in transition. *The Horizon, 11*(1), 6-10.

Morrow, D. (2002a). An examination of the effectiveness of types of learner interactivity in an online professional development course. In C. Crawford (Ed.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2002* (pp. 871-875). Chesapeake, VA: AACE.

Morrow, D. (2002b). Information and communication technologies in the teaching and learning process: Does online professional development make a difference? In *Proceeedings of World Conference on Educational Multimedia, Hypermedia & Telecommunications 2002* (pp. 1392-1396). Chesapeake, VA: Association of the Advancement of Computing in Education.

Murray, T. R. (2003). *Blending qualitative and quantitative research methods in theses and dissertations*. Thousand Oaks, CA: Corwin Press, Inc.

Nandhakumar, J. (1997). Issues in participant observation: A study of the practice of information systems development. In G. McKenzie, J. Powell & R. Usher (Eds.), *Understanding social research: Perspectives on methodology and practice*. London: The Falmer Press.

Navarro, P., & Shoemaker, J. (2000). Performance and perceptions of distance learners in cyberspace. *The American Journal of Distance Education, 14*(2), 15-35.

Neuman, W. L. (2003). *Social Research Methods: Qualitative and Quantitative Approaches* (5th ed.). Boston: Allyn and Bacon.

Nisan-Nelson, P. D. (1999). Teacher training and distance education: The effect of online education and teacher attitudes. *International Journal of Educational Telecommunications, 5*(2), 143-156.

Nodder, C., Young, A., & Joyce, D. (2001). Using an electronic discussion board to supplement classroom sessions with post graduate teacher education students. In C. Crawford (Ed.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2001* (pp. 2864-2867). Chesapeake, VA: AACE.

NZ Ministry of Education. (2001). *ICT in schools 2001: Final report*: The Learning Centre Trust of New Zealand.

Ohlund, B., Yu, C. H., Jannasch-Pennell, A., & Digangi, S. A. (2000). Impact of asynchronous and synchronous Internet-based communication on collaboration and performance among K-12 teachers. *Journal of Educational Computing Research, 23*(4), 405-420.

Olgren, C. H. (1998). Improving learning outcomes: The effects of learning strategies and motivation. In C. C. Gibson (Ed.), *Distance learners in higher education: Institutional responses to quality outcomes*. Madison, WI: Atwood Publishing.

Pachnowski, L. M., & Jurczyk, J. P. (2000, February 16-19, 2000). *Correlating self-directed learning with distance learning success.* Paper presented at the Annual Meeting of the Eastern Educational Research Association, 23rd, Clearwater, Fl.

Palloff, R., & Pratt, K. (2003). *The virtual student: A profile and guide to working with online learners*. San Francisco: Jossey-Bass.

Partington, G., 32-44. (2001). Qualitative research interviews: Identifying problems in technique. *Issues In Educational Research, 11*(2), 32-44.

Pawan, F., Paulus, T. M., Yalcin, S., & Change, C. F. (2003). Online learning: Patterns of engagement and interaction among in-service teachers. *Language Learning & Technology, 7*(3), 119-140.

Perdue, K. J., & Valentine, T. (2000). Deterrents to participation in web-based continuing professional education. *The American Journal of Distance Education, 14*(1), 7-25.

Perkins, J., & Newman, K. (1996). Two archetypes in e-discourse: lurkers and virtuosos. *International Journal of Educational Telecommunications, 2*(2/3), 155-170.

Perkins, J., & Newman, K. (1999). Meaning in e-discourse. *International Journal of Educational Telecommunications, 5*(2), 157-168.

Peters, O. (1993). Understanding distance education. In K. Harry, M. John & D. Keegan (Eds.), *Distance education: New perspectives* (pp. 11-17). London: Routledge.

Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course, *Journal of Asynchronous Learning Networks, Vol 6, No 1* (Vol. 2004).

Poole, D. M. (2000). Student participation in a discussion-oriented online course: A case study. *Journal of Research on Computing in Education, 33*(2).

Potter, J. (1998). Beyond access: Student perspective on support service needs in distance education. *The Canadian Journal of University Continuing Education, 24*(1).

Putnam, R. T., & Borko, H. (1997). Teacher learning: Implications of new views of cognition. In B. J. Biddle, T. L. Good & I. F. Goodson (Eds.), *International handbook of teachers and teaching* (Vol. II, pp. 1223-1296). Dordrecht: Kluwer Academic Publishers.

Rice, J. (2004). Preparing school technology leaders for online professional development: Training efforts with El Paso Teachers for online course facilitation in Texas STARgate, *Online Journal of Distance Learning Administation, 7(3)* (Vol. 2005).

Richardson, J. C., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks, 7*(1).

Rock, P. (1999). Participant observation. In A. Byrman & R. G. Burgess (Eds.), *Qualitative research* London: Sage Publications.

Rose, E. (1999). Deconstructing interactivity in educational computing. *Educational Technology, 39*(1), 43-49.

Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (2001). Assessing social presence in asynchronous text-based computer conferencing. *Journal of Distance Education, 14(2)* Retrieved April, 2004, from http://cade.athabascau.ca/vol14.2/rourke_et_al.html

Rovai, A. P., & Barnum, K. T. (2003). On-line course effectiveness: An analysis of student interactions and perceptions of learning. *Journal of Distance Education, 18*(1), 57-73.

Russell, T. L. (2003). The no significant difference phenomena. Retrieved August, 2003, from http://teleducation.nb.ca/nosignificantdifference/

Russo, T. C., & Campbell, S. W. (2004). Perceptions of mediated presence in an asynchronous online course: Interplay of communication behaviors and medium. *Distance Education, 25*(2), 215-232.

Saba, F., & Shearer, R. (1994). Verifying key theoretical concepts in a dynamic model of distance education. *American Journal of Distance Education, 8*(1), 36-59.

Salomon, G., & Perkins, D. N. (1998). Individual and social aspects of learning. In D. P. Pearson & A. Iran-Nejad (Eds.), *Review of research in education* (Vol. 23, pp. 1-24). Washington: American Educational Research Association.

Saunders, N., Malm, L., Malone, B., Nay, F., Oliver, B., & Thompson, J. (1997, October 15-18, 1997). *Student perspectives: Responses to Internet opportunities in a distance learning environment.* Paper presented at the Annual Meeting of the Mid-Western Educational Research Association, Chicago, IL.

Savenye, W. C., & Robinson, R. S. (1996). Qualitative research issues and methods: An introduction for educational technologists. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology.* New York: Simon & Schuster MacMillan.

Schlager, M. S., & Fusco, J. (2003). Teacher professional development, technology, and communities of practice: Are we putting the cart before the horse? *The Information Society, 19*, 203-220.

Schrum, L. (2001). Online professional development: Suggestions for success. Retrieved August, 2001, from http://www.att.com/learningnetwowrk/virtualacademy/success1.html

Seidman, I. E. (1991). *Interviewing as qualitative research*. New York: Teachers College Press.

Selwyn, N., & Gorard, S. (2003). Reality bytes: Examining the rhetoric of widening educational participation via ICT. *British Journal of Educational Technology, 34*(2), 169-181.

Sherron, G. T., & Boettcher, J. A. (1997). *Distance learning: The shift to interactivity*. Boulder, Colorado: Cause.

Shotsberger, P. G. (2000). The human touch: Synchronous communication in web-based learning. *Educational Technology, 40*(1), 53-56.

Silverman, D. (1993). *Interpreting qualitative data: Methods for analysing talk, text and interaction*. London: Sage Publications.

Sims, R. L. (1999). Interactivity on stage; Strategies for learner-designer communications. *Australian Journal of Educational Technology, 15*(3), 257-272.

Sims, R. L. (2003). Promises of interactivity: Aligning learner perceptions and expectations with strategies for flexible and online learning. *Distance Education, 24*(1), 87-103.

Soo, K.-S., & Bonk, C. J. (1998). Interaction: What does it mean in online distance education? In T. Ottman & I. Tomek (Eds.), *Proceedings of Ed-Media/Ed-Telecom 98 World Conferences on Educational Multimedia and Hypermedia & World Conference on Educational Telecommunications. Freiburg, Germany.* (pp. 1764-1765). Charlottesville, VA: AACE.

Stake, R. E. (1994). Case studies. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research*. Thousand Oaks, CA: Sage Publications, Inc.

Stein, D., & Glazer, H. R. (2003). Mentoring the adult learner in academic midlife at a distance education university. *The American Journal of Distance Education, 17*(1), 7-23.

Stephens, A. C., & Hartmann, C. (2004). A successful professional development project's failure to promote online discussion about teaching mathematics with technology. *Journal of Technology and Teacher Education, 12*(1), 57-73.

Strauss, A. (1987). *Qualitative Analysis for Social Scientists*. New York: Cambridge University Press.

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, California: Sage Publications, Inc.

Sutton, L. A. (2001). The principle of vicarious interaction in computer mediated communications. *International Journal of Educational Telecommunications, 7*(3), 223-242.

Swan, K., Shea, P., Fredericksen, E., Pickett, A., Pelz, W., & Maher, G. (2000). Building knowledge building communities: Consistency, contact and communication in the virtual classroom. *Journal of Educational Computing Research, 23*(4), 359-383.

Tabs, E. D. (2003, July 2003). Distance education at degree-granting postsecondary institutions: 2000-2001.   Retrieved September 2003, 2003, from http://nces.ed.gov/surveys/peqis/publications/2003017

Trilling, B., & Hood, P. (1999). Learning, technology and education reform in the knowledge age or 'we're wired, webbed, and windowed, now what?" *Educational Technology, 39*(3), 5-18.

Tsui, A. B. M., & Wing, W. K. (1996). An analysis of conference interactions on Telenex: A computer network for ESL teachers. *Educational Technology Research and Development, 44*(4), 23-44.

Tu, C. H., & McIsaac, M. S. (2002). The relationship of social presence and interaction in online classes. *The American Journal of Distance Education, 16*(3), 131-150.

Tuckman, B. W. (2004). *The effect of motivational scaffolding on the effectiveness of distance learning.* Paper presented at the American Educational Research Association, San Diego.

Turoff, M. (1995). *Designing a virtual classroom.* Paper presented at the 1995 International Conference on Computer Assisted Instruction, Hsinchu, Taiwan.

Turoff, M., Hiltz, S. R., & V., B. (1994). The human element in collaborative hypertext/hypermedia. Retrieved July 28, 2003, from http://eies.njit.edu/~turoff/Papers/cscwhy.htm

Twigg, C. A. (2002). Innovations in online learning: Moving beyond no significant difference. Retrieved August, 2003, from http://www.center.rpi.edu/PewSym/Mono4.html

U.S. Dept of Education. (2000). *Teachers' tools for the 21st century: A report on teachers' use of technology*. Washington, DC: Office of Educational Research and Improvement.

U.S. Dept of Education. (2002). *The condition of education 2002*. Washington, DC: National Center for Educational Statistics, US Government Printing Office.

Waddington, D. (1994). Participant observation. In C. Cassell & G. Symon (Eds.), *Qualitative methods in organizational research: A practical guide*. London: Sage Publications.

Wagner, E. D. (1994). In support of a functional definition of interaction. *The American Journal of Distance Education, 8*(2), 6-29.

Wagner, E. D. (1997). Interactivity: From agents to outcomes. *New Directions for Teaching and Learning, 71*, 19-26.

Waits, T., & Lewis, L. (2003). *Distance education at degree-granting postsecondary institutions: 2000-2001* (No. NCES 2003017): National Center for Education Statistics, US Dept of Education.

Weller, H. G. (1988). Interactivity in micro-computer-based instruction: Its essential components and how it can be enhanced. *Educational Technology, 28*(2), 23-27.

Werry, C. (2001). The work of education in the age of e-college. *First Monday, 6*(5), 1-24.

Wiggins, G. (1993). Assessment: Authenticity, context and validity. *Phi Delta Kappan, 75*, 200-214.

Williams, D. L. (2001). The virtual classroom in relation to educational models. *International Journal of Educational Telecommunication, 7*(1), 23-32.

Williams, M., & Robson, K. (2004). Reengineering focus group methodology for the online environment. In M. D. Johns, S.-L. S. Chen & G. J. Hall (Eds.), *Online social research: Methods, issues and ethics*. New York: Peter Lang.

Willoughby, K. W. (2003). The Virtualization of university education: Concepts, strategies and business models. Discussion Paper #75, September 15-19,

2003. Retrieved September, 2003, from
http://it.coe.uga.edu/itforum/paper75/paper75.html

Wilson, S. M., & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. In A. Iran-Nejad & P. D. Pearson (Eds.), *Review of research in education*. Washington: American Educational Research Association.

Woods, R. H. J., & Baker, J. D. (2004). Interaction and immediacy in online learning, *International Review of Research in Open and Distance Learning* (Vol. 5).

Wu, D., & Hiltz, S. R. (2003). *Online discussions and perceived learning.* Paper presented at the Ninth Americas Conference on Information Systems, Tampa, Florida.

Wu, D., & Hiltz, S. R. (2004). Predicting learning from asynchronous online discussion. *Journal of Asynchronous Learning Networks, 8*(2), 139-150.

Yacci, M. (2000). Interactivity demystified: A structural definition for distance education and intelligent computer based instruction. *Educational Technology, 40*(4), 5-16.

Yin, R. K. (1994). *Case study research: Design and methods* (2 ed.). Thousand Oaks, CA: Sage Publications.

Zeidler, D. L., & LeBaron, J. F. (1997, March, 1997). *Meeting the challenge of professional development: Design and evaluation of a telecommunications mediated course in science, mathematics and technology education.* Paper presented at the 70th Annual Meeting of the National Association for Research in Science Teaching, Chicago, IL.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64-70.