

**STUDENT UNDERSTANDINGS OF LEARNING AT THE
END OF AN UNDERGRADUATE PROGRAM USING
NETWORKED LEARNING: A CASE STUDY**

by

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Abstract

Course-based online learning has grown significantly in the last decade, yet the understanding of students' experience of this form of learning is only just starting to emerge. Practitioners and researchers are already starting to explore post course-based networked learning scenarios, including networked lifelong learning. Now would seem to be an opportune time to investigate students' learning experiences in course-based networked environments, in order to inform the development of these post course-based learning environments.

The aim of this case study was to examine students' understandings of learning gained through course-based networked learning, with the aim of shedding some light on how students might engage with post course-based networked learning environments. Specifically, the study sought to understand what aspects of identity as learners and understandings of ways to learn were shown by students who had been through a program using course-based networked learning. Through interviews with six students who were close to completion of an undergraduate program making significant use of networked learning at a west coast Canadian University, this research explored the understandings about learning that these students had developed through their program. Results showed that students were faced with an onslaught of technologies and found it challenging to develop new ways to learn. This suggests that newer ways to learn will have to be explicitly taught if students are to be successful with networked lifelong learning.

The study concluded with implications for the development of post course-based networked learning environments, for educational programs using networked learning and for future research on students' experiences of networked learning.

Keywords: post-secondary education; student experience; online learning; networked learning; identity; learning metaphors

Subject Terms: learning theories, computer networks, online learning

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Chapter 1: Introduction

3.2 million students were enrolled in at least one online course in the United States in the fall of 2005 (Allen and Seaman, 2006) and by fall 2008, this number had grown to 4.6 million (Allen and Seaman, 2010). This 2008 figure represents one quarter of all students enrolled in higher education in the United States (Allen and Seaman, 2010). Thus, it is clear that many post-secondary educational institutions have deployed networked learning environments (see Definition of Terms in Appendix E). Consequently, many post-secondary students have had exposure to such tools in their educational courses and programs.

This chapter introduces the area of networked learning and the issues within this area that the current study will focus upon. This first chapter contains a discussion of the significance of this study, along with the stated purpose, program and personal context, and research questions. Chapter 2 includes a review of the research literature on networked learning, identity and learning. Chapter 3 presents a description of research methodology based on qualitative, naturalistic inquiry methods. Chapter 4 covers the results, while Chapter 5 provides a discussion and conclusions.

The previous generations of text-based networked learning environments have been extensively researched (see Harasim, Hiltz, Teles and Turoff, 1995). The present generation of graphical world wide web-based (web) networked learning environments, have been in use for about a dozen years now. They have also been the subject of much research, which will be reviewed in Chapter 2. Both these generations of networked learning tools, as Harasim et al., (1995) and the research in Chapter 2 show, have focused on the course in an educational institution as the basic unit. In this research subjects were students taking one or more courses in a networked learning environment.

A number of designers and researchers (de Freitas and Jameson, 2006; Koper, Giesbers and van Rosmalen, 2005; McAndrew, MacKinnon and Rist, 2002; Sharples, 2000), have started to look beyond the formal course as the basic unit in networked

learning and have been exploring other contexts for learning, including networked lifelong learning. This has led to problems, as Tosh, Light, Fleming and Haywood (2005) point out, that networked learning systems that disembed themselves from the course, which students have been socialized into over many years, may run into problems related to commitment to the use of such systems in situations and time frames beyond the length of a course. Networked lifelong learning, by definition, must be able to support students beyond individual courses.

A preliminary search of the literature shows that attempts to support lifelong learning through networked learning environments are a recent phenomenon. Thus there is a lack of research looking at factors related to the success or failure of such environments. The longer history of research, reviewed in Chapter 2, on course-based networked learning is perhaps sufficient to suggest some factors that support successful student learning in course-based networked learning environments. Many ways of learning in course-based networked learning might also be expected to be present in lifelong learning based networked learning. Using this longer history of research on course-based networked learning it should be possible to speculate on what factors might be important in the success of networked lifelong learning. In particular, it might be worth determining if: (1) existing course-based networked learning environments are influencing whether students are developing ways of learning that might be important in networked lifelong learning environments, and (2) whether students are developing ways to learn in course-based networked learning that were not intended by the program. This might suggest that students can independently expand their learning repertoire in networked lifelong learning.

The study presented in this thesis explored the understandings about learning in a course-based networked environment of those who are well-placed to take advantage of networked lifelong learning beyond post-secondary education, namely those who have already spent significant amounts of time in programs making use of networked learning tools in their courses. Interviewing such students, as they finished this period of significant exposure to course-based networked learning, allowed for an investigation of the influences of these environments on the understandings about learning they have acquired during the program. The end of a program is expected to be a significant

turning point (Strauss, 1962) in the lives of the students and thus a time when thinking about learning beyond formal education would be salient for them. Turning points are more salient for learners than the routine periods in between such turning points (Hodkinson, Hodkinson, Hawthorn and Ford, 2008). This study was focused on a group of such students and examined their thinking about learning and the extent to which their thinking has been influenced by their experiences with networked learning. It focused on students' general identity as learners and awareness of specific ways to learn acquired from participation in a program making extensive use of course-based networked learning. This is important in order to understand if post-baccalaureate students are ready for networked lifelong learning. It is also important because a search of the literature shows that there has been little exploration of the effect of students' experience with networked learning on their conceptions of learning. Similarly, as this study will show, the concept of 'learning identity' has not been extensively explored in the literature, but there seem to be significant reasons for using this concept in such research.

The concept of learning identity allows a deepening of the analysis of the influence networked learning may have on students' self-understandings of their own learning and also has some epistemological benefits. There is a growing literature that maintains that identity is at the heart of looking at learning. First, Giddens (1991) in particular, looks at identity and its importance as a mediator of learning for the individual, under conditions of modernity. Second, Wenger (1998) also extends Giddens work in some respects, but more importantly provides a basis for another model of learning in which identity plays a major role: participatory activity. Third, the examination of identity by these writers provides many clues as to what to look for and what to ask students about their experiences and their thinking about their learning. Identity adds depth, by allowing a search for more substantive effects on individuals that have influenced their identities as learners.

Identity is a complex concept and the challenge in getting people to talk about it in relation to their own learning further compounds this problem. Eraut (2000) reports "potential respondents are unaccustomed to talking about learning and may find it difficult to respond to a request to do so" (p. 15). Towle (2008) similarly reports that

researchers on student experiences with technology have found it difficult to get learners to talk meaningfully about their experiences with technology. Eraut (2004) reports that these problems became greater as discussions of learning involved informal learning and in general have led to the predominance of interview-based research because of the unsuitability of using questionnaire-based research with phenomena that are difficult to elicit. Case studies predominate on the topic of informal learning (Sawchuk, 2008) and on research that examines student experiences with technology-based learning as the UK Joint Information Systems Committee (JISC) research program (JISC phase 1, 2008; JISC phase 2, 2008) has shown.

Given the difficulty in getting respondents to talk about learning, interviews tend to focus on such concepts as “key lifetime events, learning projects, recent changes in respondents life or practice or situations where more knowledge or skill was needed” (Eraut, 2004, p. 248). Eraut (2004) devised a series of questions, which broke down the process of learning, to encourage respondents to elaborate on specific learning episodes and to ask respondents to provide examples of general statements they made about learning. Towle (2008) reports that many of the research studies in the JISC research program used “Interview Plus”, that is an artefact or a critical incident selected by the learner to support guided recall during an interview. Eliciting student responses on their learning identity was expected to be problematic in the current study. As a result, the researcher attempted to use the previous research on learning identity to capture the broad effects of exposure to networked learning, using methodology recommendations from Eraut (2000) and Towle (2008).

These challenges with the concept of identity suggested the need for an additional and more concrete way of accessing students’ conceptions of learning. Written artefacts based on learning metaphors were devised in order to provide some structured help to students in identifying specific ways of learning. Chapter 2 includes the rationale for using learning metaphors.

These challenges of accessing learning identity, however, suggest that researchers should set appropriate expectations as to what can be discovered. Edwards and Usher (2008) suggest that in new areas such as educational technology and lifelong learning, the best that can be hoped for is to get glimpses of what is happening.

Purpose

The purpose of this case study was to understand the influences that a program which makes extensive use of networked learning, had on the understandings about learning of students who have been through such a program. The students were post-secondary students, who had already made substantial use of networked learning tools across a series of courses in their undergraduate program. It was posited that there was value in examining post-secondary students, who already use networks extensively in their learning, so as to understand what they have learned about learning in such environments. Through this research, it was hoped to gain some understandings from students' experience with course-based networked learning, understandings that might inform the development of networked lifelong learning environments. In particular, it was hoped to gain some understanding about whether or not students developed meta-understandings about how they learn and whether they also develop a conscious sense of their identity as learners in networked environments.

Methodology of the Study

The methodology of the study was an instrumental case study of a group of senior undergraduates who were close to completion of a program making extensive use of networked learning. Their understandings of learning as realized in their identity as learners and their understandings of learning as realized in their acquisition of learning metaphors was the focus of the study. This case study called on a program evaluation framework to extend its reach. The aim of adding a program evaluation framework was not to facilitate judgements about the program, but rather to provide a structure for describing major elements of an educational program. Specifically, this structure supported a description of the program's intended outcomes for the growth of students as learners in comparison to students' realization of outcomes.

Significance of the Study

Sharpe (2008 and personal communication), see Figure 1, suggests an ascending hierarchy of needs that learners in networked learning environments possess; these are

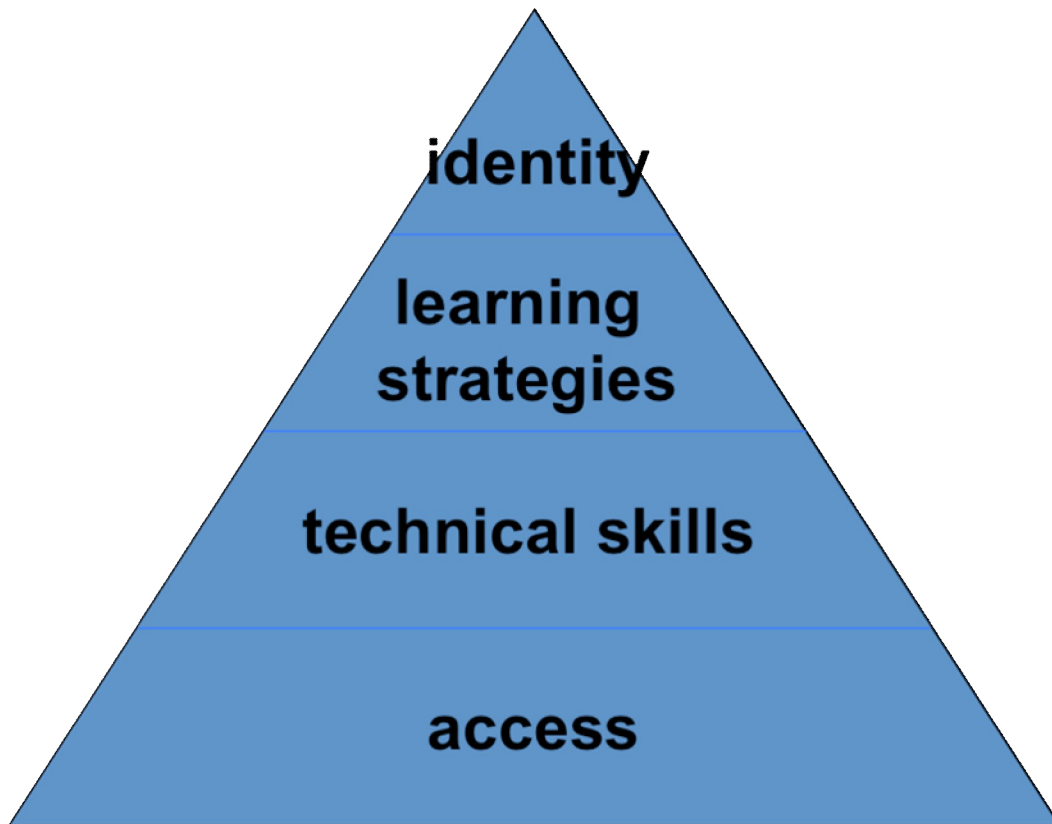


Figure 1.1: Developmental model of e-learning (Sharpe 2008 & personal communication)

access to technology, development of technical skills and development of learning strategies for technically mediated environments. If all these needs can be met, then the final stage is for learners to develop their own style of learning technology usage, the ability to create their own networked learning environments and the ability to participate actively in knowledge building and sharing communities. In short, in this advanced stage, networked learning becomes incorporated into the individual's identity as a learner.

The significance of this study can be found in this developmental model of e-learning shown in Figure 1 (Sharpe, 2008 and personal communication). Specifically, this study sought to address the practical animating question of this study, about networked lifelong learning, which is located within the top two levels of this model. In addition, this study aimed to increase the understanding of the influences of networked learning on students' understandings of ways to learn and identity as learners. This study examined these two areas, but from a different perspective than addressed by Sharpe (2008). Firstly, the concept of learning identity was grounded in the theoretical writings of Giddens

(1991) and Wenger (1998) and secondly the concept of learning strategies was grounded in a model of ways to learn. This different perspective formed the core of Chapter 2. The remainder of this section in Chapter 1 examines the state of development of e-learning using the model shown in Figure 1.

While learning strategies and the nature of changes to an individual's learning identity may differ in networked lifelong learning, the issues of access and technical skill will be the same as in course-based networked learning. This follows, logically, as the basic hardware will be the same and software environments are likely to be similar, that is, web-based. If access issues are extensive, students are not picking up technical skills or students are not picking up ways to learn in course-based networked learning environments, then networked lifelong learning would seem to have a bleak future.

Access

The problem of access has often been highlighted by the concept of the digital divide. At its most basic, the digital divide is often conceived of as having or not having access to technology. Gourova, Hermann, Leijten & Clements (2001) define the digital divide as:

the gap between nations which can and cannot afford the technology, between the businesses and consumers enjoying the advantages of the Information Age and those still awaiting its benefits, as the divide which separates the haves from the have-nots in the sphere of information, or as the exclusion of those who are poor, illiterate, rural or non-English speaking. (p. 4)

In terms of having access to the Internet, 49% of all adults in the USA had access to the Internet in 2000, though this access was greater for younger than older groups, richer than poorer groups, more educated than less educated groups and for the white population compared to other ethnic and racial groups (Pew Internet & American Life Project, 2000). A repeat of this survey in 2003 showed that the Internet was now being accessed by 58% of all adults in the US and that while access was still differentiated by age, household income, educational attainment and race/ethnicity, greater proportions of the elderly, poor, less educated and non white populations were now online (Pew Internet & American Life Project, 2003). Similarly, in Canada the proportion of households who had at least one member using the Internet grew from 49% in 2001 (Statistics Canada, 2002) to 64% in 2003 (Statistics Canada, 2004). Similarly, in Canada, households with

high income, members active in the labour force, those with children still living at home and people with higher levels of education were in the forefront of Internet adoption (Statistics Canada, 2004).

Students taking networked course-based learning have had their access to networked technology examined. The UK Open University, found that student access to computers, across both courses which required and did not require access, rose from 37% in 1988 to 89% of students in 2002 (Kirkwood and Price, 2005). Similarly, Conole, De Laat, Dillon and Darby (2006) in a survey of 427 students across a group of UK universities found that less than 5% of students reported that getting access to an Internet enabled computer was a problem for them.

Such basic conceptions of the digital divide, however, are problematic. It has been argued that they do not capture the continual change in technology and use of the Internet and the fact that technology access is less about a simple rich/poor divide than qualitatively different technology usage between the rich and poor. This can be seen, in particular, when looking at network technology usage across different countries. In many countries, outside of the US there are more cell phones than computers, per 1000 of the population (Czerniewicz and Carr, 2005). This can be seen in some of the research on e-learning. Creanor, Trinder, Gowan and Howells (2006), in their UK based research, found that while 71% of the students in their study had access to a computer at home, 85% made frequent use of a mobile phone. More fundamentally, however, many conceptions of the digital divide are too simplistic from an educational perspective. Selwyn, Gorard and Furlong (2006) warn against uncomplicated conceptions of the digital divide as having or not having access. They suggest that instead access should be reconceptualized by reconsidering what is meant by Information and Communications Technologies (ICT), what is meant by access, what is the relationship between access to ICT and use of ICT and how best to consider the consequences of engagement with ICT. Based on the simplified conception of access on which much of the research cited here has been based, access would seem to be a problem that has lessened over time.

Technical Skills

Assuming a student's access to technology needs are met, the next issue is whether they are able to acquire technical skills in order to be able to use networked learning

technology. As with access, technical skills appear to be coming less of an issue over time. Brinkerhoff and Koroghlanian (2005) surveyed five hundred and twelve participants from six universities located throughout the USA, who answered questions on their computer skills related to Internet delivery of instruction. Students were confident in basic skills (basic email skills, sending and reading attachments, following links on web pages), but less confident in more advanced skills (use of FTP programs, creating Web pages, locating and installing browser plugins). In addition, students without prior Internet-delivered course experience were less confident in their computer skills than participants with prior Internet-delivered course experience.

Comparing students' self-assessed computer skills from a prior administration of the same survey in 1999, Koroghlanian and Brinkerhoff (2008) found that students' skills had improved somewhat on most items in the survey since 1999, though the effect size was greater for lower level than higher level computer skills. Koroghlanian and Brinkerhoff (2008) also found higher skill ratings occurred with participants who had taken an advanced computer course, with higher connection speeds, with higher hours per week of computer use, with seven years or more of computer ownership and by participants who had taken five or more Internet-delivered courses.

Conole et al. (2006) in a survey of 427 students across a series of UK universities reported that fewer than 10% of students said that they found using a computer difficult. Conole et al. (2006) further reported from an integrative review of the above survey data together with a series of interviews and student recorded audio usage logs, that:

students' use of technologies is multi-faceted, complex and tailored to individual needs. Students are accessing information from different sources to gain multiple interpretations.... Communication is also multi-faceted and there is evidence that there appears to be an increase in the amount of oral and visual presentations that students are now required to do; many students referred to the fact for example that they were required to do PowerPoint presentations as part of their courses. (p. 52)

Conole et al. (2006) also found that students were generally able to explain what they used each piece of technology for in their learning and could articulate criteria for their selection and use or rejection of technology.

Creanor et al. (2006) found that 50% of the students in their study reported they

were confident or very confident in their computer skills, while a further 44% described themselves as partly confident. Creanor et al. (2006) further found that students often did not see their lack of computer skills as important and could often articulate a path through their use of learning technology by which they expected to be able to improve their computer skills. As Wilkinson (2006) cautions, and provides evidence for, actual students computer literacy may not always meet student's perceptions of their computer literacy.

The larger problem, however, larger than student technical skills is student informational literacy skills. Evidence suggests that these do not develop as easily as technical skills (Ashling, 2008). While taken together these reports are not adequate to suggest that students do not have any technology skill issues, this area of research is suggesting growing technical skills on the part of students.

Learning Strategies and Identity

Beyond having access to technology and skills to use technology lies the question of whether students are able to develop their ability to learn in networked learning environments, to acquire ways to learn. This requires an examination of the range of ways to learn, the establishment of a way of translating ways to learn into concepts understood by students and an examination of existing research on students' learning experiences in networked learning environments. Finally, it is valuable to examine whether students' networked learning experiences are having more substantial affects on students' understanding about learning, beyond their acquisition of ways to learn, that is, effects on their identity as learners. Rather than address these within the framework provided by Sharpe (2008), Chapter 2 will address these issues instead for the following reasons.

Sharpe (2008) and colleagues have produced a significant amount of research on students' experiences with networked learning, which will be reviewed in Chapter 2, under student experiences of networked learning. This research, however, while providing much operational detail about students' experiences, is lacking in theoretical thinking. Specifically, it lacks depth in its consideration of what constitutes identity and what constitutes learning. The delineation of these concepts has significant epistemological importance for this area, as will be discussed at the beginning of the next chapter. Given the importance of these concepts, a different approach was taken to the

last two stages of Sharpe's (2008) model. This approach and the research associated with it will form the basis of Chapter 2.

Recent Historical Context

Taylor (1991) warns against the dominance of instrumental rationality, particularly with regards to technology. Instrumental reasoning refers to “the kind of rationality we draw on when we calculate the most economical applications of means to a given end. Maximum efficiency, the best cost-output ratio, is its measure of success” (Taylor, 1991, p.5). Taylor points out that instrumental reasoning has become particularly associated with technology which “makes us believe we should seek technological solutions even when something very different is called for” (Taylor, 1991, p.6). Instrumental reasoning is driven by “powerful mechanisms of social life [which] press us in this direction” (Taylor, 1991, p.7). For Taylor (1991) the solution to instrumental reasoning is:

... an alternative enframing of technology... a moral framework of the ethic of practical benevolence.... But we have to place this benevolence in turn in the framework of a proper understanding of human agency, not in relation to the disembodied ghost of disengaged reason, inhabiting an objectified machine. We have to relate technology as well to this very ideal of disengaged reason, but now as an ideal, rather than as a distorted picture of the human essence. Technology in the service of an ethic of benevolence towards real flesh and blood people, technological, calculative thinking as a rare and admirable achievement of a being who lives in the medium of a quite different kind of thinking.... (p.106-107)

This warning by Taylor needs to be heeded by educators as it provides an ethical basis for the introduction of learning technologies that enable positive ends to be accomplished in a more efficient and robust manner. Only if learning technologies are situated within a broader educational framework can they be justified, both in terms of the allocation of scarce resources and their positive effect on students' learning and learning identities.

Justifications for the deployment of technology in education might have some sound philosophical basis, but history provides us with cases that offer warnings about these kinds of initiatives. Culbertson and Cunningham (1986) document the justifications given by proponents during the introduction of microcomputers in Ohio in the early

1980s. Reasons given included “because they are important,” with no specificity about how they were important, “because they will help learning” with no specificity about how they would help learning and “because they are important in the world” with no definition of how importance in the world connected to importance within the school system. Unfortunately, instrumentalism is also evident in the more recent history of networked learning (Selwyn, 2008).

Computer-based learning networks have been around for a couple of decades (see Harasim et al., 1995 for an in-depth review of networked learning prior to the emergence of the web). The researcher was heavily involved in the emergence of web-based networked learning and had a front seat in these events through participation in the events themselves. Authoritative information, given the rapid consolidation and thus disappearance of many companies and organizations in this sector over the last decade, makes referencing problematic. Much of the history of this movement at present exists as naturalistic generalizations (Stake, 1995) emerging from personal engagement of the researcher who was an actor in these events.

A significant growth in the use of networked learning occurred in the mid 1990s with the emergence of the web into the public sphere, followed shortly afterwards by the release of several web-based course management systems (CMSs), including Blackboard and WebCT. These CMSs emerged out of university computer science departments, as projects produced by graduate students (Blackboard) or professors (WebCT) looking to use the web to support their own teaching practice. Essentially, these course-based management systems provided several different categories of web-based tools, generally tools already in existence individually, within a web-based environment. Chief among these was the ability to mount and present web-based documents and the ability to support asynchronous discussion between a professor and their students and among the students themselves. Over time, these CMSs added many more tools and became more sophisticated.

These CMSs, however, remained collections of tools predicated on the assumption that individual professors would select the tools they wanted and that their use of these tools would be governed by their context and pedagogical goals and that their context and goals would direct their planning of online instruction. The current

researcher, a former employee of WebCT and Blackboard, can make the following naturalistic generalizations (Stake, 1995) about what was assumed by the makers of these tools. There was an implicit assumption that professors had acquired these pedagogical planning skills, would come to understand these new environments, would see the value of these new environments and thus would be motivated to commit to redesigning their teaching for these new environments. This reworking of their pedagogical planning would thus allow them to use these new environments effectively. As these tools existed individually outside of CMSs, course-based and non-course-based teaching and learning could occur via the use of similar, standalone, web-based tools. Given the range of conceivable contexts for teaching and learning and the range of pedagogical approaches to teaching, the easy availability of these tools led to their use in a wide range of contexts, including contexts, which initial analysis might suggest, were unlikely to be successful.

Before the above picture had a chance to mature, technology had changed again. The turn of the millennium saw the beginning of the emergence of a new class of network-based software, loosely referred to as Web 2.0 software (O'Reilly, 2005). This new category of software was web-based, generally free, often simpler, and thus easier to use than the previous course management systems housed on institutional servers. This category of software included applications such as web logs (commonly referred to as blogs), wikis, video sharing, social networking as well as shareable online productivity applications such as shareable online word processors, spreadsheets and presentation programs (see Appendix F which lists and briefly describes the technologies cited in this study). Again, this software, not specifically developed with education in mind, came to be used in education. Certainly, some of these applications had connections with learning processes. Blogs, for example, lent themselves to writing and publishing processes common in writing-related disciplines. The use of many of these tools, however, was not necessarily instructor or institution led. Indeed, it is likely that students were initiating the use of such tools inside but also outside of formal education. Certainly there is evidence that this was happening with web-based technology in general (Selwyn et al., 2006).

While instructor-student and student-student interaction tools were going through this generational change, arguably, larger online changes were happening elsewhere in post-secondary institutions. This was the growth of web-based online academic content.

Chief among academic content was the growth of online accessible academic journals. There were approximately 50,000 scholarly journals and between one-third and one-half of them were available online by the end of 2003 (Tenopir, 2004). Arguably, the proliferation of academic journals online might be seen as connected to research, rather than the teaching and learning mandate of post-secondary institutions. However, a UK national survey of university students and their instructors found that 65% had used an online book to support their work, studies or leisure and more than half of these users said their last online book came from their academic library (JISC, 2009). If undergraduate students are accessing more online academic resources and accessing academic resources historically used mainly by researchers, perhaps there are changes happening in the boundary between what has historically been seen as teaching and learning and what has been seen as research. In essence, the expansion of conceptions of what is seen as learning is related to this change, as will be further examined in Chapter 2 when historical conceptions of what has been seen as learning metaphors are challenged by Paavola and Hakkarainen (2005).

Little in these historical developments suggests any deep reflection on the nature of education and learning or the application of such reflection to the intentional development of networked learning environments. Indeed, access to resources and the ability to communicate, while useful elements, do not constitute in themselves a learning environment. What appeared to be lacking was a deeper reflection on the nature of learning and purposes of education and the intentional design of networked environments that might support such learning purposes. Projects that are more thoughtful have attempted to address these concerns, such as the Computer Supported Intentional Learning Environment (CISL) (Scardamalia and Bereiter, 1993). CISL mixes an environment built on a conceptualization of knowledge building and the explicit training of individuals to use such an environment. CISL has arguably led to better learning outcomes (Scardamalia and Bereiter, 1996), but it does not appear to have been widely adopted.

Program Examined and Personal Context

The program examined was the undergraduate program in the School of Interactive Arts and Technology (SIAT) at Simon Fraser University (SFU), comprising approximately 700 students. The “School of Interactive Arts + Technology at SFU is an interdisciplinary research focused school where technologists, artists, designers and theorists collaborate in innovative research and immersive study.” (“SFU”, 2008a, p. 1). SIAT is located at SFU’s Surrey campus in Vancouver, British Columbia, Canada and started in 2002 (“SFU”, 2008b). The TechOne program, with approximately 250 students, is the common first year of each of the streams in the undergraduate program in the School of Interactive Arts. TechOne aims to blend hands-on and technical approaches to the Applied Sciences, Business Administration and Communication, Art and Technology (“SFU”, 2008c). After TechOne, students choose one of three streams: Interaction Design, Media Arts or Informatics. This allows students to decide on a career of either designer, media artist or computer programmer. A capstone course in the final year integrates the three streams as students create authentic technology-oriented projects and products. Students in the programs in SIAT make extensive use of learning technologies as part of their program (personal communication from Kaufman, D., May 16, 2007). This program was selected as an example of a program that made substantial use of networked learning technology. It was also a program that was accessible to the researcher.

I am very familiar with networked learning technology through my years of work in K-12 and higher education. This work instilled in me a strong appreciation of the value of education and the importance of access, and the role technology can play in improving access and enriching the learning environment. These experiences also provided me with a solid understanding of instructional environments and mismatches between environments and needs of students. Also, personal experiences as a mature student, a serial mid life career changer, a teacher, an educational psychologist and an educational technologist have also informed my perspective. I have taught learning theory to trainee teachers and I have experienced acquisitive, participatory, creative and reflexive approaches to learning. I do not value any one particular learning approach and believe learning is richer when many approaches to learning are experienced by students.

I believe technology, when intelligently deployed, can broaden the approaches to learning that students are exposed to. I believe that many problems in the application of educational technology result from a lack of thinking about educational issues in the process of application of technology in education. This is the motivation for the study presented in this thesis.

My lack of association with the SIAT program at SFU resulted in few assumptions and biases in interpretation resulting from prior contact. This lack of association, however, also meant that I lacked the grounding that would come from prior association. My roles and association with educational technology informed this research, and the direction it took but did not make me an ‘insider’ in this particular research site.

Research Questions

The intent of this study was to gain knowledge about how exposure to course-based networked learning influences students' identity as learners and their understanding of ways to learn. Specifically, what developments of student identity as learners and student understanding of learning, whether intended or not by a learning technology intensive post-secondary education program, occurred. This study asked:

What aspects of identity as learners and understandings of ways to learn are shown by students who have been through a program using course-based networked learning?

Sub-questions that will be addressed include:

- (a) What aspects of students’ identity as learners were intended by the program?
- (b) What aspects of students’ identity as learners were realized by students in the program?
- (c) What understandings of students’ learning metaphors were intended by the program?
- (d) What understandings of students’ learning metaphors were realized by students in the program?

Chapter 2: Literature Review

The questions that this study seeks to address are grounded in what Aristotle termed praxis (Aristotle, 2000, p. 207). Networked learning is an area that has emerged out of the practical activity of participants seeking to address issues in their educational context. Often, this is an educational program. This focus on praxis, however, has left networked learning open to epistemic threats. Episteme, what Aristotle termed knowledge (Aristotle, 2000, p. 206), is called on to ground this practical activity and to counter the epistemic threats faced by networked learning. The major epistemic threats are instrumentalism and technological determinism.

Instrumentalism (Taylor, 1991) has already been discussed as a major issue with regards to technology in education. More fundamentally problematic is the notion of asking questions about learning from a starting point of technology. To do so would appear to expose oneself to charges of technological determinism. Despite problems with the concept of technological determinism (Bimber, 1994), the current study has already provided examples of technology influencing educational decisions and will provide further examples. Technological determinism in the current study is a soft determinism, which suggests that technology is a driver, but not sole determinant of educational outcomes related to the use of technology in education. Thus, care is perhaps called for in constructing a foundation for this study, for determining if there is substance in this area of networked learning, and for providing a framework which will stand up to these threats.

In order to counter these threats and provide a foundation for the research questions in the current study, this chapter will review the literature to seek answers for some fundamental questions: what is a network and what, if anything, in societal changes is calling for networked learning? Is research on networked learning avoiding these epistemic threats and asking important questions related to learning? Is there any evidence that learning occurs in courses using networked learning and if so what types of

learning appear to be possible? Lastly, what is known about students' experiences with networked learning? Perhaps more important than any of these questions is the need to ground any examination of the use of technology in conceptions of learning, so questions as to what is happening with technology can be answered from principles of learning. If questions can be asked about technology from a well-grounded model of learning, then a defence against charges of instrumentalism and technological determinism may be possible. If this state can be reached then, from a firm grounding in learning, questions can be asked about how networked technology might serve learning.

This chapter is organized to review the literature that will help address the above questions and thereby provide a foundation for the research questions outlined in Chapter 1. This chapter will examine the three broad areas related to the research questions. Firstly, networked learning, which is the animating field of this study. Secondly, learning identity, to look at the nature of learning identity and how learning identity expresses itself. Thirdly, learning metaphors, to look at specific ways to learn based on these metaphors and how learning metaphors express themselves. These expressions of identity and learning metaphors will be the elements examined, in the participant interviews, for the influences of networked learning. Throughout each of these following sections and across these three broad areas, there will be an attempt to move from networks to learning, to increasingly reorient the study towards an examination of networks from the perspective of learning. This not only addresses the epistemic threats outlined above, but also helps to elucidate clear learning purposes that networks might serve. Finally, this approach will support the development of the research questions of this study, outlined at the end of Chapter 1.

Networked Learning

This examination of the literature of networked learning will begin with a discussion of the “networked society”, and will examine the work of the major author on the concept in order to look for societal drivers of networked learning. This will be followed by a look at early research on the current graphical-based generation of networked learning and the problem of instrumental thinking in this research. Next will follow a section on course-based research on networked learning, to look for evidence of

the types of learning that have been found in studies of networked learning. This will be followed by work on students' experiences of networked learning that seeks to understand the nature of networked learning from the perspective of the student. Finally, the last two sub-sections will examine aspects that flow from the work on students' experiences of networked learning, that is, change and resistance to change or conservatism in students' technology usage. These latter two areas will be shown to relate to important changes in the learning identity of students using networked learning and will prove foundational in the results of the present study.

The Networked Society

Castells (1996) provides an analysis of the emergence of the network society grounded in underlying changes in economics, the role of the state, knowledge and technology. For Castells (1996):

Dominant functions and processes in the information age are increasingly organized around networks. Networks constitute the new social morphology of our societies and the diffusion of networking logic substantially modifies the operation and outcomes in the processes of production, experience, power and culture. While the networking form of social organization has existed in other times and spaces, the new information technology paradigm provides the basis for its pervasive expansion throughout the entire social structure. (p. 469)

For Castells (1996), society in the information age is constituted by the “networking logic of its basic structure” (p. 12). The work of Castells is part of a much larger body of work on the emergence of the information society (Webster, 2006), but the focus on the network is clear in his work. Castells' (1996) analysis leads to the idea of the emergence of the network organization bringing forth the requirement for networked labour. Castells and others see the idea of networked labour as primarily flexible labour, labour which adjusts to the network in terms of patterns of work, for example, as part time, or episodic, but more importantly, in terms of the nature of work that the network enterprise requests. That is, knowledge-based labour, as opposed to manufacturing or manual labour.

Castells (1996) defines a network as a set of interconnected nodes as follows:

What a node is, concretely speaking depends on the kind of concrete networks of which we speak.... The topology defined by networks

determines that the distance (or intensity and frequency of interaction) between two points (or social positions) is shorter (or more frequent, or more intense) if both points are nodes in a network than if they do not belong to the same network. On the one hand, within a given network, flows have no distance, or the same distance, between nodes. Thus, distance (physical, social, economic, political, cultural) for a given point or position varies between zero (for any node in the same network) and infinite (for any point external to the network). Networks are also “open structures”, able to expand without limits, integrating new nodes as long as they are able to communicate with the network. (p. 470-471)

The reason why networks have become important, for Castells (1996), is that networks are:

...appropriate instruments for a capitalist economy based on innovation, globalization, and decentralized concentration; for work, workers and firms based on flexibility; for a culture of endless deconstruction and reconstruction; for a polity geared towards the instant processing of new values and public moods; and for a social organization aiming at supersession of space and the annihilation of time. (p. 470-471)

For Castells and Cardoso (2006), the historical problem with networks was that they were limited by their size and ability to handle complexity; they were more common in private life than public life, the life of organizations. For Castells and Cardoso (2006), digital networks overcame these limitations and produced a truly global network: “its logic transforms and extends to every country in the planet, as it is diffused by the power embedded in global networks of capital, goods, services, labor, communication, information, science, and technology” (p. 4-5). Further, for Castells and Cardoso (2006), digital networks lead to:

...a major change in sociability, not a consequence of Internet or new communication technologies, but a change that is fully supported by the logic embedded in the communication networks. This is the emergence of networked individualism... So, the network society is a society of networked individuals. (p. 12)

Castells (1996), however, does not extend this analysis to say whether or not any more fundamental change in the nature of learning in the network society follows from this analysis. Therefore, Castells leaves us with questions about the consequences of networks for learning. This issue will be revisited in the examination of learning metaphors, to see if there is any indication in the field of learning that learning needs to

become networked and what type of learning might be supported by networks. Castells (1996) is primarily focusing on what might be termed weak tie networks, networks in which the ties between individuals are dynamic and changing (Hakkarainen, Palonen and Paavola, 2004). Weak tie networks and their opposite, strong tie networks, are a distinction that forms part of the basis of different approaches to learning. This distinction will be examined later in this chapter.

Actor-network theory provides an example of a more active conception of a network. Callon (2002) provides the example of a car accident leading to the reconfiguration of human and non-human elements in the network that underlies the use of automobiles. Within an extensive and well-developed socio-technical network, from the time of a car accident, subsequent human and non-human reconfigurations are triggered long into the future (Callon, 2002). As well as a more active conception of a network, this example is interesting as an example of a well-developed network. This network has multiple players each with well-defined roles, and whose patterns of behaviour are understood by others in the network. Numerous patterns of behaviour result, including those related to medical interventions, automobile repair, insurance and legal actions. The car accident leads to interactions in the network that extend well into the future and these interactions are flexible, but based on well-defined patterns of behaviour.

Castells' network society theory, however, is but one of several theories of what might be termed theories of the information society (Webster, 2006). Castells, though he does provide a very rich analysis of the information society, is open to criticisms of presentism¹ and technological determinism (Webster, 2006). More importantly, for the current study, he is providing little guidance on learning. Anthony Giddens (1991), in contrast, provides us with a less deterministic analysis of modern society rooted in a much longer time frame and so avoids much of these two criticisms (Webster, 2006). More importantly, for the current study, Giddens (1991) provides an analysis of changes in the nature of learning that follows from his analysis of the modern information society. Finally, Giddens' analysis of changes in the nature of learning provides part of the basis

¹ A sociological view that there is insufficient time between the present and such events and thus no established framework from which to view such events.

for distinguishing different types of learning. Before examining learning theory and metaphors, several areas of research on networked learning will be examined in order to provide a foundation for the research questions.

Early Research on Graphical Based Networked Learning

The emergence and use of networked learning tools has been driven more by practice than theory, and this is reflected in the general literature on graphical based networked learning. Some attempts have been made to build research processes that match the complexity of the praxis of online learning, such as De Laat and Lally (2003) and Levy (2003). Others have attempted to provide an overarching view of networked learning, but ended up pushing general conceptions of teaching and learning onto networked learning, such as Roberts (2003). Practical attempts to implement learning networks also come up against instrumentality with a headlong rush into implementation without significant attention to the sorts of difficulties involved in achieving forms of networked learning which improve teaching and learning, such as O'Brien, Burton, Campbell, Qualter and Varga-Atkins (2006). Networked learning projects, however, are not always clear about their focus on learning. Some projects have attempted to bypass this issue, for example, a UK multi-year multiple networked learning communities project operated on the basis that each project (network) would choose its own focus on student learning (Worrall and Noden, 2006).

Other literature represents an attempt to learn and understand the practice of online learning rather than an attempt to analyze online learning after having developed an understanding of the practice, such as Mann (2003). Usefully, Frankham (2006) looks at failures in networked learning as a means of highlighting the instrumental and immature thinking behind some networked learning projects and shows how learning could occur.

This brief research history is at the heart of the challenges of making sense of networked learning. Instrumentalism is evident in the academic discourse as well as the practice of networked learning.

Signs of growth in the questions being asked, however, are starting to appear in later research on graphical based networked learning. Carr, Lally, De Laat and Cox

(2006) suggest there are three central high-level research questions facing networked learning:

- How do we take into account the richness and complexity of praxis, and understand the extent to which it is currently “beyond theory” in any case or context?
- How do we achieve a synthesis of multi-theoretical perspectives, and thereby, increase their power as a tool in the research process, and as a guide to the design of praxis?
- How do we support the creative interaction of theory and praxis, and the research methodologies used to facilitate this? (p. 222)

These questions, however, make no mention of learning. It would seem to be important to establish that learning is occurring in networked learning environments and to understand what types of learning are possible in networked environments.

Course-based Research on Networked Learning

De Laat (2006) and De Laat, Lally, Simons and Wenger (2006) in reviews of research on networked learning, found that research on learning and teaching processes in courses delivered via networked learning revolved around five themes. These themes were: collaborative learning, role and involvement of the teacher in asynchronous learning environments, teacher-student relationships, need for group structure and pedagogical guidance for networked learning and participation in networked learning communities. This section will look at the first and last of these themes, which deal with evidence for the capacity of course-based networked learning to support different types of learning. This section draws on De Laat (2006) and De Laat et al. (2006).

The term ‘collaborative learning’ is used in networked learning research to refer to studies in which students are working in groups on a shared task or problem (De Laat, 2006). Several studies provide evidence that collaborative learning can occur in course-based networked learning environments. McConnell (1999) reported, in a case study of a university course where small groups of students and a tutor worked together, that through analysis of discussion transcripts it is possible to see participants’ ideas and knowledge developing, to see them “picking up other participants’ and tutors’ points and

using them” (p. 235). Vonderwell (2003) similarly reported in a case study that asynchronous environments appear to help students to construct and express their ideas and that collaborative work helps them to reflect on the issues being discussed and learn from others. Following their survey, interview and content analysis of a networked course, Hammond and Wiriyaipinit (2004) reported that the groups in their study were active, the participants communicated with each other and commented on each other’s work. These studies are not arguing that anything substantially different is happening, in comparison to collaborative learning in physical classrooms, but they are arguing that collaborative learning can occur when students are distributed in different locations and responding asynchronously.

Several studies found modes and degrees of engagement or participation of students in communities of practice using networked learning. Anderson (2004) observed that engaging in an online community provides students with a social structure in which identities are formed, friendships are developed and peer-to-peer support systems established. Kennedy and Duffy (2004) also reported that students in some cases volunteered as informal mentors to students who more recently entered the program. Stefanou and Salisbury-Glennon (2002) in their study on the effects of participating in a learning community on students’ motivation to learn, found that students in communities had increased self-efficacy, intrinsic and extrinsic motivation (for learning) and a decreased test anxiety.

Showing that course-based networked learning can support at least two different types of learning substantiates that meaningful learning can occur in networked learning. The majority of this research, however, is focused on observable learner behaviours (Creanor, Trinder, Gowan & Howells, 2007). This absence of the learner’s perspective and voice is important because, as subsequent sections show, the driving force behind networked learning is shifting from post-secondary institutions to students themselves. To understand what is happening in networked learning requires an understanding of what choices students are making with regards to technology in their learning.

Students’ Experiences with Networked Learning

JISC in the UK has supported a research program to build up a deep understanding of students’ experiences with networked learning (JISC phase 1, 2008; JISC phase 2,

2008). Many of the following studies are drawn from this research program. Sharpe, Benfield, Lessner and DeCicco (2005) found that learners' perspectives were poorly represented in research on networked learning and that there was a need for research that looked at learners' experiences beyond individual programs or technical systems. Sharpe and Benfield (2005) found some studies that suggest that rather than IT skills being a barrier, it is students' limited pedagogic understanding of less traditional or newer pedagogic approaches used in these courses such as collaborative learning, which is the most important barrier. This seemed to be less of an issue for students in professional development courses where these newer methods were more closely aligned to their professional practice (Sharpe and Benfield, 2005). Research in this area has sought to broadly understand student usage and has asked students about their use of technology not just in their school environment, but more generally in their lives. The first phase of this research program, JISC 1, involved two large research projects: Conole et al. (2006, 2008) and Creanor et al. (2006, 2007).

Conole et al. (2006, 2008) conducted a survey of 427 students with a follow-up series of 14 in-depth case studies based on interview and analysis of 85 student recorded audio logs, across sixteen UK universities in the 2005-2006 academic year. Conole et al. (2006, 2008) found that students' use of technologies is multi-faceted, complex and tailored to individual needs. Students were accessing information from different sources to gain multiple interpretations. Wikipedia was cited frequently as a source used by students to add meaning or explanation and Google was heavily used by students for initial searching. Students were using Wikipedia and Google tools to help themselves understand course materials before digging in deeper with subject specific and university library databases. Conole et al. (2006) also found that communication is multi-faceted in terms of how students construct their network, who they communicate with and in their selection of technologies for communication. Thus both the ways in which students use information and communicate are complex and multi-faceted. Conole et al. (2006) also found evidence of technology usage transferring from other aspects of their lives, such as general Internet chat with friends, to the learning context.

Creanor et al. (2006, 2007) looked at students' technology usage experiences across nine different UK further and higher education institutions (colleges and universities) in

the 2005-2006 academic year, using a survey and phenomenological approach. The survey found highly rated characteristics included confidence in their ability to cope with life, learning and technology; the capacity to network with others through a variety of communication channels; highly effective time management skills; and the skill to integrate and balance learning with work, leisure and family commitments (Creanor et al., 2006). Boundaries between these different aspects of their lives were often blurred and learning was seen as being very much a part of their identity (Creanor et al., 2006). While technology was not always rated highly in the survey, it was clear from student comments in interviews that technology had infused many aspects of their learning, but it was seen by students as a given or background rather than a foreground issue. Moreover, self-rated effective learners also tended to be highly skilled networkers and often used the technology to pull in support for their learning when needed (Creanor et al., 2006).

A series of further, smaller, studies on the student experience of e-learning were conducted under the umbrella of JISC phase 2 (2008) research program. These studies included: Students' Blending Learning User Patterns (Blups, 2009), e-Learning for Learners, (E4l, 2009), Learner Experiences across the Disciplines (Lead, 2009), Disabled Learners' Experiences of e-learning (Lexdis, 2009), Learners' experiences of blended learning environments in a practice-based context (Pb-lxp, 2009), Student Reflections On Lifelong e-Learning (Stroll, 2009) and Exploring the Experiences of Master's Students in Technology-Rich Environments (Thema, 2009). These studies were synthesized in Learners Experiences of E-learning Synthesis Report: Explaining Learner Differences (Lxp2, 2009).

In the JISC 2 round of interview-based case studies, the context of these studies on student usage differed for students transferring from college to university education (Stroll, 2009), to university undergraduates (Blups, 2009; E4l, 2009; Lead, 2009, Pb-lxp, 2009), to graduate students (Thema, 2009), to disabled undergraduate and graduate students (Lexdis, 2009). Some studies used students drawn from programs with practicum components (Pb-lxp, 2009), while others used students from different undergraduate programs (Blups, 2009; E4l, 2009; Lead, 2009), some from a range of taught graduate programs (Thema, 2009) and some from a mix of programs and levels

(Lexdis, 2009). In addition, three of the studies conducted and integrated the results of surveys (Lead, 2009; Pb-lxp, 2009; Thema, 2009).

Although differences in context across programs and institutions can never be ignored, the current study looked at trends in usage across these studies in the JISC 2 round. In general, differences between programs and across institutions appear to have had little effect across these studies. The JISC 2 studies were generally smaller qualitative studies more focused on understanding a small set of students' voices in detail, rather than large-scale surveying of students.

As discussed earlier, historically, the period in which the students in the current study were pursuing undergraduate studies coincided with the emergence of Web 2.0 software (O'Reilly, 2005). Therefore, a basic problem in comparing the technology usage of the students in the current study with earlier research is the continuing change in the technologies available to students over the last five years. Even though most of the studies referred to were only separated by one to two years, this continuing change is clearly visible. Technologies appear, and then show up in students' usage one to two years later then this usage drops within a subsequent year. Indeed, there appears to be a clear trend in the technologies used from the JISC 1 studies to the JISC 2 studies to the current study. In contrast, there was clearly also conservatism in students' usage. In the following two sections in this chapter, the nature of these two phenomena in previous research will be outlined. The apparent contradictions in these phenomena, why students appear to change yet are also conservative in their usage, will appear in a different light when viewed in Chapter 4 of the current study.

As well as broader societal changes in technology usage, the context within which students' use of technology changed was against a background of institutional decisions about technology provision. Some institutions clearly put significant energies into the provision of an institutional platform and brought an institutional or program level consistency and quality of support to these platforms. This was the case with the Stroll project, which was reflected, in institutional tools often being the first port of call for students (Stroll, 2009). Other cases of well supported Virtual Learning Environments (VLEs) were apparent in their extensive use and strong ratings by students (Lead, 2009). Use of institutionally provided VLEs, however, was often weak and where the VLE was

considered poor, it was bypassed by students (E41, 2009). Although faculty introduction of tools to students could be influential (Stroll, 2009), a powerful underlying trend was the transition from institutionally provided tools to student acquired tools. Conole et al. (2006) found that student's made extensive use of their own personally acquired technology, as opposed to university-mandated technology and the picture emerging from the other large scale study, Creanor et al. (2006), was similar. This ubiquity of technology usage confirmed earlier studies suggestions of the increasingly pervasive nature of technology in learners' lives (Creanor et al., 2006). This ubiquity, however, should not be taken to imply students were regularly using large amounts of different technologies, as will become apparent in the next couple sections and the results of the present study. This picture of change continues from the JISC 1 studies through the JISC 2 studies and into the current study.

Change in Students' Technology Usage

The nature of technology usage can be seen to change and evolve over a series of studies, starting with the JISC 1 round of studies (Creanor et al., 2006; Conole et al., 2006). Creanor et al. (2006) found that email had been by far the most used technology for learning followed by computer accessed course materials. The study by Creanor et al. (2006) occurred during a period when social networking was emerging, but this class of tools was barely registering in students' usage in this study. Similarly, Conole et al. (2006) found that the web was the first port of call for students, that is they used search engines, subject specific sites and online accessible journals. Email, Microsoft Word and instant messaging were also heavily used. On the little used list of technologies, Conole et al. (2006) found a large number of other technologies were mentioned by students. This list included wikis and blogs but not Google Documents (Docs), social networking or YouTube; indeed much of this list was non-network based technology (Conole et al., 2006). Appendix F lists and briefly describes the technologies cited in this study.

By the JISC 2 round of studies, the picture of student usage of technology had changed. In the JISC 1 studies, social networking and other web 2.0 network based technologies were not appearing in the heavily used category, while standalone programs like Microsoft Word were commonly appearing. By the time the JISC 2 data were collected during 2007-2008, this picture had changed. Much greater mention of social

networking technologies was apparent in Lead (2009) and Stroll (2009), though it was clear that much of this use was not related to school (Stroll, 2009). Lead (2009) showed that the majority of technologies used were now network-based technologies and there was relatively little reporting of standalone tools. Social networking and instant messaging were the most used technologies on a daily or weekly basis (Lead, 2009). Students in Lead (2009), however, were asked about their technology use as a whole and not just in relation to learning. Stroll (2009) showed that when students were asked about working in groups, they generally used instant messaging to share text or files. Google Docs, however, did make a brief appearance on the list of programs used to collaborate on group assignments (Stroll, 2009). Finally, the Stroll project which collected data during 2007-2008, found that the use of social networking was very high at the start of the research, but towards the end of the data collection period, there was evidence of a drop off in the use of social networking (Stroll, 2009).

Conservatism in Students' Technology Usage

Implicit in this picture of change is also a picture of resistance to change or conservatism. This picture is most evident in the JISC 2 studies (JISC phase 2, 2008). Technologies are not showing as used by students till a year or more after their emergence and their use is often ceasing within a further year or two after emergence. This is the case with social networking, for instance, and the Facebook social networking program in particular. Facebook went public in 2004 ("Facebook", 2010), was in common usage by Fall 2005 ("Facebook", 2010), yet barely appeared in students' usage data collected in 2005-2006 (Conole et al., 2006; Creanor et al., 2006). Facebook usage, however, was evident in the second JISC round of projects that collected data in 2007-2008 (E41, 2009; Lead, 2009; Stroll, 2009; Thema, 2009). One could argue that change in usage does happen, but that it is conservative.

The JISC 2 studies show this conservatism as a multi-faceted phenomenon. Most students have not got beyond the basic functions of the technologies they use (E41, 2009; Stroll, 2009) and most have few expectations about how to use web 2.0 technologies (Thema, 2009). They tend to rely on a few common applications unless there are course related factors affecting their choice (Blups, 2009) and look to their teachers for advice on which technologies to use (E41, 2009; Stroll, 2009). Students use more technology

over time and make more mature decisions about which technologies to use to meet a need (Stroll, 2009) and adopt a more thoughtful and critical view of the use of technology in their courses (Lead, 2009). Where courses require students to work in groups, students make significant use of communications technologies (mobile phones, email, instant messaging, social networking) to support the process of group work in combination with face-to-face work (Stroll, 2009). Microsoft's Internet Messenger (MSN) and mobile phones were preferred ways of keeping in touch with other students, while email was regarded as slow, more formal and for keeping in touch with academics (Stroll, 2009). The low usage of online calendars, social bookmarking and RSS suggests a low awareness of the potential role of Web 2.0 in managing their learning (Thema, 2009). Online citation management software was also not mentioned, except by one student in the Lexdis study (Lexdis, 2009).

Many students made significant use of social networking sites, though more for recreational use. There appears to be a clear separation between online learning and online social activities (Lead, 2009; E4I, 2009; Stroll, 2009). Social networks were used avidly at the start of the Stroll project but use seemed to have slowed by the end of the project (Stroll, 2009). Use of Web 2.0 tools centers on Facebook. Some students had joined Facebook reluctantly, feeling under pressure from their peers (Thema, 2009), but peer-support groups that were set up early in the courses, for exchanging resources, tended to have become mainly social groups by the end of the second term (Thema, 2009).

Certainly, this change and conservativeness could be explained by the simple fact that these research groups represented different cohorts, who found different technologies available to them when they started their studies. This would tend to be supported by the dates of the emergence of Web 2.0 software, but as the current study will show, individual students do change the software they use within their program, while remaining fundamentally conservative.

These studies on students' experiences with networked learning provide a wealth of qualitative data on students' use of networked technology in post-secondary courses. This literature shows that students appear to be transitioning from stand-alone non-networked tools to networked tools and this transition seems to be driven by students themselves,

more than by post-secondary institutions. What is missing from the literature on students' experiences is an examination of whether this substantial exposure to networked technology has affected students' identity as learners and their understanding of ways to learn. The current study intends to address this gap.

Summary of Networked Learning

So far, this chapter has shown that there are some connections between networked learning and changes in modern society, that the general research on networked learning appears to be becoming more grounded and is asking some important questions, and there is evidence that networked learning can support different types of learning. Next, research on students' experiences with networked learning showed that students' experiences are important because networked learning is developing more through the choices of students than the actions of post-secondary institutions. Finally, the conservatism and change among students' technology usage has been shown. This will be connected to the maintenance of learning identity in the results of this study.

This literature review, so far, has barely engaged with the nature of learning. There is a need for understanding the different ways to learn and how these are grounded. One question that may be asked is: if the nature of learning has not significantly changed then why would institutions commit to networked learning? That technology makes no significant difference, within traditional ways of thinking about learning, is well established (Russell, 1999; Russell, 2008). So, an understanding of the nature of learning is needed in order to ascertain the role that technology in learning might be able to play. This will be addressed in the following section on learning metaphors. First, the next section will turn to an elaboration of the nature of learning identity.

Learning Identity

This section of the literature review will examine two theoretical models concerned with learning identity. These models will be elaborated in order to obtain expressions of learning identity, which can be looked for in student interviews. These expressions of identity will be the elements examined for the influences of networked learning in the participant interviews. This section will then end with some specific

learning identity research, also with the aim of elaborating expressions of learning identity, which can be looked for in student interviews.

Theories Concerned with Learning Identity

As mentioned in Chapter 1, Giddens (1991) provides another theory of the information society, but importantly he provides an analysis of changes in the nature of learning that follows from his analysis of the modern information society. Certainly, Giddens' (1991) work is not without criticism and suggestions have been made that it applies more to academic social theorists than the majority of the population (Buckingham, 2008). Giddens' (1991) analysis of changes in the nature of learning both contrasts and extends the changes in the nature of learning coming from work on learning metaphors, as will be seen in the section on learning metaphors later in this chapter. While providing the concept of reflexivity, for Giddens (1991), this is just part of a broader change in the importance of identity in the modern world. This increased importance of personal identity is, he argues, connected to an increased importance of learning in the modern world. It seems to be an iterative process.

For Giddens (1991), the individual's identity is the accumulation of the individual's learning and capacities, and means of interacting with and being interacted on by the world. Modernity (as defined in Appendix E) is managed by the individual through identity. It is in essence the bulwark against being overrun by the forces of modernity, but more importantly, its adaptation and growth is the means by which the individual copes with or learns to adapt to modernity.

For Giddens (1991), the altering of pre-existing social practices and modes of behaviour in modernity deprives the individual of easily accessible and understood practices and behaviours with which to incorporate into their identities. These new and more active mechanisms of identity formation are shaped by and in turn shape the institutions of modernity themselves, thus 'self' and 'society' are interrelated in a global milieu and transformations through globalization are directly connected to transformations in identity (Giddens, 1991). The maintenance of identity becomes much more intense and complex as modernity speeds up the pace and scope of social change (Giddens, 1991).

The challenge for the individual is to sustain a coherent, yet continuously revised identity in the face of multiple choices as presented to them by abstract systems (Giddens, 1991). According to Giddens (1991), a person with a reasonably stable sense of self-identity has a feeling of biographical continuity in the story they tell which they are able to grasp reflexively and, to a greater or lesser degree, communicate to other people. In terms of form and style and the capacity of the individual to use 'I' across different contexts, autobiographies vary in much the same way as other narrative forms do (Giddens, 1991). Finally, there is sufficient self-regard to sustain a sense of the self as 'alive', within the scope of reflexive control, rather than a sense of the self as controlled by things in the object-world (Giddens, 1991).

While Giddens provides a theory of the information society in which identity and learning play a key role, Wenger (1998) provides a theory of learning in which identity plays a key role. Giddens (1991) stresses the need for more traditional learning and adds the idea of reflexive learning, while Wenger (1998) argues the need for another fundamentally different category of learning, participatory learning. Wenger (1998), however, is relevant to this study not only for a rich elaboration of this participatory model of learning, but also for his elaboration of the importance of identity in this model of learning.

For Wenger (1998), identity is the full, lived experience of engagement in practice. It is:

...a layering of events and participation and reification by which our experience and its social interpretation inform each other. As we encounter our affects on the world and develop out relations with others, these layers build upon each other to produce our identity as a very complex interweaving of participative experience and reificative projections. Bringing the two together through the negotiation of meaning, we construct who we are. In the same way that meaning exists in its negotiation, identity exists – not as an object itself – but in the constant work of negotiating the self. It is the cascading interplay of participation and reification that our experience of life becomes one of identity, and indeed of human existence and consciousness. (p. 151)

Wenger presents a theory that integrates the interaction of practice, identity and learning in real-world communities. This becomes apparent in Wenger's theory, particularly when his looser definition of community (Wenger, 2005) is accepted, and it

is also accepted that individuals are constantly in a state of movement or flow from the periphery to the centre of each community and back again, as their needs change with regard to the practice of a given community. When the individual is conceived as having membership of multiple such communities, then a clear model of learning becomes visible. These ideas are apparent in Wenger (1998) but are extended in Wenger (2005). Trajectories and flow are occurring in this model, but more importantly, these trajectories and flow clearly relate to learning. These trajectories for Wenger are essentially the process of learning. At its most basic, this is what Lave and Wenger (1991) term legitimate peripheral participation. They argue that learners participate in communities of practitioners, and mastery of knowledge and skill occurs as newcomers move towards full participation in the practices of a community.

For Wenger (1998) learning can be approached by talking about our evolving ability, individually and collectively, to experience our life and the world (meaning); the social resources, frameworks and perspectives that can sustain mutual engagement in action (practice); the social configurations in which our enterprises are defined as worth pursuing and our participation is recognizable as competence (community); and how learning changes who we are and creates personal histories of becoming in the context of our communities (identity). Learning is the vehicle whereby practices evolve, newcomers can be brought into the community and the means for the development and transformation of identities (Wenger, 1998).

Teasing out the elements of identity in Wenger's work is a challenge given the tight integration of his model. For Wenger (1998) individuals' experience their identity by:

... what we recognize and what we don't, what we grasp immediately and what we can't interpret, what we can appropriate and what alienates us, what we can press into service and what we can't use, what we can negotiate and what remains out of reach. (p. 153)

An identity, however, is more than a single trajectory; it is the intertwining of all the trajectories from all the communities in which the individual participates, a nexus of multi-membership (Wenger, 1998). The challenge for the individual is the reconciliation of these multiple memberships and the reconciliation of different practices into a single identity (Wenger, 1998).

At heart, there are some fundamental distinctions between these different ways of thinking about learning, which will be developed in the section on learning metaphors. There is a distinction between the acquisitive way of thinking about learning implicit in Giddens thinking about traditional learning, Giddens' newer reflexive category of learning and Wenger's participatory way of learning. Further, it will become apparent in the following section on learning metaphors that there is a weaker role for communication and relationships, two key attributes of networks, in traditional conceptions of learning and a more central role for them in these newer categories of learning.

Learning Identity Research

Research looking at identity and learning approaches the area from a variety of perspectives, but in general provides support and further enriches Giddens and Wenger's perspectives on identity and learning. Common among research programs looking at identity (Pollard, 2007; Biesta, Goodson, Tedder & Adair, 2008; Sfard and Prusak, 2005) is the idea that identity has a narrative structure (Biesta et al., 2008). Biesta et al. (2008) state that people tell stories about their lives and these stories vary in quality (descriptive, analytical or evaluative; recounting events vs. making sense), intensity (confined or elaborate), focus (formal vs. informal learning), plot (the way the life story makes sense to the story teller), efficacy (consequences and conclusions vs. stuck in the story) and flexibility (strong versions of life story which the individual sticks to vs. flexibility in life storying). Sfard and Prusak (2005) put it more simply: the stories are not about identity, they are identity. They also add the notion of actual vs. designated identity i.e. stories that assist in narrating the present, which arrive from the past vs. identity stories the individual tells in a future tense, stories about what the individual expects is possible or achievable for them.

Two large-scale longitudinal projects have looked at identity and learning. The identity and learning program (Pollard, 2007, Pollard, 2007b) was a longitudinal ethnographic study that tracked the learning, identity and pupil careers of two cohorts of students from 4 to 16 years old. One of the salient events, which emerged from this ethnographic study, was the importance of the transition from elementary to secondary school. This transition became problematic for students who had a viable identity in

primary school that did not transfer to secondary school. These students experienced challenges with their learning performance and showed accompanying social emotional and behavioral difficulties (Osborn, McNess and Pollard, 2006). Similarly, adult learner's previous learning identities, such as a wounded learning identity, can affect the individual's current and future engagement with learning in the workplace (Wojecki, 2007).

The Learning Lives project (Hodkinson et al., 2008) was a longitudinal study looking at the interrelationships between learning, identity and agency in the life course. One hundred and twenty adults were interviewed over three years, and the resulting data were combined with the British Household Panel Survey to allow retrospective life history research to be combined with real time life course research. One of the foci of this research was to seek to understand how different forms and practices of learning and different learning achievements impact upon learner identities and how a learner's identity impacts upon learning dispositions, practices and achievements. What emerged was a complex and rich picture of learning and identity, including the deep intertwining of formal and informal learning in people's lives, and variance in the significance of learning across different people but also within their lives (from time to time, across different contexts and purposes). Also evident was the importance of turning points compared to routine life in increasing the salience of learning for the individual and the complex and recursive connections between identity and learning, in that identity facilitated some learning and inhibited other learning. Tacit learning of which individuals sometimes only became aware long after the event was also a factor, but more so in learning occurring in routine life, rather than in turning points. This type of learning and growth in the awareness of learning often operated over long time spans (Hodkinson et al., 2008).

Other empirical research has looked at identity in networked learning environments. Common among this research is an examination of whether or not the acquisition of identity in networked learning is even possible. Typically, this is an examination of the acquisition of an individual professional identity in professional training programs. There is also an examination of the emergence of professional

community identity, the extent to which a group can come together and start to view themselves as a community, separate from those outside their community.

Perrotta (2006) looked at the construction of identity in an online forum for trainee psychologists and concluded that the construction of a professional identity can occur online. Analysis of online discussions showed the growth of an awareness of the boundaries of the profession, the relationship between the psychological profession and society and the status of the profession in relation to other health professions (Perrotta, 2006). Understanding the nature of that identity and the nature of its construction, however, was problematic. This was less to do with issues of identity creation in the online world than the lack of a well-developed understanding of offline identity creation (Perrotta, 2006).

Guldberg and Pilkington (2006) looked at online discussions of parents and caregivers of people with autistic spectrum disorder, within a networked learning community. They found evidence of the emergence of not only individual but also group identity as autistic spectrum disorder caregivers, in terms of developing common goals and values and defining themselves as a group in relation to other groups. Similarly, Smith (2005) and Hudson, Hudson and Steel (2006) both showed that group identity can be seen to emerge in online discussions in the emergence of us vs. them dialogues. Finally, Allan and Lewis (2006) showed membership of a virtual learning community as affecting the individual learning careers and professional identity of university staff who formed an online e-learning community to introduce e-learning to a university.

Summary of Identity

Giddens presents identity as the individual's bulwark against the continual onslaught of modernity. The individual must adapt to a continuing stream of events in order to maintain a stable identity. For Wenger, identity is connected into the process of learning itself. For Wenger identity emerges through interaction with others in multiple communities. In his work the challenge for the individual is the reconciliation of conflicts between different identities.

In general, identity presents as an open, multifaceted and broad concept capable of diverse expression. The open, broad and diverse nature of this concept was confirmed by learning identity research, which provided practical ways of looking at identity. The

breadth of this concept opens up the possibility that participants in the current study might each exhibit unrelated aspects of identity. For redundancy purposes, a way of narrowing and focusing participants in the present study onto a common set of aspects of identity was needed. Learning metaphors met this need. Learning metaphors also provided a vehicle for defining learning.

Learning Metaphors

This third and final section of the literature review will examine the case for using learning metaphors as expressions of ways to learn. This will be followed by an examination of three established learning metaphors and one tentative learning metaphor, reflexivity. The description of these four metaphors enabled an examination of students' responses in the interviews concerning specific ways to learn. These descriptions of learning metaphors were the elements examined for the influences of networked learning in the participant interviews.

The Case for Learning Metaphors

Learning is generally discussed, in academic discourse, in relation to different theories of learning. This approach, for students outside of education or psychology, is a problem because they generally lack any background in theoretical approaches toward learning. What was needed was an approach that simplified and captured the essence of the different theories of learning and rendered them intelligible to undergraduate students. McGuiness (2005) usefully provides a multi-level view of theories of learning, that is, theories in relation to their underlying conceptions of learning and these conceptions in relation to their underlying metaphors of learning. The metaphors of learning approach is the simplest of these three approaches and appeared to hold promise as a basis for discussing learning with undergraduate students. As McGuiness' (2005) goal was to communicate among researchers, she chose the intermediate level of conceptions of learning. For the current study, however, the more basic level of metaphors was worth examining.

Metaphors are a means for summarizing concepts. Lakoff and Johnson (2003) argue that the "human conceptual system is metaphorically structured and defined.

Metaphors as linguistic expressions are possible precisely because there are metaphors in a person's conceptual system" (p. 6). They (Lakoff and Johnson, 2003) suggest that metaphors are about recognizing the nature of cognition that includes the "systematic use of inference patterns from one conceptual domain to reason about another conceptual domain" (p. 246) and it is this phenomenon that they call conceptual metaphors. Furthermore, they maintain that conceptual metaphorical mappings between domains that give meaning to metaphorically laden communication arise from our "embodied experience" (Lakoff and Johnson, 2003, p. 247).

Sfard (1998) argues that a conceptual metaphorical approach is more useful than theory given the continual change in theoretical approaches towards learning and that metaphors underlie not only everyday thinking but also scientific theories. For Sfard (1998) "metaphors are the most primitive, most elusive, and yet amazingly informative objects of analysis" (p. 4). Further, Sfard (1998) argues that "One glance at the current discourse on learning should be enough to realize that nowadays educational research is caught between two metaphors that... will be called the acquisition metaphor and the participation metaphor" (p. 5).

Acquisition

Acquisition sees learning as getting (Sfard, 1998). Within the overarching metaphor of acquisition, metaphoric sub-groups can be seen to exist. Thus, acquisition includes the growth of knowledge, knowledge acquisition, concept development and construction of meaning (Sfard, 1998). Entities that may be acquired include "knowledge, concept, conception, idea, notion, misconception, meaning, sense, schema, fact, representation, material, contents" and they may be acquired by processes of "reception, acquisition, construction, internalization, appropriation, transmission, attainment, development, accumulation, grasp" (Sfard, 1998, p. 5). Under acquisition, the role of the teacher includes "delivering, conveying, facilitating, mediating, et cetera" (Sfard, 1998, p. 5). Finally, the mechanisms of concept development have been thought about differently over time by researchers. From passive reception, to active construction, from transmission from the social to the individual, to internalization by the student and a never-ending self regulating process of emergence in a continuing interaction with peers, teachers and texts (Sfard, 1998). Learning theories under the acquisitive metaphor

include: folk theories, constructivist theories, information processing theories, mindful self-regulation theories and social constructivist theories (McGuinness, 2005). For the purpose of summarizing this metaphor for participants in this study, acquisition was be defined as: learning as a process of acquiring possession of knowledge, knowledge structures, skills, attitudes, etc

Starting from Castells' (2001) notion of 'networked individualism', Jones, Ferreday & Hodgson (2008) contrast between the weak ties and relationships found in open learning networks and the strong ties and relationships found in communities of practice. Jones & Esnault (2004) and Jones et al. (2008) stress the importance of weak ties in networks and argue that networks are a better metaphor for understanding the organization of social practices that might contribute to a better understanding of learning. Furthermore, they argue, that in reality these types of loose tie networks are simply more common than communities of practice.

This contrast between loose ties and strong ties is an important one and not just for the reason given by Jones and his colleagues. It is important because it draws a fundamental distinction between learning as acquisition and learning as participation. Beyond the different metaphors involved, this distinction also has importance with regards to the learner's identity. While the loose ties approach or learning as acquisition has little to say about the identity of the learner, the strong ties or learning as participation approach has much to say about the role of identity in learning. This has already been discussed in reviewing Wenger (1998) earlier in this chapter.

Participation

Participatory metaphors replace the idea of permanent entities or states with the idea of action or activities; getting is replaced by the "constant flux of doing" (Sfard, 1998, p. 6). Activities are not considered separately from the context within which they take place (Sfard, 1998, p. 6). The context is multifaceted and is described by terms like situatedness, contextuality, cultural embeddedness, and social mediation (Sfard, 1998). The role of the teacher in participatory approaches might be described as expert participant and preserver of the practice or discourse, with the student in the role of the peripheral participant or apprentice in the process of becoming a participant (Sfard, 1998).

The distinction between these two metaphors is not individual and social. Indeed, many social approaches to learning such as collaborative learning are fundamentally based on an acquisitive metaphor of learning. Rather these two metaphors can be distinguished by the presence or absence of a definitive end to learning. In acquisition, learning has a clear end whereas with participation there is no end or “halting signals.” (Sfard, 1998, p. 6). Learning theories under the participatory metaphor include: neo-Vygotskian theories, social cultural theories and activity theories (McGuinness, 2005). For the purpose of summarizing this metaphor for participants in this study, participation was defined as: learning as a process of participating in social practices and shared learning activities, with no sense of learning as ending.

Creation

Paavola and Hakkarainen (2005) argue that Sfard’s analysis focused on existing knowledge and thus she had missed an important third category of learning metaphors, a category becoming more important in the knowledge age, namely creation. The importance of knowledge creation can be seen in the larger role that research has come to play in universities (Slaughter and Leslie, 1997; Marginson and Considine, 2000).

Underlying the knowledge creation metaphor is the idea of striving for something new and advancing beyond present knowledge. In the knowledge-creation metaphor, knowledge embedded in mediating artifacts, skills and practices is emphasized. People “put” (or embody, objectify) knowledge onto these artifacts: scientific theories, plans, models, instruments and so on (Paavola and Hakkarainen, 2005). An important aspect of the knowledge-creation metaphor is the interaction between different forms of knowledge, particularly between conceptual knowledge and tacit knowledge. This interaction differs between the different theories included under the creation metaphor (Paavola and Hakkarainen, 2005). While the theories behind the creation metaphor depict innovative processes as happening within communities, this metaphor is distinguished from the participation metaphor by the focus being on the object being developed rather than on the interaction between the people involved (Paavola and Hakkarainen, 2005). Learning theories included under the creation metaphor include: Bereiter’s knowledge-building, Engestrom’s expansive learning, and Nonaka and Takeuchi’s organizational knowledge-creation (Paavola and Hakkarainen, 2005). For the purpose of summarizing

this metaphor for participants in this study, creation was defined as: learning as a process of innovative inquiry, creating, bringing an artifact into existence, starting something for the first time, introducing something new and original research.

Relationships between the Learning Metaphors

Examining these three learning metaphors, Hakkarainen, Palonen and Paavola (2004) argue that each of these metaphors builds on those below it. Thus the ability to learn by acquisition is necessary in order to be able to learn in a participatory mode which, in turn, is necessary in order to learn at the highest level of learning, namely that of creation. This is shown visually in Figure 1.3. More importantly, these metaphors differ on whether or not they are fundamentally relational. The acquisition metaphor does not see knowledge as relational; learning is factual statements occupying an individual mind (Hakkarainen et al., 2004). The participation metaphor sees knowledge as situation specific, rooted in stable situational relations (Hakkarainen et al., 2004). The creation metaphor, while acknowledging the object-like nature of knowledge also emphasizes the creative and expansive nature of the formation of relational knowledge (Hakkarainen et al., 2004).

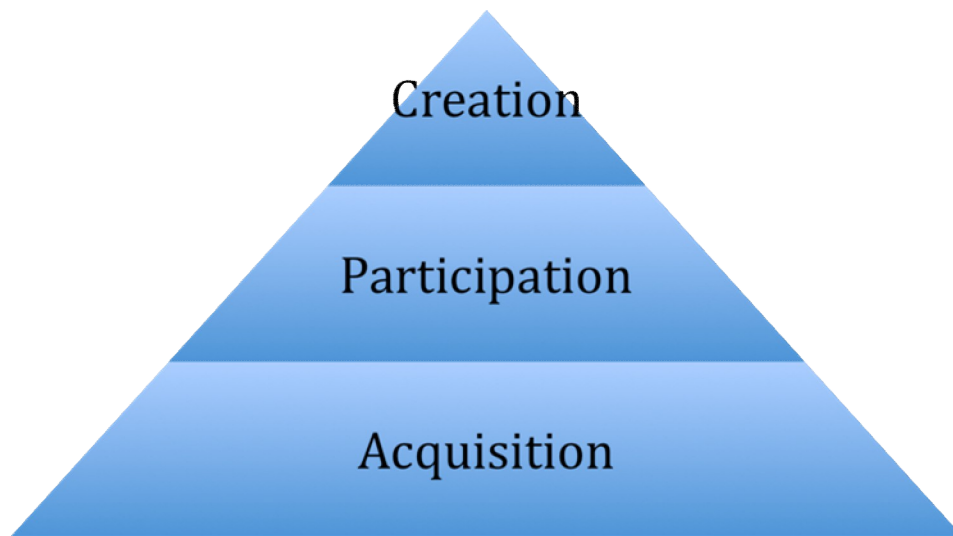


Figure 1.2: Developmental model of learning metaphors (based on Hakkarainen et al., 2004).

While acquisition metaphors can be efficiently and effectively handled in a non-networked learning environment, that is not so easy with participation and more importantly creation metaphors of learning. These latter two metaphors often call on

resources and connections beyond the local, particularly the creation metaphor (Hakkarainen et al., 2004). Rather than the need for networked learning being driven by the network society, growth in conceptions of learning are similarly granting increasing importance to relational learning, learning which requires structures to support relations. While participatory learning may exist with only local relations, it is the broad and expansive relations that the creation metaphor requires which call for the distributed relations provided by networks (Hakkarainen et al., 2004).

McGuiness (2005) analyzed twelve programs covered by the UK Teaching and Learning Research Program, by the learning metaphors employed. She found that the acquisition metaphor was dominant, though the participation and a mix of the acquisition and participation metaphors were present in some programs (McGuiness, 2005).

A Metaphor for Lifelong Learning?

The concept of lifelong learning does not exclude any ways of learning, rather its expansiveness and inclusiveness has been criticized as rendering it of poor explanatory value (Taylor, 2005). It could be argued that a more useful question is to ask whether the concept of lifelong learning adds any new ways of learning.

Alheit (2002), summarizing Field (2000), sees the basis of lifelong learning as trends operating in the post industrial societies of the western world, which came to a head at the end of the twentieth century:

1. the changing nature of work
2. the new and totally transformed function of knowledge
3. challenges facing the social actors themselves that are characterized only roughly with labels such as 'individualization' and 'reflexive modernization'

The first two points are essentially claims about changes in the state of the world and do not suggest any new forms of learning beyond those which have already been discussed. The last point, coming from the work of Anthony Giddens, is an assertion that the nature of the modern world is radically different and that the individual and the world have become intertwined. For Giddens (1991) this continuing interaction and interconnection between the individual and the world brings forth the need for continual, lifelong learning. This is a complex claim rarely discussed outside of academic literature. Its complexity and lack of exposure outside of academic literature raises the question of

whether the average student would have any awareness of it. There is perhaps though, as well as a connection to the broader concept of identity, the basis for a unique metaphor of lifelong learning in the work of Giddens (1991).

Giddens concept of reflexivity supports the argument that lifelong learning is essential in the modern world. For Giddens (1991), the foundations of the social world are altered by modernity, which has changed the underlying assumptions of the social world in three stages. Firstly, under modernity time and space have become separated. Time and space are no longer connected through the situatedness of place as modernity allows the individual to easily occupy multiple places and modern communications and media facilitate the transcendence of time. Secondly, the process of the emptying of time and space leads to, the disembedding of social institutions – the “lifting out’ of social relations from local contexts and their rearticulation across indefinite tracts of time-space” (Giddens, 1991, p. 18). This ‘lifting out’ is the “key to the tremendous acceleration in time-space distancing which modernity introduces” (Giddens, 1991, p. 18), but more importantly “propels social life away from the hold of pre-established precepts or practices” (Giddens, 1991, p. 20). This leads to a “thorough going reflexivity which creates continual change in pre-established precepts or practices and institutions” (Giddens, 1991, p. 20). Finally, modernity’s reflexivity leads to the “susceptibility of most aspects of social activity, and material relations with nature, to chronic revision in the light of new information or knowledge. Such information or knowledge is not incidental to modern institutions, but constitutive of them” (Giddens, 1991, p. 20).

Reflexivity for Giddens (1991) is both the requirement and the capacity of the individual to deal with this increasing complexity, to increasingly make decisions for themselves. Individuals must deal with the growing migration of specialized knowledge from a multiplicity of specialized domains to the public domain (Giddens, 1991). This process alone further disembeds the individual from society, but is in itself driven by a decline in institutionalized forms, religion, bureaucracies, the family and other social institutions thus reducing the availability of social supports (Giddens, 1991). For Giddens (1994), this requirement for reflexivity is shown in the large number of choices that individuals are now faced with on a day-to-day basis. This change in the foundations of the social world and the relationship of the individual to the social world changes several

aspects of the nature of learning needed for the individual to be able to function in the modern world.

Firstly, for Giddens (1991) the conceptual complexity of the nature of the modern social world brings forth a requirement for higher levels of cognitive functioning. This can be seen in the widely accepted expectation in the western world that all individuals now require at least two years of post-secondary education. It is, however, clear that Giddens also sees a requirement for continual decision making across a wider range of domains than could reasonably be expected to be covered in formal education and that this requirement for enhanced decision making is therefore lifelong. Fundamentally, however, it is the individualizing tendencies of modernity that require greater and continual processing and decision making by the individual, across all knowledge domains, and thus continual learning.

Secondly, for Giddens (1991), the challenge of reflexivity for the individual is as much emotional as cognitive. For the individual, modernity institutionalizes the principle of radical doubt and insists that all knowledge takes the form of hypotheses (Giddens, 1991). Such a world, he maintains, where multiple cognitive conceptions must be entertained, is too complex for the individual to function cognitively and hence an emotionally-based and practical acceptance of the world is essential. Emotional management tools such as routine and bracketing (separating a problem from oneself or placing boundaries around a problem) become essential for the individual and allow them to focus on issues and events which must be dealt with and filter out issues and events which can be ignored (Giddens, 1991).

It was anticipated that the concept of reflexivity would be hard for students to understand. The goal for this metaphor, in the current study, was to see if any elements of this concept were meaningful to students. It was anticipated that significant explanation of this concept would be required followed by further discussion, to get students to the point of understanding the concept. The goal was to present students with as many elements as possible of this concept in the hope that one or more of these elements might trigger some awareness of these ideas. For the purpose of summarizing this metaphor for participants in this study, reflexivity was defined as: learning as a process of coping with the complexity of the modern world. The modern world is characterized by the

integration and continual interaction between the individual and the world. Action, by the individual or in the greater world, affects both the entity instigating and the other (individual or world). Elements of this metaphor include: cognitive load placed on the individual, a requirement for adaptability and continual change, an emotional acceptance of the cognitive load and the deployment of practices such as routine and bracketing to accommodate, and the maintenance of doubt and multiple conceptions of the world. This summary was used as the basis for a metaphor of reflexivity, for lifelong learning. This study attempted to determine whether students have any awareness of this metaphor.

Summary of Learning Metaphors

Learning metaphors were used as a means of summarizing and simplifying the numerous theories of learning. Four learning metaphors were described and defined as follows. These definitions can be found on the metaphor cards that were created for use by the participants in the interviews, see Appendix B.

- Acquisition: learning as a process of acquiring possession of knowledge, knowledge structures, skills, attitudes, etc
- Participation: learning as a process of participating in social practices and shared learning activities, with no sense of learning as ending.
- Creation: learning as a process of innovative inquiry, creating, bringing an artifact into existence, starting something for the first time, introducing something new and original research.
- Reflexivity: learning as a process of coping with the complexity of the modern world. The modern world is characterized by the integration and continual interaction between the individual and the world. Action, by the individual or in the greater world, affects both the entity instigating and the other (individual or world).

Chapter Summary

This chapter has surveyed the literature on networked learning and on learning. Research on networked learning has provided evidence that learning can occur in networked environments and is starting to understand students' experiences of this type

of learning. This latter set of research, however, has focused heavily on students' usage rather than on what this usage means, particularly what it means to students' conceptions of learning. Missing from this research is any attempt to determine whether students are picking up new ways to learn through their exposure to networked learning. As discussed in Chapter 1, this question is important if students are going to use networked learning beyond post-secondary education, where learning will likely require more independence.

While Chapter 1 identified that learning identity was a complex concept to research, Chapter 2 has shown that the concept is well grounded in important theoretical work from Giddens and Wenger. Further, at the heart of these theorists' work, are some fundamentally different ways of thinking about learning, differences that are most clear when expressed as learning metaphors. The theory and research on learning identity paints a picture of learning identity as a broad and multi-faceted concept. Given this broad and multi-faceted concept and the problems in getting students to talk about learning, a secondary, narrower and more focused concept was needed to ensure meaningful responses could be obtained from students. Learning metaphors filled this role, for the purpose of the current study.

The work on learning metaphors points out that while the most basic and common metaphor of learning, acquisition, has no fundamental need for relations, that is not so with higher levels of learning. The participation and creation metaphors are fundamentally relational and learning at these levels calls forth the need for relations with others. It is this work on learning metaphors, which addresses the issue raised at the beginning of this chapter about technological determinism. Higher levels of learning, that is participation and creation, are calling for networks, rather than the lower acquisition level of learning. To the extent that networks have a valuable role in mediating relations with distributed others, then networked learning has a valuable role to play in supporting access to higher levels of learning. Lastly, calling on the work of Giddens there has been an attempt to put forth a tentative metaphor of lifelong learning: reflexivity.

The next chapter reviews the research methodology of the study. The research methodology is used in this study appears to be the most common methodology used in empirical studies of networked learning.

Chapter 3: Research Methodology

This chapter will outline the research methodology selected, the research issues faced and choices made. This will include the selection of methodology and an elaboration of that methodology before turning to the research procedures. The research procedures will include participant selection, the interview process, data collection, data analysis and steps taken to establish credibility.

For the current study, undergraduate students in the School of Interactive Arts and Technology (SIAT) program at SFU appeared to be a valuable population to study as they made extensive use of computers not merely as input or output tools but as tools for mediating the process of learning (personal communication from Kaufman, D., May 16, 2007). The tools believed to be used in this program to mediate the learning process included email, wikis, blogs, podcasting, online game environments, synchronous presentation and interaction tools (Eluminate Live) and course management systems themselves (see Appendix F), which incorporate many of these individual tools among others (personal communication from Kaufman, D., May 16, 2007). In addition, it was also believed that use was made by students in this program of a learning communities/community of practice software platform called TechZone (personal communication from Paulin, D., March 6, 2009).

Methodology Selection

The case study was chosen as the methodology for this study for a couple of reasons. Firstly, this methodology was used in much of the research, cited in Chapter 2, on student experiences of networked learning. Secondly, this methodology was the best fit for a study which sought to examine a program and which required more flexibility than many other methodologies allow in applying the methodology.

The case study asks the seemingly simple epistemological question of what can be

learned from the single case. Stake (2000) describes the case study approach in the following way. He sees the goal of the case study is to optimize understanding through description and interpretation. However, the epistemological stance of seeking particularization, through rich description and searching for the uniqueness of the case negates a basis for generalization (Stake, 1995). Qualitative methods such as open-ended interviews, observations, document reviews and dialectics are typically used in case studies (Stake, 1995). The goal of the methods employed is to facilitate interpretation (Stake, 2000). Epistemologically, no one interpretation can be claimed to be accurate, rather, according to Smith (1997):

The correctness of a particular practical deliberation [interpretation] is determined by the comparative superiority of the interpretive positions either side of a move.... Typical ways of achieving this goal are through identifying and resolving a contradiction in the original interpretation, pointing to a confusion that interpretation relied on, or by acknowledging the importance of some factor which it screened out. (p. 210)

Interpretations have been increasingly seen by Stake, throughout his work, to be constructivist. Constructivism further strengthens the epistemological basis for case studies by preferring shared rather than individual interpretations, and interpretations developed through a series of stages rather than interpretations based only in a single stage:

Ultimately, the interpretations of the researcher are likely to be emphasized more than the interpretations of those people studied, but the qualitative case researcher tries to preserve the multiple realities, the different and even contradictory views of what is happening. (Stake, 1995, p. 12)

Case studies are as much defined by their limits as by what they seek to achieve. This case study was limited by conscious decisions around the nature of the roles the researcher would take. Firstly, the researcher was not an evaluator. While some interpretations are, in a case study, inevitably evaluative (Stake, 1995) care was taken not to slip into an evaluative role. The researcher had no mandate for such a role. Secondly, the researcher's role as an advocate was limited. While inevitably advocating for particular interpretations (Stake, 1995), the researcher, as an outsider to a program selected for instrumental reasons, needed to maintain some distance from the core interests of the program. In addition, this is because in the current study the researcher

was aware that the animating ideas of the study were not central to the SIAT program. The current research leans more towards a conception of the researcher as "... more chameleon-like... who fits into the situation with a minimum of disruption..." (Prus, 1996), than the more ethically and politically active stance advocated by Denzin (1994).

In order to provide some structure for contrasting students' realization of learning with program intentions for learning, this case study was extended by the use of a program evaluation framework. The intention was not to make judgments, but rather to provide some structure for further description, in particular a description of the congruence between learning intentions and learning realizations.

The case study itself can be an evaluation framework (Burgess, 1987), an evaluation framework grounded in an epistemology of interpretivism and constructivism (Greene, 2000). This case study framework was extended by the Judgment Evaluation of Intentions program evaluation framework (Burgess, 1987) based on the work of Stake (1967, 1991) and similarly grounded in interpretivism and constructivism. This is represented graphically in Figure 1.3. This framework simply seeks to think about programs in terms of their:

- Antecedents, conditions existing before teaching and learning which may relate to outcomes;
- Transactions, all the encounters of students with teachers, other students, materials and tools; and
- Outcomes, the consequences of educating both immediate and long range, cognitive and conative, personal and community-wide (Stake, 1967).

The evaluation framework essentially states that Antecedents, Transactions and Outcomes form a 3-stage model for looking at programs and that the relationships between these stages are those of logical or empirical contingencies (see Figure 1.3). Lastly, the model proposes a parallel intended and observed framework, so intended antecedents can be examined for congruence with observed antecedents and so on. "Congruence... is for the purpose of making the case understandable, not for indicating program merit," (Stake, 1991, p. 73).

As Stake (1991) elaborates, the structure of this model was less important. If the model served as a framework for increasing description, particularly description about events earlier than outcomes, and helped externalize comparisons that were often

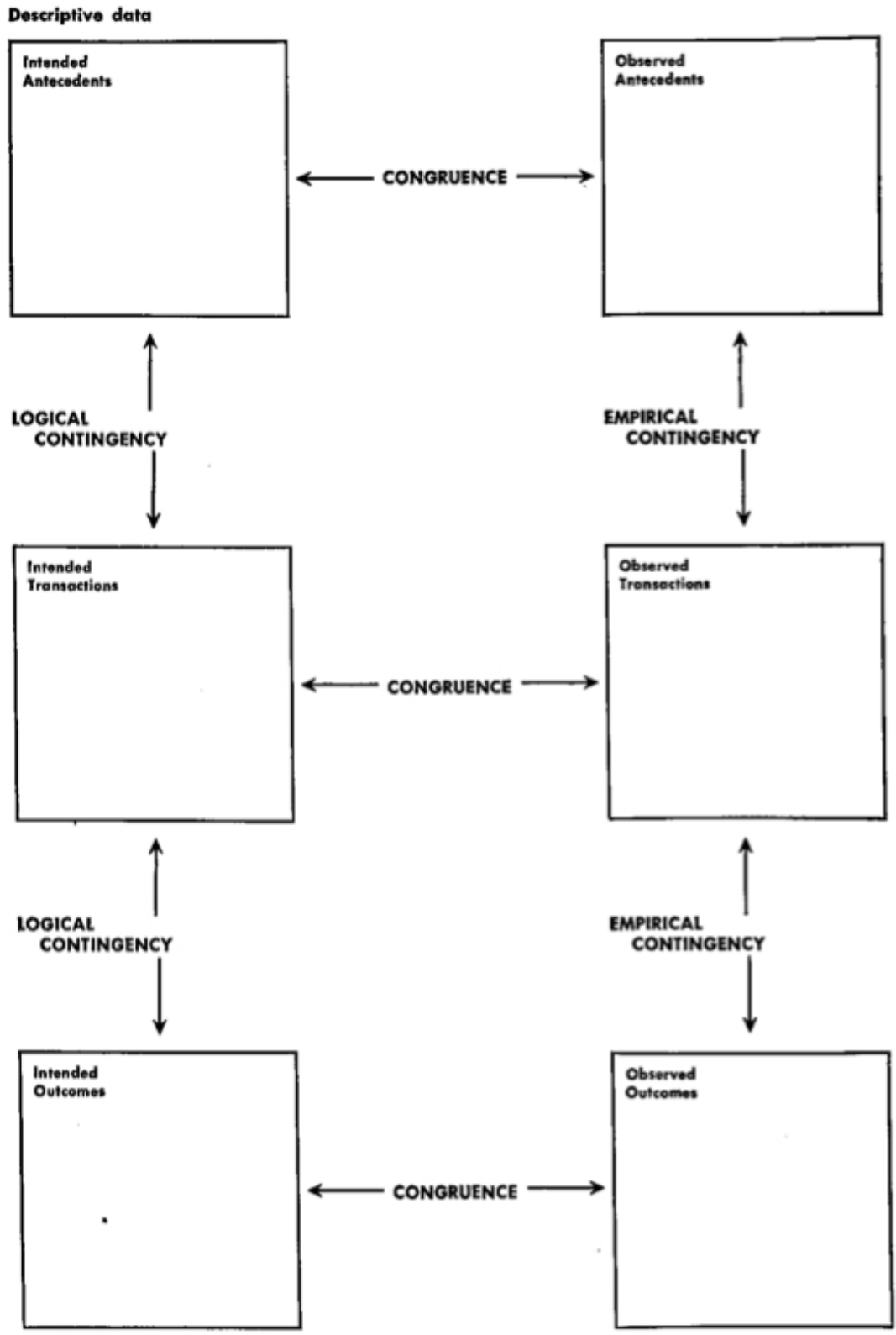


Figure 1.3: A representation of the processing of descriptive data (Stake, 1967, p.533)

implicit, then it served its purpose. Indeed, Stake (1975) started the work of reorienting this evaluation framework into what he termed Responsive Evaluation, to stop this framework being used in a mechanical way and focus its use on generating description, description emanating from and richly connected to the stakeholders of the program. As the current study did not involve observation of transactions between instructor and students, these three stages were collapsed into two stages, intended and observed and were focused primarily on an examination of the congruence between intended outcomes and observed outcomes relevant to the research questions.

Creswell (1998) describes a case study as an "exploration of a 'bounded system' or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information, rich in context" (p. 61). The case in the current study, a program, was selected based on its accessibility. As the current study represented an attempt to understand the general influences of networked learning programs and because the program selected was selected based on its accessibility, this study was an instrumental case study (Stake, 1995).

The method of inquiry was a within-site, case study of six students who were completing the SIAT program at SFU. Before interviewing the students, informal interactions with various staff took place, program visits occurred and then two program staff were interviewed. In addition to the interviewing of these two groups, program documents were reviewed to provide a richer set of data. Thus, student responses could be examined in the context of program intentions and could be triangulated against faculty responses, program documents and information acquired through program visits and informal interactions with staff.

Finally, it is important to acknowledge some tensions with the case study approach in this research. The desire for the expression of students' voices to come through was countenanced by a need to bring focus and structure to students' responses. Previous research on student experiences with networked learning, reviewed in Chapter 2, had shown that rich understandings could be obtained, but they were often across so broad and diffuse that it was problematic to draw rich conclusions about students' learning. It was concluded that this was less a question of finding the right research methodology, than challenges with the nature of the phenomena being examined, as discussed in

Chapter 1. With a broad and diffuse concept such as identity, students would need to be directed and focused along narrower lines. The initial questioning strategy used in the first stage of the interview sought to do this, while also leaving room for participants to reveal the issues important to them. This first stage was backed up by the second stage of the interviews, which used narrower questions on learning metaphors in the latter stage of the interview. This second stage aimed to obtain students' responses about their understanding of the learning metaphors in order to address the research questions, but also sought to ensure focused responses about learning were obtained in case they were not obtained in the first stage of the interview.

Inherent in the design of this case study was the intent to triangulate, but this alone was not adequate for achieving clarity. Pre-testing the questioning approach showed a need to increasingly focus questioning as the interview progressed, to bring more structure to support students while still allowing those who could to provide structure to their own thinking. An approach that will be called funneling was adopted in this study. Funneling was a strategy to increasingly focus questions and the issues outlined in Chapter 1, to ensure responses about identity and learning were obtained from participants. Funneling was conceived of as moving from the broad and open ended concept of learning identity to the narrower and more focused concept of learning metaphors, while progressively using responses from all prior questioning of the participant and using the responses of all other prior participants to focus the current interviewee. The initial stages of the funnel were broad, allowing faculty and students to define the broad identity issues important to them. As the interview progressed, the funnel got narrower and narrower as the questions got narrower and narrower.

Further, within faculty and student interviews, funneling was in operation as questions moved from understanding their general usage of technology, to asking them about how it had changed them as learners, to reviewing specific ways of learning and how each of these were associated with how they learned with technology. At each stage, explanations and elaborations about ways of learning with respect to their own technology usage were sought. Each successive question sought to focus previous questions and previous data and ensure that initial broad open-ended questions about identity allowed individuals to express the aspects most important to them; thus

increasingly narrowly focused questions about specific ways to learn enabled complex phenomena (Eraut, 2000) to be pinned down.

Procedures

Participant Selection

The experiences and understandings of six undergraduate students were studied. Senior students were selected who were within a couple of semesters of the end of their program. Students were selected from the SIAT program at SFU, a program selected because of its significant use of networked learning tools. Students were selected using a purposeful sampling procedure (Gall, Gall and Borg, 2003). Staff and students were selected in the following manner.

Firstly, two staff members from the program were interviewed. These staff were selected based on recommendation from the SIAT program director. The SIAT program director was asked to recommend two staff who were involved in the setup of the program or who were significantly involved in the program and who might be able to talk about the learning intentions in the program and the relationship of the program learning intentions to the intended technology usage in the program. These staff interviews were used to confirm or modify initial understandings of the program, gained through informal interactions with staff, site visits and document review and to develop a list of technologies used within the program for use as an advanced organizer with students. Data from the staff also provided the learning intentions of the program, so interviews with students could start with the intended technology usage and learning intentions of the program before moving into students' actual usage of technology and experience of program learning intentions. Specifically, the faculty's list of technologies used, their descriptions of the learning intentions of the program and their explanations of expectations around each of the learning metaphors formed the starting point for the student interviews.

Secondly, these initial staff interviews were also used to obtain students for interview. Staff were asked to recommend students whom they considered articulate, academically sound and who were likely to have made significant use of networked learning technology. Site and staff interviewing visits also allowed the researcher to

investigate other avenues for student recruitment. Most students ended up being directly recruited by the researcher in response to an email sent to all SIAT students. Respondents to this email were selected if they passed a pre-screening telephone call, as outlined below. Visiting also allowed the researcher to acclimatize to the program and provided the researcher with some context about the operation of the program which was used to further stimulate responses from students about their learning.

Thirdly, purposive sampling techniques (Gall et al., 2003) were used to identify six students who were enrolled in the latter half of the undergraduate SIAT program at SFU in the winter 2009 semester. In general, it was not anticipated that most demographic characteristics of students would be significant in mediating the effects of networked learning on these students. It was, however, anticipated that the effects of networked learning on these students would be weak, so an attempt was made to find a homogenous sample that might show less variance and thus would be more likely to show evidence of these effects.

As many as possible of the following characteristics were used, as was practical, to obtain a homogenous sample. An attempt was made to select only participants who had received significant exposure to the technologies and learning approaches used in the program, that is, completed at least three academic years in the program. An attempt was also made to restrict the sample to students 24 years old or younger in order to ensure an interview sample that had had homogenous exposure to technology, at least the same generations of technology. It was anticipated that ethnic background and whether or not students were first, or subsequent generation immigrants might have a bearing on their orientation towards learning, given research suggesting cultural differences in perceptions of learning (Pratt, 1992). Thus an attempt was made to restrict the sample to second or subsequent generation immigrants i.e. to those born in Canada or who had completed some of their K-12 schooling in Canada. This was also done to reduce issues around English as a second language and lack of awareness of learning metaphors used in Canada by ensuring that all members of the sample had received some exposure to pre-tertiary education in Canada. With regard to ethnicity, an attempt was made to restrict the sampling to two of the main ethnic groups in the program, in order that any differences in understandings of learning metaphors might be examined. Finally, with regard to place of

birth, ethnicity and amount of schooling completed in Canada, it was recognized that undergraduate programs at SFU in Surrey were culturally mixed so these restrictions might not be practical to implement. These criteria for sampling were restrictive in order to obtain a homogenous sample that might thus be able to demonstrate some evidence, across the sample, of what were anticipated to present as weak affects.

Lastly and most importantly the key characteristics of the students was a willingness and apparent ability, as determined in a pre-screening telephone call, to talk about their learning and technology usage in the SIAT program. This call was also used to try to obtain students who appeared to meet the above student characteristics. Students were also told they would be paid \$25 for their participation. Snowballing sampling techniques (Gall et al., 2003) were used to expand and locate students with these desired characteristics.

Interview Process

Semi-structured, face-to-face interviews of one to two hours in length were conducted with each student in order to collect a rich set of qualitative data. The interview consisted of the research questions, but also used substantial secondary or probing questions in order to assist the students to talk about their learning, for clarification and in order to go deeper into the students' understandings of their learning. A pilot interview was conducted with one student in order to test out the planned questions for intelligibility and to condition the interviewer to approaches that were likely to be successful in encouraging rich responses from students. The pilot student's data were not used in this study. All students were given the interview question before their scheduled interview. During the interview, students were asked to respond to the research questions and the subsequent probing questions.

Human ethics approval was received by the Office of Research Ethics, at SFU on March 27, 2009 (Appendix D). All study participants were interviewed from March 27, 2009 to April 8, 2009. At the beginning of each interview, participants were asked to sign a consent form and were informed that their identity would remain confidential (Appendix C). Students were also asked to create a pseudonym in order to maintain their confidentiality, while the researcher created pseudonyms for the faculty members. Students and faculty were referred to by their pseudonyms throughout the research.

Participants met with the researcher in a university meeting room or other meeting room of their choosing, which was accessible by the participant and researcher and which was conducive to private discussions.

Data Collection and Recording

Data collection: Students – Multiple sets of data were used in this study including informal interactions with the program, site visits to the program, a review of program documents followed by interviews with program faculty. Together, all these data sources oriented the researcher towards the program and provided a rich context for interviewing the students. This approach also provided different perspectives on the students' experience in this program and provided a triangulation of the students' interview responses.

The bulk of the data came from unstructured, face-to-face interviews. The interviews with the two program staff and six student participants were between 60-120 minutes each. An interview guide (see Appendix A) was developed based on the research questions presented in Chapter 1 and the summary learning metaphor definitions presented in Chapter 2. Staff interviews paralleled student interviews, but instead the focus was on what was intended for the students, rather than what was realized by students. Participants were asked to share their thoughts about their learning, about learning resulting from completing a program of networked learning. The intent of the interview was to explore, in more depth, the experiences of the students in this regard. Prospective participants were assured that their willingness to participate or not participate would have no effect on their status at SFU.

Following the research protocols established by Simon Fraser University, students were asked to sign an informed consent form (Appendix C). Participants were also asked if they consented to have the session audio recorded and given the option to not have the interview audio recorded (Appendix C). The consent form outlined the handling of the recording and transcription. A copy of their interview transcript was given to the participants to review for accuracy. Participants were also assured that care would be taken to remove any identifying statements or remarks from the final product and that all recordings and transcripts of the interview would be destroyed once the research was completed.

Data recording: Researcher - The researcher was the sole collector and analyzer of the data for this study. An audio recording device was used to record the interviews, to ensure accuracy in capturing the participants' responses.

Field notes, from informal interactions with staff and site visits to the program at SFU, were used to capture ideas and observations. Along with notes from informal discussions, site visits, the review of program documents and the interviews of staff, these notes were used to inform the student interviews.

Data Analysis

Using a modified method of analysis for case studies based on Stake (1995), two forms of analysis, plus a third proposed by Creswell (1998), were used to analyze the data: correspondence and patterns, naturalistic generalization, and description. In short, the analysis consisted of a review of the data to ensure accuracy, an overall review of data to search for patterns, and finally an analysis of emerging patterns to identify those issues that related to the research questions.

To ensure the themes that emerged from this study were meaningful and could be transferred to a broader context, the following sequential analysis steps were conducted (Nerini, 2008): (a) checking the accuracy of findings with participants; (b) reviewing the data to search out and identify patterns; (c) checking patterns and specific comments of the participants against information collected through observations, program documents and program staff interviews, and notes on personal conversations kept in a research journal; and (d) writing detailed descriptions of the findings.

The method of analysis employed was a qualitative content analysis. This aimed to locate utterances that related to a description of an aspect of identity related to learning or a description of a method of how to learn.

Credibility

Creswell (1998) summarizes eight credibility procedures often discussed in the literature and recommends that qualitative researchers engage in at least two of them in any given study. This study uses two of the most commonly used procedures, triangulation and member checking and adds a third, reflexivity. These strategies were:

- Triangulation - The use of several theories to study a single problem and the use of a variety of data sources in a study
- Member checking (participant review) - Participants were asked to review their data and the interpretations based on their data
- Reflexivity - The process of reflecting critically on the self as researcher (Lincoln and Guba, 2000). This was done with the use of field notes and other notes from the review of program documents and staff interviews.

Chapter Summary

This chapter has outlined the research methodology used, how the case study methodology was conceived and the procedures used to select participants conduct interviews, collect and record data and finally analyze data. The next chapter presents the findings from the informal interactions, site visits, document review and participant interviews.

Chapter 4: Results

This chapter will examine these students' learning with networked technology in the larger context that is the SIAT undergraduate program. It will begin by introducing the participants as a group, followed by a review of the history of the program, an examination of the faculty's learning intentions for the students before moving to examine the student's realization of the faculty's learning intentions. An analytical structure was used which allowed an examination of the congruence between what was intended for students and what was realized by students, across both a broad perspective on identity and a focused perspective based on learning metaphors.

This chapter discusses and analyzes the data collected from document reviews, informal interactions with program staff, site visits, faculty interviews and student interviews. Some aspects of the data collection design were linear. Thus, the informal discussions and site visits sensitized the researcher to issues and questions for the document review, which in turn helped structure questions for faculty, questions grounded in a historical and current understanding of the program. Finally, faculty responses helped shape secondary levels questions for students.

It became apparent in early interviews that it was, as expected, a substantial challenge for students to be articulate about their own learning. As the interviews continued, however, it became clearer that this problem was more complex and that aspects of identity were being revealed, but they were more embedded in usage descriptions than had been anticipated. Students' actual usage patterns highlighted a disconnection between the faculty members' understandings of students' usage and students' actual usage. Students' use of technology in learning appeared to be driven by other issues, and faculty intentions were not a major driver. The overall picture that emerged was that students had adapted to an onslaught of technology and displayed a significant variance in the quality (Biesta, 2008) of their engagement with networked learning technology. They varied in their ability to articulate a pattern of technology

usage, ability to articulate ways to learn with technology and ability to articulate their future use of technology for learning.

Embedded within the students' responses about their usage and brought out by further questioning throughout the interviews, information about how their understanding of ways to learn had grown became available. Some of these understandings, however, remained implicit and more was likely hidden from students themselves in their tacit understandings. Essential in getting to grips with students' understandings of learning, was the narrowing in data collection from the initial broad perspective on learning identity to the narrower focus on students' understandings of learning metaphors. Key aspects of student learning in the program did not come into relief until the questions about learning metaphors were asked.

Faculty and Student Profiles

All the student participants were in their 3rd or 4th year of the undergraduate SIAT program at SFU. The sample of students obtained through an email sent to all SIAT students and snowballing tactics with the first selected students led to the following set of students. It did not prove practical to select students based on a restriction of younger than 25 and students obtained ranged from 21 to 29 years. All students spoke English, though for most English was not their first language. No other ethnicities were rejected and the sample obtained naturally split between, self-identified, ethnically Caucasian and ethnically Chinese students. Table 1.1 summarizes the profile information obtained from participants in the interviews, using subject-selected pseudonyms for the students. Definitions of the technologies used by students are contained in Appendix F.

Table 1.1: Participant Profile Summaries

Participant Pseudonym	Status	Year in University	Gender	First Language	Second Language	Born Inside or Outside Canada	K-12 Schooling completed in Canada	Ethnicity (participant ascribed)
Faculty 1	Faculty	Junior faculty	Male	English				Caucasian
Faculty 2	Faculty	Senior faculty	Female	English				Caucasian
Orange	Student	3 rd	Male	Mandarin	English	Outside	2, 3, 4, 8-12	Chinese
Frida	Student	4 th	Female	Mandarin	English	Outside	None	Chinese
Sasha	Student	4 th	Female	English	None	Inside	K-12	Caucasian
Yukiya	Student	4 th	Female	Mandarin	English	Outside	10-12	Chinese
Kyle	Student	4 th	Male	Russian	English	Outside	11-12	Caucasian
Pavel	Student	3 rd	Male	Polish	English	Inside	K-12	Caucasian

Faculty 1: Faculty 1 had been working at SIAT since 2005 and in the last few years he had been teaching in the TechOne program. He has also had other roles at SIAT including teaching assistant and graduate student. Faculty 1 was referred by the SIAT TechOne Director as “someone you should talk to, who is doing innovative things with technology.” Faculty 1 had been experimenting with a program called BackChannel, a live chat environment for lectures that lets students’ type in questions during a lecture, which are displayed on a large screen that all students can see and which the faculty member can periodically review. Faculty 1 had been involved in the development of the curriculum for one of the core TechOne courses.

Faculty 2: Faculty 2 was mentioned by Faculty 1 and several other members of the SIAT faculty as a senior member of faculty who had been involved with the program for a long time and someone to whom the researcher should talk. Faculty 2 was a member of faculty at TechBC prior to its merger with SFU and the start of the SIAT program at SFU. Faculty 2 transferred from Tech BC and had experience teaching in the SIAT program from its earliest days at SFU through to the present. Tech BC was a new university established in the late 1990s in Surrey, BC. However, it did not last long and was merged into SFU around 2003. Faculty 2 had taught TechOne courses, senior undergraduate courses and graduate courses in SIAT as well as having published a substantial amount of research.

Orange: Orange was a 3rd year undergraduate student in the SIAT program but who, prior to transferring to SIAT, did the first year of his post-secondary education in engineering. Although born in China, with Mandarin as his first language and English his second language, he had lived in Canada since the early years of his elementary school and his English was of a high standard. He identified his ethnicity as Chinese. Orange describes himself as someone who typically takes on technical or programming roles on group projects. For Orange, Google Docs was a tool that was heavily used while, many social tools such as instant messaging, chat and Twitter were little if at all used. Facebook had been used as part of one course assignment, but was little used beyond this in a school related context.

Frida: Frida was a 4th year undergraduate student in the SIAT program, about to graduate. Frida was born and grew up in China. She had not attended any elementary or secondary school programs in Canada and was an international student who came to Canada in order to take the SIAT program at SFU. Her first language was Mandarin and English was her second language. She described her ethnicity as Chinese. Frida stated that she has found English to be challenging and that making friends at SFU had proved challenging. Frida described herself as someone who typically takes on design roles on group projects. Frida used Google Search and Google Docs a lot, but she also used instant messaging and email a lot. She made little use of social networking sites like Facebook and MySpace.

Sasha: Sasha was a 4th year undergraduate student in the SIAT program. Sasha was born and grew up in Canada and only spoke English. She went into SIAT straight from high school. She identified her ethnicity as Caucasian. Sasha described herself as someone who typically takes on management and project management roles on group projects. For Sasha, Google Search, Google Scholar, Google Calendar and Google Docs were the key tools used, while instant messaging and chat tools were little used. Facebook was used in a few courses, one teacher initiated use and several other students initiated uses though it was little used beyond this. A work and career related social networking site, LinkedIn,

was used after it had been introduced by an instructor in a course.

Yukiya: Yukiya was a 4th year undergraduate student in the SIAT program. Yukiya was born and grew up in China, but moved to Canada in her high school years and completed the last 3 years of high school in Canada. Her first language was Mandarin and her second language was English. She identified her ethnicity as Chinese. Yukiya described herself as someone who typically takes on media roles on group projects. Yukiya used Google Search, Google Scholar and Google Docs a lot; instant messaging, chat and Facebook were little used. Yukiya had a particular interest in photography and videography, so she made significant use of several online tools related to this including Flickr, Wrench and YouTube.

Kyle: Kyle was a 4th year undergraduate student in the SIAT program. Kyle was born and grew up in Russia, but moved to Canada in his high school years and completed the last 2 years of high school in Canada. His first language was Russian and his second language was English. He identified his ethnicity as Caucasian. Kyle described himself as someone who typically took on technical roles on group projects. Kyle had the most eclectic technology usage of the group. He explored a wide range of networked technology and gave many examples of usage across the range of technology he used. He appeared to have a strong drive to figure out how things worked. His usage, however, did parallel the others at the extremes. He used search engines extensively and made substantial use of Google Docs and online communities and forums. He made little use of instant messaging, chat and social networking sites such as Facebook, MySpace and Twitter.

Pavel: Pavel was a 3rd year undergraduate student in the SIAT program. Pavel was born and grew up in Canada and completed all his elementary and secondary school years in Canada and then went straight into the SIAT undergraduate program at SFU. His first language, however, was Polish and his second language was English. He identified his ethnicity as Caucasian. Pavel describes himself as someone who typically takes on technical or programming roles on group projects. Pavel had a casual approach to his use of technology and found it a challenge to distinguish between his levels of usage. It

appeared, however, that his usage was not that different from others. He did express a strong preference for Google’s tools and made significant use of their search, documents and calendar programs. It was not apparent that he made significant ongoing use of other technologies that he had mentioned.

Students and their Technology Usage

Table 1 .2: Participant Network Technology Usage Summaries (see Appendix F for a description of these technologies)

Participant	Network Technologies used (for faculty: technologies they believed used by students)
Faculty 1	Email, Wikis, Blogs, CMS, BackChannel, Facebook, Course Website, YouTube, TechZone
Faculty 2	Email, Wikis, Blogs, Podcasting, CMS, BackChannel, Facebook, Solid Works, TechZone
Orange	Email, Wikis, Blogs, CMS, BackChannel, Facebook, YouTube, Instant Messaging, Google Docs, Google Search, Online Forums, Course Website
Frida	Email, Wikis, Blogs, CMS, Instant Messaging, Google Docs, Google Search, Online Forums, Knowledge Mgmt System, Course Website
Sasha	Email, Wikis, Blogs, podcasting, CMS, Online game environment, BackChannel, Social Networking, Instant Messaging, Google Docs, Google Calendar, Google Search, Google Scholar Search, Online Forums, Knowledge Mgmt System (LinkedIn), TechZone
Yukiya	Email, Wikis, Blogs, CMS, Social Networking, Flickr, Wrench, YouTube, Instant Messaging, Google Docs, Google and other Search Engines, Online Forums, Library Databases, Course website
Kyle	Email, Wikis, Blogs, podcasting, CMS, Online game environments, Social Networking, YouTube, Instant Messaging (MSN, Skype), Google Docs, Google and other Search, Text Messaging, Cell phone, Online Forums, Library Databases
Pavel	Email, Wikis, Blogs, CMS, Social Networking, YouTube, Instant Messaging, Google Docs, Google Calendar, Google Search, Wikipedia, Text Messaging, Online Forums, Library Databases, Video Chat (Skype)

Table 1.2 summarizes the network technology usage of participants, obtained from participants in the interviews. Faculty were asked to provide a list of the technologies they believed were being used by students. The reasons for asking students about usage, in the current study, was as a way of providing a concrete starting point for a more abstract discussion about what they might be learning about learning from their technology usage and to allow comparison with previous research on student technology usage. Students were asked to focus on their use of networked technology, rather than standalone technologies and about their usage with regard to formal learning. Students found the first requirement easy, though some such as Yukiya and Kyle did bring up non-networked technologies. Students also found the second requirement easy to understand,

yet the distinction was not necessarily a meaningful one for them. Kyle's usage descriptions were unrelated to his schoolwork and he was repeatedly requested to provide school related usage descriptions. Yukiya had a strong interest in photography that was both a school related focus of her studies and a hobby interest, and the boundary between informal and formal learning for Yukiya was hazy. So both of these distinctions were understood by students, but as prior research has suggested (Creanor et al., 2006), these distinctions are not necessarily meaningful to students.

Several general aspects of students' technology usage in the current study stand out. Firstly, students were using more technology than faculty were reporting they believed students used. This is congruent with Faculty 1's statement that he did not see technology usage as driven by the program. It does, however, highlight that students are using a significant number of different technologies, confirming earlier suggestions of the ubiquity of technology in students' lives (Creanor et al., 2007). As mentioned under the student profiles, however, the amount of technology that each student was using heavily was less than a half a dozen programs and that although there is some variance in the technologies reported by each student, there is a high degree of commonality in the technologies used. A wide variety of technologies were casually used at some point by students, though only a few remain heavily used by them. Further, as earlier studies had shown (Conole et al., 2006), there was a clear dominance of students' individually acquired technology over university provided technology. This becomes even more important when the depth of usage of these technologies is examined. No university-provided technology was heavily used by students, as shown in the student profiles. As the student profiles further show, these key tools were all individually acquired technology and virtually all network technology.

The description that there were technologies students used heavily and others they used rarely suggests that students' technology usage was unchanging. This, however, was not the case. Some technologies, instant messaging and chat technologies in particular, were reported by students as technologies they had used heavily several years ago, but their use of them had significantly declined. Other technologies that were commonly reported as little used by students included social networking, course management systems, wikis (adding to wikis, as opposed to viewing Wikipedia) and TechZone.

Twitter was mentioned by one student, the most exploratory of the group, Kyle, but was not regularly used by him. Technologies which were extensively used by students included Google web search and Google Docs. Google Docs, not mentioned by the faculty, was used extensively by students for putting together team projects, a common assignment format in the SIAT undergraduate program. Several students, Orange and Sasha in particular, gave detailed descriptions of how they used Google Docs and expressed strong opinions on how it should be used most effectively. All students discussed some aspect or aspects of Google Docs. The students had come to use Google Docs extensively because it provided a shareable word processing platform within which all could work on the same document and communicate. Thus, instant messaging, social networking and wikis were dropped by students for team project assignments.

It is clear from this simple description that students' technology usage can change. It is also clear, and will become more so, that there was also a conservatism in students' usage, as was apparent in the literature discussed in Chapter 2. These two themes will be examined further in a subsequent section on the onslaught of technology. The move away from university provided technology to student acquired technology is also noted. This change was mentioned by faculty and confirmed by students. This movement will achieve greater importance when examined in light in changes in the program, in the following section. As well as understanding the nature of the process by which students' usage evolved the important question, however, is what students were abstracting about ways to learn and how their identity as learners was being influenced, within this technology rich environment.

Students' Identity as Learners as Intended by the Program

This section will review the results of the document review, informal meetings, site visits and formal faculty interviews in order to build a rich picture of the programs' intentions for the development of the students' learning identity.

Understanding the Program: Document Review, Informal Meetings and Faculty Interviews

The SIAT program at SFU is unique in that it was inherited by SFU from the

merger of Technical University of British Columbia (TechBC) with SFU. What follows is an examination of this inheritance, from the archives of the TechBC through to the Senate documents of SFU. There were two goals in analyzing these archival documents. Firstly, learning about the history of the program, informed the development of questions to put to faculty. Secondly, learning about references to intended approaches toward learning, informed the development of questions for faculty and students about their experience of these learning approaches. Interpretations generated from the document review and informal meetings were checked with faculty and served as an advanced organizer for the faculty interviews.

The main finding from a review of these documents is the decline in references towards learning approaches from the earliest documents at the Technical University of BC through to the later documents at SFU. This could be interpreted as a reflection of an established program no longer needing to discuss its approach towards learning. Closer analysis though shows not only a reduction in discussion of learning but also the steady dropping of references to many different types of learning with the result that a smaller set of learning approaches are being mentioned in later documents than in earlier documents. This suggests a change from a program characterized by an extensive and innovative approach towards learning to a more restricted and traditional approach towards learning.

One of the earliest documents in the TechBC archives with regards to plans for the design of learning environments was “Interim Delivery Models for the Technical University of British Columbia” (Educational Technology and Learning, 1998). This forty-one page document contains a summary of plans for delivery models for all programs from 1999 onwards. Chief among the proposals was a plan for what was termed integrated learning. Integrated learning was the interweaving of both face-to-face and on-line delivery into a single delivery mode. “Thus at any time a student may be taking a series of courses each of which has a different mix of campus based attendance and online delivery.” (Educational Technology and Learning, 1998, p. 4). Within an integrated model a series of more specific models were proposed including: presentation/cooperative, individual learning, computer-mediated classroom, problem-based learning, scripted lab, design lab and comprehensive course. Cooperative learning,

also referred to as collaborative learning in TechBC documents is featured in most of these learning models including presentation/cooperative, computer-mediated classroom, problem-based learning, scripted lab, design lab and comprehensive course. As stated under the presentation/cooperative model “this model will more effectively build the collaborative work skills that are a primary learning goal for TechBC students.” (Educational Technology and Learning, 1998, p. 10).

In addition, the original program proposal “School of Information Technology Proposed Educational Programs” (Calvert, 1998) included in TechOne a course called “Learning and Information.” This course included modules on theories of learning, self-directed learning, on-line learning, team learning, situated learning, creative thinking, critical thinking, finding and evaluating information, organizing information, theories of the information society. Other proposed courses included one on team dynamics and another on communication across the curriculum.

In contrast, the subsequent SFU Senate documents show fewer references to approaches towards learning and a more restricted set of learning approaches are mentioned. Again, this might be interpreted as the lack of a need to discuss what had already been settled. The evidence against such an interpretation is a series of changes over several years to the core first year courses of the SIAT program. From 2003 to 2008, SIAT included both Tech 100 (Fundamentals of Teamwork and Communication I) and Tech 101 (Fundamentals of Teamwork and Communication II) as shown in the SFU Senate document and the SFU printed academic calendars for these years. From 2008 onwards, the reference to “blended learning” and “on-line activities” were deleted from the academic calendar description for TechOne (“SFU”, 2009a). In addition, Tech 100 was discontinued, merged into Tech 101 and Tech 101 was reconfigured to focus more on writing skills (“SFU”, 2009b). What these changes suggest is a decline in the planned use of learning technology and the emergence of a more traditional academic approach.

The picture that emerges is one of a declining role of technology and a reduction in the approaches towards learning. The picture of these changes were put to the two faculty, both members of the SIAT faculty, who were interviewed.

Faculty 1: It wasn't quite distance learning, but it was designed to be completely online learning. I guess we have moved away from that, in terms of relying solely on technology as the way to deliver the material and as a way of discourse.

Faculty 2: There were probably other courses in the curriculum that were taught that way [online]... over the years; that's just completely changed. For practical reasons and for pedagogical reasons... So, the whole program has moved from completely online to completely face-to-face supplemented with technology. There's very little use of the technology for delivering content... I don't know how much of that has to do with the change to go from TechBC to SFU, it's probably also a progressive understanding of maybe better ways of doing things, especially with first year students, where there's a need for face-to-face.

As well as a reduction in the use of technology, there was also a reduction or diminution of the use of the models of teaching and apparent range of approaches towards teaching:

Faculty 2: Another thing that we moved from was some of these courses were highly detailed, heavy, prescriptive, designs. Everybody had to do the same thing, all at the same time, our course teams were very very rigid... We've completely changed that. It's now, everybody does their own thing. Still with the same assignments, we still have the same assignments, and we still have... we share things, but we don't do all the same things.

Beyond the reduction in the use of technology and the decrease in interdisciplinarity, there was also a diminution of collaborative learning:

Faculty 2: I think originally, we had the sense that collaborative learning was a reasonable thing to do, although, from my perspective, there were big problems with it, but... there's lots of issues with doing collaborative learning. But there are some benefits to teams, learning in teams, I don't even want to use the word "collaborative learning," because I think it's... anyway. But learning in teams and being a part of a team has some good learning benefits for students, because they learn about how to... they learn about team processes, they learn how to be responsible, they learn how to communicate, there's all kinds of things that come out of working on teams and learning on teams that help them.... So, you learn about teamwork, and then you work on a team. And you reflect on that experience and it's pretty explicit.

As well as pedagogical reasons, partnerships with other faculties also drove these changes:

Faculty 2: I think that that is also a result of the broadening of the partnerships that make up TechOne... So, TechOne used to belong to one university, then it belonged to one school, and now it belongs... You've come at a very very odd time. It's actually potentially on the chopping block in the sense that there are three different faculties who have interests in the program who send their students here for their first year experience. The influence of those different program

partners and what they think are good approaches to learning, and the kind of things that they think their students need are quite diverse. So, we've gone from idealistic notions of everybody needs to know how to work on teams, everybody needs a bit of academic writing, everybody needs to know a little bit about technology and its impact on society, everybody needs a little bit of computing science and a little bit of math, too, here are very, very strict things that we need in our disciplines and we want you to include them in your courses, so... that's been a big influence. There was always the sense that it was an interdisciplinary program, and we've pushed that envelope as far as the university would even ever allow. And now we're being basically told it can't possibly be that interdisciplinary.

Other informal interactions with program staff also suggested that as well as the “practical reasons and for pedagogical reasons” (Faculty 2) the SIAT program had developed to support other undergraduate programs at SFU and these programs had increasingly pushed for TechOne to serve their needs. Demands, such as an increased focus on writing skills in the first year, had led to the TechOne becoming more traditional and a diminution of the role of “on-line activities” (Faculty 2). Finally, informal interactions with staff suggested that in parallel with these changes, through the movement of the program from TechBC to SFU in particular but also through subsequent realignment of the program, many of the original staff were no longer part of the SIAT program at SFU.

Although the formal, planned use of networked learning for delivery had clearly decreased over the history of the program, as this section has shown, the occurrence of “on-line activities” was still substantial. In addition, faculty still had learning goals related to technology for students.

Understanding the Students: Faculty Perspectives on Students and Learning Intentions for Students

Table 1.2 summarizes the network technology usage of both faculty and students, but faculty were asked, rather than describe their own usage, to describe their understanding of the usage of students in the program. As can be seen from Table 1.2, the most obvious difference is that faculty were underestimating the amount of technology that students were using, but for faculty there wasn't necessarily a sense that usage of technology could or should be driven by them:

Faculty 1: I think definitely we would like them to be able to leverage these tools, to help them over their time here in university. But I think that it's almost a moot point because they are doing that anyway, they are digital natives. I mean second nature doesn't describe it, its first nature. It's natural for them.

It was also, however, clear that other activities in this faculty member's TechOne course were aimed at introducing students to wikis and to blogs, technologies they may not have used before. More importantly, however, was the sense that the faculty did have a role to play in developing in students critical thinking around technology. Faculty 1 showed this by outlining a key activity in Tech 114 which was aimed to get students to use multiple technologies to encode, transmit and receive a message in order to come up against and thus reflect on the issues that each technology brings to the processes of encoding, transmitting and decoding:

Faculty 1: So in one way we want them to have experiences with these tools and in another way we want them to think critically about what using them actually means and how the ubiquity of these systems, how they are affecting society at large. I really see the role of the TechOne courses as being an entry point for them to start thinking about the concepts and themes that they will run into later.

An emphasis on critical thinking seemed to be shared among the faculty:

Faculty 2: Critical thinking is, and critical reading, is another... So as an example, in the Tech 101 course what we require the students to do is to read a journal article, and they have to write a summary about that article, which is a persuasive piece. So they have to do a critique. So all of the work in that course has to do with... understanding what the purpose of the paper is, and then trying to persuade your audience what your perspective is.

Analytical thinking, as it is in most undergraduate programs, was also important:

Faculty 2: Analytical thinking is a very important part of the program. Both in the more technical domains like Tech 106, where we have students doing very high-level analytical thinking around three-dimensional objects. So, we do that in writing around words and around technology in Tech 114 and we do that around design in Tech 124. So analytical thinking is very important to the whole program.

So, beyond the content of the curriculum, critical thinking was the core concern of the faculty members interviewed. Indeed, some proponents have viewed the development of a critical perspective with regards to technology as the most important thing that students need to be taught about information technology (Buckingham, 2005).

This issue of critical thinking will be briefly touched upon later in this chapter when students' identity as learners as realized in the program is examined. It will then be examined in Chapter 5, as this is a separate area of research, but an area that reveals an important parallel with the current study.

What was absent from the faculty members discussions about the SIAT program were references to broader ideas about learning, as had been expressed in the earlier institutional documents reviewed in the last section. Indeed, the decline in references to learning in the documents to almost nothing was paralleled in the discussions with faculty:

Interviewer: And looking at networked technology specifically, do you think there was any implicit intent on the faculty or program's part that through students being significantly exposed to technologies that make use of networks, they would come to understand more about learning... ?

Faculty 2: Only in the sense of the course content. Like for Tech 114. The idea that networks... there are certain ways that people are using networks, but I don't think it's been explicitly a kind of learning outcome for us, no.

There was no inconsistency between the learning concerns of the program, as expressed in the most recent documents and the statements of the faculty. The emergence of a traditional academic program, apparent in the documents was mirrored in the faculties' perspective and understandings of their program. Broader ideas about the development of the identity of students as learners, beyond critical and analytical thinking or ideas about learning grounded in theories of learning were simply not core ideas that were intended by the SIAT program. The fact that open-ended questioning around identity and learning did not bring out an expansive picture of program intentions does reflect on the complexity of these concepts and getting faculty to talk about them. This was not the full picture and more that was implicit about faculty intentions for student learning was revealed by the narrower and more focused questioning on learning metaphors. This will be addressed in a later section.

In many ways, the changes in learning intentions of the program have worked in concert with the changes in technology usage of the program. From an earlier focus on technology and the resultant use of a significant amount of institutional technology, the program has evolved into a lesser focus on technology and declining use of institutional

technology by faculty. In parallel, student usage of institutional technology declined, but an explosion of non-institutional technology use by students occurred. This divergence of the program world and the student world suggests that a divergence might be expected between intended student identity as learners, intended by the program, and how students realized their identity as learners with regards to technology. Regardless of the intentions of the program, students' identity as learners might have developed in ways fundamentally unrelated to program intentions.

Summary of Students' Identity as Learners: Intended

Many of the early learning intentions of the SIAT program were dropped as the program evolved due to pedagogical re-evaluation resulting following on from experience with learning technology and institutional administrative issues. The primary aspect of learning identity that faculty now wished to develop in students was the development of critical thinking. Critical thinking was both an aspect of the content of the program, the development of critical thinking about technology, and a more general academic skill. In this latter regard, it was the development of critical thinking in students' reading and writing.

Students' Identity as Learners as Realized in the Program

This section will review the results of the student interviews in order to build a rich picture of the students' realization of the development of their learning identity. This will include: student identity related to critical thinking, students' conceptions of networks, students' development of an identity in response to an onslaught of technology, the emergence of new identities and the conflict between aspects of identity, the variance in identity among students across three aspects of variance.

Student Identity: Critical Thinking & Reading

As explained in the previous section, faculty saw critical thinking and reading as the most important intention they had for students as learners. Critical thinking and reading, in a broad sense, were brought up by one student, Orange. Orange stated that he

did use fewer academic resources, but visually and vocally expressed pain in qualifying the conditions under which he used these resources:

Orange: ... we've been taught, mostly academically, how to do research... books, academic journals, and to stay away from Wikipedia... Which, I can totally understand, when you're working professionally. But just in the sense of learning, and understanding how things work and using these tools to... as an aid to approach a project, I think it absolutely works. If I have a question about something that I don't need a too detailed answer to, most of the time we look up Wikipedia, and based on what we know or don't know about the context of this one thing, we'll judge as to whether it's believable or not... In terms of if you wanted to work academically and if you're doing like a research paper, that probably might not be a credible source.

While Orange volunteered a critical understanding of the limitations of popular web-based resources, for most students a much more functional approach was taken. For these students there was a clear explanation that search engines were functional tools for locating answers to questions and that going deeper into more academic resources was done because, functionally, an answer was not located from a search engine search.

Sasha: That's like the first problem solving thing, like, no matter what, like I mean, it could be anything, even if I just know a few words, I'll just go "oh! I can Google it!"...

Interviewer: So if you Google it, and you don't find the answer in a search, what's the next thing that you do?

Sasha: We go to refined blogs or databases. So the one that I can't think of... LinkedIn, so that's a specific one that not everyone's open to, so then it has more technical answers. It has... it's more scholarly. So then we would search within, in those.

Yukiya: ... I learn a lot through Google. Google and YouTube. Because that's a main source of all the tutorials.

Pavel: Yeah, I think everyone, whoever writes a paper, I think the first thing they do is Google... Wikipedia, but that's up here, right?

Certainly most students were engaging in the use of web search engines as their first port of call, as Conole (2006) had found and certainly for most students the context was the typical project based assignments, which were dominant in the program.

However, apart from Orange, other students did not offer qualifications to their usage of Google search or Wikipedia and the more in-depth resource cited by Sasha, LinkedIn, appears to be more accurately described as a professional than a scholarly resource.

For faculty, critical thinking and reading were the dominant issues. For students, it was not important to most of them. It may be that for many students this was more of a background and implicit issue, but the fact that no other student brought up issues related to this suggests this was a weaker issue for students than for faculty. Students, in general, were more functionally focused on the needs of finding information to complete project-based assignments and this perspective appeared to underlie their conceptions of networks.

Student Identity: Conceptions of networks

One of the curious aspects of the students' perspectives was their conception of the Internet. As discussed on page 19 in Chapter 2, the basic view of a network is as a series of interconnected nodes. From a simplistic perspective and in the case of the Internet, these nodes might be seen as information sources or people. Beyond this simple notion of a network, there are more complex notions of a network, such as the example provided on page 21 from actor-network theory. The simple notion of the network, however, accounted for the students' conceptions of the Internet. Indeed, it appeared that the dominant conception of other nodes on the network, from a learning perspective, was of nodes of information. The notion that there might be active nodes on the network, other people with whom interaction might occur in order to learn, was generally resisted by students:

Interviewer: So, when you post something or... are you looking for a particular answer to a particular question, or are you looking for a person who seems to understand a lot about something, who you can ask a question?

Orange: For the most part, I notice that we look for an answer to a particular question... None of them go and ask for "who's the best and could be able to help me with this?" So we definitely, I think, go in and look for an answer to a specific question.

Interviewer: Have you had the experience of using people out on the network who you don't know directly, not in a class that you're taking, and not a class that you

have taken, in order to find out information or answers to questions? One of the ways people have done this is going out... onto the Internet and posting a question.

Sasha: Oh absolutely. And a lot of the time, too, if you just Google your question, someone's already asked it, and then there's already answers, so that's nice, too.

Interviewer: So if you Google it, and you don't find the answer in a search, what's the next thing that you do?

Sasha: We go to refined blogs or databases... So then we would search within, in those.

Interviewer: Well, what I'm trying to get at is do you have other places you might go and post that question, or other communities you might search out to find, to see if someone in that area, that community has an answer to the problem...

Sasha: I personally don't belong to a lot of general blogs or any blogs... It's usually like, if I Google it and it's not there, then I'd find something more specific that I know has worked in the past. Otherwise I might just email some students or a teacher, or something like that.

Interviewer: Ok. So no online use of forums other than was mandated, so you haven't ever gone and posted a question in a forum saying "hey, how do you do this? How do you do such and such?"

Frida: No... Because Internet is, I mainly use it for information research.

This reticence to see others on the Internet as potential sources of learning, that is as other nodes on the network, still existed for one student when the population of others was defined as beyond the immediate class but within the SIAT program:

Interviewer: ... Are there times when you get involved in things, learning or projects, things that go beyond the class, maybe it has to do with people in other classes in the program or people you've worked with in the past in the program?

Pavel: Mm-hmm. And also, like, for example, I go to YouTube, this is going beyond even like the school, where I try to find tutorial sites on how to do things.... But to go into other people and different classrooms, SFU Surrey's... Well, it was nice a few years ago, when it was a lot smaller, it's grown over its time....

Pavel: Just like... forums, I guess... Um... online communities... going through and... usually just like... I don't know... the teacher teaches you the basics and then if you want to expand on it you'd search. I always go through Google...

For one student, however nodes on the network could also be active individuals:

Yukiya: ... Because sometimes when... I'm personally not part of specific websites, but most of the time when I'm doing photography or video skill research, and I saw people help each other and learn from each other... And people are concentrating on different fields, and they exchange their ideas and teach each other, and learn from each other.

In many ways, this is congruent with faculty intentions around networks. As Faculty 2 had stated in the previous section, the network was seen as connected to course content rather than any conception of how students might use networks. While congruent with faculty intentions, as has been suggested here, students' basic conceptions of networks are worth noting. Castells' (1996) notion of networks as a set of interconnected nodes seems adequate to account for students' conceptions of networks without recourse to more active or complex notions of networks, such as actor-network theory. Indeed for students, other nodes on the network, as far as learning is concerned seem to be simply repositories of content. All these conceptions of the network, from the perspective of learning, appear to be basic. This would seem to suggest a need to look at the field of learning and examine what it has to say about networks. This will be done in the later section on learning metaphors.

This conception of networks, however, was not a problem from the perspective of students. This conception of networks did appear to be increasingly influencing their choice of communication tools. Students were interacting with others via communication tools and much of the onslaught of technology they were experiencing concerned communication tools.

Student Identity: Dealing with the Onslaught of Networked Technology

As previous research reviewed in Chapter 2 had shown, students use of technology was substantial and changing. As an earlier section on students' use of technology suggested, the period 2004-2009 during which the students in the current program were undergraduates, was a very active period for the emergence of networked

technologies. The earlier section on technology usage in the current chapter has shown that these trends were occurring with the participants of this study. Indeed, the continuing emergence of new technologies in the 2004-2009 period might be termed an onslaught of networked technologies. It may be that during this time, this cohort of students had a historically unique experience as they transitioned from a world of standalone software to one that was largely networked and web-based. As the earlier section suggested, this continual emergence of networked technologies seems to have been a factor in the change of technology usage among students. It was also, however, a factor in students' rejection of change or what might be termed the conservative nature of their usage.

As was discussed in Chapter 2, Giddens (1991) saw modernity as placing significant pressure on the individual, as the individual continually reacted to a stream of decisions required of them. With respect to the onslaught of technology, the individual would seem to have to be continually making choices about whether to test, use or reject new technologies. The challenge for the individual learner using technology would seem to be expanding learning capability, while maintaining stability in the face of continual change in the technology environment. Clearly, what would be needed would be strategies for accepting, rejecting and changing technology usage. While there is significant research on technology adoption in general, there is little with regards to technology adoption of students (Thorpe and Edmonds, 2009). Initial research suggests that key factors in determining the adoption of technology by students appear to be similar to the general population, that is, perceived usefulness and perceived ease of use (Thorpe and Edmonds, 2009).

To get a sense of what this change of technologies looks like, consider the main technologies reported in the student experiences studies cited in Chapter 2. Conole et al. (2006) reported that web-based search engines, email, Microsoft Word and instant messaging were the main technologies being used in 2005-2006. Also from 2005-2006, Creanor et al. (2006) reported that email was the most used technology followed by computer-based materials. Neither Google Docs (nor its predecessor Writely) nor social networking was registering in these studies. Non-networked technology was also heavily reported (Conole et al., 2006). Moving onto the JISC 2 studies that collected data during 2007-2008, social networking was well reported (Lead, 2009; Stroll, 2009) and instant

messaging was still in significant use (Stroll, 2009). In the JISC 2 studies, network based technologies figured prominently, non-networked technologies much less so.

In the current study, the main technologies used by student were web-based search engines (primarily Google) and Google Docs. In the team projects where students were required to produce an artifact, the Google search engine would be used to check if someone else had done the project, to answer other questions and locate other information necessary to complete the project. Google Docs would then be used to put the project together, with all members of the team working to add their agreed contribution. While instant messaging and social networking were being reported by students, there comments made it clear that both these technologies had largely been dropped for learning related purposes. Similarly, the main word processor used by students was now a web-based networked one, Google Docs and communication that might have previously been done with instant messaging was now done within Google Docs. Non-networked technology was rarely brought up by the students. So a change in the larger world in terms of the continuing onslaught of new technologies and of changes in the underlying technology paradigms, from non-networked to networked technology, appeared to be occurring. How did students' cope with this continual series of choices, this onslaught on the maintenance of a stable learning identity? The following sections will show how students both changed and rejected change, in order to maintain a stable learning identity.

Firstly, students did not rush to use new technology. As was indicated with the dates of the emergence of Facebook and its usage by students showing up in student experience research, usage is delayed. The same can be seen with Google Docs. Writely, the precursor to Google Docs, had appeared in Summer 2005 ("Writely", 2005) and then Google Docs had appeared in October 2006 ("Google", 2006). Writely did not appear in any of the JISC 1 studies conducted during 2005-2006 and Google Docs rated only a brief mention in data collected for the JISC 2 studies during 2007-2008 (Stroll, 2009). In the current study, for which data was collected in March-April 2009, Google Docs was used extensively by all the students and was the main software used by the students for their primary assignment format, the team project. This conservatism in students' behaviour is shown in table 1.3.

Table 1.3. Date of Emergence of Technology and Its Adoption by Students

YEAR - STUDY/ NETWORKED TECHNOLOGY	Fall 2005 Technology in Public Use	2005-2006 JISC 1	2007-2008 JISC 2	Spring 2009 CURRENT STUDY
Facebook	Facebook	Facebook – No Use	Facebook – Use (signs of decline starting)	Facebook – No Use
Writely / Google Docs	Writely	Writely – No Use Google Docs available 2006	Google Docs – Minor Use	Google Docs - Heavy Use

Secondly, students used face-to-face meetings rather than technology, particularly in the early brainstorming phases of a project:

Sasha: Brainstorming? I prefer doing face-to-face brainstorming

Pavel: Brainstorming stuff, it's all face-to-face.

Orange: ... If we wanted to do... discussions would be best done face to face. Most students here do them in person...

Thirdly, students tried out software and rejected that which was not meeting a need:

Sasha: ... Facebook... it's an extra side tool. It's never the primary focus of anything

Yukiya: That's what I never use. I used Facebook for about a week, but there's too much junk information, so I just froze my account.

Orange: We have had to use Facebook... It was actually part of an assignment... If Thomas Edison had a Facebook page who would be his friends and what they leave on his walls and... that was about as close as we get to use Facebook.

Frida: In terms of learning, Facebook and MySpace. That's why I don't use them much. I don't really see I can learn something from that. It's only the newest updates for your friends...

Fourthly, students used a category or piece of software until another emerged which was better. The original software was then supplanted by the new software that more closely aligned to their needs:

Interviewer: I'm just trying to check if this is right, maybe earlier on you used chat quite a bit, but it sounds like you've moved from using chat to using Google

Docs more.

Yukiya: ... You know, on MSN when five people try to type at the same time, the screen goes so fast you can hardly catch it. You always have to force it backwards, and it's really time consuming. And Google doc gives us a better... it provides an environment that's easier for synchronized thinking but synchronized editing. So yes, we've moved to Google Docs. ... when it comes down to research, we tend to use Google Docs. People just put all of their research links and their own writings into the Google Docs. And we edit for each other.

Orange: Um, Surprisingly, when I first started, everything was... everybody started with MSN, the first thing we would do is swap MSN and cell phone numbers, but I've noticed that over the years I've staying away from using MSN as a form of communication for academic work... If we wanted to do... discussions would be best done face to face. Most students here do them in person, when we use Google Documents, that's more like when we're brainstorming [Note: Orange uses the word brainstorming in a unique way] for ideas where we don't have to bounce anything off each other in that way, we just kind of go "Ok. I'm thinking this, this, and that."

Fifthly, students restrained the amount of software they used, keeping their ongoing daily use of software to a few programs that met their learning needs. Outside of the few programs they used daily or had not discarded, their use of the remaining programs was minimal:

Frida: I use Google Docs... I use this a lot.

Frida: Yeah. I just use Google [Search] for everything. Whenever I have questions, like define terms or how to do this, how to do that. I just Google it.

Pavel: Ok... I use a lot [of Google programs]..., I'm really into Google.

Yukiya: It's [Google Docs] more convenient when it comes to research papers, Google [Search] is pretty helpful.

Sixthly, certain technologies were simply ignored by students and don't appear to have been used. Among these technologies were the same technologies mentioned by Thema (2009) i.e. social bookmarking and RSS feeds. Online calendars, also mentioned as an ignored technology by Thema (2009), however, did show up in this study as significantly used by students. In addition, just like Lexdis (2009), which showed that online citation management software was not used; the same was found in the present study. Some university technologies also fell in this group, Tech Zone most notably:

Orange: No, um. Is Tech Zone something used in this school for TechOne?

Yukiya: No. This is the first time I've ever heard this term [Tech Zone].

Lastly, where several technologies apparently filled a similar role in a course, students quickly evaluated which technology filled the role most effectively and rejected the others. This was most noticeable with university provided technologies:

Sasha: I find that when they use more than one, like I had a course where it said WebCT and wiki, they tend to just update and to put primary focus into one or the other, so then one's more reliable than the next, even though they're both there for that course, so things might contradict each other. It gets kind of messy because I guess it's a lot for the teachers to then update all over the place, but it's... whatever the teacher says, you'll just go there.

Interviewer: So although the course might start off with a range of technologies, in practice, you quite quickly figure out that there's one primary one—

Sasha: Yeah, Teacher's preference. And I just go there.

Interviewer: ... here's what one of the students [Frida] said too me and I'm just interested if you found it's the same, they often say at the beginning of the course the prof or TA will say use all these technologies, wiki, blog, course management website, then they'd figure out in the first week that really they were only using one, and so once the students understood that, they would just go and use that one system.

Yukiya: Yes, that happened before.

So, students were left with a small group of technologies that met their needs, which they thus used regularly. It was the Google search engine and the Google Docs program which dominated this small group of technologies for all students.

Faculty members were certainly aware that students interacted with significant amounts of technology in this program, though they had underestimated the total amount of technology students were using and over estimated the proportion of university provided technology that students were using. Indeed making sense of technology in a broad, societal sense was a part of the curriculum of this program. What was no longer a central part of the curriculum was the role of technology in mediating the formal learning of students themselves. These phenomena showed themselves in a decline of use of institutionally provided technology by faculty and a similar decline in the use of

institutionally provided technology by students. These changes, however, masked another change that was being realized or faced by students, that is an onslaught of networked based technology. This was managed by students in the ways that have been outlined in this section.

Student Identity: Emergence and Conflict

While Giddens' conception of identity has helped highlight some important aspects of students' learning identity, Wenger's conception of identity was less evident despite some glimpses of emerging identities and conflicts between identities.

The emergence of an identity influenced by an exposure to technology was most evident with Sasha. Sasha started to develop an identity as a project manager in her first few years in the SIAT program:

Sasha: ... I'd say like, first and second year, it was huge because... I mean, I went into the program not knowing a single person, and so instead of me, in class, going up and introducing myself and trying to get teams together, because a lot of it is hugely team-based, that it was nice because online you could just introduce yourself and say "I'm a designer" or "I'm a programmer, I need a team." And then from that you could easily form teams and then just have a meeting time and then you knew everyone was in the same boat...

As her time in the SIAT program progressed, her identity as a project manager developed in line with her technology usage:

Sasha: I would say Google Docs and calendars... they were huge for my project management developing skills. Because then I would make them up, send them out, and then I would get all the feedback and... and that's kind of a new thing for me, to be able to have people write on all these things and have it all sent back to me as one whole document, and then I'd be able to go through it and it just kept things really organized, and that was kind of like the... when I fell into project management.

One other student, Yukiya, did show a significant involvement of technology in the emergence of a participatory learning identity, with many connections to Wenger (1998). This, however, did not come out in the early stages of questioning, but rather in the later stages of the interview, which focused on the specific learning metaphors. This will be covered in the analysis of students' understandings of the participation metaphor.

A conflict between identities was most clearly shown by Orange. This was a conflict between a professional and an academic identity. The conflict was more evident

in his visual and vocal expressions of pain as he admitted he would do things with technology from a practical perspective, which he knew were wrong from an academic perspective:

Orange: ... we've been taught, mostly academically, how to do research... books, academic journals, and to stay away from Wikipedia... Which, I can totally understand, when you're working professionally. But just in the sense of learning, and understanding how things work and using these tools to... as an aid to approach a project, I think it absolutely works. If I have a question about something that I don't need a too detailed answer to, most of the time we look up Wikipedia, and based on what we know or don't know about the context of this one thing, we'll judge as to whether it's believable or not... In terms of if you wanted to work academically and if you're doing like a research paper, that probably might not be a credible source.

In general, most students exhibited an instrumental approach towards technology. Their learning and technology usage showed few connections to the development of their identities as learners and was not an arena in which identity conflicts were evident. Certainly more students demonstrating a struggle over their instrumental use of technology would have been welcomed by faculty. Faculty, however, had not seen a role for the development of identity related to technology in the way described by Wenger (1998).

That Wenger's (1998) ideas about identity were not more evident was perhaps not surprising given the weak role that a participatory model of learning played in the program and the deep connection between Wenger's conception of identity and participatory learning. Although few aspects of a participatory identity emerged in the early broad questioning around students' identity, it did come out in the later narrower questioning of students around learning metaphors. The narrower focus was able to surface aspects of participatory identity, which the broader focus on identity did not, as will be shown in the sections on learning metaphors.

Student Identity: Variance

Biesta et al. (2008) pointed out that identities, that is the stories people tell about their lives, vary along several dimensions including quality, intensity, focus, plot, efficacy and flexibility. The researcher had spent considerable time, with pre-screening phone calls, trying to obtain a homogenous sample along the characteristics outlined in

the last chapter. This was done in order that effects might be more visible due to less variance. Regardless, significant variance in student responses was obvious. Indeed, the researcher concluded that he was fighting a losing battle against the forces of variance. Attempting to restrict variance was somewhat futile and despite how students might have appeared to vary little by the characteristics they were selected on, their responses stood out during the interviews as varying significantly.

In particular, the students stood out as varying in terms of the quality of their descriptions (stuck in literal descriptions of their usage vs. ability to analyze and discuss their usage abstractly). One student, Pavel, was virtually unable to get beyond literal descriptions of his usage, while Kyle and Frida got beyond literal usage descriptions to a limited degree. Yukiya was able to give a rich account of her usage with respect to participation, but was less successful otherwise. Orange and Sasha were able to give rich accounts of the thinking behind their usage, Orange with little prompting. One student did vary in focus (formal vs. informal learning), Kyle. He had a tendency to discuss his technology usage around his non school related learning as opposed to the rest who kept to the request to discuss their use of technology around their school related learning. For Kyle though, as Hodkinson et al. (2008) describe, formal and informal learning were deeply intertwined and his use of technology in formal learning often emanated from trying to solve practical problems such as fixing his car and successful uses in this regard migrated from his informal to formal learning.

Student Identity: Variance in extent able to articulate a usage pattern

The strongest and most obvious variance that exhibited itself in the interviews was in the students' ability to articulate their usage pattern of technology. Some students were able to richly articulate their usage of technology with little or no prompting, Orange and Sasha in particular, while others were not.

Orange, who typically took technical roles on group projects, was able to analyze his usage pattern by purpose:

Orange: If we're working... like, I'm thinking between working academically, and working on a project... a lot of times when you're asked to write a paper, it's about using credible sources to support what your claims are, but when you're working on a project, you don't really have that type of a concern. It's "if this

works, then it works” kind of thing. If this can teach us what we need to know to get it to work, then it can do it.

and by stages in the academic assignment process:

Orange: Oh beyond the initial stage [figuring out how to approach a topic] ... If there were any problems in terms of scheduling or a problem with... that we'd run into with a project, we'd really just use any type of these [points to list of tools, as Appendix B] as a communication tool, let's say. Or if a friend wants to email a sample of her work, yeah, actually, mostly just email... Mostly once you've figured out how to do things, you turn to individual software that you just work on by yourselves... And then there is a final stage where... let's say I've done my part, and I'm ready to send it to the rest of the group, it depends if the files are small enough, let's say it's a web page or just a simple poster, picture, we can attach it through email. But for larger files, if it's a video thing, or an audio thing, we do use and Fops that the school provides us... but that's basically... yeah, that's the final stage when we have to compile it... if we do delegate tasks, that's when we have to compile everything. ... Yeah, there are a number of ways of submitting our work. It depends on the course. Some of them we submit via WebCT, and then that's that, some of them will require a combination of both where you have to submit it on WebCT, but then also on the day of, you have to do a presentation... And the rest are all physical either in paper or in CDs or DVDs.

Sasha had a very different view of her technology usage, a more social view informed by the project management role she usually undertook on team projects:

Sasha: I would say Google Docs and calendars... they were huge for my project management developing skills. Because then I would make them up, send them out, and then I would get all the feedback and... and that's kind of a new thing for me, to be able to have people write on all these things and have it all sent back to me as one whole document, and then I'd be able to go through it and it just kept things really organized, and that was kind of like the... when I fell into project management.

And this social, project management outlook pervaded her choice of tools:

Sasha: Like, as a manager or something, if I knew someone was more open online, I would communicate with them more with email.

And the stages of her technology use in the assignment process:

Sasha: Give or take along the way, it always initially starts off with emails. Where you get everyone's email address at SFU or hotmail or whatever. From there it usually goes to MSN, because that's when you get your first chatting together and... and then with the email you get their MSN account, so then that becomes the... and then as the project moves on, straight into a wiki, I would say, because then you can create whatever sections you want for that. And that's when you start organizing your projects. And that's all for the documentations and stuff.

And then from the wiki, like if it was a Google wiki, when you start getting into more specific projects, it would be calendar, and then Google Docs.

Other students were able to do this, but in a less elaborated format:

Yukiya: Face to face tends to be the concept phase. We describe the big issues and the big ideas. And when it comes down to research, we tend to use Google doc. People just put all of their research links and their own writings into the Google Docs. And we edit for each other.

Yukiya: I mainly do everything through Google. But instead of going to a specific website other than WebCT, like Google and WebCT are main sources. WebCT has the recommended reading, and recommended sources, and Google is where you search for more specific answers, or tutorials.

Frida: After I took this program, I barely go for study group, everyone seems to be always busy, so talking, asking questions, is mostly by email or by those online forums. Course management systems, for the first two years, that's the major place I went for answers to questions, to check out the course materials and everything...

One student was challenged to discuss usage beyond specific tools:

Kyle: So like Facebook would be a way for you to first learn about new developments, and then you would use, you can go on Skype and MSN talk to someone is involved with some challenge you can talk to them, learn about it, learn additional information. So I would go on search engines to learn about all this new software then ask all my friends. And then it was, if I don't understand, if I want to learn new or something more, I actually install the software, for example, then I try it myself, and then if all of those fail, that's when I go back to the books.

Another student had significant problems articulating a usage pattern:

Pavel: Um, I guess so. I start off by going on a Google search and then start from there. I think that's like, for me, that's like the essence of all my research, where it starts, and then from then on, I just find things online. If I need a scholarly piece of work I'd maybe go to the library database, I'd go to the library, search for a book...

Student Identity: Variance in extent able to articulate ways to learn with technology

There also seemed to be variance in students to ability to articulate ways to learn with technology. Some students were able to generate multiple ways they could learn with technology:

Orange: It [Google Documents] allowed us, as a group, to brainstorm ideas from remote locations. So whenever I had an idea, I would put it on the document, and the entire group would be granted access to that one document, and anything... basically it's one file that's shared by all four. You can just as much delete what the other person's written, but we keep it all there just so we have a list of... what we've thought of, and everything.

Orange: If we wanted to learn, say, how to do something particular in a said program, we would look on... say if we had a video editing project or a special effects thing, 3-D course... and we want to learn how to do a certain effect like a car exploding or something, which wasn't taught in the course, we might look at some of the online communities that discuss a 3-D, an online 3-D effects community, and we would look at what they would have to say about it.

Orange: If I have a question about something that I don't need a too detailed answer to, most of the time we look up Wikipedia, and based on what we know or don't know about the context of this one thing, we'll judge as to whether it's believable or not. But for the most part, things off Wikipedia seem to be pretty well monitored, and they're mostly pretty believable and true for the most part. Yeah, it has changed the way I perceive learning, and I think that it is a way to learn.

Some students had a primary and then secondary strategy for acquiring information:

Sasha: if you just Google your question, someone's already asked it, and then there's already answers. That's like the first problem solving thing, like, no matter what, like I mean, it could be anything, even if I just know a few words, I'll just go "oh! I can Google it!"

Interviewer: So if you Google it, and you don't find the answer in a search, what do you do?

Sasha: We go to refined blogs or databases. So the one that I can't think of... is LinkedIn, so that's a specific one that not everyone's open to, so then it has more technical answers. It has... it's more scholarly. So then we would search within those.

For some students, specific tools had helped open up new areas of learning for them:

Sasha: I thought... I guess there was like, downfalls and advantages... like, I definitely see the advantages with the whole community, it's not just a one on one with your teacher. I mean there is that option, but you get to see questions of other students, and then the answers to those questions. And you can actually

communicate to the whole community of students, and that sort of thing, so that was nice... especially at the very initial stages...

Sasha: Ok. Um... I would say calendars and documents... they were huge for my project management developing skills. Because then I would make them up, send them out, and then I would get all the feedback and... and that's kind of a new thing for me, to be able to have people write on all these things and have it all sent back to me as one whole document, and then I'd be able to go through it and it just kept things really organized, and that was kind of like the... when I fell into project management.

Other students had a less well-developed understanding of how they learned with technology:

Pavel: I'm not sure, I find myself like a jack-of-all-trades here. I feel that I'm really good at pretty much everything that I do. And I think a lot of that to these technologies, because I spend a lot of time searching, and trying to learn more, depending on whatever programs I use... for example, when I was working last year in the summer, I got this job and they wanted me to do something and I didn't know how to do it. I pretty much learned everything online through three or four forums where I'd ask questions and there was also this tutorial site that I followed to a T and now I use it at school this semester.

Student Identity: Variance in extent able to articulate future usage

What did not stand out, as strongly for these students close to the end of their program, was that this was a significant turning point in their lives. Thus, a request to think about their technology usage beyond university was challenging for them. Students did manage to respond to this request, but it was clearly a difficult request and this was the weakest of the three variance phenomena. Hodkinson et al. (2008) offer an answer for the weakness of this phenomena: turning points are hard for individuals to see at the time and can only really be seen by the individuals themselves with hindsight. As the students were being interviewed, they were getting their final assignments completed and getting ready for their final exam period. In these circumstances, the future was perhaps an abstract concept.

Some students had a clear understanding of how they saw their future use of technology:

Orange: If I ever had to work in another team, for a job or something, where we would need... where we had to bounce ideas or brainstorm ideas, we probably, and at all times, if it's late at night and we just came up with the idea, I would continue to use Google Documents.

Orange: If you're working professionally and you're aware of other professionals in your field that were keeping a blog, that could definitely work.

Sasha: That's like the first problem solving thing, like, no matter what, like I mean, it could be anything, even if I just know a few words, I'll just go "oh! I can Google it!" That's definitely... I would never have thought to do that in high school, but just being open to all this sort of stuff, like at SFU, it's definitely, everyone that I know, that's like how we... and then we Google it and we're like "oh, of course."

Frida: Because you don't have access to instructors anymore, so online tools, online forums, online information web access tool, that can update you a little bit, connect you to the world, not explain yourself too much. It might be hard, because in school all the courses will be specific to an area, so you know exactly what this course about and what you're going to learn and a way to come up with in the end. But for later on, when you learn something, the information refers to when you got, it might be related to what you're interested, but not really specific to it. So you yourself need to get information and process a branch, try to connect if it makes sense to yourself. Online forums is really useful because it's kind of communication. You can ask and people can answer it. Email, I guess. Emails is narrowed down your question to a specific person.

Other students had a poor understanding of how they saw their future use of technology:

Pavel: I don't know... just like, everything seems quicker than it was before.

Summary of Students' Identity as Learners: Realized

Critical thinking, central to faculty members' concerns, was peripheral to students who showed an instrumental approach towards this issue. In contrast to the limited yet focused intentions of faculty, a series of identity related phenomena were occurring with students. The dominant theme connecting these phenomena was Giddens' position that, in modernity, the individual has to deal with a continuous onslaught of decisions in order to maintain an identity.

Students did show that maintaining a learning identity, because of the onslaught of technology they were faced with, was a significant challenge. They exhibited a series of strategies in their technology usage to both change and resist change, to deal with this onslaught. While this challenge of maintaining a learning identity connected with Giddens' view that identity maintenance was a challenge in the modern world, less evident was Wenger's participatory approach towards identity. A few students showed

glimpses of the emergence of a participatory identity or conflicts between different aspects of learning identity. This was seen as resulting from a lack of participatory intentions at the centre of the SIAT program.

Students also responded to this onslaught of technology in differing degrees of depth, including along the lines of the following three variances. Students varied in the extent they were able to articulate a usage pattern, articulate ways to learn with technology, and articulate their future usage of technology. This was neither congruent nor incongruent with faculty members' intentions for students and their learning with technology. Faculty members had no significant intentions for students in this regard.

These variances, taken together, suggest a variance in the quality of their engagement (stuck in literal descriptions of their usage vs. ability to analyze and discuss their usage abstractly) with technology among students. From a learning perspective, some students were able to engage with technology in the learning process with some depth. These students were able to articulate a pattern of usage of technology, understand how technology supports different ways to learn and could project their usage of technology into future learning scenarios. Orange stood out in this regard. Unfortunately, many were only able to engage with technology in a more functional and instrumental manner.

Some students, Orange and Sasha most noticeably, were able to show development in these three areas, which suggests students may be able to independently develop aspects of identity as learners on networks. That most students were not able to develop significantly along these dimensions suggests that it is probably incorrect to assume that on networks, independent development of learners will naturally occur. In part, the limitations of these developments were related to a lack of conceptions about learning among students. When students were presented with underlying conceptions or metaphors of learning, the picture of engagement with technology became more elaborated.

Students' Learning Metaphors – Intended

This section will review the results of the formal faculty interviews in order to build a rich picture of the program's intentions for the development of the students'

understanding of the four learning metaphors: acquisition, participation, creation and reflexivity.

Acquisition

Sfard (1998) described the acquisition metaphor as the most basic and most pervasive learning metaphor. Learning involves getting. Acquisition, for the faculty and students in this study, was defined as learning as a process of acquiring possession of knowledge, knowledge structures, skills, attitudes, etc. Learning as acquisition, not surprisingly, played a dominant role in faculty members' learning intentions for students in the SIAT program:

Interviewer: So I don't know if there are any terms [referring to metaphor sheets presented to subjects, see appendix B] which resonate for you in this set of acquisition terms... which might describe what students get out of learning activities in the program.

Faculty 1: Yeah, I could honestly make an argument for all of these terms. But reflection would be one that I don't see here. One of the key activity structures we use in is to get them using a series of technologies for an activity, get their hands dirty, and then stand back afterwards and reflect on the experience and think about some of the broader issues. So we try and have a theory on one side and experience on the other end and then reflection takes place between these

Faculty 2: We have very specific learning outcomes that are... it's a fairly well defined space of knowledge, skills, so... yes.

Viewing learning as acquisition was easily understood by faculty and was clearly a major way they viewed learning. As previously discussed, a significant framework faculty used to discuss learning was that of thinking skills. Critical thinking stood out in this regard. While critical thinking was more grounded in acquisitive focus on learning, some aspects of this were argued by faculty to represent a participatory focus on learning.

Participation

For Sfard (1998), participation replaces getting with activity as the underlying learning metaphor. The activity is necessarily embedded in the full richness of its context and learning for the individual is a never-ending process of becoming. The distinction between acquisition and participation, as was discussed in Chapter 2, is not individual and social, rather these two metaphors can be distinguished by the presence or absence of

a definitive end to learning. Participation, for the faculty and students in this study, was defined as: learning as a process of participating in social practices and shared learning activities, with no sense of learning as ending.

As already discussed, the faculty members focus on thinking skills tended to lead to an outlook which saw some elements of participation mixed with an acquisitive view of learning. This can be seen again, when the faculty members were directly asked about participation:

Faculty 2: So we are enculturating them into, through their participation in, the acquisition of the skills, it's kind of a funny line to draw, but that's what we're doing, and I talk to them a lot about what a university is, when I teach them in the first year in their writing courses. I say to them "if you learn to develop an argument, you're going to be doing that through the rest of your... certainly the rest of the time you're in this place, and... hopefully, the rest of your life. You'll learn what an argument is." So that line there in some of our courses may be a little bit blurred. It's not like teaching math. We're teaching spatial thinking, so hopefully spatial thinking... so maybe it's that level where you're saying it's at thinking process, kind of, becomes more of the participatory part of it. The actual skills that they learn in relation to those thinking, in those processes, is maybe what this is about.

The team assignments, a commonly used learning model in the program, mixed elements of both acquisition and participation, in the classroom:

Faculty 2: Well definitely, in what we do is, very explicitly, we teach about, and we do, in all our classes is teams. So that process of learning about and participating in a variety of different teams for different academic purposes... it is social, but it's got an academic purpose as well. So they start off with teams in all their classes, all the TechOne classes, and I would say SIAT is probably very similar.

Elements of a more truly participatory approach to learning also occurred in a more social sense, as an extension of the classroom:

Faculty 1: We have TechTeams, which beyond the specific opportunities to learn specific things is about getting them involved, social opportunities as well as workshops. We want them to step up and get involved in TechTeams in their first year (TechTeams is only offered to first years) which will then lead to them getting involved in something else the following year, student politics perhaps. So the seeds of that would be TechTeams.

In general, it seemed the program had a loose or weak role for participatory learning, certainly not a strong role as described in the work on communities of practice.

Most of the above descriptions by faculty of intended learning as participatory, within the metaphor definitions used, were more accurately described as acquisitive learning.

Attempts, however, at participatory learning had not always worked out. When it was suggested that attempts to build TechZone as a learning community seemed not to have been successful:

Faculty 1: I feel guilty for saying, but yeah. I think though the people who built it saw it more as a social than a learning community. They're social communities, they don't have much to actually do with the curriculum itself.

That participatory learning should have a weak role within the program is not surprising. A full participatory learning approach would require a major commitment on the part of faculty and is at odds with the demands on faculty in a traditional academic program: a semester-based approach to teaching and substantial research. Aspects of participation, however, are worth considering as the community oriented nature of participation forms part of the creation metaphor of learning. The program seemed to accomplish this with its focus on teams. The team format, however, also has more to say about creation than participation.

Creation

Creation is a straightforward metaphor. It is the idea of creating something new, of attempting to advance beyond present knowledge. Although the processes by which it is expected to occur are similar to those of participation, its focus is the artifacts or other outputs of the process of creation, rather than a focus on the activity of creation. Creation, for the faculty and students in this study, was defined as: learning as a process of innovative inquiry, creating, bringing an artifact into existence, starting something for the first time, introducing something new and original research.

Learning as creation appeared to occupy a clearer and more central role than learning as participation in the SIAT program:

Faculty 1: I think with the SIAT program, beyond TechOne more so than with TechOne, this stuff is all extremely relevant. For example a 4th year SIAT undergraduate student created a simple online video game and it was just voted one of the top video games of the year by, I think it was, Time Magazine. So a lot of the courses in SIAT are centered around producing, delivering, creating these things. Usually they are new media, but sometimes they are things like these,

automated mechanical toys which were produced in TechOne. So these all have a place in TechOne and SIAT, but more so SIAT.

Faculty 2: I'm not sure about advancing knowledge, but, certainly creating, striving for something new, innovation, these two, I'm not so sure, in terms of formalized research, but they actually do learn how to do research.

What was interesting was the dominance of the common team assignment used throughout the program, to create new technical artifacts, yet creation did not stand out as having a more explicit role in the program. It was clearly present, but did not seem to be dominant in faculty members' thinking. The substantial amount of instructional time that was clearly dedicated to this recurring assignment in the program and thus the prominence given to this view of learning as creation, did not seem to be reflected in the prominence given to this view of learning in faculty members' thinking.

Reflexivity

Reflexivity, a complex concept, is a case for an additional way of learning both required and integral to modernity. In this respect, it might be seen as a metaphor for lifelong learning. Little attempt was made to formalize it as a metaphor; rather the aim was to present as many aspects of the concept as was practically possible in order to try to see if any of these elements connected with faculty and students. Reflexivity, for the faculty and students in this study, was defined as: learning as a process of coping with the complexity of the modern world. The modern world is characterized by the integration and continual interaction between the individual and the world. Action, by the individual or in the greater world, affects both the entity instigating and the other (individual or world). Elements of this metaphor include: cognitive load placed on the individual, a requirement for adaptability and continual change, an emotional acceptance of the cognitive load and the deployment of practices such as routine and bracketing to accommodate, and the maintenance of doubt and multiple conceptions of the world.

From the faculty perspective, learning as reflexivity, was well understood. Faculty quickly grasped the concept, being already aware of the work of Anthony Giddens. This concept played, however, only an incidental role in the SIAT program:

Faculty 1: So I speak to the students in discussions and labs, you know what you're describing there is disembedding [referring to Giddens use of this

concept]. So you see routine as a means of coping, entertaining multiple conceptions of the world, having to respond to continual change. These are things that come up in our discussion in the labs, that they come to after experiencing some of the activities.

Faculty 2: I don't... well, I don't know about... their world is the university. So... how far that extends, how big that is, for students to learn to manage the cognitive demands of their program and understand that relationship of that to the world, I'm not sure if they've quite made that leap.

While reflexivity was not a significant part of the intended learning metaphors of the SIAT program, there was a clear pattern of intended learning metaphors in the program, as will now be discussed.

Summary of Intended Learning Metaphors

Faculty understood all the learning metaphors, though the participation metaphor was the least clear for them. The primary learning metaphor, intended by faculty in the SIAT program, was acquisition. Participation occupied a muddled role in the program, with much of what was intended more accurately described as acquisition or creation. Creation had a clear role in the program, though this was limited to a definition of creation as the production of artifacts by students. Reflexivity was only intended as an incidental outcome.

Students' Learning Metaphors - Realized

This section will review the results of the student interviews in order to build a rich picture of the students' realizations of the development of their understanding of the four learning metaphors: acquisition, participation, creation and reflexivity.

Acquisition

This way of thinking about learning was understood by all students. For most students this way of thinking about learning was second nature:

Interviewer: So in general, does this sort of way of understanding learning seem fairly common, straight forward, and something that's kind of probably what you do when you think about how you learn? Is this an alien way of thinking about learning, or is this fairly...

Sasha: Not anymore. I mean, since I went straight from high school into it, after first year, this is like, what I know now.

Students had little problem understanding the idea of learning as acquisition and generally didn't require extensive explanation or correction of misperceptions on their part:

Orange: I'm thinking about development. I'm thinking in terms of a certain skill, a certain knowledge that you can develop.

Some were able to give examples of this way of learning with technology in the context of the metaphor:

Orange: If I were to try and learn off of blogs and wikis, it would probably be like reception.

Yukiya: I think construction and development-wise, I learn a lot through Google. Google and YouTube. Because that's a main source of all the tutorials.

Yukiya: I'd say for reception mainly got it from WebCT, blogs, and wikis. And course websites, because they kind of serve the same purpose so far. Because our professors host all the course material there so we get the lecture slides or reading materials from there.

Most students, when asked, said they could go on giving many more examples of technology usage in line with this type of learning:

Interviewer: And if we were to go on for a long time, could you see there are lots of associations between tools and this type of learning?

Sasha: Oh yeah. Absolutely.

Interviewer: And if we had to sit here and think of lots of other examples in which you got learning using different technologies, does that sound something that would be quite easy to do, we could come up with more and more examples?

Yukiya: I think so. There probably might be like... it's too intuitive, like the learning process seems so intuitive that you don't think about it anymore.

Students were able to reflect on their technology usage in the context of this metaphor, as intended by faculty, and provided examples of their technology usage in-line with this metaphor. So, the students' realization of this experience of learning as acquisition would seem to be congruent with the faculty members' intentions. For faculty, acquisition was the major way they intended learning to occur and for students

this was the major way they experienced learning. For both groups understanding connections between learning and technology from with this view of learning was clear, dominant and largely implicit in their thinking.

For students, learning as getting was their signature pedagogy (Shulman, 2005). The challenge for students came when they were asked to start thinking beyond this metaphor for learning, regardless or not of whether subsequent metaphors were intended by the SIAT program.

Participation

The idea of learning as participation was harder than the idea of learning as acquisition for students to grasp. While the participation metaphor was not a key animator of the SIAT program, as far as the faculty were concerned, one student did provide a particularly detailed and rich account of this metaphor in their technology usage:

Yukiya: ... You reminded me of a blog that I haven't gone for like, about two or three weeks, but I used to go a lot. It's a blog that a whole bunch of online people submit what, a lot of concept ideas they found, really cool, like concept projects and concept design, or some of the merchandises that's being designed to sell... So they share all those ideas of like, small or like, one or two small-sized products, to they're trying to design... So it expanded my thinking in, like how people, like, they do their individual researches, but somehow the entire website looks... but it feels like a community. Like they have common language and similar values about green design and saving space in a visually pleasing way...

Interviewer: And do you have any interactions apart, so you read things in the blogs, but do you do anything, do you interact with that blog in any way?

Yukiya: Um, I replied several times. When I saw designs that I really like, I will feedback to the original person who posted it and say why I liked it.

Interviewer: Ok. And why do that?

Yukiya: It's kind of a thank you for providing this so that I learn something cool and something new. It's also a way to encourage them to keep on doing this, so that I can keep on learning from this website.

Interviewer: So you recognize there's something there which is valuable and by you encouraging and helping, that helped sustain and build that community.

Yukiya: Yes. And by doing so I found like, no matter how good they are on the

design or on the research, or how famous they are, they still appreciate when someone says thank you, I like your research, I like your work.

Interviewer: That sounds like a useful thing to learn in life. Any other terms or ideas, and maybe not even things that are written down here, come up for you around this idea of participation?

Yukiya: I'd say either community or being a part of. Because sometimes when... I'm personally not part of specific websites, but most of the time when I'm doing photography or video skill research, and I saw people help each other and learn from each other. Because even if you say media field, it can be specified so many different ways. And people are concentrating on different fields, and they exchange their ideas and teach each other, and learn from each other. And from their language, it sounds like they've known each other for a long time.

Interviewer: Ok. So in some ways, was that kind of like your example, your last example of you might get stuff from there, and you might say thank you in order to encourage them, and so on.

Yukiya: It's very similar. One thing different might be like, during the continual learning, I'm the one who's only learning from it, but in this community, I think people are teaching each other. It changes the role once in a while. So they're kind of in an equal position, instead of teaching and learning.

Interviewer: Ok. So is this more talking about a community of people who are peers to you, who are kind of equals as opposed to a community where you're a part of a community of experts who have a lot more background.

Yukiya: Mm-hmm.

Interviewer: What sorts of things might you do in this type of community that you wouldn't necessarily do here?

Yukiya: It trains me about teaching skills actually. Because we have some idea in mind, and it might seem easy to you when you have it in front of you, but you're doing this only through text or maybe some screenshots. So you have to... first of all, Internet ethics. Like, you have to be polite, even if you're teaching people, and the language you use in this certain community has to be some kind of common language they use. The same terminology and probably referring back to the same experience everyone had. So you have to know something about this community first. So in the continued learning website, you're just looking randomly at what people have. But in this one you have to do a bit of research on the website itself, to look at how people think things here, it actually kind of forces you to study this deeply.

Interviewer: And it sounds like when you go to write something up in this case... it's a lot more complicated... and you are careful about how you write it for those, so you write it for that audience and the community, it sounds like, and you also try and write it to make sure that it's clear and easy to understand. Now why go to all the trouble... why do that?

Yukiya: I think I started to first because I learned a lot from that specific website, like, but first of all used it as the community learning tool, and then I found that I am able to actually answer some of the questions with my field. So as a feedback to the community, I would start doing this.

Interviewer: Why do that?

Yukiya: Hmm... I don't really think about that... You feel like you're not only taking, but you can also give something, so you're a part of something bigger. It feels different in the school. It does the same thing, but the sense of community is somehow different. I think it's because you never see these people face to face. You don't know who they are, you don't know where they are. But only some part of everyone in there has a common interest, so I think that's probably why people are so stuck to a second life kind of game. Like, in those games you don't know each other in the reality, but you have some common interests, or something that connects you together in some way.

A significant amount of explanation of this metaphor, however, was required for most students. In general, most students grasped only a partial understanding of this metaphor, after further explanation:

Frida: Yeah, that's what I understand about learning. Learning is never end. It's always continuous, changing.

Some students were able to associate elements of the participation metaphor with their technology usage:

Orange: So yeah, participation, engaging, taking part, those... they would apply to Google Docs, I guess... Community and membership would apply to forums. Us versus them and separate from outsiders would also be forums. Now social mediation, that could be... that could come from email or for blogs. And I think that's about it...

Kyle: Like when I created the suspension on my car, I changed the shocks, and because the thing, the springs are different, the manufacturer's different height of the car, so if the spring is too short then the car's too low, so usually, when I've changed the suspension on my car, many people are interested in what kind of springs to buy, how low the car will be. So what I've done is like taken pictures of the car, a before and after, and then like shown with a little ruler how much more

the car is, and people are like “ok, so these are too low for me, these aren’t as low.” So there, for sure the online forums.

Students were provided clarification by the researcher if they suggested the distinction between acquisition and participation was simply an individual vs. social learning distinction. Some students, however, were still challenged to really grasp this metaphor, after several sets of explanation:

Pavel: Blogs, like, there’s this one guy who has a blog where he programs all his programs and stuff I mean, he stores the notes in a blog form, so it’s really easy, and then you can comment underneath the blog and like, ask questions maybe or like, say thanks or, “I really learned this,” or say that part of his code is, could work better this way... so, is that a kind of community?

The fact that most students did not really grasp the participation metaphor of learning is not surprising. Participation was not a major metaphor of learning intended by the faculty. The fact that one student, Yukiya, had developed a rich sense of learning as participation through her technology usage, even though a rich view of learning as participation was not intended by the faculty, is encouraging. That students can pick-up and understand this way of learning, through their experience with networked learning, is also encouraging. Unfortunately, the fact that most students do not naturally pick up this way of learning through their experiences with networked learning is more sobering. This will be discussed further in Chapter 5.

Creation

Like participation, the creation metaphor of learning was harder for students to understand than the acquisition metaphor of learning:

Orange: Like, I’m looking at research, so we’ll do some research. I’m thinking of extensive research where you come up with new stuff.

Orange: I guess there is a little bit of a difference... innovation would imply, for me, innovation would imply creating. But creating does not necessarily mean innovation.

This metaphor was comprehended by students because they experienced it through the artifact creation assignment used in many courses. This common assignment typically involved a team project where creation of a novel artifact was required:

Sasha: Pretty much every single thing, for most every class, actually. Yep, they always want something new.

Students found it easy to give examples of these types of projects:

Sasha: Like, some of the ones that we made third year, was an interactive suit... superhero suit. Where it's like, all the programming software, the design of the actual... a lot of prototyping. This year we used a lot of software to do 3-D model stuff, and now we're prototyping it with the laser cutter and 3-D printer.

In addition, some were able to give examples of this way of learning with technology in the context of the metaphor:

Sasha: The Adobe Suite, Photoshop Illustrator and Design, Fireworks Flash, all those things are all creating something new, because, I mean, you can still include programming and design in those type of things.

Orange: Google Docs, definitely for creating. Striving for something new.

One student was able to elaborate on the process of creation and the use of technology in this process:

Sasha:... We find out what each of our strengths are, so if it's a more design based group, you would end up doing something more design based... So really, it depends on the group. And then from that it's like it's interests. So like, for one of my animations this year, one of the guys in the group is a dancer, so we decided, we thought "oh that'd be cool," so he's filmed himself doing some different dance moves and we're bringing it in and animating along to the video that he's recorded of himself. So largely on the individual strengths. And that way it keeps it really exciting and each individual has at least something to be excited about with the project...

Interviewer: So when you think about creation as a process, it's typically thought of as an interactional process... the whole notion of coming up with a good idea and testing that idea out against other people and starting to build the bits and pieces, perhaps the preliminary bits... does that happen... is it all in person, or is some of that also happening across technologies?

Sasha: It's mostly in person. From what I've worked with. I'm sure there's other groups that do a lot of it online, but a lot is done in person because then, as you know, you're shouting out ideas or as you're throwing post-its up on the wall, it just really generates that storm cloud of ideas along the way. The real time is really important.

Interviewer: So if we go back to some of these other forms of learning, you were doing a fair bit of the interactions over software, over networks, whereas when we get to this level, you're not doing this. What's changed?

Sasha: The real time. You need that for being able to bounce ideas and that sort of thing. With this it's like "oh I have an idea" you can email it off and maybe not hear for a few hours, and then it's just kind of gone... but to get that energy going...

Interviewer: So is that because the interactions happening between a project group when they're really trying to create something new are just too complex to do over software?

Sasha: Yes. And just... I mean, you don't get to use all these other ways of communicating ideas, where especially in the brainstorming or coming up with an idea, it's like... I mean, you could do something with your hands that totally would get the idea across, whereas if you were, you might sit at an email for half an hour just trying to think of how to word something. Even if you were to sketch it and scan it and email it off, it's still hard to see... to know that the idea has really come across to that person.

Further, Sasha was able to articulate the role of networks in helping put together a team for creating an artifact:

Sasha: At the very initial stages, I'd say like, first and second year, it [the network] was huge because... I mean, I went into the program not knowing a single person, and so instead of me, in class, going up and introducing myself and trying to get teams together, because a lot of it is hugely team-based, that it was nice because online you could just introduce yourself and say "I'm a designer" or "I'm a programmer, I need a team." And then from that you could easily form teams and then just have a meeting time...

There was, however, a tendency to overextend this metaphor by including things in this category that were not innovation or original research:

Yukiya: Maybe I should rephrase my words. Like, doing this research, for example, for a new product, we have to research in our field so that we can build this new thing. For example, if we're doing installation, we probably need to research for how the circuit works or something.

Some students, however, only managed to grasp at elements of the creation metaphor:

Frida: Creating, I think blog maybe. You create your own documents, right. And... Google Docs. Um... innovation... I'm not sure about innovation. Innovation's when you invent something new... but those already exist format that we got from instructors...

Kyle: Well, just to create it, you have to interact, so like... like learning

Pavel:... There are a lot of times where we are like "oh, that's a great idea!" you know, and then you start doing it and then like, over the time that we're doing it,

as we're doing research online about it, we find out like, that it's been done already.

Students, much as with participation, did not easily grasp a rich understanding of this metaphor, even though implicitly they generally recognized elements of this metaphor and connections to the common team assignment. Unfortunately, the fact that most students do not naturally pick up a rich understanding of this way of learning, through their experiences with networked learning, does not bode well for supporting learning as creation on networks when there is less support, such as with lifelong learning.

The common team assignment was clearly intended by faculty and was clearly experienced by students; they repeatedly created technological artifacts in teams. Creation was intended as a learning metaphor for the SIAT program, perhaps more strongly through its implicit role in the common team assignment, than through explicit promotion of the concept by the faculty. Some students, however, had trouble abstracting and understanding this activity as creation. This is surprising given this was a common assignment and activity they repeatedly engaged in each semester over several years. It would seem that for most or all students to fully grasp a metaphor beyond acquisition is a challenge.

Reflexivity

Reflexivity seemed quite difficult for students to understand. No one was able to demonstrate a rich understanding of the reflexivity metaphor of learning. All students required at least two sets of explanation, which did allow some to achieve partial understanding of this concept:

Kyle: So you'd never have the cushion of working in an IT industry, you never going to have a cushion of job security unless you're continuously getting better, learning new things always always always. So I guess that definitely just continuous adaptation and the pressure to adapt is also driving your learning.

Orange:... I've heard of numerous other places where we're working as either engineers, or in technology related careers, and what happens is... the field tends to develop really quick and what they've learned four years ago, or even two years ago, is already outdated. And in order for them to keep up with whatever

job market or whatever it is that they're doing, they have to constantly look for more information and educate themselves as they go...

Some students were able to get into a richer discussion about reflexivity, but only about a narrow aspect of the metaphor:

Interviewer: Maybe just first make the comment about these ideas about learning. Do these have any resonances or connections independent of technology with you?

Sasha: Well, here, definitely like what you were saying about your studies, I mean you are aware of different things going on, but you just really disconnected from them because you have your own life, or your own struggles. Neither is more important than the other...

Interviewer: Do you have any experiences going throughout the program where, often perhaps there may be an occasion where something was very stressful? And you've maybe made a decision to simply cope and get by but you're sort of going," what was that all about?" In a sense of the thing or the thing that happened didn't fit within your existing way of looking and dealing with the world.

Sasha: It's hard to think of these courses and stuff and try to relate them to the world. I usually just keep things separate. Like if it's school, it's school. If it's my social life, it's my social life. They... I wouldn't say they would ever really overlap...

Interviewer: Do you need to do that as a matter of being able to...

Sasha: I need to do that.

Interviewer: That's a coping mechanism?

Sasha: Yes. It's how I stay organized. I guess routine as means of coping.

After several sets of explanation, for some students, reflexivity was still not clear:

Pavel: But for like, learning concepts, like... I don't know. People join blogs, like, one person has their blog and a lot of people join their blog and then like, I guess they learn from them and... I don't know, like all the comments and stuff, I guess it comes back to them.

Students were more challenged than with previous metaphors of discussing this metaphor in the context of their technology usage. All students were in fact simply challenged to gain any significant understanding of this metaphor. The fact that no

student fully grasped the reflexivity metaphor of learning is not surprising. It was not a learning metaphor intended by the faculty, other than as a basis for incidental learning. Faculty 2 had hypothesized correctly that this metaphor would be too abstract for students and not connected to the students' world. Buckingham's (2008) criticism that this concept applies more to academic social theorists than the majority of the population would seem to be supported.

Summary of Intended vs. Realized Learning Metaphors

The metaphor approach had further enriched the understanding of learning in the SIAT program beyond that revealed by the initial broad examination of identity. This initial take on identity had surfaced the view of learning as acquisition and had surfaced the importance of critical thinking to faculty. The metaphor approach helped bring out the importance of learning as creation for faculty and its implicit role in the program. Similarly, the metaphor approach helped establish that even though elements of a participatory approach could be said to be an intended part of the program, a full embedding of learning in context or community was not an intended part of the learning makeup of the program. Reflexivity was intended only as a source of incidental learning, by faculty, and was not fully understood by any student.

Both the program intentions and the students' realization of these intentions were primarily grounded in an acquisitive view of learning. Both groups demonstrated that they were seeing glimpses (Edwards and Usher, 2008) of other ways to learn, but these were not always fully formed. Faculty had a clearer understanding of their intentions for creation, than students understood. Encouragingly, some students through their use of networks were able to see well formed glimpses of learning as participation or learning as creation, even though the understandings they were showing might not have been intended by the program. Discouragingly, these glimpses were not seen by most students. Specifically, most students did not comprehend the depth of the activity of creation, despite the fact they were repeatedly engaging in the common creation assignment.

Chapter Summary

Students in the SIAT program used a substantial amount of networked technology as part of their learning, though only a few programs were heavily used by students. A

wide range of approaches to learning were envisaged in the early planning for the SIAT program, though many of these had been dropped as the program had evolved into a more traditional academic program. The primary aspect of identity intended by the program was the development of critical thinking. This intention barely registered for students, who instead sought to maintain a learning identity in response to an onslaught of technology.

In the SIAT program, acquisition and creation metaphors were primarily intended by faculty, with some intention of a participatory approach towards learning and reflexive learning left to be handled on an incidental basis. For all students, the acquisition metaphor was strong, while the participation and creation metaphors of learning were only richly grasped by some students. The reflexive metaphor of learning was not understood by any student. In general, most students are not grasping learning metaphors beyond acquisition. Students, however, did naturally vary along three dimensions: the extent they are able to articulate a usage pattern of technology, their ability to articulate ways to learn with technology and their ability to articulate their future use of technology for learning. The results of this study do not support the assumption that, without assistance, all students can develop new ways to learn on post-course networks.

Chapter 5: Discussion and Conclusion

This chapter will start out by summarizing the results of the study in relation to the research question and the major concepts in the study. Next, this chapter will address a separate finding from the results of this study which was not addressed in the results chapter, namely the importance of critical thinking to faculty members and the relationship of this finding in the context of research on critical thinking with technology. Finally, this chapter will address the implications of this study for the development of post course-based networked learning environments, the implications for educational programs using networked learning and the implications for future research on students' experiences of networked learning.

Summary of the Study

The research question of this study asked: What aspects of identity as learners and understandings of ways to learn are shown by students who have been through a program using course-based networked learning? Sub-questions of the research question sought to break down this question to compare aspects of identity intended by the program vs. those realized by the students, and understandings of learning metaphors intended by the program vs. those realized by the students. As was discussed at the beginning of Chapter 1, this question was asked so that some insight into the nature of learning in course-based networked learning might be gained. In turn, this would inform the development of networked learning in contexts beyond the course, particularly lifelong learning.

Given that the animating idea behind the present study was a practical one, the current study drew upon a significant amount of theory. This was as a result of the recent historical context, reviewed in Chapter 1, which showed the dominance of instrumental thinking in the use of technology in education. Concerns about technological determinism were also raised. The results of the study showed evidence of these concerns, though the results also showed responses to these concerns.

The first set of results of the study were concerned with the identity intended by the program and the identity realized by the students. The diffuse, open and broad nature of identity showed itself in the responses of faculty and students, but ultimately each group were concerned with different aspects of identity.

For faculty, much of the foundation on learning identity, apparent in the original formulation of the SIAT program and within the foundation of this current study, was largely irrelevant. For faculty, critical thinking was now the dominant concern. For faculty, this had two dimensions. Firstly, as a matter of content of the program, students needed to develop skepticism and an awareness of the limitations of technology. Secondly, in a more traditional and academic meaning, students needed to develop critical thinking skills such as reading critically and developing sound arguments in their writing.

Although critical thinking resonated significantly with one student, in general the students took an instrumental approach to their use of technology. Concern about critical thinking was not dominant for them. For the present study, this issue of critical thinking lay outside the theories and research this study was based upon. This issue of critical thinking, however, does lie at the foundation of another area of research with educational technology that will shed light on the current study. This research and its relationships to the current study will be reviewed in the next section.

For the students in the study, the general identity issue that came up for them was dealing with the onslaught of technology with which they were faced. For these students, this was an instrumental issue and they had a variety of strategies for maintaining a stable learning identity while adapting their technology usage over time. The differences in the intended and realized learning identities of the students were not simply a result of the broad and diffuse nature of learning identity, but a result of significant forces operating to push students to react to different issues. This was the decision of the SIAT program, during the time the students were enrolled as undergraduates, to step back from the use of institutional technology, which coincided with an explosion in the provision of free, web-based software. In general, the study showed that usage of networked learning technology itself influenced the students' learning identity, through pushing them to cope with the technology, but it did not substantially alter their orientation towards learning. Usage was certainly not in the direction the faculty intended, that is, towards an increased concern with critical thinking.

The second set of results of the study, concerned with the learning metaphors intended by the program and realized by the students, did bring greater focus to each

group's orientation towards learning. This approach also expanded the discussion of learning to bring up aspects of learning that had not been mentioned before. Most significant in this regard was aspects related to learning as creation.

For faculty, the traditional view of learning as acquisition was dominant, though they also viewed learning as creation as important. Participatory learning and learning as reflexivity did not play a significant role. While faculty understood all these different ways of learning, students did not show the same depth of understanding.

Students were able to develop ways of learning with existing course-based networked learning environments that might be important in networked lifelong learning environments. It was particularly encouraging that students could develop the creation based ways of learning, that were intended and which called for the relations which networks provided. The problem was that while this was possible, this was not common for most students. Secondly, the students were able to develop ways to learn in course-based networked learning that were not intended by the program. It was encouraging that the students were able to develop participatory approaches towards learning, which were not directly intended by the program. Again, however, this was not common for most students in the study.

Despite some glimpses, the students' showed they had difficulty going beyond basic acquisition based-conceptions of learning. The students were clearly limited in their ability to develop understandings of new ways to learn in their course-based networked learning environment. Both the results on identity and the results on learning metaphors are showing that the students were challenged to engage beyond the technology and into an increased understanding of learning, in their networked learning environment. Understanding creation was the program intention which presented the biggest challenge for students. Returning to a separate finding of the study, on critical thinking, will help further develop this point.

Critical Thinking

Concerns about critical thinking and reading skills of students using the web have animated recent research (Rowlands, Nicholas, Williams, Huntington, Fieldhouse, Gunter, Withey, Jamali, Dobrowolski and Tenopir, 2008) and lie at the heart of curricular attempts to address critical literacy in the information age, such as Marupova & Vega

Garcia (2007). Critical thinking in studies of undergraduate students has long been the subject of research on post-secondary students (Pascarella and Terenzini, 1991; Pascarella and Terenzini, 2005). Common in this research is a definition of critical thinking that focuses on:

... an individual's capability to do some or all of the following: identify central issues and assumptions in an argument, recognize important relationships, make correct references from the data, deduce conclusions from information or data provided, interpret whether conclusions are warranted based on given data, evaluate evidence or authority, make self-corrections, and solve problems. (Pascarella and Terenzini, 2005, p. 156)

The advent of networked based learning and the use of online tools by students has expanded the range of environments where critical thinking is required by students, but also extended the domains in which critical thinking is required, to include visual images, animation, audio, video or any combination of these with or without text (Buckingham, 2005). Equally concerning has been that although much of the usage of these tools occurs outside of the classroom, their effects have seeped into students' school work (Buckingham, 2005). In the SIAT program, for faculty, critical thinking was both a content area and a more general academic issue. Buckingham (2005) argues the need to expand conceptions of critical literacies to include "asking questions about the sources of that information, the interests of its producers and, the ways in which it represents the world; and understanding how these technological developments are related to broader social and economic changes" (p.20). He also argues the need to expand conceptions of critical literacies to take account of the new domains mentioned above.

Another strand of research related to critical thinking is the debate about whether students are "digital natives" (Bennett, Maton & Kervin, 2008) or "the Google generation" (Ashling, 2008; Rowlands et al., 2008), the former used to imply capability, the latter to imply there are problems with this capability. The problem, from the perspective of the current study, is that this debate often emphasizes students' usage and technical skill rather than emphasizing their use of the technology as learning tools or their learning needs. Suggestions that so-called digital natives learn differently are only "supported by anecdotes and appeals to common-sense beliefs" (Bennett et al., 2008, p. 777). A recent study, however, suggest there is a lack of homogeneity of usage and

technical skill among students in the digital native age bracket (Jones, Ramanau, Cross & Healing, 2010). It can be argued that, in many ways, this debate is asking the wrong question. A more useful question, grounded in the concept of critical thinking, is: to what extent are students able to use the new technologies critically?

Rowlands et al. (2008) examined the actual web searching behaviour of high school aged students using 2 major UK web-based information resources, via server logs and surveyed the literature on information searching behaviour. They reported:

... users make very little use of advanced search facilities, assuming that search engines understand their queries. They tend to move rapidly from page to page, spending little time reading or digesting information and they have difficulty making relevance judgments about the pages they retrieve. (p. 297)

They concluded “there is no evidence in the serious literature that young people are expert searchers, or that the search skills of young people have improved with time” (p. 302).

Nicholas, Huntington, Jamali, Rowlands & Fieldhouse (2009) similarly analyzed the actual usage of undergraduate students using three substantial academic databases. Students were heavy users in terms of the number of sessions and pages viewed, though they did not view a lot of pages during a session. This fits the picture of students as bouncing from page to page as reported by Rowlands et al. (2008). Nicholas et. al (2009) also found that students were more likely to undertake a simple rather than an advanced search. Other results showed different usage patterns between the databases, which were attributed to differences in the interfaces and design of the databases.

The current study showed parallels with this research. Students in the current study made extensive use of web-based search engines, but there was little evidence that they used advanced searches. In the current study, the students’ use of networked learning was often instrumental, and the students showed little evidence of critical thinking in their usage.

The line of research on critical thinking with technology parallels the current study. In both areas of research, the underlying issue appears to be surface level skill in the use of technology masking a lack of depth in the usage of technology, in particular a

lack of critical use or relationship to the needs of learning. Both these areas of research are pointing out that students do not naturally develop depth with regard to learning in their use of technology.

Using the developmental model of e-learning introduced in Chapter 1, both these areas of research are suggesting that most students have mastered access and technical skill issues, but are challenged to develop depth in their learning skills with technology. That some of the students in the current study were able to engage with technology with some depth, means that it should be possible to teach students to engage with networked technology with greater depth. In the context of the SIAT program, the most valuable technology areas for teaching students would seem to their critical thinking skills and a deeper understanding of creation.

Limitations of the Study

Although generalization is not a goal of case studies (Stake, 1995), readers will be interested in the applicability of findings from this study to other contexts and programs. The following comments outline limitations of this study and act as a context for the implications of the study in the subsequent three sections.

It is important to note that the SIAT undergraduate program is relatively new and has undergone several iterations, including changes during the period the students studied were in the program.

Instrumentalism, technological determinism and presentism were discussed, in Chapter 1 and Chapter 2, as the epistemic threats to investigations into the use of technology in education. While the first two of these threats have either shaped the design of this study or have been discussed within the study, the latter has been somewhat ignored. Presentism or the problem of recentness of networked technology in education, and specifically many of the networked tools, their usage and the research in this area, means that some general hesitation about the nature of the present study and the research in this area should be maintained. Much of this research in this area is somewhat exploratory, and one intention is to inform the development of better questions in the future, to lead to more rigorous attempts to address this area.

One issue of this recentness is the change in the nature of technology throughout the period the students in this study were undergraduates. Although this change has itself

formed part of the findings of this study, it does create problems in comparing the current study with previous studies, studies conducted several years earlier when some of the networked technologies referred to in the current study were not available. In this regard, the current study is based on a snapshot of student technology usage (see Appendix F) that is different from what would have been found several years ago and from what might be found in several years time.

This technology change, as the current study has shown, has some specific characteristics. Not only do individual programs come and go, but underlying platforms are also subject to change. The current study showed a change from desktop applications to a mix of desktop and networked applications to a largely networked application world. Further, categories of applications have changed in parallel with these changes. Google Docs is not simply a word processor that happens to be networked, but a networked word processor with communications capabilities. This process shows no evidence that it has ended yet. Indeed a new program on the horizon, Google Wave (“Google”, 2009) appears to be an integration of a series of categories of communication and information management programs and does not fit within previous categories of programs. These continuing changes in technology make the comparison of research based on student usage patterns hard to compare. It is fundamentally problematic trying to compare studies, let alone build upon, studies which are more than a couple of years old.

The learning context of the program in the current study may have been unique, in particular, the recurring team-based project approach used throughout this program. Some, if not much of the students’ use of networked technology, may flow from the requirement to be continually forming teams and completing team projects throughout their time in the program. Students in more traditional individualistically-oriented academic programs, might not have had the same pedagogical drivers to use programs such as Google Docs. In such programs, they might tend to be communicating predominantly in one-to-one as opposed to team-based scenarios. In individualistically oriented academic programs, chat and instant messenger type technologies might not have imposed the burdens they imposed in team-based scenarios.

The small number of students who were studied in the present study must be mentioned. Conventional wisdom dictates that more students would have resulted in

better data, though it was obvious to the researcher that repeats in the occurrence of phenomena were already occurring even after just the first couple of students. More substantive are the other issues mentioned in this section, which more clearly relate to the nature of the phenomena under investigation.

Finally, despite concerns expressed in the participant selection section of Chapter 3 about cultural differences in orientation towards learning, and an attempt to control for these concerns, this issue was found to be insignificant. However, this was less due to the nature of the issue than the nature of the design of this study. Pratt (1992) had reported cultural differences between the Chinese and Canadians in their orientation towards learning. Pratt, however, was comparing Chinese educators in China with Canadian educators in Canada. The present study, in comparison, was examining a mixed cultural group all resident in Canada in the same educational program. Only one student could be described as uni-culturally Canadian (Sasha). This lack of a clear division between the cultural backgrounds of these students may explain the lack of differences in the learning metaphors adhered to by those whose dominant self-ascribed ethnicity was Caucasian and those whose dominant self-ascribed ethnicity was Chinese. There may be differences between Chinese and Canadian educators and students, as Pratt (1992) describes. The current study, due to its use of a mixed cultural group, is unable to usefully shed light on this issue.

In summary, the results of this study do not show a clear distinction between Caucasian and Chinese students with respect to the metaphors of learning they understand. In the current study, however, the division between Caucasian and Chinese students was not clear. Most of the students could perhaps be more accurately described as coming from a mixed cultural background. This lack of a clear division between the cultural backgrounds of these students may explain the lack of a clear distinction in the learning metaphors adhered to by Caucasian and Chinese students. Certainly, this study was very different from Pratt (1992) who was interviewing what might be described as a uni-cultural group: Chinese educators in China.

All the above qualifications provide a context within which to view the below implications. Each of the following three sections provides a series of implications, which flow from the current study.

Implications for the Development of Post-Course Learning Environments

The originating intent behind this research was to understand students' experiences of networked learning in order to make comments about what might be needed in post course-based learning environments, such as networked lifelong learning environments. Using Sharpe's (2008) model, introduced in Chapter 1, students do not appear to have major problems accessing or developing technical skills in the use of networked learning tools. As Sharpe and Benfield (2005) had suggested, students' limited pedagogic understanding of less traditional or newer pedagogic approaches used in courses, does seem to be a problem.

What students do appear to have problems understanding is new ways of learning, ways of learning with which they have likely not experienced during their previous scholastic career. To the extent that a networked lifelong learning environment is based on an acquisition model of learning, students will likely understand the model of learning. To the extent that a relational model of learning is used, such as those that underlay participatory and creation based approaches to learning, then students are likely to have problems understanding the learning approach taken. In these latter circumstances, an explicit program of teaching them about the new approaches to learning is indicated. This is even more the case, where the assumption is that students come to a community that assumes greater independence on the part of students or does not provide supports similar to those found in a course-based environment i.e. explicit instructional leadership. The current study has shown that it is incorrect to assume that students using networked learning environments will, without assistance, independently develop into well-rounded learners.

Even assuming the above issues are addressed; students are unlikely to adopt any new technological environment quickly. It is likely that diffusion of new technologies will occur through their fellow students and that the experiences of the initial students will be critical in ensuring that this diffusion does occur. Closely interacting with initial students, and adapting the environment or the nature of support to resolve problems

highlighted in these early interactions, will be arguably essential to ensure later adoption by other students.

Implications for Programs Using Networked Learning

The current study suggests that programs should be reflecting on why they are using networked learning; particularly university introduced networked learning tools. It may be that some of the tools used by a program, as a result of early experimentation, are no longer serving a purpose central to the program. In such cases, redirecting resources to other program issues may be worthwhile. Reducing the amount of technology may also reduce the pressures that the onslaught of technology appears to generate, and which appear to lead to students taking instrumental decisions with regards to their technology usage. Finally, students already exist in a networked technology-centric world. It may be that they are already using technology that will meet the needs in question, without requiring them to use a new technology that replicates capabilities they already possess.

Even in cases where a program chooses to use few university initiated networked learning tools, students will likely take it upon themselves to acquire and use their own tools in this area. A program concerned with critical thinking and reading will need to recognize that some of the challenges of realizing these goals will be occurring in this self-acquired networked technology environment. In particular, students' crude use of web based search engines and their shallow online reading strategies may need to be addressed. Either the program or the program in concert with library staff may wish to address these issues. The current study suggests that critical thinking is not an issue that is dominant for students. The onslaught of technology that students have been faced with appears to encourage an instrumental approach towards the use of technology in learning.

Articulating beliefs about learning and the models of learning a program wishes to use with its students would seem to be worthwhile for programs using networked learning. Explicitly articulating and communicating these to students will help them understand the goals of the program and the types of learning the program is seeking to develop. A deeper understanding of the intended models of learning will probably lead students to more fully comprehend the activities within a program, and continue their involvement with the newer ways of learning beyond the end of the program.

Where a program chooses to use approaches to learning grounded in participatory or creation-based methods, they should recognize the need to explicitly educate students on these approaches as students appear to have trouble understanding these learning metaphors. Regular engagement in activities based on these approaches, as the present study shows, does not appear to be sufficient for students to develop a good understanding of these metaphors.

Participatory approaches towards learning are often confusing. This was clear in the current study. Firstly, the definition of this metaphor is not simply social or team-oriented organization, but is grounded in a culturally based conception of learning, most clearly espoused by Wenger (1998). In this pure form, this metaphor is not common in the “real-world”. Indeed the more temporary and dynamic form of activity common in work-based teams, popularly described as community, is more commonly found (Hakkarainen et al., 2004). It is more sensible to use this looser understanding of community, if approximation to work-based settings is the underlying goal.

Where the building of an innovation and creation-based approach towards learning is considered important, the one element that is common to the different theoretical approaches towards creation is a focus on questioning, specifically the ability to refine and develop good questions (Hakkarainen et al., 2004). This is necessarily a relational exercise, requiring feedback from others and would appear to be an element that could be built into creation-focused team assignments.

Reflexive learning appears to be too complex for undergraduate students. The students in the current study were not able to comprehend this way of learning after several sets of explanations suggesting that the concept may be too abstract. The fact that this concept has not moved substantially beyond the work of Giddens and out into the broader literature related to learning also suggests that the metaphor is too abstract. Finally, the dominance of policy-based rather than academic work on lifelong learning (Taylor, 2005), does question the nature of exactly what type of learning that is not already covered in the other three learning metaphors needs to be addressed. In any case, students are faced with what this study has shown is a significant enough challenge: understanding participatory and creation based approaches to learning.

This study shows that students vary in their ability to understand and critically use technology in their learning. One or more confident and articulate students may appear to be digital natives, but their skill and understanding is unlikely to be common throughout the cohort of students. Further, technical skill does not imply a depth of understanding about learning or an ability to use technology in a critical manner. It is these latter problems that appear to lie beneath the veneer of apparent technical sophistication of some students and reflects the real state of development of many students. These are the important issues for educational programs to address.

Implications for Future Research on Student Experiences of Networked Learning

Although this study has suggested the explicit training of students on other approaches to learning, beyond acquisition based approaches, it would be useful to understand if such training did influence students' conceptions of learning in networked environments. Students' understanding of learning as acquisition has developed over many years of schooling. Adding to students' conceptions of learning, such that a solid understanding of these new ways of learning can be ascertained, may not be easy. Thus, it is important to understand the characteristics of effective instruction in this area.

This study indicates that students in general may not think about learning as an abstraction. It is hard for them to think about learning, so supports are necessary. The metaphor approach used in the current study did help focus and structure student thinking about their learning. Providing written explanatory sheets for the metaphors used and providing an initial list of technologies for students to react to also helped. Using responses from prior faculty and students who had been interviewed to see if the present student also had a similar experience, also worked. Other artifacts that could be created or acquired might also be helpful, for example, observations of student learning or pieces of student work for discussing with students. Significant pretesting would be worthwhile, to understand if the artifact or approach taken is obtaining meaningful responses about learning from students.

One fairly obvious future study that should be conducted would be to do a follow-up of these same students after they have experienced graduate school or industry

environments. It would be revealing to determine whether their learning identities and understandings of ways to learn on networks had evolved. In addition, the present study could be built upon by expanding the number of participants to determine if the patterns revealed in this study would be replicated on a larger scale.

Finally, it seems worthwhile to consider conducting research about ways of learning and how they may best be supported by networked learning. The growing importance of research and innovation within the university community, that is the creation metaphor, seems to be an increasingly important form of learning and a form of learning that does not seem to be connected, for many undergraduates, to their existing understandings of learning. Certainly, the present researcher has only started to appreciate the extent of the connections between learning and research as a result of conducting the current study. Some important questions in this regard might include: How might undergraduates be helped to understand the connections between what they do and the world of innovation and research? What sort of experiences as undergraduates might increase the likelihood of them participating in innovation or research related communities in the future? What mixtures of pedagogical and networked elements might support the development of such communities? The answers are unlikely to be simple, but the long-term importance of developing a deeper understanding of research and innovation among undergraduates, and developing stepping-stones into innovation and research communities, are valuable. Starting with the desired nature of learning sought has the additional advantage that it ensures that technology is serving learning.

Conclusion

The current study started with a simple research question grounded in the praxis of networked learning. Epistemic concerns were raised about the foundation of this praxis. Instrumentalism was readily apparent, and the deterministic danger of asking questions about learning from the starting point of technology was also raised. These questions have in many ways been answered throughout the tacit fabric of this study, but, in conclusion, they should be answered explicitly.

The challenge of technological determinism called for a careful examination of the nature of learning and the demands of different types of learning, if any, for networked learning. The learning metaphor model of learning provided in Chapter 2 was

a powerful model, which distilled the essence of different approaches to learning and the connections of these approaches to networks. While participatory learning may exist with only local relations, it is the broad and expansive relations that the creation metaphor requires which call for the distributed relations provided by networks (Hakkarainen et al., 2004). The acquisitive metaphor of learning was not found to be calling for learning networks. Learning networks are appropriate for forms of learning beyond the formal learning environment to the extent they are based on relational forms of learning which benefit from networks.

Taylor (1991) showed that the solution to instrumentalism was the adoption of an ethic of care. In the case of education, the dominant ethic of care involves keeping the needs of students and their learning foremost in mind. There is no reason why this same ethic of care should not apply to networked learning. Networked learning, in regard to this ethic, is no different from the rest of education. In practice, this may mean in some learning contexts, a reduction in involvement of a program in networked learning. If networked learning is to be used, let it be undertaken with care and with the development of students' learning at the forefront.

Appendix A - Participant Interview Questions

Participant Interview

General Learning Identity Questions

- In what ways have you developed as a learner in this program?
 - Follow up on responses to understand in greater depth. This question and follow-up questions aim to get at any increased understanding about learning

- What ways of learning are you now aware of, that you weren't aware of before, as a result of your time in this program?
 - Follow up on responses to understand in greater depth. This question and follow-up questions aim to get at any increased breadth of understanding about learning

- What ways of learning were you aware of, that you are now more aware of, as a result of your time in this program?
 - Follow up on responses to understand in greater depth. This question and follow-up questions aim to get at any increased depth of understanding about learning

Specific Learning Metaphors Questions

- Here are a series of words or phrases that can be used to describe learning, can you move to one side which, if any, you have experienced in this program?
 - Present students with a series of learning metaphors, from one set at a time, each on a separate card. Explain what each set is about. Have student describe how they experienced each metaphor they selected. Repeat process for Participation, Creation and Reflexivity metaphors.

Metaphor Words and Phrases (placed on Technology and Metaphor cards for subjects, see Appendix B)

Identifier (participant selected): _____ Age : ____ Gender: M F

Current year in SFU: _ 1st , _ 2nd , _ 3rd , _ 4th , _ 5th

1. What is your first language? English Mandarin Cantonese Korean Other:
2. What is your second language? English Mandarin Cantonese Korean None Other:
3. Were you born: in Canada Outside of Canada
4. Which of your primary and secondary school grades were completed in Canada?
5. What is your ethnicity? Caucasian Chinese Korean Indian Other (please specify):

Appendix B – Technology and Metaphor Cards

Technology used in SIAT undergraduate program

(Circle those confident used, strike out those confident not used, add others)

email

wikis

blogs

podcasting

course management system

online game environments (Second Life)

synchronous presentation and interaction tools (Eluminate Live)

learning communities/community of practice software (TechZone)

Acquisition: learning as a process of acquiring possession of knowledge or knowledge structures, skills, attitudes, etc

(Circle those meaningful to you, add other terms that make sense to you in this category)

reception

acquisition

construction

internalization

appropriation

transmission

attainment

development

accumulation

grasp

Participation: learning as a process of participating in social practices and shared learning activities. Continual: there is no sense of learning as ending

(Circle those meaningful to you, add other terms that make sense to you in this category)

participation

doing

contextual learning

cultural experience

social mediation

apprenticeship

continual learning

coming together

community

membership

us vs. them

separate from outsiders

common goals

common values

engagement

practice

trajectory

flow

taking part

being a part of

Creation: learning as a process of innovative inquiry, creating, bringing an artifact into existence, starting something for the first time, introducing something new or original research

(Circle those meaningful to you, add other terms that make sense to you in this category)

creating

striving for something new

advancing knowledge

innovation

research

developing an object

developing a product

Reflexivity: learning as a process of coping with the complexity of the modern world. The modern world is characterized by integration and continual interaction between the individual and the world. Action, by the individual or in the greater world, affects both the entity instigating and the other (individual or world).

(Circle those meaningful to you, add other terms that make sense to you in this category)

continuous adaptation
respond to continual change

having to

awareness of intertwining of self with the world

taking into account the intertwining of self with the world

managing cognitive demands of world

emotional acceptance of the world a means of coping

maintenance of doubt

entertaining multiple conceptions of the world

routine as a means of coping

setting aside assumptions and beliefs for greater understanding

Appendix C - Informed Consent Form

Informed Consent & Confidentiality Form

Study: Networked learning affects on students learning identity

Researcher: John Morrison

The purpose of this study is to learn and understand more about the affects of networked learning on students learning identity, that is there development as learners.

The research being conducted includes informal face-to-face interviews. Participants should feel free to conclude the interview at anytime, reserve the right not to answer any question and add any detail they feel is relevant. Interviews are approximately one hour in length and will be recorded with the permission of the participant. Interviews will be conducted in a setting selected by the participant, therefore no discomfort or undo risk is expected.

Your program at Simon Fraser University was selected because you make significant use of learning technology. This research is designed to explore the affect of your experience in this program on your development as learners. Results of the study can be obtained by contacting John Morrison at (360) 450-6861 or john.morrison@google.com.

By contacting the Director, Office of Research Ethics at Simon Fraser University, hweiner@sfu.ca (778) 782-6593, participants may have their questions concerning procedures answered.

Participation in this research is voluntary. Participant is free to withdraw his/her consent and discontinue participation at anytime, without penalty or loss of benefits to which they are entitled. If you feel, in any way, compelled, coerced or obligated to participate in this study please check the "choose not to participate" box below. Your decision will be respected and in no way affect your program at Simon Fraser University. The researcher, like you, is only a student at Simon Fraser University and has no other

status at Simon Fraser University.

Participants will be asked to have interviews audio recorded. If consent is given the audio recording will be transcribed with any indication of names or identifying remarks removed. Once the research is concluded the researcher will destroy these recordings. Any information that is obtained during this study will be kept confidential to the full extent permitted by the law. Knowledge of your identity is not required. You will not be required to write your name or any identifying information on research materials. Materials will be maintained in a secure location in Canada.

I understand the risks and contributions of my participation in this study, I am at least 18 years of age and I:

agree to participate or choose not to participate:

Last Name

First Name (please print)

City

Province

Email Address

Phone

Signature

Date: mm/dd/yyyy

Permission to use personal correspondence

I _____ have reviewed the correspondence, records and information to be used in the research by John Morrison. I understand that all identifying information will be removed prior to publication. I hereby give John Morrison permission to use my correspondence, records and information in his research.

Print Name

Signature

Appendix D – SFU Ethics Approval

FOR CONTACT IN REFERENCE TO THIS REVIEW

Application Number: 39645

Dr. H. Weinberg
Director, Office of Research Ethics

B. Ralph, Ethics Officer

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Reference Ethics Policy 20.01: <http://www.sfu.ca/policies/research/r20-01revised.htm>

Notification of Application Status

Investigator Surname	Morrison
Investigator First Name	John
Investigator Department	Ed.D. Educational Leadership
Investigator SFU Email	jmmorris@sfu.ca
Investigator Position	Graduate
Title Of Research	Student understandings of learning at the end of an undergraduate program using networked learning: A Case Study
Supervisor Surname	Kaufman
Supervisor First Name	David
Supervisor SFU Email	dkaufman98@yahoo.com
Co-Investigators	none
Co-Investigators Email	none
Risk	Minimal
Approval Status	Pending REB (Blue)
Approval Date	March 23, 2009
Approval Start Date	March 23, 2009
Approval End Date	March 13, 2012
REB Date	April 8, 2009

Grant Information

Submitted To Agency For Review	No
Approved Subject To Ethics Approval	No
Reviewed By Any Other Agency	No
Title Of Grant	
Date Granting Agency Approval Began	00/00/00
Date Grant Ends	00/00/00

Appendix E - Definition of Terms

Identity

Hodkinson et al. (2008) defined identity as:

A person's dispositions towards and about themselves. (p. 31)

The focus on identity in the current study will be solely on the subjects' identity with regards to learning. This was expanded upon in Chapter 2.

Learning Metaphors

Lakoff and Johnson (2003) defined conceptual metaphors as:

inferences in sensory-motor domains (e.g. domains of space and objects)... used to draw inferences about other domains (e.g. domains of subjective judgment...) (p. 244)

The focus in the current study will be solely on conceptual metaphors about learning. This was expanded upon in Chapter 2.

Lifelong Learning

The European Commission (2001) defined lifelong learning as:

all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competencies within a personal, civic, social and/or employment-related perspective. (p. 33)

The focus on lifelong learning will be on a new way of learning which the concept of lifelong learning requires. This was expanded upon in Chapter 2.

Modernity

Giddens (1991) defines modernity (which he also terms late modernity) as:

The current phase of development of modern institutions, marked by the radicalizing and globalizing of basic traits of modernity. (p. 243)

Networked Learning

The Centre for Studies of Advanced Learning Technology group at Lancaster University, UK (Jones and Esnault, 2004) defined networked learning as:

...learning in which information and communication technology is used to promote connections: between one learner and other learners, between learners and tutors, between a learning community and its learning resources. (p. 1)

That network conceived of, unless otherwise indicated, is the Internet. Learning scenarios, however, at a point in time may restrict the notion of the Internet, for example, to a portion of the Internet only accessible by members of a class. It is assumed that the individual interacts with both content and with other people on the network. Ultimately, networked learning is about allowing the possibility of all the permutations of connections between the learner, learners, the group, the class, a community, all communities and all learning resources. The existence of such extensive affordances does not imply their realization. The range of networked learning tools used by students is assumed to include tools that individually or collectively support both interaction with content and interaction with others. Networked learning is a term widely used in Europe, while in North America, the term online learning is used. The European term is used to retain focus on the network and because much of the research in this area comes from European experiences with this type of learning. This was expanded upon in Chapter 2.

Reflexivity

Giddens (1991) defines reflexivity as:

continual change in pre-established precepts or practices and institutions... the susceptibility of most aspects of social activity, and material relations with nature, to chronic revision in the light of new information or knowledge. Such information or knowledge is not incidental to modern institutions, but constitutive of them (p. 20).

This definition was expanded upon in Chapter 2.

This was operationally defined in this study, in Appendix B, as:

learning as a process of coping with the complexity of the modern world. The modern world is characterized by integration and continual interaction between the individual and the world. Action, by the individual or in the greater world, affects both the entity instigating and the other (individual or world).

Appendix F – Technology Descriptions

BackChannel – a networked based application that allows real-time chat by students in a lecture setting. The real-time chat is displayed on a screen at the front of the classroom and the lecturer periodically glances at it to review student questions and comments.

Blogs – A blog (a contraction of the term "web log") is a type of website, usually maintained by an individual with regular entries of commentary.

Cell phone – a mobile device used for mobile telephone calls, texting and other applications.

Chat – live text-based conversations across a network, typically between 2 people.

CMS – Course Management System. A network based software system designed to support teaching and learning in an educational setting. It presents to users as a collection of tools provided within a common web-based environment. Also called VLE.

Course Website – an instructor maintained web page or website which typically contains a course syllabus and links to course resources.

Email – Electronic mail, a network based method and class of software programs for exchanging digital messages.

Facebook – a web-based social networking site. Users can add people as friends and send them messages, and update their personal profiles to notify friends about themselves.

Flickr – a web-based image and video hosting website.

Google Calendar – a web-based calendar produced by Google Inc.

Google Docs – a web-based word processor and communication program produced by Google Inc.

Google Scholar – a web-based search engine specializing in academic papers and conference presentations.

Google Search – a web-based search engine.

Instant Messaging – a class of web-based chat programs, which provide live text-based conversations between 2 or more people.

LinkedIn – a business-oriented social networking site. Referred to by one student in the study as a “Knowledge Mgmt System”.

Library Databases – Proprietary databases or organized bodies of information acquired by university libraries, usually from publishers. They provide search capabilities, allowing the searching of large numbers of academic journals and other academic resources.

MSN – an Instant Messaging program produced by Microsoft Inc.

Online Forums – a web-based site, which supports user-generated online discussions.

Online game environment – a class of web-based game-related programs. These may involve an individual playing a game with a computer or with other users of the gaming environment.

Podcasting – digital media files (either audio or video) that are released episodically and downloaded to a personal computer and often a portable audio or video device.

Skype – a web-based software application that allows users to make voice calls and chat over the Internet.

Solid Works – a 3D mechanical CAD (computer-aided design) software program.

TechZone – a web-based learning communities/community of practice software program.

Text Messaging – the exchange of brief written messages between mobile and portable devices over cell phone networks.

VLE – Virtual Learning Environment. Term used primarily in the UK to refer to a CMS. See CMS.

Wikis – a category of web-based software that runs a wiki, or a website that allows users to collaboratively create and edit web pages using a web browser.

Wrench – a computer graphics program.

YouTube – a video sharing website on which users can upload and share videos.

Most definitions based on initial information obtained from the following Google web search:
<http://www.google.co.uk/search?hl=en&safe=off&q=define%3A+&btnG=Search&meta=>

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