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Learning in simulation: Theorizing Ricoeur in a study involving paramedics, pilots, and others

by

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I wish to dedicate this work to

Marg and Thurlow Essington, my mom and dad, whose desire for me to attend university has never failed me

and to

Christine Essington, my wife, who has more than patiently supported all of my academic endeavors.

Abstract

The use of simulation is becoming increasingly important in the education of practitioners whose field of work contains a low tolerance for error. In aerospace, aviation, medicine, paramedicine, and the military, simulations are expected to provide working practitioners with “on demand” experience. However, the ways in which learning emerges out of simulation have been poorly understood. This research provides insight into the processes of learning that are generated and the forms of knowledge that arise out of learning endeavors based upon the use of simulation.

This study employed a form of naturalistic inquiry. Eight individuals from seven domains of work were extensively interviewed regarding their simulation experience. Conceptually, the methods are premised upon Patton’s (2002) understanding of qualitative inquiry, Van Manen’s (1997) phenomenological approach to lived experience, and Ricoeur’s hermeneutical approach to the interpretation of the text. Ricoeur’s (1986) conceptualization of ideology and utopia as a dialectic which comprises the social imaginary and Kearney’s (2003) analysis of the Other inform the analysis.

It is the central finding of this study that experience in simulation is consistently interpreted to be both real and an imagination of the real. Experiential learning has at least five dimensions: purpose, interpretation, engagement, self, and context (Fenwick, 2003) all of which are affected in the pedagogical activity of simulation. The learning that emerges out of simulation always involves the social imaginary. Simulation forces an engagement with the symbolic nature of the social imaginary, and it is because a

specific aspect of the social imaginary is reproduced in simulation that a need for interpretation is provoked and learning occurs.

This study is theoretically significant because it adds to the academic literature through an improved understanding of simulation as a complex entanglement of the real and the imaginary. Practical significance lies in understanding the effective use of simulation as a pedagogical tool which can inform or reify the existing dimensions of experiential learning. Overall, the study contributes to our knowledge about how learning emerges out of simulation and how simulation fosters such an emergence.

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CHAPTER 1 – INTRODUCTION

Background

The use of simulation is becoming increasingly important in the education, the training, and the continuing competence of practitioners whose field of work contains a low tolerance for error (Gaba, 2004). In aerospace, aviation, medicine, the nuclear power industry, and the military, simulations are expected to provide professional practitioners with experience that is not readily available during the typical course of professional practice or education. However, the ways in which learning emerges out of simulation seem to be poorly understood. This research provides insight into the processes of learning that are generated and the forms of knowledge that arise out of simulation.

Simulated environments have the potential to solve some practical educational problems related to inadequate access to experience. This is especially so in cases where access to real world experience is vital to the sustainability of educational programs but is either impossible or nearly so as in the case of space exploration. Similarly, simulation has educative value when access to real world experience must be limited or curtailed because of economic constraints as in airline pilot education and training (Salas, Bowers, & Rhodenizer, 1998); political constraints as in urban planning exercises (Simpson, 2001); ethical concerns as in medical practice on “near or newly dead” patients (Berger, Rosner, & Cassell, 2002); or environmental constraints regarding nuclear reactor control and operation (Fumizawa, Kameda, Nakagawa, Wu, & Yoshikawa, 2003). In the health care system, simulation promises to solve some long standing problems. Chronic shortages of health care providers limit the availability of clinicians to be preceptors and mentors. Overcrowded medical facilities limit student access and put students from related professions in adversarial competition with each other for clinical experience. There are increasing liability concerns as more students come in contact with more

patients. Simulation provides possible solutions to these problems by providing access to alternative forms of lived experience, which ultimately may reduce clinical time, ease preceptor and mentor workloads, and reduce the overall student impact upon the health care system. In all of these cases, simulated experience offers the opportunity to supplement or replace "real" world experience in ways that directly benefit individuals, programs, and endeavors.

Pedagogical Issues

Learning in simulation is often predicated upon a belief that learning is primarily a rational exercise dedicated to the production of predefined goals. However, such a view ignores the fundamental dimensions of psychological, social, and cultural engagement all of which can affect how learning will emerge (Fenwick, 2003). Furthermore, the use of simulation as a pedagogical tool to modify or construct experiential learning requires consideration of ethical issues. As Fenwick maintains, "important questions have been raised about any intrusion of educators into people's ongoing experiential learning" (p. 89). She points out that educational intrusion may become "management of learning for economic goals…as when employee's experience is considered to be intellectual capital" (p. 89). It may also be considered surveillance when it is required to be recorded in reflective journals or portfolios which must later be shared. Sometimes the educator directs the experience towards self-serving ends that reify existing organizational structures. In the following section, I share a personal experience which manifests many of the concerns Fenwick raises about the intrusion of the educator into individual ongoing experience and which demonstrates the need to cautiously consider the ethical, psychological, social, and cultural aspects of this pedagogical engagement.

A Personal Experience with Simulation

In 1989, I was undertaking a clinical rotation in a big city hospital as part of my initial training to become a paramedic. The primary purpose of this rotation was to obtain experience in the advanced airway skill of endotracheal intubation. My preceptor was a physician with a specialty in anesthesia. Under his tutelage, I practiced performing the procedure of intubation on several adult patients. Given that I was in a teaching hospital, there was nothing unusual about this. However, my preceptor had an "ethical" belief that would not permit students to intubate children. At that time, this was not uncommon, and during my paramedic training, I never intubated any children. So, in 1990, when I began working as a field paramedic, the first time I performed this difficult life saving procedure was not on a healthy child under expert supervision, but rather on a non-breathing toddler in front of his hysterical parents on the floor of their living room.

This experience was replicated in various ways among several other new paramedics and their pediatric patients. Then, in the early 1990s, the American Heart and Stroke Association developed a special Pediatric Advanced Life Support course to train practitioners in the procedures of pediatric resuscitation. They decided to use living but anesthetized house cats for physicians, paramedics, and students to practice on. The purpose of the cat was to simulate an infant. It was my first introduction to high-fidelity simulators.

However, I did not believe that a cat was a good human patient simulator. Prior to this, I had been required to dissect a cat in order to attain a zoology degree, so I was acutely aware that a cat has a smaller head, a smaller tongue, a smaller mouth, no lips, different teeth, no vocal chords and actually in no way resembles a human infant. Learning how to intubate a cat makes one better at intubating cats not necessarily humans. Consequently, I boycotted the course until the late 1990s when the cost of "humanely" killing cats became

prohibitively expensive and the “cat lab” was replaced with artificial human heads. In 2001, I became an instructor for this course and remain so today.

The events of this story have influenced me in many ways. Encountering the use of animals as human patient simulators forced me to reorient and re-imagine myself in deep ways. While I recognized the desperate need for a simulator upon which to practice medical procedures, I felt forced to resist accepting a process that I deemed to be pedagogically flawed. Furthermore, I did not like the idea of needlessly practicing medical procedures on cats. I believe that as educators we need to understand how simulation affects learning. Otherwise we risk an administrative decision that brings back the “cat lab.” Simulation does not necessarily result in the emergence of the “right” kind of learning. This research sheds light upon how individuals imagine themselves in simulation, how they orient themselves when they are in simulation, and how they engage the world with the experiences they acquire in simulation.

Purpose of the Study

The purpose of this study is to provide answers to the following research questions.

Key Research Question

1. What forms of knowledge and processes of learning are generated in a simulation learning environment?

Sub-Questions

1. What is the nature of the simulation experience from the learner’s perspective?
2. What aspects of simulation foster learning?

3. What are the pedagogical and ethical implications for simulation learning environments?

Conceptual Definitions

Knowledge

In common understanding, knowledge is the justified belief in a claim to truth. However, this definition is much contested. According to Billett (1999), knowledge structures have propositional, procedural, and dispositional dimensions which may vary in different settings. Propositional knowledge or declarative knowledge enables conceptualized description of particular phenomena. Procedural knowledge is that which is exercised in completing a particular task. Dispositional knowledge involves interests, values, and attitudes.

An important epistemological distinction is the difference between foundational and non-foundational knowledge. Foundational knowledge presumes a certainty that particular facts can be absolutely true. Procedural and declarative knowledge are often considered to be either foundational or based on foundational knowledge. Non-foundational knowledge usually avoids direct claims to truth and is justified based upon the presence of relationships (e.g., between social constructions and the physical world). Non-foundational knowledge includes that which is argued and that which is negotiated. Sometimes knowledge is not so easily classified into either frame. For example, embodied knowledge is the idea that knowledge is present throughout the entire body. This may be something “encompassing, relational, and holistic that captures the essence of interrelatedness and connection through being-in-the-world” (Freiler, 2008, p. 38). Embodied knowledge is a holistic view of knowledge that engages the body as a site of learning in connection with spiritual, affective, and rational domains of learning. Embodied knowledge may be considered tacit

knowledge because it cannot be easily expressed or taught but nevertheless provides some unique insight or ability.

In this study, I conceptualize knowledge in accordance with Ricoeur (1986) who holds that knowledge is ultimately based upon hermeneutical interpretation that is mediated through the signs and symbols that exist in the world. A community of interpreters is required to judge the worth of particular interpretations, and it is they that make the decision as to what constitutes knowledge. Narrative, in the form of story and through the expression of the symbolic, enables the construction of much that is considered knowledge. Narrative serves as a repository for knowledge, enables the transmission of knowledge, and fosters the construction of knowledge.

Learning

Learning is a multidimensional phenomenon (Merriam, 2008). It is an ongoing and integral process in the lives of human beings (Fenwick, 2003, 2008). In the context of this study, learning involves new meaning making that is inclusionary, emancipatorally motivated, politically astute, socially normative, and critically aware (as in Taylor, 2008). This means that while learning involves reflection it also involves a social event requiring participation in social activities. Learning emerges through participation in social events (Wenger, 1998) and typically involves reflection and perspective transformation (Mezirow, 1996). Learning is not identical to either living or experience. Sensory experience does not necessarily result in learning. I write more on learning in chapter two.

Simulation

Simulation has been traditionally referred to as the application of a simulator to education or training (Cooper & Tacqueti, 2004). In this definition, a simulator is a piece of equipment designed to represent a specific aspect of the

world. However, this definition is both inaccurate and incomplete. Medical educators often use role playing actors to simulate standardized patients in order to teach and evaluate the concepts of medical history taking and assessment (Gates, Fitzwater, & Telinelo, 2001). Simulation in this case, does not require the use of "simulator" technology. Also, the traditional definition of simulation fails to account for the pedagogical goal of simulation which is to promote experiential learning.

Therefore, I define simulation as a means of forming, supplementing, amplifying, or replacing existing experience with new guided "lived" experiences arising out of an attempt to artificially replicate a field of work and substantial aspects of the real world that encompass that field of work. Typically, I understand simulation to occur in immersive settings that focus the "lived" experience on the learners' particular tasks or task sets within a field of work and which in some significant way involve an interactive function. In the context of this study, I use the term simulation as the descriptor for simulation that is contextually rich, historically referenced, and activity dependent.

It is important to note that my definition places limits upon the nature of simulation. I do not intend that either internship or apprenticeship be considered as simulated activities. Internship and apprenticeship are different from simulation both in kind and in degree. Neither typically attempts to artificially replicate a field of work. Instead, both are directly concerned with work performed in an actual workplace. This is not the case in simulation as I have defined it. A simulation mimics an aspect of the real world. Setting and context vary between the actual and the simulated. In both internship and apprenticeship, the lived experience is different in the degree to which the experience affects the individual practitioner. Medical interns can make clinical errors that harm their patients. A clinical mistake affects the patient and intern directly in multiple ways. However, poor performance in a medical simulation yields no direct impact on any patient and existentially affects the intern to a

lesser degree. These issues relate directly to fidelity considerations which I consider more fully in the following section.

Simulation Fidelity

Fidelity is a commonly used term in the simulation literature. Typically, it is considered to be a measure of how lifelike a simulation appears to be with respect to that which it simulates (Beaubien & Baker, 2004). In one sense, fidelity is the degree to which a simulation component, such as a simulator, successfully and fully replicates the natural component it is designed to replace. Low fidelity simulators are often referred to as task trainers because they simulate single tasks or task sets and typically ignore the context in which the task is immersed. In the medical profession, an example would be an electrocardiogram (ECG) simulator, which might be used to simulate heart rhythms for recognition practice. A human mannequin that in terms of appearance and function is able to simulate numerous examples of human pathology and which can interact with the student is an example of a high-fidelity simulator. However, high-fidelity simulators do not by themselves correspond with high-fidelity simulation. So fidelity also refers to the degree to which an entire simulation replicates a natural system.

In regard to the aviation industry, Rehmann, Mitman, and Reynolds (1995) have proposed that simulation fidelity actually consists of three parts: equipment fidelity, environmental fidelity, and psychological fidelity. Equipment fidelity is the degree to which simulated technology replicates real technology. In aviation, this ranges from full motion cockpit simulators to flight software programs on personal computers. Environmental fidelity, in aviation, concerns the degree to which motion, visual cues, and other aspects of the environment are replicated. Psychological fidelity involves the degree to which the simulation actually mimics the task demands of the real system and the extent to which those involved in the simulation are able to suspend the belief that they are

operating in a simulated system. The concept of fidelity is thus recognized as multidimensional. Because it may be imagined in differing ways, conceptualizations of fidelity orient research in particular ways.

Orientation to the Study

In this study, I hold the view that the world is a real world, "always already there," that physically exists separately from our conception of it, and at least in some fashion has not been constructed by us (Heidegger, 1996). Simulation is an imagined representation of some aspect of the world. However, simulated systems, with respect to the world, operate on different stratums of reality. Simulations are reversible and repeatable in ways that the systems which simulations are designed to mimic are not. More importantly, simulations are designed by "beings in the world" and, therefore, have constraints in system design that differ from those in the world. Simulations have different governing parameters and fidelities, and these may cause differing outcomes. Complexity theory predicts that seemingly inconsequential differences in system inputs may have radically varying outputs (Davis, Sumara, & Luce-Kapler, 2006). Consequently, simulations can never be equal to the systems they represent in the world and must always be subordinate to those systems in the world.

My Position as a Researcher

In qualitative research such as this, the researcher is considered to be an instrument for the study (Patton, 2002). Therefore, it is important to clarify, as much as possible, how I understand the particularities of my own position, background and views to the extent that they have shaped the conduct of my research. In this respect, it is important to know that I am a pilot licensed to operate small single engine aircraft. I, therefore, have some theoretical and practical aviation knowledge. I have a network of individuals with whom I can

relate and correspond. However, my “lived” experience in this area is not substantial.

Since 1990, I have maintained registration as a paramedic. Consequently, I view myself as a medical clinician. This means that I have been immersed in the doctrine of “evidenced based medicine.” This doctrine espouses quantitative research methodologies to establish evidence which can be used to justify or warrant appropriate medical treatment (Rosenberg & Donald, 1995). In this mindset, the highest level of evidence is that obtained by multiple, large, prospective, randomized, double-blinded, controlled, clinical human trials. Physician-led research into Emergency Medical Services (EMS) generally attempts to adhere to this type of quantitative methodology. An exemplar of this approach is the well known *Ontario Pre-hospital Advanced Life Support study* (Stiell, 2005). My research does not find itself in alignment with these physician led initiatives. I hold the belief that paramedics need to find methodologies in the qualitative realm that more fully appreciate the diversity and complexity of human society and the social structures contained therein. It is for this reason that I have chosen a qualitative methodology for this study.

As I paramedic practitioner, I also carry preconceptions with regard to how paramedics and medical practitioners should think and relate to the world. I consider myself bound in some measure by a medical code of ethics which involves holding to the notion that there is something unique about human beings. This is supported by a personal spiritual view that upholds the sanctity of human life. Consequently, I do not believe the “uniqueness” of a human being to be the sole result of social construction.

As an educator of paramedics, I hold the notion that all education should have a critical component that questions current social practice by bringing to light inequities of race, gender, class, and other forms of marginalization with an aim towards improving the social condition of people. Such a belief corresponds to Charles Taylor’s (1991) ideal of authenticity. In this regard, I believe that the

educator is an active participant and not merely a facilitator of the educational process. I believe that pedagogy is at times necessary to interrupt unethical practice and the continued reproduction of social inequality.

I understand practice always as being social practice. As Wenger (1998) notes, practice includes both the explicit and the implicit. The explicit form of practice includes "the language, tools, documents, images, symbols, well-defined roles, specified criteria, codified procedures, regulations and contracts that various practices make explicit for a variety of purposes" (p. 47). Practice also includes "all the implicit relations, tacit conventions, subtle cues, untold rules of thumb, recognizable intuitions, specific perceptions, well-tuned sensitivities, embodied understandings, underlying assumptions, and shared world views" (p. 47). It is in the implicit relations that practice exhibits unpredictability. As an experienced paramedic, and paramedic educator, I am familiar with much that is both explicit and implicit in the practice of paramedicine. Given this experience, I believe that careful attention to the simulation environment as manifested in the thoughtful use of language, tools, codified procedures, and well-defined roles is more important than a simulation which preferentially relies on expensive high-fidelity human-patient simulators.

Conceptual Approach

I acknowledge the descriptive power of a phenomenological orientation to a study that incorporates the perspective of individuals. The descriptions I employ have a phenomenological quality. In this regard, Van Manen (1997) strongly informs my methodology. The interpretations I make have a hermeneutical quality which implies that interpretation is value-laden (Kearney, 2004). Crotty (1998) states, "Habermas is insistent that no hermeneutics can prescind from the setting in which the understanding occurs. At once social, historical, and discursive, this setting is the battleground of many interests and no analyst or researcher can afford to ignore it" (p. 105). I find it particularly

important to keep in mind the idea of the "double hermeneutic" (Crotty, 1998, p. 56). This is the interpretation of the "object" (in a phenomenological sense) and the interpretation of the language that describes the "object." There is a double interpretation to which the researcher must be cognizant. I also acknowledge Ricoeur's hermeneutic theory of interpretation. According to Kearney (2004), in Ricoeur's hermeneutic vision, "meaning is never the intuitive possession of a subject but is always mediated through signs and symbols of our intersubjective experience" (p. 42). In this understanding of hermeneutics, narrative plays an important role in the transmission and construction of knowledge.

Significance of the Study

There is scanty information in the academic literature pertaining to the ways in which learning emerges out of simulation environments. However, it is generally acknowledged by those in aviation or medicine that simulation can provide an environment in which learning may emerge (Gaba, 2004). Most often, the learning is understood in a behavioural sense, as a correlation between skills performed in a simulated environment and skills performed in a clinical environment. There have been attempts in the academic literature to quantify simulation experience for pedagogical purposes (Gaba, 2004; Shapiro, Kobayashi & Morchi, 2003; Wayne, et. al., 2005). In medicine, these attempts are often directed at ultimately improving patient medical outcomes in order to correlate pedagogy with the accomplishment of patient care goals (McFetrich, 2006). In aviation, simulations provide training with the pedagogical goal of reducing human error (Salas et al., 1998). In each of these, the learner is instrumentalized.

As Van Manen (1997) points out, an important analytic approach to research is to show how an experience as it has traditionally been represented in the literature "is ill understood and how the taken-for-granted or generally accepted conceptualizations gloss over rather than reveal a more thoughtful

understanding of the nature of a certain topic" (p. 171). The individual perspectives of those engaged in simulated activities have received little research attention. Given the current lack of knowledge about learning in simulation, I believe that this study provides a step forward in understanding the processes by which learning emerges both in individuals and in the larger systems in which those individuals are immersed.

This study has both theoretical and practical significance. The theoretical significance resides in an improved understanding of simulation as a pedagogical tool that can encourage learning to emerge. Because this study has examined perspectives on how the learning experience is constituted, it is of theoretical significance for all those seeking to understand the nature of experiential learning. The practical significance lies in the effective use of simulation as a pedagogical tool that fosters learning. This study is relevant to designers of educational simulations. It informs educators as to the processes that are important in making the simulation experience a fruitful one. It also provides educators with information about how to structure educational programs so as to effectively and ethically use simulation as a means of supplementing or replacing clinical experience. Furthermore, this study is relevant to instructors and evaluators utilizing simulation for pedagogical purposes by informing each of reasonable and ethical goals for the simulation experience.

This study makes an important addition to the academic literature through an improved understanding of the way lived experience in simulation fosters learning. It also provides insight into the forms of knowledge that arise out of simulation activities. Given the current deficiency in the literature and the increasing use of simulation in many educational programs, studies such as this one are necessary to better identify the forms of knowledge and learning processes that arise out of simulation and to warrant the time and expense necessary to set up simulation systems for pedagogical purposes. I believe these points are supported and clarified in the literature review that follows.

CHAPTER 2 - LITERATURE REVIEW

Learner participation in simulation prompts many questions about the nature of experiential learning and how learning arises out of simulation. It has long been documented in the adult learning literature that conceptualizing learning through experience requires theoretical understandings that are predicated upon particular assumptions (Hanson, 1958). In this chapter, I review the academic literature on simulation and learning with an eye towards the theoretical frames of reference which I deem to be particularly relevant to the interpretation of this study. Specifically, I examine the literature as it pertains to learning in simulation, social perspectives of learning, and the imagination as it concerns learning in simulation. This literature review was informed by the empirical work of this study. The literature I have chosen to include in this chapter is pertinent to this study because the findings have indicated the pertinence of it. Consequently, this chapter was revised after the analysis was completed. However, before I examine the literature in detail, I start this chapter by establishing the context of simulation within the field of education by reviewing a social problem for which simulation offers a potential remedy.

The world is critically short of health workers. The World Health Organization in the 2006 *World Health Report* estimates the global shortage of health workers to be 4.3 million of which 2.4 million are physicians, nurses and midwives. Wealthy countries like the United States, Great Britain, Germany, Finland, New Zealand, Australia and Canada are compounding the global health workforce shortage by recruiting large numbers of medical professionals from poor countries in an effort to meet their own health care demands. For example, Canada is short of most kinds of health workers (Allen, Ceolin, Ouellette, Plante, & Vaillancourt, 2006). Twenty-three percent of Canada's approximately 60,000 physicians have been trained abroad with many originally practicing in Africa. Six percent of Canada's nurses are similarly trained abroad (Allen et al.). The

substantial immigration of physicians to developed countries from poorer countries is having detrimental effect on the health capabilities of the poorer countries (Mullan, 2005). Consequently, the World Health Organization has called for the richer countries to educate and train more medically skilled individuals in order to fulfill their needs at home.

A stirring ethical debate over medically related hiring practices now rages. Labonte, Packer & Klassen (2006) have forcefully suggested that it is necessary to lessen the "pull" on foreign workers by increasing student enrolment in Canada. Labonte et al. conclude that while most provinces have already reacted to the health workforce shortage by making substantial increases in medical and nursing enrolments, the increases are not nearly enough to meet demand. In short, the "training spots" in medicine, nursing, and other allied health fields must be increased. On this point, there is both national and international consensus.

As it turns out, increasing training spots is not a straightforward exercise. In Canada, as in most places in the world, medically related education usually has a required practical component. Accreditation agencies (typically national) and government professional approval boards (typically provincial) often require that specific competencies be evaluated in clinical settings. This means that physicians, nurses, paramedics, laboratory technologists, respiratory therapists, and many others must obtain experience under the supervision of registered members of their respective professions in the work place. However, the inability of educational institutes to obtain adequate clinical experience for their students is a key impediment to increasing the number of health care graduates. There simply are not enough clinical sites in which to place students. In an attempt to alleviate the clinical experience bottleneck, many medically related education programs are attempting to simulate real clinical experiences in a classroom or laboratory setting. In a Health Canada (2006) project *Identifying Best Practices for Clinical Practice Education,* it states, "In many regions

educators have been forced to reduce the amount of practice education at clinical sites and expand the laboratory or in-school simulation situations for students" (p. 11). The question then asked but not answered is, "Will this change in educational delivery be detrimental to the student?" (p. 11).

Thus a shortage of healthcare workers both worldwide and nationally has forced educational institutions to reconsider the way clinical education occurs. This constitutes a driving need to find an educational alternative. Given the recent educational enthusiasm for simulation, it is not surprising that educators have turned to simulation in an attempt to replicate and replace clinical experience. However, in the medical literature, there is scanty research on how simulation fosters learning even though that is a primary goal of simulation (Issenberg, McGaghie, Petrusa, Gordon, and Scalese, 2005). So, even though there is the potential for simulation to be an important part of a solution that remedies the worldwide health worker shortage, as well as, other pertinent educational problems, there remains skepticism based upon uncertainties related to a lack of research. Nevertheless, because a pressing urgency exists to alleviate some practical pedagogical problems around inadequate access to workplace experience, simulation has become an educationally relevant topic.

Literature on Learning in Simulation

As is evident in the previous examples, simulations are now viewed as playing an increasingly important role in solving particular educational problems (Gordon, Issenberg, Mayer, & Felner, 1999). Gaba (2004) has suggested that simulation can be used to improve professional culture by advocating particular professional habits. In medicine, many continuing competency courses require the use of simulation to maintain clinical "competence" (Wayne, et al., 2005) and simulation is now firmly established in healthcare education (Kneebone et al., 2006). "Time in simulation" is required to certify airline pilots on specific types of aircraft (Salas et al., 1998). Flight specialists are trained in simulation for

operation of the Canadarm® on the International Space Station (Gibbs & Sachdev, 2002). Police, fire departments, and the military all rely upon simulation for emergency response training (Grossman, 2004). All of these applications imply a pedagogical attempt to construct complex sets of experience for the workplace.

For the purposes of this study, I presume that all simulation is inherently pedagogical and, therefore, purposeful. This assertion is somewhat contrary to Baudrillard (2001) whom I examine in some detail in chapter five. Nevertheless, it typically does not make sense to think of simulations as accidentally derived given that effort is required to create or construct them. Because simulations are planned, they have overt purposes. When simulation is included in a curriculum, there is always a particular reason. Simulation, as a bounded pedagogical device, is typically easier to organize, schedule, supervise, evaluate, and budget than a workplace apprenticeship or a clinical internship. This is because in a simulation, the educational institution directly controls the "logistics" of practice. An educational institution has much less control over the working professional, the workplace, and the means by which teaching occurs in the workplace. Similarly, "risk management" is easier and usually more favorable if learning activities are designated to occur in simulation. Liability insurance, provincial regulatory boards, and student placement contracts become less of a program concern. These factors can combine to make simulation an appealing educational alternative for many programs that are required to provide forms of situated experience (Bremner, Aduddell, Bennett, & VanGeest, 2006).

However, decisions based primarily upon program logistics do not necessarily result in the enhancement of learning opportunities (Bradley & Postlethwaite, 2003). Program managers with goals of corporate efficiency, as in cost recovery programs, or with responsibilities for ensuring that teaching has occurred, as in competency based programs, may not operate in alignment with educators who seek to provide the best opportunities for learning. The

educational danger is that simulation as a teaching tool might be used primarily as a convenient "proof" of teaching in order to satisfy a program audit requirement and not in a manner that is most conducive to learning. Many authors writing about simulation in the academic literature seem oblivious to this concern because they ignore important aspects of the learning process.

The Paucity of Research on Learning in Simulation

Generally speaking, many researchers studying simulation do not seem to understand the nature of learning or how processes of learning are affected by simulation systems. This is not surprising because of the paucity of research in the academic literature pertaining to learning in simulation. Issenberg et al. (2005) performed a thorough and systematic review of the medical and education literature (including ERIC and MEDLINE) in order to answer the question, "What are the features and uses of high-fidelity medical simulations that lead to most effective learning?" In part because of their requirement for quantitatively measured outcomes, they settled upon 109 studies to answer their question. They found that 51 journal articles referred to studies which reported that educational feedback was the most important feature in simulation-based medical education. Repetitive practice was identified as a key feature in 43 studies. Eleven studies identified the adaptability of high-fidelity simulations to multiple learning strategies as an important factor in educational effectiveness. Ten studies emphasized the importance of a controlled environment where learners can make errors without adverse consequences. Ten studies emphasized the importance of treating learners as active participants in their learning. But overall, Issenberg et al. found that there simply was not enough good research to inspire confidence in any of the conclusions.

Qualitative research is likewise sparse. Even in the nursing literature, where qualitative research methodologies are popular, there are few qualitative studies on student perspectives of learning in simulation. In one of these few,

Schoening, Sittner, & Todd (2006) reviewed the reflective journals of 60 baccalaureate nursing students involved in a two week obstetrics simulation study. A key finding was the perspective that simulation built confidence through practicing techniques in a non-threatening environment. Also many students believed that experience in simulation helped them to "act fast in an emergent situation" (p. 257). In another study, Bremner et al. (2006) performed a two part quantitative/qualitative study on 56 novice nursing students and their use of a high-fidelity human patient simulator. Nine students commented favourably in terms of "learning through hands-on experience" (p. 172) and eight on how learning and remediation could occur in simulation without risk. Again, extensive descriptions of simulation learning experience are simply underemphasized in the literature.

Issenberg et al. (2005) demonstrates that the connection between learning and simulation is both important and understudied. Alinier, Hunt, Gordon, and Harwood (2006) note "most experts in the field still believe that more research is needed to prove that skills acquired in a simulated environment are transferable to real life patient care" (p. 360). David Gaba, an often quoted source in the simulation literature, calls for a thorough investigation into the nature of experience obtained in simulation. Gaba (2004) proposes that this be undertaken through a systematic exploration of the variables that encompass simulation. Accordingly, he has identified eleven dimensions prescriptive for health care simulation. These are listed below.

1. The purpose and aims of the simulation activity
2. The unit of participation in the simulation
3. The experience level of the simulation participants
4. The health care domain in which the simulation is applied
5. The health care disciplines of personnel participating in the simulation

6. The type of knowledge, skill, attitudes, or behaviour addressed in simulation
7. The age of the patient being simulated
8. The technology applicable or required for simulations
9. The site of simulation participation
10. The extent of direct participation in simulation
11. The feedback method accompanying simulation

While Gaba's (2004) dimensions can be criticized for their reductionist underpinnings, he nevertheless affirms that there is a lot of room for further research into simulation. In a similar plea for more and better research, Issenberg et al. (2005) note "qualitative studies also have a place on the high-fidelity research agenda in medical education" (p. 25). They note in their conclusion that few studies cite research outside of their own field and state, "there appears to be little awareness of the substantive and methodological breadth and depth of educational science in this field" (p. 25).

Bradley (2006) echoes these concerns. In a brief discussion on learning theory where he mentions social constructivism, reflective learning, situated learning, and activity theory, he states that, "the [learning] field itself is theory-rich and such an abundant conceptualization of learning should help us understand how learning is taking place and how it can be supported through simulation" (p. 259). However, he goes on to say, "it is apparent that much of what has been and is being written is limited in scope to reporting evaluations…" (p. 259). In other words much of the research does not deal with how learning is actually taking place in simulation. Like Issenberg et al. (2005), Bradley too acknowledges the need for "interpretive paradigms" aligned with appropriate theoretical approaches that research learning in simulation. .

The call for further and better research into simulation by Bradley (2006), Issenberg et al. (2005), Gaba (2004) and others demonstrates that further research is needed that investigates the learning dimension of simulation

activities. As has been pointed out, both quantitative and qualitative forms of research have inadequately explored the relationship that learning has to simulation. Furthermore, the failure to adequately interpret the nature of learning often manifests as uncontested acceptance of particular theoretical perspectives which do not give sufficient credit to the ways in which learning is enmeshed in the underlying complexity of simulation. In the next section, I critique two of these perspectives.

Expertise and Behaviourism

Research that is concerned about the nature of learning in simulation has typically been informed by the expertise literature and behavioural perspectives of learning. However, these perspectives are inadequate. While both expertise and behavioural learning theory remain important in terms of the background they bring to this study, neither provides an adequate foundation for the interpretation of learning within the context of simulation. After outlining the importance these concepts traditionally hold with respect to learning in simulation, I demonstrate why they have not played a more important role in this research.

The expertise literature

The idea of the expert and the concept of expertise are embedded in much of the simulation literature and in the practice of medical and aviation simulation (Issenberg et al., 2005). Expertise is of particular interest because of its consideration in novice-expert studies which remain popular in medicine (Benner, Chesla & Tanner, 2009) and also because of what many consider an important goal in simulation, namely, the promotion of expertise (Bradley, 2006). Expert attributes are well documented in the literature (Chi, Glaser, & Farr, 1988), and it has long been a goal to develop educational pedagogies which promote the virtues of the expert (Bereiter & Scardamalia, 1993). But while

expertise remains a popular topic of research (Sternberg, 2003) such studies have struggled in understanding the processes by which a novice is able to attain expertise (Alexander, 2003).

In society, the term expert is often used to describe highly experienced professionals. However, the term expert is contentious. It is caught up in notions of credentialing, authority, professionalism, specialization, experience, age, paternalism, rationalism, positivism, and elitism (Bereiter & Scardamalia, 1993). The term expert fails to portray a sense of process, of history, and of the relevancy of social systems, culture, and space in which the expert is found. For these reasons, not everyone agrees with the idea of the expert. Ivan Illich (1977) points out that experts and expert culture always call for more experts and that this is done to the detriment of the individual in society who makes no claim to expertise. Experts create institutional barricades whereby they control their membership, proclaim themselves, regulate themselves, and protect the domain in which they are established. Experts control knowledge production, decide what is valid and legitimate knowledge, and determine how it is sanctioned. Illich provides a scathing critique of the institutional processes set up to further expert culture. Postmodernists like Patrick Slattery (2006) suggest that to categorize the sequence of novice to expert as Benner et al. (2009) have done is really to present a discourse that constructs the very reality it seeks to find. Rather than reflecting a pre-existing reality, it shapes and constructs one.

Nevertheless, notions of expertise cannot be ignored. Expertise is often considered in the simulation literature and on occasion is purported as the goal of simulation. However, the conceptualization of the expert is fraught with hidden assumptions, implies uncontested power arrangements and generally confuses the way learning might be understood to emerge out of simulation. For these reasons, the expertise literature is not forefronted in this study.

Behavioural learning perspectives

Notions of expertise often go hand in hand with behavioural perspectives of learning. Typically, simulation learning has been conceptualized within the domain of behaviourism (as in Gaba, 2004), with the Tylerian rationale featuring prominently in the design of objectively constructed curriculum (Pinar, Reynolds, Slattery & Taubman, 1995). This perspective still undergirds the development of professional occupational competency profiles and has only recently been seriously questioned in medicine where simulation plays a prominent role (Prideaux, 2003). Health related professions have been prominent in developing competencies (Reeves, Fox, & Hodges, 2009) for either competency profiles or accreditation purposes (Wood, 2009), and this view has been instrumental in curriculum design where simulations play an important pedagogical role.

However, behavioural perspectives of learning have been harshly criticized for a negligible understanding of what learning is or how it might occur (Pinar et al., 1995; Slattery, 2006). This perspective pays virtually no attention to meaning making either individually or socially, and it cannot account for learning that does not change observable behaviour. Furthermore, behavioural perspectives tend to inadequately acknowledge issues of race, class, gender, history, context, culture, and issues of power which may be implicit but unstated in both behavioural objectives and competencies (Pinar et al., 1995). More complex views, which better consider how these issues relate to learning, are required (Fenwick 2003).

Like expertise, behavioural perspectives of learning underlie much of the theoretical work being done in simulation research. Yet, both are found to be insufficient in their theoretical composition with respect to understanding the way learning emerges out of simulation. Both tend to understand learning as the manifestation of a particular behaviour or attribute which is conceptually

insufficient given the wealth of information present in the adult learning literature. Better theoretical constructs are available as I shall soon demonstrate.

Summary of the Literature on Learning in Simulation

Simulations are playing an increasingly important role in solving particular educational problems (Gordon et al., 1999). Because simulations can be pedagogically constructed to conform to specific purposes, simulations are now considered to provide educational opportunities for obtaining forms of situated experience (Bremner et al., 2006). However, decisions based on incorporating simulation into curriculum may be made based upon logistical concerns rather than on providing the best opportunities for learning (Bradley & Postlethwaite, 2003). In part, this arises because of inadequate research on how learning emerges out of simulation (Issenberg et al., 2005). There is, therefore, a general call for more research into this issue (Bradley, 2006). Unfortunately the research that does exist tends to forefront notions of expertise (Issenberg et al., 2005) or behavioural perspectives of learning (Gaba, 2004). But as Slattery (2006) points out, these perspectives ignore many aspects relevant to learning. Future research should be guided by more robust theoretical perspectives on learning (Fenwick, 2003), and to this I now turn.

Conceptualizing social learning

Simulation is almost always a social activity that involves learning through experience. In contrast to behavioural and psychological perspectives of learning, social learning perspectives forefront the social aspects of experiential learning (Fenwick, 2003). Social learning perspectives critique the view of learning as an individual process that tends to be apolitical, ahistorical, gender neutral, and culturally blind. Two views of social learning are particularly important to this study. The first is complexity theory, and the second involves

communities of practice. Both of these are described later. These perspectives are relevant to this study because simulations are from the outset contextually constructed (Gaba, 2004) often in ways that call for social interaction and participation. Often simulations make social interaction and experiential learning their primary purpose as in "teamwork training" (Burke, Salas, Wilson-Donnelly, & Priest, 2004; Shapiro et al., 2004) or "patient focused simulation" (Kneebone, Nestel, Vincent, & Darzi, 2007). Sometimes simulations require that participants engage relevant social considerations such as that exemplified in team work training (Wright, Taekman, & Endsley, 2004). On occasion, simulations may even promote identity shaping situations (Gates et al., 2001). In any case, simulation as an imagination of the real, forces an interpretation of how simulation applies to real settings of work practice for both educators and students (Bradley & Postlethwaite, 2003; Kneebone et al., 2006; Salas et al., 1998). These studies stress varied aspects in the relationship between experiential learning and simulation and reveal the pertinence of a social perspective for this study.

Learning through Experience

The field of adult education has a long history of honouring experiential learning (Fenwick, 2003). In apprenticeship training for trades, and also in much of professional education, there reside strong beliefs that important forms of learning occur with the repeated practice of skills in a context which requires engagement with the working community. In other words, some things are best learned by doing, and it is in the "doing" that "experiential learning" as a conceptualization has achieved popularity.

John Dewey and Eduard Lindeman are particularly important with respect to the growth of experiential learning as a historical movement. Fenwick (2003) points out that John Dewey's classic book *Experience and Education* published in 1938 was pivotal in justifying education on the basis of learning by doing. Interestingly, Dewey emphasized that not all learning educates, something

Bereiter & Scardamalia (1993) have more recently advocated. Sometimes we learn things which prove harmful to ourselves or others. According to Dewey experience must include interaction with the social environment. Edward Lindeman, a colleague of Dewey's, had four beliefs which he felt must drive adult education. According to Fenwick these are (a) that learning occurs in everyday experience, (b) learning puts meaning into the whole of life, (c) learning must be based on experience resulting from actual situations, and (d) that the learner's experience is a valuable resource. Both Lindeman and Dewey stressed the inseparability of learning and doing.

More recently, a host of scholars, from a variety of perspectives have provided significant insight into the relationship of experience to learning. Malcom Knowles (1970) focused the attention of adult educators on the importance of experience in adult learning as one of five principles in his well known theory of andragogy. Paulo Freire (1970), through his emancipatory theory of conscientization and praxis, has shown that learning can occur through radical action when it is combined with critical reflection. Donald Schön (1983) has popularized an approach to professional education through what he has called "reflection-in-action." David Kolb (1984) has theorized experiential learning in a now popular model for adult educators which suggestes an intricate relationship between action and reflection. Jack Mezirow (1996), an often quoted source in the adult education literature, has shown how perspective transformation may result from critical reflection on experience. As well, postmodern perspectives of experiential learning which emphasize the tacit and unpredictable nature of learning are becoming increasingly foregrounded in the curriculum of adult educators (Pinar, et al., 1995; Slattery, 2006).

Much of the focus of experiential learning in the last hundred years has challenged the orthodox notion of learning as something that must occur in the lecture hall. Contemporary understandings of experiential learning, as in Fenwick (2003) or Slattery (2006), contest any view that "legitimate" education can only

occur in accredited instutions through planned programs which preordain learner outcomes. Experience is often attained outside of the classroom and outside of formalized learning centres in unanticipated and complex ways. It is becoming increasingly clear that experiential learning is a complex conceptualization incorporating diverse perspectives with sociological relevance. As Fenwick points out, experience comes with different dimensions, and in the next section, I examine these dimensions in greater detail.

Fenwick's Dimensions of Experiential Learning

Fenwick (2003) has outlined a framework that is useful in discerning how experiential learning may be conceptualized, and it is in accord with both complexity theory and community of practice perspectives. In keeping with the above, Fenwick suggests that there are at least five different dimensions that are particularly relevant to understanding experiential learning: purpose, interpretation, engagement, self, and context. Understanding a particular kind of experience thus involves understanding, in some fashion, the nature of these five dimensions within the experience. This is not to suggest that the understanding of experience can ever be complete or that the dimensions stand in isolation from each other. This is not the case. Fenwick (2000) states, "All dimensions of classification derive from some perspective held and imposed by the classifier, thus constructing a world arranged according to the preferred order of things derived from the classifier's viewpoint" (p. 246). As Fenwick points out, classifications are neither natural nor neutral. It is also important to note that the dimensions can be conceptualized differently based upon the theoretical framework in which they are found. Nevertheless, Fenwick's five dimensions suggest a starting point for understanding experiential learning, and I use them extensively in this study. Given that this research considers how experiential learning emerges out of a particular form of experience, namely simulation, a brief overview of Fenwick's dimensions is appropriate.

Purpose, in a general sense, tends to govern the reasons for deliberately entering into an experience. Purpose is thus tied to intentionality. As Gaba (2004) points out, simulation has an inherent pedagogical purpose that drives it. Ethical responsibilities are also implied by what Fenwick (2003) asserts is the "ethical obligation to declare clear purposes" (p. 15). Because purpose is tied to intention, it may also act as a kind of gatekeeper for experience. Certain things are experienced only when the intention to experience them is realized.

Interpretation is the understanding we produce from our experience. As Fenwick (2003) states, "Our interpretation is mediated by the concepts and language we bring to an experience" (p. 15). Interpretation alludes to the idea that certain phenomena are always preferentially selected for interpretation. Fenwick states, "We make associations based on what we have already seen. We explain things in terms of theories we already hold…" (p.15). Interpretations of simulation experience are required in order to relate to experience that happens in the world (Bradley & Postlethwaite, 2003; Kneebone et al., 2006; Salas et al., 1998).

Engagement is about action and desire (Fenwick, 2003). Fenwick notes, "We engage different experiences with a range of positions, processes and intensity." A key thought is that intensity alters the processes by which phenomena are physically and cognitively encountered. For Billett (2001), engagement evokes the idea of co-participation where interaction is between a workplace which affords participation and individuals which participate in social practice. According to Gaba (2004) and many others, the degree of participation in a simulation directly influences the learning that emerges. The desire to participate may compel either active or passive participation which in turn alters the nature of the experience.

Self, in the sense of the unitary, individual, humanist self, capable of a linear sense of maturity and development, is now highly contested as Fenwick (2003) demonstrates. She points out that according to a feminist orientation the

self is not single and solitary but woven into different relational networks. From a postmodern perspective, the self may be viewed as a subject arising from its production in "a web of social practices and language" (p. 17). Fenwick states, "We are not even conscious of the various selves we inhabit in everyday experience" (p. 18). In simulation, we may view ourselves as students participating in an activity, as actors in a script, or as apprentices learning to work in the presence of a "master."

Context also shapes the nature of experience. Context includes issues of time and space, the environment, culture, and the history that the experience draws upon. Thus context is intricately woven with the meanings of an activity and its socio-political dynamics (Fenwick, 2003). All of these elements are interrelated in complex ways. As Fenwick states, "We view and feel what happens through the values and norms of our culture" (p. 19). Furthermore, it is in the dimension of context that Fenwick stresses the notion of power. She states, "Here is where the dimension of power and its link to knowledge, language, and identity becomes critical in understanding learning in experience" (p. 19).

In brief, Fenwick (2003) problematizes the notion of experiential learning by considering the five dimensions of purpose, interpretation, engagement, self, and context. The all too common assumption is that "we simply enter an experience, reflect upon it to make meaning, then apply its lessons in a process we like to think of as learning" (p. 19). However, this obscures rather than reveals any understanding of the way experiential learning occurs. A consideration of these dimensions forces a re-imagining of the nature of simulation and the learning that emerges from it.

Complexity Theory

Fenwick's five dimensions relate to each other in theory dependent ways. In complexity theory, all dimensions are mutually constitutive within their

educational system (Fenwick, 2008). Learning is viewed as happening through complex processes of co-emergence where system relationships simultaneously change and take on new meanings. A key point is that the learner is enmeshed in the fabric of the context and is not simply "a part" of the context or "situated in" the context. An extraordinary example is provided by the Moken village sea gypsies whose survival of the December 2004 tsunami off the coast of Thailand is credited by Freiler (2008) to be the result of prior "embodied" learning. Freiler states, "Their way of knowing, embedded in their cultural context of interrelatedness with their environment, surfaced as the reason for their survival" (p. 37). In complexity theory, learner and environment are a false dichotomy. This is a key difference between complexity and community of practice perspectives. In the latter, the learner is situated but not enmeshed in the environment in which the learning occurs.

In complexity theory, the metaphors of physics which are so commonly found in the cognitive theories of learning are replaced by the metaphors of biology and the language of complexity science (Davis et al., 2006). Learning is a process through which a system (and the learner as a system) expands the space available for possible action and in which there is a transformation in the character of the collective (Davis et al.). It is in the potential for action that learning occurs. Learning in simulation typically seems to meet several complex conditions including internal diversity, internal redundancy, decentralized control, enabling constraints, neighbouring interactions, feedback loops, and recursive elaboration (Bowsfield et al., 2004; Davis et al., 2006). *Internal diversity* draws upon the idea of genetic diversity as a metaphor for change in a cultural system. It implies that "difference" in background, culture, age, etc. creates opportunities for the emergence of new learning. Gaba (2004) has pointed out that these things are important in simulation learning research. *Internal redundancy* refers to the common ground of culture, language, history which is necessary to prevent termination of the learning system. It is associated with the

robustness of a system and allows the system to preserve the differences already present. Simulations can proceed only if the rules of the simulation are understood. *Decentralized control* speaks to the idea that learning can never be an entirely directed activity. Control is not and cannot be overpowering even though it might appear to be in simulation. *Enabling constraints* are physical, cultural, and contextual rules which always exist in simulation and which direct the activity in a particular direction. *Neighbouring interactions* involve the idea that relationships with other systems outside of the simulation are vital to the emergence of learning. *Feedback loops* are premised on the idea that certain aspects in a learning environment will either reinforce or mitigate other aspects. Finally *recursive elaboration*, speaks to the ways in which processes of knowledge are interdependent.

A key interpretation is that the "designated educator" in taking the role of a story teller, interpreter, or facilitator, is a part of the learning process and simultaneously a part of the system in which the learning occurs. In simulation, this person is often known as the simulation controller. Through the complexity perspective, educators and students are at the same time a whole, a part of the whole, and a collection of wholes. The collective system is greater than the sum of the parts (Davis et al., 2006). These ideas are relevant in that they force a reconsideration of the way that simulation is incorporated into a curriculum. The structure of the simulation and the controller of the simulation cannot be divorced from the individual "learners" within the simulation.

Understanding learning in terms of complexity yields interesting pedagogical insights. However, a view of learning as "meaning making" or as a process of constructing an identity is problematic within the complexity perspective, as is the concept of agency. These are significant concerns. As Fenwick (2008) observes, it is unclear how complexity can adequately explain the kinds of ethical issues which are often so important for education, and I address this more fully in chapter six. Nevertheless, many complexity theory concepts

are now found to be immersed in multiple discourses pertaining to learning, and they are relevant to understanding learning in simulation.

The complexity perspective stresses a holistic picture of educational processes and forces a reconceptualization of the nature of learning and the metaphors by which we understand learning to occur. This means simulation as a pedagogical construct must also be reconceptualized. However, because in the complexity perspective there is a tendency to lose the distinction between the learner and teacher or the learner and the background, it is worthwhile to examine another perspective where such distinctions are more evident.

Communities of Practice

Social learning may be viewed through a community of practice perspective. “Communities of Practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (Wenger, McDermott, & Snyder, 2002, p. 4). Not everything that is deemed to be a community involves practice, and not every aspect of practice involves a community. But communities of practice are everywhere and exist even without recognition or intention. Simulations by themselves are not communities of practice. However simulations may be part of the practice that a community undertakes. Understanding the ways in which simulations reflect or reify both communities and practice contributes to a better understanding of how learning emerges out of simulation.

Wenger (1998) describes three dimensions important in linking community with practice. First is a sense of *mutual engagement* where activities are practiced together despite the presence of diversity that would otherwise tend to keep the activity from occurring. Second is the idea of *joint enterprise* where a sense of belonging is negotiated, and there is an understanding of mutual accountability. Finally a *shared repertoire* is important where meaning is

constructed through story, discourse, historical structure, and knowledge is mediated through tools, symbols and artifacts. Claims about what constitutes a community of practice and the community of practice that is actually in place may not coincide. A community of practice cannot exist in a historical vacuum (Wenger, 1998). Understanding practice is something that arises out of a connection with the history of the practice and also with direct participation in the cultural activities of the practice. In so far as simulation is a means to practice within a community, simulation must also, according to Wenger, (a) require engagement, (b) negotiate accountability and power and (c) construct meaning through story, discourse, and historical structure.

According to Wenger (1998), a community of practice is a required condition for the existence of knowledge. Lave and Wenger (1991) point out that, "participation in the cultural practice in which any knowledge exists is an epistemological principle of learning" (p. 98). An individual's intention to learn and the meaning of learning are configured through the process of participation in a community of practice (Lave & Wenger). For Lave and Wenger, the perspective of learning that matters most is not the one that details learning as the acquisition of cognitive schema but rather one that forefronts social interaction and learning through participation. Wenger (1998) suggests that learning is interplay between social competence and personal experience. It is when competence and experience are in a state of tension that learning occurs. It is important to note that Wenger does not use the word competence in the sense of being proficiently able to perform competencies as might be outlined in a national occupational profile. Rather, competence for Wenger (1998) involves knowing how to act in a way that is recognized as appropriate by fellow members of the community. The recognition in most cases is tacit not formalized recognition. So for Wenger (1998), belonging to a particular social system is absolutely fundamental to the learning process. "Learning depends on inviting identities for participation" (Wenger, 1998, p. 264). Here, Wenger implies that

Fenwick's (2003) dimension of the *Self* is intricately tied to the dimension of *Engagement*. Engaging in simulation therefore means to bring forth particular selves to participate.

Wenger (1998) believes that "belonging" incorporates dimensions of engagement, alignment and imagination all of which serve to construct identity. According to Wenger, engagement pertains to the ways in which individual members negotiate meaning with each other as they perform, interact, and direct the practices that are associated with the community. Engagement has an important power dimension because it can only occur through the mediation of power. Power is required to negotiate enterprises and to construct identities of competence, and power may serve to isolate a community from others that might inform it. Power is thus seen to be embedded in simulation not only in dimensions of context (e.g., culture, history) but more directly in the sense of allowable participation.

Alignment, in the way Wenger (1998) uses the term, is the way that broader enterprises are formed to channel energies and practice beyond our own engagement. "Alignment amplifies the ramifications of our actions by coordinating multiple localities, competencies, and viewpoints" (p. 180). It manages scales and complexities that provide new levels of belonging. Alignment is embedded in political power. While alignment can magnify the ramifications of a single community, it can also be disruptive, coercive, and prescriptive. It can result in a violation of the sense of self and serve to crush identities. The ways in which simulation activities are expected to align with the real world can be highly consequential.

For Wenger (1998), imagination involves constructing images of self and community which explore the as yet unrealized potential of the self and community. Imagination allows reflection and interpretation of another's experience and involves a transcendence of time and space. It concerns the production of images and identities that transcend those involved in

engagement. Imagination in this sense may be collective as well as individualized. Imagination allows the acceptance of other histories and perspectives and can serve as a way to reinterpret history and to open up worlds of new possibility. Wenger believes that imagination entails processes of storytelling and more specifically that it involves "generating scenarios, exploring other ways of doing what we are doing, other possible worlds, and other identities" (p. 185). However, imagination may also lose the distinction between what is considered meaningful and what is considered meaningless fantasy. The linkage of imagination to story and to the experience of others turns out to be conceptually important in terms of understanding the narrative linkages simulation has with the real world.

One way in which engagement, alignment and imagination may all come into focus is through the process of *legitimate peripheral participation*. Lave and Wenger (1991) use this concept to describe the process by which new members of a community of practice work toward full membership in a community and in so doing acquire experience and understanding of what such a membership entails. This concept "provides a way to speak about the relations between newcomers and old-timers, about activities, identities, artifacts, and communities of knowledge and practice" (Lave & Wenger, 1991, p. 29). During the process of participation in a social practice, intentions to learn are followed by engagement in practice, and meaning arising out of experience is eventually reconfigured and situated in the practice. The social processes relevant to learning are gradually codified in a repertoire of tools, concepts, symbols, artifacts, ritual, and past experiences all of which are embedded in the meaning of the practice. Legitimate peripheral participation may thus provide a contrived way to ease into full practice.

The improvisation of practice as an attempt to direct experiential learning towards particular ends makes legitimate peripheral participation pedagogically encompassing of certain forms of simulation. Simulation can be a form of

legitimate peripheral participation. Crucial to the learning process is immersion into a culture of practice, and legitimate peripheral participation may achieve this through apprenticeship models or simulation. Immersion results in the learner absorbing and being absorbed in a myriad of shared practices many of which might be unanticipated and where awareness and understanding of the terminology, tools, concepts, symbols, artifacts, and fields of work become increasingly clear. Legitimate peripheral participation provides an approximation of full participation with exposure to actual practice. Simulation provides such an approximation. Simulation, as legitimate peripheral participation, can involve, "lessened intensity, lessened risk, special assistance, lessened cost of error, close supervision, or lessened production pressure" (Wenger, 1998, p. 100).

In the community of practice perspective, learning requires participation. Participation requires belonging. Three key processes in belonging to a community of practice are engagement, alignment and imagination each of which affects how identity and meaning are constructed and negotiated. These processes are relevant for how learning emerges out of communities of practice generally and how learning emerges out of simulation specifically. The concept of legitimate peripheral participation as a contrived pedagogical activity is important to this study because simulation can be conceptualized within the framework of what has been traditionally thought of as legitimate peripheral participation. The nature of simulation is affected by ideas of legitimacy, peripherality, belonging, engagement, alignment, and imagination. Overall, the community of practice perspective has implications for how learning emerges out of simulation and as a pedagogy of simulation which moves towards, "intricate structuring of a community's learning resources" (Lave & Wenger, 1991, p. 94).

Summary of Social Learning Perspectives

Social processes of learning are particularly relevant to this study because simulation is a social structure. Fenwick's (2003) five dimensions of experiential learning imply a means by which social experience may be better understood, and these dimensions are utilized throughout this study. Two particular perspectives of social learning seem to be particularly relevant with respect to simulation: complexity theory and communities of practice. Complexity theory understands learning in terms of its emergence out of a system (Davis et al., 2006). Learning in this sense is complex and difficult to orient towards particular purposes. It is always in flux. Because complexity theory challenges the meaning of contemporary metaphors of learning, it opens a way to reconceptualize how learning occurs in newer educational environments such as simulation. The reconceptualization of metaphor, as it turns out, is particularly important in the analysis of this study. While simulations are not communities of practice in and of themselves, they may comprise part of a community of practice and may be pertinent as a form of legitimate peripheral participation. The community of practice literature pays particular attention to the ideas of engagement, alignment, and imagination as they are enacted in both the identification of a community of practice and individual identity. Conceptualizing imagination is acutely important to the in-depth analysis that occurs in this study.

Imagination

Wenger's (1998), view of imagination, within the community of practice literature tends to forefront the production of the "image" as the essential aspect of the imagination (see p. 174). But as it turns out, there are many different understandings of imagination, what it means to imagine, and how imagination is manifested in the world. The term imagination thus requires clarification. Kearney (1988) notes that the human ability to imagine something

has been understood in two main ways throughout the history of Western thought. One way views the imagination as a representational faculty that reproduces some pre-existing reality. The second understands imagination as a creative faculty capable of producing images in original ways. In the present, Kearney identifies four main meanings of the term imagination.

1) The ability to call forth from another time or place absent objects which exist elsewhere without confusing them with things present in the here and now.
2) The construction in material form of real things in some "unreal" way (e.g., through paintings, pictures, statues, etc.).
3) The fictional projection of that which does not exist (as might occur in dreams or fictional narratives).
4) "The capacity of human consciousness to become fascinated by illusions, confusing what is real with what is unreal" (p. 16).

Imagination, as Wenger uses the term within the community of practice perspective seems to inadequately consider all four perspectives, and consequently cannot provide the breadth and depth of theoretical understanding that this study requires. In the remainder of this section, I more thoroughly conceptualize imagination starting with a brief examination of both the existential imagination and the social imaginary. In this section, I point out that imagination exists not just in the mind of the individual but also as an integral part of the social world. This has ramifications for understanding the nature of simulation and its relation to the world. I then outline the important concept of the Other as the means through which the social imaginary is ultimately understood before moving on to an examination of simulation as a narrative form that implies a sense of narrative self, narrative time, and narrative ethics.

The Existential Imagination

If simulation is an imagination of the real (as I affirm in this study) then Kearney's (1988) assertions that the imagination may either represent an existing object and/or construct a real object in some unreal way become obviously relevant to simulation. Simulation may reproduce a past event (perhaps a fire call or a flight log) or it may create a "theatrical set" or background for an event perhaps in the form of an aviation simulator (thereby constructing an real object in an "unreal" way). However, Kearney's assertions that the imagination may also project that which does not exist or that imagination may fundamentally confuse what is real with what is unreal are not so obviously linked to simulation. In the following paragraphs, I draw upon the literature to demonstrate that such connections are relevant to understanding the nature of simulation as a manifestation of the imagination.

The existentialist understanding of the imagination which reaches its extreme in the work of Jean-Paul Sartre relates directly to the idea that the imagination may project that which does not exist and that the imagination may also confuse the real with the "imaginary." This has particular relevance to simulation. According to Kearney (1988), Sartre's first two major works, *Imagination* published in 1936 and *The Psychology of Imagination* published in 1940, were devoted to a comprehensive description of the existential act of imagining. Sartre goes to great lengths to differentiate between the real and the imaginary worlds. According to Kearney, Sartre believes that "to project an imaginary world is *ipso facto* to negate the real world" (p. 228). The "image" for Sartre is ultimately a form of nothingness that must not be confused with real objects existing in the real world. "To imagine something (e.g. a tree or the person Pierre) I must be able to negate both this thing as it really is and the world in which it really is; for it is only by means of such a double negation that I can intuit the unreal thing in an unreal world" (Kearney, p. 228-229). In this view,

simulation as an imaginative projection is thus a negation of the very world that it simulates, and that which arises in simulation (including experience) is necessarily a negation of the real. It is perhaps here that the common idea of simulation experience as "simulated experience" or "pseudo-experience" first arises (as discussed by one of the participants in chapter four of this study).

According to Sartre, negating the real results in strange consequences. The "nothingness" of the imaginary world manifests itself as temporal, spatial and worldly unreality (Kearney 1988). Temporal unreality is imaginary time. It is the time of dream, fiction, art, and it can be slowed down, accelerated, or reversed. Spatial unreality is one in which a change in the object immediately implies a change in its imagined surrounding world background. Worldly unreality is the idea that unlike real objects, imaginary ones can assume illogical and contradictory perspectives. These unrealities link imagination to simulation in pedagogically pertinent ways in part because the entire structure of the simulation is governed by them. In the existentialist view, the simulation world, its time, and its space are important in terms of how they negate the real not in terms of how they might vivify the real. In this view the entire context of simulation takes on the aura of the unreal.

The existentialist imagination, however, is not just an act of negation; it is also an act of fascination because imaginative consciousness produces an "object" of desire and allows an individual to take possession of it (Kearney 1988). Sartre uses this rationale to offer up an explanation for the "willing suspension of disbelief," and given the pertinence this phrase has to simulation, his explanation is worthy of elaboration. The "suspension of disbelief" is typically utilized in the simulation literature to describe a participant in simulation who pretends that the non-real is, for the moment, real (Beaubien & Baker, 2004). The British poet Samuel Taylor Coleridge (1817) first uses the phrase in reference to theatre (Chapter XIV of his autobiography *Biographia Literaria)*. Though Sartre accepts Coleridge's "suspension of disbelief" at face value, he argues that the

reason it is able to occur is because the real is negated and a fantasy is created in its place. He asks, “How are we to account for that strange ‘suspension of disbelief’ which allows us to passionately identify with the actions and sufferings of imaginary characters” (quoted in Kearney, p. 230). According to Sartre, it is not the actor who becomes real on stage, but through the negating imagination the actor disappears so as to allow an absent non-existent persona to appear as a “magical presence.” The actor experiences the transition of an actual self to an impersonated self as “a consciousness of being possessed” (Kearney, p. 230).

In the existential imagination, the imaginative act of possession may have serious consequences. Because transitions in space and time are easy (we can easily imagine ourselves in some other place and time), it means that imagination can provide a way to escape the cause-effect constraints of the real world. Computer video games in their simulation of adventure provide just such an escape. However, escape may turn into a form of enslavement to the unreal, because the unreal appeals to desire, and desire can lead to dependence. This is reflected in the pathological dependence some people have to online simulations that utilize avatars as a means to experience alternative realities (Lee & Shin, 2004). Given that the imagination is fascinated with the entities it has created, it may degenerate into a form of self-fascination which knows no ethical limits and which loses touch with the real. The multi-billion dollar pornography industry knows this all too well. For Sartre, imagination is thus viewed as pathological and entirely distinct from the real. In such an imagination, both the suspension of disbelief and simulation itself must also be viewed as pathological because of the potential for confusing them as real. This confusion in simulation, of what is imagined with what is real, is a point I stress later.

Overall, the existentialist imagination is one of both negation and fascination. By negating the real, different conceptualizations of time, space, and the world are made manifest. The real is distinctly different from the “objects” of the imagination. In the context of simulation, this means that time, space, and

the world in the simulation are negations of their real counterparts, and in the context of Sartre's understanding, pathological because they may confuse what is imagined for what is real. However, while Sartre's point on confusion is very pertinent, there are those who would disagree that the imagination must be a negation of the real and that imagination must always be pathological.

The Social Imaginary

Imagination does not have to be conceived as a negation of the real. Rather, it may be conceived as that which vivifies the real through a social imaginary. Charles Taylor (2004) in his book *Modern Social Imaginaries* states, "The social imaginary is not a set of ideas; rather, it is what enables through making sense of, the practices of a society" (p. 2). Taylor clarifies that the social imaginary is not the same as social theory. The social imaginary is carried in stories, images, symbols, metaphors, and myths. Social imaginaries are shared by large groups of people, even entire cultures. As Taylor states, "The social imaginary is that common understanding that makes possible common practices and a widely shared sense of legitimacy" (p. 23). Taylor's reference here to legitimacy and sharing implies that simulation, as a social activity, comprises part of the modern social imaginary for education. In another work, Taylor (1991) advocates the ideal of authenticity which through a lack of recognition does much to explain the malaise of modern society. This view asserts that there are authentic attributes which make human beings human.

In Paul Ricoeur's (1986) concept of the social imaginary (out of which Taylor's views are derived), the imagination is always at work to produce collective narratives that serve to help us understand the world and explain ourselves to others. These narratives extend beyond the scope of the individual imagination and spill into the world to form a communal imaginary in society with what Ricoeur calls ideological and utopian dimensions. Both directly influence interpretations of the real.

For Ricoeur (1986), ideology does not necessarily imply an inversion of the real with the imaginary as Marx and Engels (1971) affirm in the *German Ideology.* Rather, Ricoeur suggests that the falsifying character of ideology hides or obscures an important integrative aspect that allows a social group to represent itself to others. Kearney (2004) outlines Ricoeur's thought as follows. "Ideology entails a process of schematization and ritualization that stereotypes social action and permits a social group to recollect itself through rhetorical maxims and idealized self-images" (p. 79). Military simulations fraught as they are in ritual and self-image typically purport just such an ideology. However, Ricoeur does not dismiss the Marxian analysis of ideology entirely because ideology does have a dissimulative or uncritical function that fails to recognize the gap between current lived reality and the imagined ideal world. This uncritical aspect of the social imaginary can manifest itself in simulation as a simulation which fails to recognize itself as a simulation. It is the danger of dissimulation that causes Grossman (2004) to caution that law enforcement training, when enhanced by the efficient use of simulation, can prove to be detrimental in the real world simply because a simulation never completely replicates the world it is designed to emulate.

Through rigorous analysis, Ricoeur (1986) goes on to show that the dissimulative and integrative functions of ideology combine into forms of "legitimizing" domination which serve to justify a social system's claim to power. If Ricoeur is correct, this means by extension that a simulation must in some sense serve to legitimate the power that manages it. According to Ricoeur, the domination of ideology is so pervasive that there is no ideological "free zone" within which it is possible to cast an unbiased critique. All critique in the social sphere is necessarily ideological, and this includes any critique of simulation. In the words of Kearney (2004), Ricoeur affirms that, "ideology is an indispensable dimension of the hermeneutic circle in which our historically situated consciousness is obliged to operate" (p. 83).

However, Ricoeur (1986) believes it is possible to operate critically within the social imaginary. This involves discriminating between falsifying and liberating ideological dimensions through what he terms the demystification of symbols. In the sense that a symbol represents a form of ideological domination, it has already lost any emancipatory function. The lost sense may be recovered through the utopian dimension of the social imaginary. Utopia serves to open ideology to the exploration of what else may be possible. The development of new perspectives outlines utopia's most important attribute which is the role it plays in helping us to rethink the meanings society imposes on us. Utopias, as Ricoeur points out, are real projects which provide an alternative view to the current established social imaginary. Utopia also challenges ideological hegemony to expose injustice, intolerance, deceit, corruption, exclusivity, and it suggests other possibilities which serve as alternatives to the power arrangements of the status quo. Simulation as an ideological "tool" is thus countered by simulation as a utopian "ideal."

But utopia is also not entirely positive either because it too is ideological even as it acts contrary to ideology. Utopia may rupture the legitimate connections ideology has with the past, severing connections with history, and consequently, with the real as it spirals into pathological forms of fantasy. Thus ideology and utopia exist in a dialectic which attempts equilibrium. In so far as simulation (a) is a social entity that reinforces ritualistic traditions and historical identities, (b) collapses into dissimulation as an ideological distortion of the real, and (c) serves as a legitimizing force for its own creation, it is also utopian in the ways it opens up opportunities for change, promotes unrealizable (or unreal) fantasies, and provides alternative means of legitimizing power.

The social imaginary according to Taylor (2004), Kearney (2002, 2004) and Ricoeur (1986) is both real and imagined. As a conceptualization, it challenges the distinction that the social imaginary is distinctly different than the real or that the imagination ultimately tends toward a pathological falsification

of the real. On the latter, it is in stark contradiction to the existentialist imagination of Sartre. The social imaginary of Ricoeur (1986) is premised upon particular understandings of ideology and utopia. For Ricoeur, ideology always involves the three facets of ideological integration, dissimulation and domination. When the social imaginary is healthy, ideology is held in check with utopian ideals that counter its power. The utopian exploration of the possible, fantasy, and the utopian alternative to power serve to balance ideology within the social imaginary. However, simulation pedagogy requires not only a consideration of the facets of ideology and utopia but also a means by which they may be socially interpreted.

Imagining the Other as a Means of Interpretation

Ricoeur (1986) and Taylor's (2004) conceptualization of the social imaginary reveals the inadequacy of the conventional understanding of simulation as a simulated physical environment. Simulation, when it works, replicates not just the physical environment but much of the social imaginary as well. In doing this, learning in simulation cannot be considered as purely a psychological exercise because the social imaginary demands social interaction. In Ricoeur's conception of the social imaginary, understanding must involve the Other. Discussions on the enigma of the Other are found in religious anthropology (Girard, Levi-Strauss), Orientalism and postcolonial thought (Said), psychoanalysis (Freud, Lacan, Kristeva), deconstruction (Derrida, Lyotard, Caputo), phenomenology (Husserl, Heidegger, Levinas), and hermeneutics (Gadamer, Ricoeur, Kearney). While a thorough presentation of the topic of the Other is beyond the scope of this work, it is necessary to have some understanding of the Other in a hermeneutic sense because it is through the Other that the social imaginary is learned (Kearney, 2003). Part of what a simulation does is construct, replicate, or emulate an Other.

The Other, as a philosophical inquiry, arouse out of the conflict between the two major post-war philosophies: existentialism and structuralism. As it became apparent that neither handled inter-subjective relations well, it became popular to believe that there must be something *other* than the self and/or an amorphous system. The *other* thus became the Other. The Other may be a person, a group, or a conceptualization. Nature as Other is clearly represented in Canadian literary fiction where the wilderness is given human characteristics as in Howard O'Hagan's (1960) novel *Tay John.* In simulation, fellow participants, instructors, and controllers may comprise the Other. For firefighters, the Other is fire, and it is often treated by firefighters as if it possesses human agency. Fire may represent a sacred flame or call forth prophecies of the apocalypse. Fire has an anthropological lineage that stretches from the dawn of humanity to the internal combustion engine. It is enmeshed in a symbolism and complexity which no simulation can ever accurately represent but which nevertheless remains an important Other in all firefighter simulations.

A key debate revolves around the absolute vs. the relative Other. Husserl and Heidegger advocate the relative Other where the Other is manifested as an alter ego or the Other in relation to self existence (Kearney, 2003). However, many (including Ricoeur) believe that the Other is the absolute Other. It is the Other that expresses itself. Fire, in its perceived manifestation of agency, is an absolute Other. In this regard, Kearney (2003) distinguishes three types of hermeneutics of Otherness. The first is Romantic hermeneutics, which Kearney attributes to Schleiermacher, Dilthey and Gadamer and which attempts through interpretation to fuse the consciousness of one subject with another in a way known as appropriation. In Gadamer's case this is called the "fusion of horizons." The second is hermeneutics in the deconstructive sense of Derrida which rejects appropriation completely and insists on the, "unmediatable and ultimately 'sublime' nature of alterity" (Kearney, p. 17) where there is irreducible difference and separation between the self and the Other. Finally, there is what Kearney

favours, a diacritical hermeneutics in which the attempt is to understand oneself as the Other even though there will always be something about the Other that remains a mystery. This is also the hermeneutics of Ricoeur, and it is in the mystery of the Other, which can be interpreted but never completely understood, that the opportunity for understanding the social imaginary arises. It is in the context of Ricoeur and Kearney that I henceforth use the term Other.

According to Ricoeur, all understanding is self-understanding, and the best way to know oneself is through the Other (Ricoeur, 1992; Kearney, 2004). The path through the Other involves a journey (which requires effort) where the participant is de-worlded, stripped of pretentious understandings, and opened to new imaginative possibilities. Mission simulations on Mars (Clancey, 2006), for example, are predicated upon the notion that outer space is an Other that must be explored to be understood, and which in the process of exploration opens up new imaginative possibilities. The same idea was prevalent in the now infamous *Bisophere 2* simulation which attempted the replication of an entire earth ecosystem (Cohen & Tilman, 1996; Zabel, Hawes, Stuart, Bruno, & Marino, 1999). It is precisely because the Other can only be partially understood that the imagination goes to work to fill in the gaps. Out of the imaginative conjectures arise novel insights which carry meaning back to the self. If there is a complete failure to understand the Other, then the imagination can find no purchase upon which to issue forth. If the understanding is too complete, there can be no Other to journey through, and no novel insights can arise (Kearney, 2004).

Richard Kearney (2003) demonstrates the connection of the imagination with the Other in a study involving three categories of Other: strangers, gods and monsters. He states, “Strangers, gods and monsters represent experiences of extremity which bring us to the edge. They subvert our established categories and challenge us to think again” (p. 3). Kearney’s distinctions here are very pertinent to the findings in this study, and I discuss them in more detail later. However, suffice it to say here that the Other in a simulation may simply be a

fellow student which one does not know very well and considers to be a stranger. The Other may be the simulation controller who exercises absolute authority over the creation and manifestation of the simulation, in the manner of a god. Or, the Other may be the ideological manifestation of a particular imaginary, like *Ivan*, an imagined U.S.S.R soldier, whom in my own prior military experience was declared (at least in simulation) to be a monster.

According to Ricoeur (1986) and Kearney (2003), interacting in the social imaginary requires an interaction with the Other. The Other, in this understanding, has agency. The mystery of the Other demonstrates a gap between what can be known about the Other and what cannot. Because this gap exists, the imagination can find room for conjecture and critical interpretation thus may ensue. This interpretation is ultimately self-interpretation because according to Ricoeur (1992) it is only through the Other that one can understand oneself.

Narrative Self

Kearney (2003) and Ricoeur's (1991a, 1991b, 1992) studies of the Other reveal that narrative is intricately entangled in the human interpretation of the world and life. Story is increasingly being demonstrated to be relevant to education, and narrative understandings are becoming popular in conceptualizing how adults learn (Clark & Rossiter, 2008). According to Verhesschen (2003) and Kearney (2002), understanding the relationship of narrative to identity is premised upon Ricoeur's (1984) idea of triple mimesis. In terms of a narrative beginning, there is what Ricoeur (1984, 1991b) calls the "prefiguring of the life world" as it seeks to be told. Narrative is rooted in life. Ricoeur (1984) believes there are three anchorage points for narrative understanding in lived experience. The first is a familiarity with language and rules of composition. The second point is that action is always symbolically mediated. Action can be recounted because it is articulated in rules, signs and

norms. The third point is that temporal features can be recognized in the action. These three points constitute prefiguration. Prefiguration is an important consideration in simulation because a student must be prefigured for learning. A non-pilot cannot be expected to pass a flight examination in a high fidelity twin engine aircraft simulator. The student must have the necessary understandings of the community (to use Wenger's terms) or the social imaginary (to use Ricoeur's) in order to make the most out of the learning situation.

The second aspect of mimesis is what Ricoeur (1984) refers to as the configuring of the text in the act of telling. Verhesschen (2003) points out that the configuring act is that of emplotment, which is to say, the mediation of separate events into a story. Emplotment provides synthesis between heterogeneous components like actors, purposes, circumstances and juggles them through various configurations of time. Verhesschen writes, "It needs to be emphasised here that according to Ricoeur several different stories can be told that suit the same plot of events. There is not one story and there is no overarching plot, no superplot" (p. 454). In simulation the configuration is the running of the simulation in real time.

The third aspect of mimesis, according to Ricoeur (1984) is the refiguring of existence in the return from the narrative to action. Refiguration in the context of simulation most obviously occurs after the simulation in the feedback sessions where the story of the simulation can be told and retold. Identity is changed by the narrative of the "text" in a way that calls forth action (Clark & Rossiter, 2008).

For Ricoeur (1984), the narrative aspects of mimesis are deeply implicated in the interpretation of experience and identity. Ricoeur affirms that each human life is already an implicit story and that life itself is in search of narrative (Kearney, 2004). Mimesis is important in this process of selfhood and identity. As Ricoeur demonstrates, all three aspects of mimesis (prefiguration, configuration, and refiguration) may occur at the same time, or they may be

sequential, but they are always cyclical. In simulation especially, it does not always make sense to consider mimesis as being sequentially driven. In fact, this turns out to be particularly important in simulation where imagined events may arise in unimagined ways and where conceptions of self are themselves simulated.

Narrative Time

I have thus far attempted to show that understanding the nature of learning in simulation is predicated upon an understanding of the social imaginary. I have also stressed that narrative understandings of the social imaginary and of the self are required to more fully interpret the complex nature of simulation and how it interacts with the social imaginary. In so doing, I contest the all too common view that simulation should primarily be about making technologically complex simulations which closely mimic the laws of physics or nature as in high fidelity aviation simulators or physiologically "real" human patient machines. One reason simulation can be so complex is precisely because it mixes the natural laws of physics with the natural existence of the social imaginary in ways that are unique to simulation. As viewed from the outside, simulation always occurs within the constraints of both physical law and the social imaginary; however, from within the simulation, assumptions are made which alter the very nature of reality in fundamental ways. In the following, I examine time as one very important simulation "enabling constraint" which is directly pertinent to both physical law and the social imaginary and which may radically influence the ways in which learning emerges out of simulation.

The character of time, both as it exists and as it is imagined to exist, constitutes a very important aspect in the nature of simulation. However, time is not typically forefronted within the simulation literature (see Gaba, 2004) even though its pedagogical consideration is always warranted. Typical conceptualizations of time, reinforced as they are in modern metaphor, are

simplistic (Heidegger, 1996). Consequently, the importance of time can be underestimated in both the pedagogical design of a simulation and in the way a simulation is played out. The common view is that time, as a dimension of the universe, is the same for everyone. As I shall point out, such a view does not provide sufficient insight into the character of time as it pertains to simulation. A more adequate understanding arises both from Slattery's postmodern depiction of time, as well as from Ricoeur's conceptualization of what he calls narrative time.

Time has traditionally been understood in education as something to be controlled, managed and manipulated (Slattery, 1995). The incorporation of simulation into educational curricula typically requires that specific periods of time be pedagogically allocated. Simulation, like many other educational endeavors, is often quantitatively measured in ways that reference time. "Time in simulation" is tracked in flight logbooks by pilots. Nursing and paramedic programs set aside time for simulation modules. "Time on task" measurements can be made on simulated and real domains of work. In all of these cases, time is treated as an isolated, independent and quantifiable variable. Traditional perspectives of simulation research (as in Gaba, 2004) also tend to treat time as a variable to be studied.

However, postmodern scholars contest what they term as "modernist" notions of time. Slattery (2006) laments that the modernist solution to teaching in a milieu with ever more pervasive time constraints is to develop technology, systems, and procedures which neverendingly attempt to reallocate time more efficiently. According to Slattery, educators are overwhelmed and frustrated with the increasing demands to incorporate expanding curriculum requirements into set amounts of time. This perhaps explains the resistance many instructors have with the introduction of simulation learning modules into core curricula. It is just another thing to try. Slattery suggests that enslavement to time can only be addressed by challenging the underlying assumptions of time.

Slattery (2006) postulates that one way to make such a challenge is to reconsider the way in which time is entrenched in modern metaphor. For example, “the arrow of time” suggests that time leaves behind its own past. There is a sense of no return. Similarly, “once upon a time” reminisces about an age never to return or be seen again. Alternatively, “time flies” reveals the inevitable march of time. The essence of these metaphors, as adages for modern life, can inadvertently limit the pedagogical design of a simulation or the research into simulation if it is not recognized that as metaphors they may be re-imagined. However, once the metaphors are re-imagined, as might occur in a simulation, then time itself is re-imagined.

Like Slattery (2006), both Heidegger (1996) and Ricoeur (1980) object to the conceptualization of time as an endless series of disconnected instants. Ricoeur states, “I agree with Heidegger that the ordinary representation of time as a linear series of ‘nows’ hides the true constitution of time…” (p. 170). According to Ricoeur, scholars writing on time typically overlook the contribution that narrative can make to a critique of the concept of time. They either look to cosmology or physics to supply the meaning of time, or they attempt to speculate on an inner experience without referring to any narrative activity. Ricoeur is adamant that time and narrativity are deeply connected. He states, “I take temporality to be that structure of existence that reaches language in narrativity and narrativity to be the language structure that has temporality as its ultimate referent” (p. 169). The relationship between time and narrativity is thus seen to be reciprocal.

Ricoeur (1980) asserts that human beings live in narrative time which is to say between the private time of individual mortality and the public time of language. He holds that as soon as we understand the mortality of our existence, we are immediately involved in a form of private narrativity. This occurs as we come up against the finitude of our existence and are forced to make time our own. Concurrently, the public character of time relates the story of the “now” in

the public setting through language. Public time is both the time that is common to a group of individuals interacting with each other and the opening up of a written text to its audience. Public time is the time that flows through the social imaginary.

In his analysis of narrative time, Ricoeur (1980) strives to link narrative structure, specifically plot, to a conceptualization of time. Ricoeur, in accordance with Heidegger (1996), notes that activity happens *in* time. He uses Heidegger's concept of "within time ness" and its sense that we are "thrown into time" to show that "being in time" is already something quite different than the measuring of time intervals between "instants." Being *in* time requires a reckoning with time. Consequently, there is a preoccupation with time before it is measured. To say "now" is really to say "now that" because the "now" in time carries an implied history and an implied future. It is only when the relationship between the now that "makes present" is obliterated from that which it retains and awaits that time can succumb to the representation of an abstract instant.

Narrative time, both in its private and public forms, requires a reconsideration of the ordinary notions of time which embed simulation. An important implication is that time may flow backward (Ricoeur, 1980). In private time, it can do this because memory can repeat the course of events in an order which is contrary to history. In public time, it can do this because the end of a story may be expressed before the beginning. Another implication is that narrative time in both its forms has the capability to transcend the simulation (by not ending with the simulation) and thereby confuse the imagination of the time that comprises the simulation with the reality of time in the world.

Both Slattery (1995, 2006) and Ricoeur (1980, 1984) show that time only makes sense within the context of language. As "beings in time" we are forced to *reckon* with time which means that there is an implied history and future in each so called "instant" of time which cannot be ignored. As Slattery points out, it is only by challenging the assumptions that underlie the conception of ordinary

time that a better understanding of time may become apparent. Simulation, as a projection of imagination upon the world, provides opportunities to entangle the physical dimensions of the world with the social imaginary in ways that inform the nature of learning in simulation. Narrative time is a concept which describes such an example.

Narrative Ethics

Narrative ethics is another concept which arises out of a narrative conceptualization of simulation. As Ricoeur (1984) has stressed, narrative can never be ethically neutral. Simulation, through an engagement with the social imaginary, alters the conceptualization of the self and the Other in direct ways. Simulation may challenge the authenticity of historical relationships and events or favour particular interpretations of these events. Furthermore, simulation purposes are always exercised in power especially when they are codified in curriculum. Even the notion of time, which implies a causal order to events, implies a necessary ethics that ensures fiction remains fiction. This means that simulation enters into the realm of experiential learning in intrusive and sometimes even violent ways. Kearney (2001, 2004) advocates that a critical hermeneutics requires four ethical tasks of narrative: (a) recognition of the debt owed to the past, (b) respect for the rival claims of memory and the need for forgetfulness, (c) cultivation of the notion of self-identity in terms of the Other, and (d) the need to persuade/evaluate action.

All narrative owes an ethical debt to the past (Ricoeur, 1984). According to Ricoeur and Kearney (2003), this is a central aspect of critical hermeneutics. By “past,” Ricoeur means both the past that is in the past and the past that is revealed in the present. Even though any narrative history must contain elements of fiction, there is a difference between fiction and the real events of history. Kearney (2004) states, “We must remind ourselves…that gas ovens and gulags did exist, that Nagasaki and Cambodia were bombed, that political crimes

and injustices have been inflicted on innocent people over the centuries. These were not simulations. They actually happened" (p. 100). As Kearney (2004) affirms, the ethics of remembering must at times respect the unique character of certain events. The danger is a superficiality that fails to discern the relevance of history. "It is just this relativizing tendency that our current culture of simulation evinces when it reduces narrative to a play of imitation devoid of historical reference" (Kearney, 2004, p. 103). Military simulations are often guilty in this regard. Sometimes and in some places, there is also the need to balance memory with forgetfulness. Some things must be set aside, intentionally left behind, so that forgiveness and acceptance may be realized. Kearney (2004) states, "Narrative memory is never innocent. It is an ongoing conflict of interpretations: a battlefield of competing meanings. Every history is told from a certain perspective and in the light of specific prejudice" (p. 105).

Ricoeur speaks of "liberating one's historical consciousness by remembering *oneself-as-another*" (as quoted in Kearney, 2004, p. 105). Kearney states, "Once one recognizes that one's identity is fundamentally narrative in character, one discovers an ineradicable openness and indeterminacy at the root of one's collective memory" (p. 104). Kearney states that after such recognition it becomes much more difficult to take oneself literally. It is in the propulsion of narrative towards the Other that there is a concomitant ethical journey. In so far as simulation constitutes such a journey, then simulation must find the balance between history and fiction. Empathy is thus seen to be at the heart of a narrative ethics.

Finally, narrative should call for an evaluative dimension of persuasion (Kearney, 2004). At its ethical best narrative should say, "Change your life!" It demands emancipation from ideological dissimulation. Narratives present the reader with a variety of ethical possibilities from which to choose and in which there is freedom to either embrace or discard. This exchange always carries an evaluative charge that requires a choice. As Kearney notes, "Even when narrative

fiction subverts the established system of virtue, it is still engaged, however implicitly, in a process of evaluation" (p. 113). A caution is in order however, because even emancipatory narratives can degenerate into oppressive metanarratives as Slattery (2006), Ricoeur (1986) and Kearney (2002) affirm.

"Narrative understanding is ethical because it is answerable to something beyond itself, so that even where it knows no censure (within the text), it knows responsibility (to the other beyond the text)" (Kearney, 2004, p. 112). Even when simulation knows no censure, it knows responsibility. Simulation, in narrative form, has at least four ethical responsibilities. It owes a debt to the past. It must balance the need to remember with the need to forget. It must cultivate a notion of self-identity as it strives to understand others and the Other, and it must call for an evaluation of action.

Summary of the Imagination Literature

Given that simulation is an imagination of the world, a conceptualization of imagination is required for this study. Historically, imagination has been conceptualized in many different ways (Kearney, 1988). The existential imagination of Sartre understands imagination as both a negation of the real and as a fascination with the unreal (Kearney, 1988). Sartre's view provides an explanation for the "suspension of disbelief," a phrase often given itself as an explanation for how learning occurs in simulation (Beaubien & Baker, 2004) but attributes it to pathological thought processes. However, the existential view does reveal the importance of temporal, spatial, and worldly unreality in imaginative settings, all of which are necessary considerations in the pedagogical construction of a simulation. While the existential imagination is primarily concerned with "images" manifested in the individual mind, another view advocates the imagination as an integral aspect of the social world. In this view, as advocated by Taylor (2004), Ricoeur (1986), and Kearney (2002, 2004) the imagination in the world is known as the social imaginary. It is what enables

making sense of the practices of society (Taylor). For Ricoeur (1986) the social imaginary has the two dimensions of ideology and utopia which serve (among other things) to balance issues of integration, dissimulation, and power. The social imaginary is ultimately only understood in a social context, and this means it must be understood through the Other. As Kearney (2003) points out, the Other can never be completely known and in extreme form is usually identified either as a stranger, a god, or a monster. Each of these three manifestations is apparent in the simulation setting. Because simulation replicates portions of the social imaginary in narrative ways, and because life is a story waiting to be told (Kearney, 2004), it makes sense to think of simulation as a form of narrative. This assumption is strengthened by Ricoeur's (1984) narrative concept of triple mimesis (prefiguration, configuration, and refiguration) which is relevant to how an individual might learn in simulation. Also, since simulation must engage the social imaginary and simultaneously bear obedience to natural law, reality takes on some peculiar aspects. These are the re-imagined concepts of Sartre's temporal, spatial, and worldly unreality. They are re-imagined because in the understandings of Ricoeur and Kearney, they are no longer confined to an interpretation that is pathological. Narrative time provides a striking example of an imagination that is open to possibility. Finally, a narrative understanding of simulation requires an ethical response which cannot be ignored (Kearney, 2004). This response is both empowered and limited by the social imaginary. Imagination is thus ethically manifested in simulation as it is in the world.

Summary of Literature review

The academic literature which I have found to be particularly useful to this study of learning and simulation is widely dispersed throughout a number of fields. In this chapter, I have paid special attention to the literature which is directly relevant to (a) the nature of simulation and the ways in which learning has traditionally been viewed to occur in this setting, (b) social learning

perspectives which prioritize experiential learning in ways relevant to this study's outcomes and conclusions, and finally (c) theoretical understandings of the imagination which I deem to be directly relevant to both the nature of simulation and learning. Within the context of this study, these three branches of the literature have revealed themselves to be particularly pertinent to both the theoretical and practical understandings of the ways in which learning emerges out of simulation.

The literature demonstrates that the nature of simulation and the ways in which learning actually emerges out of simulation are both understudied (Issenberg et al., 2005) and poorly conceptualized (Gaba, 2004). Consequently, there is a general call for more research into these issues (Bradley, 2006). Simulation is generally accepted as providing forms of situated experience (Bremner et al., 2006), and there are increasing demands to utilize simulation to solve some longstanding educational problems (Gordon et al., 1999). Unfortunately the utilization of simulation as a pedagogical tool in curriculum makes inadequate use of established learning theory (Bradley & Postlethwaite, 2003). The theoretical understandings that do exist are undergirded by notions of expertise (Issenberg et al., 2005) and behavioural perspectives of learning (Gaba, 2004), but these perspectives are clearly insufficient for this study because they ignore many aspects relevant to learning (Slattery, 2006). Conceptualizing experiential learning requires much more robust theoretical frameworks (Fenwick, 2003).

Social perspectives of learning suggest a multidimensional approach is more appropriate (Fenwick, 2008; Merriam, 2008). One way to better understand the nature of experiential learning (be it in simulation or otherwise) has been proposed by Fenwick (2003). Fenwick believes that there are at least five dimensions relevant to processes of experiential learning: purpose, interpretation, engagement, self, context. I use these dimensions as a framework for the analysis of the interview data acquired in this study. Also, two views of

social learning seem to be relevant to the social activity that simulation fosters. Complexity theory understands learning in terms of its emergence out of complex systems and forces a reconceptualization of common metaphors associated with learning (Davis et al., 2006) thereby opening a way to re-imagine educational environments such as simulation. The community of practice view stresses participation in social settings as the fundamental basis of learning and pays particular attention to the ideas of engagement, alignment, and imagination as the means to belong to such a community (Wenger, 1998). While simulations are not communities of practice in and of themselves, they may comprise part of a community of practice and may be pertinent as a form of legitimate peripheral participation where newcomers can learn the traditions, rituals, tools and symbols necessary for entry into practice (Lave and Wenger, 1991).

The ways in which simulation may imagine the traditions and symbolism of practice are not necessarily intuitive. Simulation as an imagination of the real suggests the need for a conceptualization of imagination. Traditionally, imagination has been understood in many different ways (Kearney, 1988). Typically, it involves the idea of the cognitively constructed image. But this is excessively simplistic, as Kearney points out, and provides no explanation for simulation as a function of the imagination. Better constructions consider Sartre's work on the existential imagination which understands imagination as both a joint negation of the real and a fascination with the unreal (Kearney, 1988). This particular understanding of imagination has been used to provide an explanation for the "suspension of disbelief" which is often attributed to simulation as the means by which the simulation is made real (Beaubien & Baker, 2004). Sartre's existential view reveals the importance of temporal, spatial, and worldly unreality in imaginative settings and presumably simulation settings (Kearney, 1988). However, these are viewed as being the result of pathological thought processes.

Ricoeur's (1986) view advocates the imagination as an integral and positive aspect of the social world. The manifestation of the imagination in the world is known by Taylor (2004), Ricoeur (1986), and Kearney (2002, 2004) as the social imaginary. It is the social imaginary that enables the interpretation of the social world (Taylor, 2004). Ricoeur points out that the social imaginary operates within the dialectic of ideology and utopia. These two dimensions counterbalance each other on issues of integration, dissimulation, and power and are present in all aspects of the social world including simulation. Because the social imaginary is always only understood in a social context, this means (according to Ricoeur) that it must be understood through the Other. The Other as Kearney (2003) points out has agency but is in some way unknowable. It typically manifests itself as a stranger, a god, or a monster. Each version may be present in the simulation setting. Because simulation replicates portions of the social imaginary in narrative ways (Kearney, 2004), it makes sense to think of simulation as a form of narrative.

The assumption that simulation is a form of narrative is supported by Ricoeur's (1984) thesis of triple mimesis in which prefiguration, configuration, and refiguration specifically relate to how an individual might learn in simulation as a narrative self. Narrative understandings of simulation also produce the concept of narrative time which demonstrates a peculiar way in which real physical laws interweave with the social imaginary. Narrative understandings of simulation also embed an ethical response that is both empowered and limited by the social imaginary (Kearney, 2004). Imagination is thus ethically manifested in simulation as it is in the world.

In this chapter, I have reviewed the literature in an attempt to expound the theoretical perspectives and practical implications of how learning emerges out of simulation experience. Both the review process and the writing of this chapter have been influenced by understandings gained in this research, and this is demonstrated in subsequent chapters. In the next chapter, I return to the

literature to justify the methodology I use for this study. I then outline the method I use to conduct the empirical research that comprises this study, and I introduce the study participants.

CHAPTER 3 - METHODOLOGY

The methodology of this study has been guided by the nature of the research questions outlined in chapter one and the literature review which I have documented in chapter two. In this chapter, I outline the theoretical aspects of the methodology that direct this study and briefly outline the conceptual frame that governs the interpretation of the data. I document the methods employed in the collection of data for this study which includes a discussion of the form and process of the interviews, the selection and description of the study participants, and a brief discussion of ethical concerns. I also make assertions as to the validity of this research.

Theorizing Interpretation

This study entails a form of naturalistic inquiry. Patton (2002) defines naturalistic inquiry as a discovery oriented approach that minimizes investigator manipulation of the setting or context and which places no prior constraints upon what the research outcomes will be. Consequently, and in accordance with Patton (2002) and Van Manen (1997), I make the assumption that the perspective of others is knowable and meaningful. However, I also note that understanding the perspective of others requires interpretation.

The design of this study is premised upon Patton's (2002) conceptualization of qualitative inquiry in which he outlines the following ten governing principles which I have attempted to follow in this study: (a) real world observations through naturalistic inquiry; (b) openness, responsiveness, and flexibility through emergent designs; (c) focus through purposeful sampling; (d) richness and depth of data; (e) use of all of one's capacities through personal experience and engagement; (f) balancing the critical and the creative through a stance of empathic neutrality; (g) sensitivity to dynamic processes and systems; (h) appreciation of idiosyncrasies through a unique case orientation; (i) insight

and understanding through inductive analysis, contextual sensitivity, and a holistic perspective; (j) authenticity and trustworthiness through ownership of voice and perspective. Atkinson and Delamont (2005) strongly stress the principle that research should be "faithful" to the phenomena under investigation. For them, this "means paying attention to the forms and media through which social actions, events, and representations are enacted, encoded or embodied" (p. 824). To me, this means honouring the intent of those individuals whose perspectives I have sought to understand. This entails an attempt to capture the lived experience of the participants and to embody this in written text.

I have followed a phenomenological-hermeneutic form of analysis conceptually derived phenomenologically from Patton (2002) and van Manen (1997) (which I report in the next section) and hermeneutically from the theoretical underpinnings of Paul Ricoeur. Ricoeur (1986) states, "All reading is a kind of violence; if we do not merely repeat, we interpret" (p. 115). Ricoeur suggests that hermeneutics is the art of deciphering indirect meaning (Kearney, 2004). By indirect meaning, Ricoeur is referring to hidden meanings that lie in the presence of more obvious apparent meanings. The indirect meaning is never given overtly, but it is the indirect meaning that, according to Ricoeur, provokes interpretation (Kearney). Provoking interpretation is a key concept because, while all meanings require interpretation, Ricoeur is referring here to a specific form of phenomenological interpretation that requires effort and insight. The insight arises in part from pre-existing historical and cultural understandings.

Ricoeur's phenomenological hermeneutics varies from certain versions of both phenomenology and hermeneutics. For example, Heidegger's view that the understanding of "Being" is primarily accessible through the route of human existence (Dasein) with the self interpreting the self through an understanding of its own possibilities is not in accord with Ricoeur's view that the best way to know oneself is through the Other (Kearney, 2004). According to Ricoeur, the

self is much more than an autonomous “I” because the self is really the “self as another.” This means that an individual cannot transparently and effortlessly translate their own experience. Similarly, Ricoeur’s view of hermeneutics does not prioritize authorial intent over the content of the text as is the case in “romantic” forms of hermeneutics. The intention for Ricoeur is not only to understand what was meant but also what was said, because ultimately understanding must occur through language. It is important to acknowledge a difference between speech, which is the immediate dialogue between a speaker and a listener, and text as mediated discourse. In the former, intent is important for understanding, but in the latter when it is no longer possible to question the author’s intent, text stands apart.

There are four parts to Ricoeur’s conceptualization (see Dreyer & Pedersen, 2009; Geanellos, 2000). First, when a dialogue is put into writing, the meaning of the text becomes more important than the spoken word. This is because the text becomes a record of a conversation. It does not alter over time and space in the way that a recollection of what was said may alter. Second, the text eclipses the intention of the original author where the text becomes autonomous and open to unlimited reading. A text may contain particular meanings which though unintended by the author nevertheless are deemed relevant by its readers. Third, the text is freed from the context of its creation to be interpreted in differing socio-political and cultural traditions. Finally the text is freed from the dialogical constraints of spoken discourse to be interpreted with different reference to the world. I acknowledge Ricoeur’s hermeneutic understanding that upon first reading the initial meaning provided by a text is naive. But through analyzing the parts of the text in relation to the whole and the whole of the text to the parts, a deeper understanding emerges. I recognize that the hermeneutics of Ricoeur is a departure from the pure descriptive phenomenology which contains a primary emphasis on the reflection of experience as an intentional mode of consciousness. However, Ricoeur is not at

odds with van Manen (1997). Ricoeur always tries to be true to authorial intent when he can ascertain what that intent may be (see Ricoeur, 1986). In this study, I also attempt to be true to the authorial intent of the study participants.

Distanciation is an important part of the hermeneutic process according to Ricoeur. The text has a mediating function that extends beyond the original spoken utterance. For one, it allows conveyed meanings to survive beyond the original author and audience. There is a sense that the text enjoys a certain independence from the author's original intentions, the audience's original reception, and the context of the original "speech." This is known as the second order of text. This also means that the text will be reinterpreted by different audiences in different contexts at different times. Textual interpretation always varies.

Privileging of the text as a model of interpretation has some radical implications. Kearney (2004) explains.

> Meaning is no longer construed as an essence to be intuited (Husserl), nor as a transcendental condition of possibility to be reflected upon (Kant). The text breaks the circuit of internal reflection and exposes us to intersubjective horizons of language and history. Meaning, as Ricoeur constantly reminds us, involves *someone saying something to someone about something*. This requires us to pay attention to the particular contexts and presuppositions of each speaker and each reader. Interpretation is described according to Ricoeur as the process by which, in the interplay of question and answer, the interlocutors collectively determine the contextual values which inform their conversation. Interpretation explodes the confines of the timeless reflective subject and discloses us as language-using beings in a world with others. (p. 4)

While interpretation can never be absolute, some interpretations always remain better than others, a point on which Ricoeur was emphatic. “The central thesis of hermeneutics, he insists, is that interpretation remains an ongoing process which no one vision can totalize” (Kearney, 2004, p. 5). Interpretation means inserting oneself into the middle of meaning and trying to make sense of it. A critical debate occurs as an attempt is made to sort through conflicting interpretations. Ricoeur agrees with Heidegger’s notion of a hermeneutic circle. The circle is entered through an understanding of distanciation, which is to say, an understanding of the second-order reference of the text. The circle is departed through acceptance of the hermeneutic wager that is made on the interpretation of the text.

Peshkin (2000) argues that the interpretive process is “assumption-laden” and “judgment-driven” (p. 9). He notes that the researcher is engaged in interpretation from the initial conception that originated the research process; a conception that is and must be mutable. He states that researcher subjectivity is involved in many areas of interpretation. This includes (a) the initial question selection, (b) the subjects selected to be interviewed, (c) what counts as evidence, (d) what to choose to write about, (e) how the elements are composed in the research story, and (f) the shaping of meaning and understanding. Peshkin affirms that in social research there is no crucial test of theories. He believes, as do I, that the real test is how useful or interesting a particular way of “looking at things” is to a critical audience. He states, “In short, it is the work of others to reject, modify, and reconstrue the researcher’s selection of ‘fact’ and the order and relationships that form the basis of the interpretation and its conclusions” (p. 9). In this spirit, I acknowledge that all interpretations are provisional.

As Patton (2002) states, “A basic tenet of research admonishes the careful separation of description from interpretation” (p. 438). This assertion is in keeping with Guba and Lincoln’s (2005) understanding of validity in research which I outline later in this chapter. In this study, I have attempted to carefully

record the perceived experiences of the study participants as they were relayed to me. I also have attempted a valid hermeneutical interpretation of the interview texts. In the next section, I outline the specific methods I used in this research.

Methods

The method of data collection which best fits the purposes of this study is the unstructured open ended interview. As Patton (2002) states, "The purpose of interviewing…is to allow us to enter into the other person's perspective" (p. 341). However, as Fontana and Frey (2005) point out, interviewing is "inextricably and unavoidably historically, politically and contextually bound" (p. 695). Interviewing can never collect objectively neutral data. The interviewer must always take a stance. Fontana and Frey note that empathetic approaches to interviewing differ from the conventional approaches in precisely this manner. An ethical stance is taken in favor of the individual or group being studied. This, they believe, restores the "sacredness of humans" in preference to theoretical or methodological concerns (p. 697). Fontana and Frey further urge that researchers become reflexive not only about what the interview accomplishes but how the interview is accomplished in order to uncover "the ways in which we go about creating a text" (p. 697). They believe the focus of interviews must encompass how people construct their lives and not just focus on the activities of their lives.

Choosing Participants

The participants in this study were chosen because of their extensive experience with simulation. All expressed an eagerness to relay their experiences for the purposes of this study, and I believe that all have been sincere in their expression of events. All have experience that directly relates to their

engagement in simulation as a learning activity. All also have teaching experience where they guide or control the course of a simulation activity for others. All have considerable work experience in their respective field of endeavour.

After finding each potential participant through various means described below, I informed each potential participant as to the nature of the study, and I outlined the requirements of participation. I followed this up with a letter or email, in some cases hand delivered, stating very explicitly the nature and purpose of the study. This correspondence included the method of study, the potential uses of the findings and the ethical procedures to be followed. I did not select any individual that I worked with in any significant capacity. Neither did I select any current or prior student of mine. I do not believe that I have compromised any of the individuals I have interviewed. Of the twenty-five or so individuals contacted from all over Canada, eight eventually became participants in the study.

Using gender specific pseudonyms for confidentiality, I briefly describe the eight participants below and my reasons for selecting them. They range in age from late 20s to early 50s. Three women and five men were interviewed. Seven were born in Canada and speak English as a first language. One was born in El Salvador and speaks Spanish as a first language with English as a second language. All have some form of post-secondary education.

Rob has a master's degree in education, has been a paramedic for over 20 years, and is employed as a paramedic instructor in a province other than Alberta. At the time of the interview process, Rob was a provisional PhD candidate at a major Canadian university. I first met Rob in 2006 at an educators' conference. We corresponded via email prior to the interview. The second interview was conducted over the phone, and I have subsequently been in contact with him regarding some specific ideas he has pertaining to simulation.

Pat is a registered nurse and holds a Master's degree in nursing. She is responsible for coordinating the simulation experiences of all the nurses in the faculty of nursing at a major Canadian university. I met Pat through her participation in a research and education group dedicated to the furtherance of simulation in clinical practice. I interviewed Pat once in her work office.

Rick is a registered paramedic who at the time of the interviews was completing a Bachelor's degree in Political Science, and it was through his occupation as a paramedic that I first made his acquaintance. Rick is a member of the Canadian Armed Forces and has served overseas in various capacities. He did a tour of duty in Afghanistan in a combat role. Upon Rick's recommendation, I read two books by Dave Grossman (1996, 2004) in order to attain a better understanding of military training procedures. I interviewed Rick twice.

Mark was a train conductor and a train engineer for several years prior to taking a job with the Information Technology department at a major Canadian university. I got to know Mark as a brilliant computer technician and enjoyed talking to him about trains even prior to this research. Mark took an early interest in this study and offered to share his own experiences in simulation. I interviewed Mark once. Tragically, Mark passed away suddenly while at work just days before the second interview was scheduled to occur. Mark possessed a real love for trains and intended to teach me how to run a train on his own desktop simulator.

Melanie completed a Master's degree in geology and as of this writing is working on her doctorate at a major Canadian university. Melanie is the youngest of those interviewed. She was mission commander on several Mars Society simulation expeditions. Most significantly, she commanded the four-month Mars simulation mission at the Flashline Mars Arctic Research station (FMARS) analogue site on Devon Island in the Canadian arctic. I met Melanie at a space conference where she agreed to be interviewed. I interviewed her once and have been in contact with her via email since.

Kris, a Spanish speaking native of El Salvador, was drafted into the military at the age of 16 although his birth certificate was altered by that government to make him appear two years older. He served in combat for almost three years. He immigrated to Canada with his family immediately upon leaving the military. I include Kris in this study because of his involvement in immersive simulation training as a "child soldier" and because he tells a story that must be heard. I have interviewed Kris once. Post interview, Kris has several times provided clarification on specific items via phone conversations.

Clarissa has many hours of flight time in sophisticated aeroplane simulators. She is a category four flight instructor and a flight acrobatics instructor. She has taught in both the civilian and military realms. Clarissa was my flying instructor and after completion of my private pilot training, I requested an interview with her. She provided me with videotapes of her training in simulation from several years ago. I interviewed Clarissa twice, and I have received clarifications regarding her interviews over the phone.

Dave has been a firefighter for over 20 years. I met Dave through a friend in common. I have interviewed Dave twice. Dave is particularly interested in the well being of the community in which he lives, and his participation in the fire department is a direct result of this value. Dave is an active participant on municipal committees ranging from public transportation to environmentalism.

Each of the eight individuals has extensive experience involving simulation as an integrative aspect of their work practice. I conducted the in-depth interviews in order to explore aspects of their experiential learning through simulation. My priority was to explore the forms of knowledge and processes of learning that emerge within immersive simulation contexts. The selected individuals, located across the country, had all participated in immersive simulation in seven different fields of work: aerospace, nursing, paramedicine, aviation, fire protection, locomotive engineering, and the military.

These high stakes fields are related in terms of their low tolerance for error. Paramedicine and nursing use sophisticated patient simulators to verify competency in entry to practice programs. Aviation uses sophisticated cockpit and full motion simulators which predate anything comparable in any other field, and it is in aviation that simulators were first recognized for their relevance in acquiring experience. It is also in aviation that simulation time is credited equivalency for flight time in government licensure requirements. In the aerospace field, sophisticated analogue environments have been constructed which simulate extra-terrestrial conditions. Analogue sites on Devon Island in the Canadian arctic simulate the landscape and weather conditions of Mars. Simulation is used in the education of locomotive engineers in ways similar to its use in aviation. Fire fighters commonly use simulation during fire practice where real fire is typically used to simulate fire in context specific ways. Typically, firefighter simulations do not rely on sophisticated technological machinery, but rather on the construction of an environment. Many military simulations consist of reenactments of historically based engagements. Military simulation can also use sophisticated equipment for skill acquisition purposes. I believe that these seven fields of work provide the breadth of simulation diversity necessary to understand the ways in which learning emerges out of simulation activities.

Interviews: Form and Process

I started the first interview with a brief explanation of the purpose of the study along with clarification of my ethical responsibilities. All participants knew that my thesis was on how learning emerged out of simulation activity. The interview proper typically began with the use of a statement such as "*so tell me about your simulation experience.*" which I found to be quite sufficient to get the interview started. Patton (2002) notes he frequently finds "the richest and most detailed descriptions come from a series of questions that ask a respondent to re-experience and/or simulate some aspect of an experience" (p. 368). In the

interviews, I attempted to incorporate Patton's advice especially pertaining to the use of probes to increase the depth and richness of a response. Thus, all questions subsequent to the first were probes that I modified as I deemed appropriate. I noted that the less I interrupted the discussion, the more coherent was the story that emerged, and I attempted to allow the participant to follow a train of thought even if it seemed like it might be off topic. Occasionally, participants asked if I agreed with their statements. Sometimes, they asked for my thoughts on the topic. To these questions my response was always brief. Typically I would reiterate that as a researcher I was trying to remain without opinion and instead seeking to understand their experience. Subsequent interviews were more structured. In part, subsequent interviews were based upon the availability of the participant. The second interview was mostly about clarification of previous points raised in the first interview. This approach allowed me to remain free to explore and probe conversation and, therefore, to acquire a rich text of the participant's experiential interpretation.

I was aware of the context of the participants' experience prior to the interviews, and I believe that this enabled me to encourage participants to tell more about themselves in relation to the topic of simulation. Trust was something I endeavoured to establish from the outset, and I believe that I was successful in doing this. The second interview did not begin with a transcript of the first as I originally intended. It seemed that the participants were always short of time, and I did not feel that rereading the transcript was the most efficient use of their time. However, I did select what I believed were particularly relevant passages from the transcript and read them aloud before asking the participant to validate, clarify, and expand the content. In every interview, I encouraged the participants to reflect on the meaning their experience held for them, and I encouraged them to look at the factors in their lives that came together to bring them to their current situation relative to simulation learning.

Fontana and Frey (2005) argue that the researcher should note the use of nonverbal communication. This involves the use of interpersonal space to convey attitude, the pace of the conversation, and length of silence interspersed within conversation. It also involves body movement and gesture, along with variation in pitch, tone, and volume. I took note of emotional response when I found that it might alter the interpretation of the written text. A subsequent interpretation of a portion of the interview text might not infer that a comment was said in jest unless it was noted in the transcript that the participant was laughing at the time. I also took note of the hand motions that at times conveyed a sense of dynamism to the conversation though I later found I did not rely on these during the analysis.

Interview Documentation

All interviews were audio-recorded and fully transcribed. I did not take notes during the interview as I found it more important to maintain eye contact. I found that note taking broke the flow of the interview and distracted the participant. Two individuals assisted me in transcribing the interviews. The transcribers were committed to following the University of Alberta ethical procedures for research involving human subjects. I obtained a signed document from each transcriber ensuring their commitment to confidentiality. I subsequently compared all transcriptions to their respective recorded interviews for verification of accuracy. However, in places where I quote the participants in this thesis, I have corrected minor grammatical errors in the interview text unless by doing so it somehow detracted from the text.

Researcher's Journal

During the course of the study, I used a journal to capture my interpretations, questions, and ideas as I encountered the research process. I

understand that the danger in this might be to arrive at a form of substantive interpretation prior to careful analysis, so I tried to remain alert and attentive to my own biases, as they became apparent to me. The process of tracking written reflections, judgments, preliminary responses and developing interpretations can help increase awareness of bias and the potential of making the data fit any preconceived ideas.

Ethical Aspects in Qualitative Interviewing

Patton (2002) has stated that it is not the purpose of a qualitative interview to change people. However, Fontana and Frey (2005) discuss the idea that the interview might be considered as "a contextually based, mutually accomplished story that is reached through collaboration between the researcher and the respondent" (p. 714). This speaks to the idea of the interview as a negotiated accomplishment where the "products" of the interview are really the constructions of a social activity. Certainly any process which involves intensive reflection may have lasting effect on the individual undergoing the reflection (Patton, 2002). There is a fine line between attempting some semblance of empathic neutrality and portraying a cold and unresponsive stance to heartfelt human issues. Interviews may be intrusive in the sense of opening old wounds, or they may unintentionally become a process for healing.

Traditionally, ethical concerns have been based on the issues of informed consent, the right to privacy, and protection from harm (Fontana & Frey, 2005). More recently, to this list have been added the concerns of studying uninformed vs. informed respondents and the degree to which the researcher is involved with the group under study (Fontana & Frey). As well, the claims of the researcher have ethical connotations. Fontana and Frey point out that, "A growing number of scholars… feel that most of traditional in-depth interviewing is unethical, whether wittingly or unwittingly. The techniques and tactics of interviewing, they say, are really ways of manipulating the respondents while

treating them as objects or numbers rather than as individual humans" (p. 715). Furthermore, interviews can become confessions under the promise of confidentiality even though, with respect to court proceedings, the confidentiality may be illusory (Patton, 2002). However, I believe that those I interviewed desired to be interviewed. They took pleasure in telling their story to someone who was intent upon hearing it and understanding it. The participants expressed an interest in the way learning emerges out of simulation and appeared to be sincere in their expression of desire to help with this study.

In this dissertation, I undertook several measures to ensure ethical guidelines were followed including safe-guarding privacy and ensuring protection from harm. I acquired informed voluntary consent by outlining the nature, purpose, method, and ethical procedures to all participants when first inviting their participation, both orally and in writing. I restated this at the beginning of the first interview, and received acceptance of both the terms and conditions of the research. This verbal acceptance was accompanied by a signed consent form. The consent form is evidence that participants understood what they were being asked to do, and understood the ways that their rights as participants were and are protected. One participant signed a modified consent form stating that it did not matter if she/he were able to be identified given that aspects of the data may make such identification possible. We agreed that we would nevertheless hide the identity as much as possible.

I followed all of the ethical procedures required by the Tri-Council Research Board of Ethics and enforced by the University of Alberta. I made it clear that participants could end their participation in the study at any time for any reason, and that subsequently data obtained from them would not be used in the analysis or findings. I will keep all of the raw data secured in my office for 5 years, at which time, I will then destroy it.

Data Analysis

In its practical aspects, I adapt the following means of data analysis primarily from Merriam (1988). Hermeneutic analysis involves what Merriam calls, "holding a conversation with the data" (p. 131). It also involves, as Ricoeur (1986) has noted, interacting with established theory.

1. The analysis of the data started with an attempt to grasp the essence of each interview. This was accomplished by carefully listening during the interview process (the first pass) and by probing for clarification as was needed during each specific interview. At this point, I was trying to become aware of the variety of issues and perspectives.
2. During transcription (the second pass), I highlighted the portions of text that I found interesting or at the time deemed to be particularly relevant based on my understandings at the time.
3. After all the first interviews were transcribed, I began to compose a list of items which cut across all the data. This required a third pass through the data. In doing this, I started with one interview and composed a list of "patterns." I then moved to the next interview text and checked it against the list. If I added a pattern to the list, I went back and checked the prior interview texts for evidence of its existence. I followed this procedure until I had a list completed. As I was doing this, I cut portions of the interview text out of the interviews and composed a document of evidence for each pattern. This outline consisted of 15 patterns, and it allowed me to think about some observed regularities. I attempted to do this without reference to theory; however, as Hanson (1958) first pointed out, all observations are theory-laden. A researcher cannot stand outside of theory to discern topics of social relevance. By the time the list was completed, the second order reference of the text had become apparent. It was at this point that the analysis began in earnest.

4. I then set the original outline aside and went through the data a fourth time without reference to the first list. In essence, I was starting over, but this time I was more prefigured to understanding what I would find. In this pass, I was more deliberately contemplative of items. I obtained nearly 200 items which I deemed to be relevant to answering the research questions. These were quotes derived verbatim from the data. These quotes were always long enough to discern context. Only a few were a sentence. Most were a few sentences. I called these units of data, and they were specific to each study participant. I began a process of coding whereby I linked the units of data to interviews and patterns.
5. I noted that some units of data had interesting data elements derived from all of the participants (a data element might be a single word like "call" or "moment"). Others were represented by only one participant. I used this information to guide the direction of the second interview. Primarily this meant obtaining clarification on a previous story or obtaining aspects of the story in greater detail with the hope of determining if particular units of data would or would not apply.
6. As I went through the data a fifth time, I was examining both first and second interviews. I refined the units of data, eliminating some, adding others. I began to group the units of data into groupings called units of analysis. *The suspension of disbelief, time in simulation, fun in simulation*, for example, were three of about 75 units of analysis. I intended that a unit of analysis should meet the following two conditions. First, it should reveal information relevant to the study and stimulate thought beyond the particular piece of information that a surface understanding would immediately indicate. Second, the unit should be the smallest amount of information about something that can stand by itself. In sorting the data, I brought theoretical knowledge to bear, particularly Fenwick's (2003) dimensions of experiential learning.

7. I then went through the units of data that had been coded to each unit of analysis and organized them into specific categories which at this point I considered preliminary. Typologies, themes, and higher order conceptualizations must be informed by the research purpose. As Merriam (1988) has noted, “This is largely an intuitive exercise” (p. 133). I attempted to construct the categories in a manner such that the distinctions between them were bold and clear. According to Merriam, there are four guidelines for establishing higher order categories: (a) based on the frequency by which something arises in the data; (b) based on the audience that reads the report; (c) based on uniqueness; and (d) based on an area of inquiry that would not otherwise be recognized. I called this the sixth generation analysis.
8. I next checked the categories for completeness. The categories were made more robust by searching through the data for more and better units of information. This involved going back to the work as whole, the seventh generation analysis. Here the categories were viewed not only as describing the data but also as interpreting the data. Each unit of data and unit of analysis were reassigned to a particular category. I set up a spread sheet to track the cross references. At this stage there were 15 categories. Three of these were *Time, Mythos,* and *Agency.* The category *Mythos* demonstrates I was beginning to think in terms of narrative structure. A few data elements were ultimately unassignable.
   I intended that the categories must also reflect the purpose of the research, be exhaustive, mutually exclusive, and independent.
9. Interpretation and theorizing eventually became foregrounded over description. This involved speculation and projection as I attempted to reveal the meaning of the text through my own understanding of the text. I noticed that there was a correlation between the categories that I derived from the data according to Fenwick’s (2003) dimensions of

experiential learning and Paul Ricoeur's (1986) and Richard Kearney's work on the Imagination (2003, 2004). I began to consider how a theoretical model might merge these elements.

10. I then attempted to divide the 15 categories into Fenwick's (2003) five dimensions of experiential learning: purpose, engagement, interpretation, self and context. It soon became apparent that some categories fit into Fenwick's dimensions better than others. This presented a problem because while data in the category *Agency* tended to fit nicely within the dimension of *Self*, in the category *Mythos* data were moved into all of the other dimensions except *Self*.
11. What followed next was a reexamination of all the units of data to slot them most appropriately into one of Fenwick's dimensions. Some went into more than one dimension. This involved a recursive process of exploring conclusions which essentially worked from the units of data within the text outwards to overarching categories and dimensions, then in again to the particularities. This involved writing, editing, and rewriting. This happened in consultation with my thesis advisor.
12. At all times, I attempted to remain alert to tensions and contradictions within the text and within my interpretation of the text. It may appear that Fenwick's dimensions trumped the categories I derived from my empirical analysis. I do not believe this to be the case. The categories led me to Fenwick's dimensions, and their information forms the basis of the content in chapter 4.

Limitations and Bias

Each participant's field of work has domain specific knowledge tacitly embedded with signs, symbols, and tools that are inherent to the work. Each contains a context specific vocabulary that may not readily be interpreted. A potential difficulty in understanding the lived experience as mediated through an

in-depth interview is understanding professional context, professional language and vocabulary. There is a sense in which the interviewer must come prefigured prior to conducting the interview. Prefiguring means the interviewer is able to comprehend the language of the participant and comprehend the context.

As a paramedic I have worked alongside nurses. I understand the context of medical terminology. I have also worked alongside firefighters. As a paramedic instructor, I am acquainted with the use of simulation as a pedagogical tool. I hold a private pilot's license and understand the vocabulary and the culture of pilots. I have been a member of the executive of the Mars Society of Canada and am aware of the efforts being put into the operation of the Flashline Mars Research station on Devon Island and the Mars Desert Research station in Utah. I am also ex-military (having served in the Loyal Edmonton Regiment), so I have some understanding of what it means to be in the military. All of this helps me to understand the particular professional cultures of the study participants. However, it also means that I introduce my own form of bias through the potential to superimpose my own experiences and my own preconceptions upon the findings of the study.

In contrast, I do not have any substantial knowledge of locomotive engineers. This appears as a limitation in the study which I think is evident in the analysis. I did spend substantial time clarifying terminology and pertinent job specific aspects of the discussion with Mark, but his experiences may not be represented in the data as much as the others. However, I was conscious of this and tried to compensate for it. Also, the limits of my experience did somewhat limit the professional domains with which I was prepared and eager to engage. This study was further limited through an inability to access individuals participating in other forms of work for which simulation remains an important learning regime. The nuclear power industry stands out in my mind here along with work related to various engineering applications. As well, at the time this study was started, virtual reality was more the realm of fiction than reality. Now

it is becoming increasingly known in various aspects of popular culture from the use of avatars to haptic (tactile) integration of computerized gaming modules. I did not interview anyone with experience in virtual reality simulation nor did I interview a "professional" gamer. Both of these point to opportunities for further research.

Delimitations

I do not define apprenticeship as a form of simulation, and consequently, it is not dealt with in this study. I have concentrated this study on what I believe to be immersive forms of simulation. I have dealt with "low fidelity" simulation like procedural task trainers when they have arisen in the data, but it has not been my intention to discuss at length every different form or aspect of simulation. Neither have I dealt in any substantive way with simulation technology. I have also chosen not to deal with computerized simulation models for things like physical or chemical interactions or complex scientific modeling.

Assertions of Validity

Assertions of validity are an important aspect of any research. This is not lessened with the use of interpretive paradigms. Validity is not a concept that can be dismissed as a dated component of positivistic research (Guba & Lincoln, 2005). Research quality relates directly to notions of validity. Unfortunately, issues of validity in interpretive paradigms of research have traditionally conflated method with interpretation. For example, Lincoln and Guba (1985) published criteria for trustworthiness which at the time was intended as the qualitative equivalent of quantitative validity. These criteria included the notions of credibility, transferability, dependability and confirmability. However, while these criteria have proved useful in the instrumental application of research methods, it is now clear that such criteria do not by themselves establish validity in research (Guba & Lincoln, 2005). As Guba and Lincoln (2005) point out, in

1985, they failed to recognize the importance of interpretation and its relation to validity. They now believe that validity involves two important aspects. The first involves the idea of trustworthiness, but perhaps more important is the second which argues for community consent and a form of rigor which may consensually ascribe priority to one interpretation over another. The latter is reminiscent of Ricoeur's community of interpreters, something Ricoeur and other philosophers have been advocating since the early 1970s (Kearney, 2004).

I mention Ricoeur here because Schwandt (1996) proposes a view that social inquiry generally must involve a form of practical philosophy, a view which (I believe) Ricoeur would wholeheartedly endorse. Essentially Schwandt argues against the belief held by many social scientists that "[research] method offers a kind of clarity on the path to truth that philosophy does not." Guba and Lincoln (2005) take up Schwandt's argument in their discussion of validity and suggest that assertions of validity involve practical philosophical arguments. Schwandt suggests (and it is reiterated in Guba & Lincoln, 2005) that naturalistic inquiry must (a) understand the aims of practice from a variety of perspectives, (b) cultivate the ability to engage in a moral critique (as in developing critical intelligence) and (c) make judgments based on the capacity of the research to foster practical wisdom.

Guba and Lincoln (2005) also suggest that notions of authenticity are necessary aspects by which interpretation might be judged. By authenticity, they refer to research that raises the level of awareness in the self and others and which may prompt some form of action both in the research participants and in the researcher. However, I would also include here Taylor's (1991) ideal of authenticity which in this context implies that research should attempt to make the human condition in some way better and Ricoeur's hermeneutical theory of interpretation which guides interpretation to some practical social significance.

I believe this research to be methodologically and hermeneutically valid based upon the following assertions.

1. The conclusions are directly relevant to the research questions.
2. The research questions asked are methodologically sound in the ways I have outlined in the methods section of this proposal.
3. I have attempted to fairly represent the views of the participants and to be true to their particular intentions within the context of the interviews. This has involved prolonged engagement with the participants.
4. In various chapters, I have included extensive quotations derived from the interviews of the participants. These instances provide important opportunities for the readers of this research to contest my interpretation and formulate new insight into the experiences of the study participants. This will aid in the transferability of the data to other research endeavors.
5. The analysis of the information conforms to established theoretical and methodological frameworks.
6. I have followed the ethical guidelines required for this research as required by the Tri-Council Research Board of Ethics and enforced by the University of Alberta.
7. The conclusions I draw make sense within acceptable theoretical frameworks and have practical applications which may be used to improve the human condition.
8. Supervisors and committee members have been tasked with the oversight of this research. These individuals have challenged both the method and the interpretation of this study.

So while a rigor of trustworthiness must be maintained in valid research, a second rigor which considers the ways and means by which interpretation is prioritized must also be upheld. I have attempted to fulfill both requirements in this research. However, Guba and Lincoln (2005) point out the following about research validity.

> How do we know when we have specific social inquiries that are faithful enough to some human construction that we may feel safe in acting on them, or, more important, that members of the community in which the research is conducted may act on them? To that question there is no final answer. (p. 206-207)

It is ultimately up to an academic community of interpreters to render judgment as to the worth of this particular study.

Methodology Summary

This research is a form of naturalistic inquiry directed towards understanding what forms of knowledge and processes of learning are generated in a simulation learning environment. Conceptually, the methods employed rely upon Patton's (2002) conceptualization of qualitative inquiry, Van Manen's (1997) phenomenological approach *t*o lived experience, and Ricoeur's hermeneutical approach to the interpretation of the text. This study relies upon the use of in-depth qualitative interviews of eight individuals from seven different fields of work (which regularly incorporate simulation into work practice) in order to determine what forms of knowledge and processes of learning emerge out of simulation. This method allowed me to foreground the perspective of the learner which is generally under-represented in the simulation literature. In this chapter, I have shown that in order to demonstrate validity both trustworthiness and rigorous attention to the details of interpretation are necessary.

CHAPTER 4 - THE SIMULATION LEARNING EXPERIENCE OF THE PARTICIPANTS

As I pointed out in the previous chapter, the world requires interpretation. This chapter is an interpretation of the experiential interpretation of others. As Richard Kearney (2004) says in *The Owl of Minerva,* this is my hermeneutic wager on their hermeneutic wager. However, having said this, I do not concede that all interpretations are equal. Some are better than others. While I view myself as being guided by the data, I nevertheless believe that theory has been instrumental in the way the data have been categorized and structured. As Hanson (1958) has stated, all knowledge is theory-laden. Consequently, I have organized the data according to a theoretical frame of reference which I arrived at only after reviewing the data. This theoretical frame relies upon Fenwick's (2003) dimensions of experiential learning.

As I have elaborated in chapter two, Fenwick's (2003) five dimensions of experiential learning are purpose, engagement, self, interpretation, and context. I use this typology as a means to organize the different ways in which immersion in a simulation may result in experiential learning. Paul Ricoeur (1986) is quite correct when he states in *Ideology and Utopia* that "schematas are very dangerous" (p. 310). Typologies can mislead, and the one used here may be construed as implying a reductionism or a positivism that neither I nor those I cite intend. It is important to note here that Fenwick (2000, 2003) expresses her own concerns on the use of typologies. Certainly, I have preferentially selected particular data elements while excluding others that could have shed light upon the interpretation I present or upon alternative interpretations. This cannot be helped. Every categorization can be deconstructed and then reconstructed in a different form or fashion. In presenting the data, I have done my best not to quote the participants out of context. I have attempted to remain true to what I perceive their intent to be given my understanding of the stories they have told.

Some of the concepts arising out of the data resist categorization in Fenwick's (2003) typology. Consequently, some of the themes arising from the data are somewhat arbitrarily categorized. However, it is precisely because the data resist reductionist forms of classification that the data should always be viewed in relation to the whole. The five dimensions of experiential learning are present to some degree in every data theme, and just because data in this study are contained under a heading of purpose, for example, does not disqualify the same data from presenting insight into engagement, interpretation, self, or context. Supplementing Fenwick where appropriate, I also integrate aspects of Ricoeur's (1986) understanding of the social imaginary, particular concepts related to complexity learning theory, and some of Wenger's (1998) ideas on communities of practice, theories which were introduced in the literature review as outlined in chapter two.

Purpose as a Dimension of Experience

Simulations are purposeful activities. They are entered into deliberately and have desired outcomes which may or may not be realized. Fenwick (2003) points out that a situation may be approached with varying intentions, but in all cases, the intentionality of the approach will affect what is learned. Fenwick also notes that purpose may be conflicted and contested. It is evident that multiple purposes are always at work in any simulation, and sometimes these purposes point simulation participants in different directions with confusing results. Purpose is caught up in power structures, and this means that purpose may be overt or hidden, clear or ambiguous. Certain purposes will be pedagogically supported in overt ways (e.g., through pass/fail criteria in the simulation) while other purposes may be ignored by "outcome measurements" and thus be relegated to an inferior status. Purposes which emerge in the enactment of the simulation (and realized only after the fact) may conflict with purposes established prior to the simulation. A simulation that declares a purpose of

"establishing teamwork in a medical setting" may actually be part of a process that legitimates the physician as the default team leader. After the fact, it may be recognized, for example, that the primary purpose of the process was really to establish the authority of the physician over other members of the medical team.

Many different purposes for simulation are evident in the data. Sometimes simulation can be used as a motivation to maintain a state of operational readiness for firefighters as Dave points out. Sometimes simulation can have a purpose related to advancing an academic career, where the publication of research becomes a factor in the design of the simulation as in the case of Melanie and the Mars analogue simulations. Rick and Clarissa affirm the importance of simulation as a means to practice drill. On occasion, simulation is entered into because it is fun as Mark demonstrates when he recounts the joy he has in playing Microsoft® Train Simulator. However, in the following section, I concentrate on three kinds of purposes which were deemed to be particularly important in some way to every study participant. These are (a) to provide a basis for credential or qualification attainment, (b) to ensure safety during mistake making, and (c) to foster involvement in complex work practices.

Credentialing and/or Qualification Attainment

A common purpose for simulation designers, instructors, and students is to use simulation as a tool to achieve a credential or qualification. In terms of acquiring a credential, this is primarily a utilitarian purpose, and typically it is pedagogically recognized by the study participants as being both overt and clear. The study participants acknowledge that an institution defines a qualification, sets the criteria for completion and in some fashion imposes its will upon those seeking a credential. In this regard, the general perception of the study participants is of complicity and acceptance regarding this particular power arrangement.

All of the study participants indicate that simulation is important for credentialing or employment qualification purposes. This was clearly demonstrated by Clarissa, who undertakes simulation in sophisticated aircraft simulators to obtain certification to fly particular aircraft both as a student and for her own students. Transport Canada recognizes that simulation flight time can be equivalent to real flight time during training purposes, though it is logged differently in the pilot's logbook. Clarissa states, "Where the students go in their career will determine what simulators they get to go on." Similarly, Mark was required to certify in a train simulator in order to be a locomotive engineer. Dave revealed that simulation is used in ongoing fire training exercises some of which are mandatory for firefighters. Kris and Rick both participated in simulations to achieve particular military qualifications. Pat and Rob pointed out that simulation is now embedded in entry-to-practice nursing and paramedic programs.

A credential also maintains a symbolic presence and legitimates an opportunity to participate in a particular practice whether in simulation or in the real world. One way in which the symbolic nature of a credential is manifested in simulation is through its power as a status symbol within a profession or field of work. Melanie is able to command a lengthy Mars analogue mission on Devon Island because she has participated in smaller missions at the Mars Dessert Research station in Utah and is now able to speak at conferences because of that experience. In a more general sense, instructors facilitating a simulation have a qualification and status that the students participating in the simulation do not have. Students are not the peers of instructors. However, because a credential's claim to legitimacy is power based, it is contestable and students may challenge the legitimacy of instructor qualifications.

The status of a credential can also foster a sense of professional pride or ethics which leads to expectations of how individual practitioners should act. Pat has clear expectations about how her student nurses should act when

demonstrating patient care in simulation. In live-fire military simulations, Rick expressed expectations about how soldiers should act. These concerns are not just related to utility. They are also about teaching what Rick calls “esprit de corps” or maintaining belief and pride in an institutionalized goal. Belief may also compete with a credential’s utilitarian claims. This can be seen in the gap between the claim to ideological legitimacy and the belief in the legitimacy of the credential by those seeking to attain it or those who already have it (Ricoeur, 1986). If the gap widens too much the credential will lose its credibility.

A credential is also symbolic of hidden power structures embedded in the social imaginary which may limit professional responsibility and individual career advancement. In this aspect, a credential functions as a form of ideological integration (Ricoeur, 1986) which resists change in order to perpetuate the traditional order of the profession or field of work. Paramedicine, as a diploma program typically operated out of a technical institute, does not provide access to an academic career path because universities in general resist awarding academic degrees to “applied” fields of work. However, what constitutes an “applied” field is an open question. Paramedicine is “applied,” but registered nursing (as Pat points out) is not, even though both paramedics and RNs frequently participate together in the workplace and in simulation. Rob speaks regretfully about how he had to step outside the field of paramedicine in order to advance his university education and in doing so demonstrates the negative aspects of ideological integration, namely the subservience of one group to another.

Action undertaken in simulation can have real world consequences when simulations are organized that forefront credentialing purposes. Success or failure in a credentialing process can affect work practice in dramatic ways. It can, for example, result in loss of employment. Rob, in reference to simulations conducted for evaluation purposes, comments, “In those days if you flunked a program, you were unemployed. So when you flunked [the simulation], we fired

you." Employment can be contingent upon obtaining a successful simulation evaluation. So while credentialing is often viewed as a necessary and integrative aspect of workplace ideology, its implications for individual practice are significant

Obtaining a credential or qualification is viewed as a key purpose of simulation. A credential legitimates opportunity to participate in a particular aspect of work. It also maintains a symbolic value that in some fashion transcends the boundary between simulation and the world. However, experience achieved in simulation is sometimes regarded as being inferior to experience achieved in the workplace of the real world. This seems to result out of an existential view of how simulation is imagined. Sometimes, action undertaken in simulation can have real world consequence especially when a credential is tied to performance in a simulation as might occur in aviation, paramedicine, nursing, etc. These aspects tend to blur the distinction between the simulation as an imagination of the real and the real itself.

Safety During Mistake Making

Another key purpose, universally reported by all interview participants, is that simulation should provide an opportunity for mistakes to be made in a safe environment. Typically, simulation should be designed to provide an environment in which a practitioner may make mistakes with minimal risk. A typical mistake according to Mark is running a train over speed for a particular section of track. In medical professions, as Rob and Pat pointed out, it is not adhering to a prescribed standard of care perhaps by taking an incomplete medical history, something common among first year paramedic and nursing students. In aviation, as Clarissa has shown, it may mean failure to comply with Department of Transport regulations caused by the inability to read a weather map. In the military, it could tragically result in standing up when someone is shooting at you as in a scenario reported by Kris. Because these mistakes can all

be made in simulation as well as the real world, simulation offers an opportunity to turn mistakes into safe learning opportunities.

Safety is relevant in simulation in two ways. The first is through the notion of sanctity, where the simulation exists as a refuge or haven which provides a context that keeps the participants safe from violation, trespass, and physical harm. The second invokes the idea of guardianship and power. In the latter case, simulation is designed and managed (perhaps through a corporate or educational structure) to safe guard the profession or workplace in ways that legitimate or protect a structure and reinforce a prevalent ideology. A particular view of safety commonly presented in the data and which contains elements of both sanctity and guardianship pertains to the use of simulation as a means to mitigate potential future accidents. As Clarissa states, "It's safer to simulate something in a controlled environment than to take a real airplane and set the engine on fire." In this statement, Clarissa is speaking both as the "guardian" of an airplane and as someone concerned about the sanctity of her students.

Mistakes also have varying degrees of safety related consequences based upon the context of the situation. Simulation serves as a means to find and mitigate mistakes that will be repeated in the real world if they are not identified. Dave comments,

> At the fire you want things to be smooth and done right quickly. So again that's why you do a lot of simulation over and over again. Figure out where the mistakes are going to happen and try and correct them. And with the simulations, mistakes are going to happen that's why you do it. So you know, slowly weed those out.

Mark echoes these comments.

> The nice thing about simulators…even Microsoft® Train Simulator is if you happen to blow something terribly bad you can just stop

> it and start over again, just say here is where I went wrong. You learn from it. Whereas in the real world you really can't make those kinds of mistakes because if you do you could be dead or pretty close to it.

Pat, as a nurse, also illustrates the relationship between sanctity and guardianship in an interesting comparison between patient safety and student experience.

> It's all about patient safety; patient safety is number one….In the clinical setting you have to step in, not in simulation you've got to let them [the student] make some mistakes….in simulation that's the place to make mistakes it sure isn't at the bedside with the real patient.

According to Pat, students need to feel pedagogically safe, knowing that a mistake will not have dire ramifications. This speaks to the sanctity of simulation. However, Pat also states that "patient safety is number one" and in so doing she conveys a very common belief among medical professionals that ultimately all simulation "training" is about patient outcomes. This is a telling quote because there are no real patients in a simulation. To say that a simulation is "number one" about patient safety subordinates the experience of the student to the "rights" of the imagined patient. This view again assumes the existential position of Sartre where experience in the "unreal" is considered pathological and subordinate to experience in the real world. The danger, that Pat's quotation suggests, is that simulation may pathologically invert the ethical priority that should always give the patient pre-eminence over the sanctity of the student. Such an inversion can be viewed as further evidence of the pathological nature of simulation because if simulation inverts the false with the real then it becomes ideological dissimulation in the context of both Marx (1971) and

Ricoeur (1986) as shown in chapter two. I shall discuss the ramifications of this rationale more fully shortly.

Nevertheless, as with purposes directed towards credentialing, purposes directed towards safety are situated in conflicting power structures. When safety is the declared purpose for simulation, it may go unrecognized that safety may refer to either individual sanctity or social guardianship and that these two aspects may be at odds. Individual sanctity centers on being able to make mistakes without dire consequence. However, because someone or some agency has to decide what constitutes a mistake and what the consequence is for making the mistake, issues of power are at play, and it may not always be clear to the simulation participants which mistakes are permissible and which are not. Pat, in her role as simulation controller, is set up as a guardian in simulation to protect not only the student but also the real world. As a controller she facilitates the pedagogical aspects of the simulation and represents (at least symbolically) the protection of complex interests which can be ethical, political, professional, or institutional.

Fostering Involvement in Complex Work Practices

A third purpose for simulation involves providing the opportunity for immersion into complex systems of work in ways that foster involvement. Simulations that concentrate on providing opportunities to put varying aspects of work together in complex ways may be intended to improve situational awareness (e.g., for flight training as per Clarissa), to inoculate against debilitating stressors (e.g., as a necessary component of military training as per Rick) or to teach students how to critically think and manage their situations (e.g., as in call management for firefighters and paramedics as per Dave and Rob). The pedagogical outcomes of immersing simulation participants into complex situations are themselves complex and cannot always be predicted in advance.

A common assertion in the data is that a simulation should (and here I am paraphrasing Rob) throw the "open-endedness" of the world at those immersed in the simulation. Simulations should show the variability of the world. They should (on occasion) have no prescribed ending which means that simulations should make allowances for purposes that emerge out of engagement with the simulation and are realized only after the fact. In some aspects, this finding seems to arise out of resistance to the idea that simulations are pedagogically preordained. Rob, in reference to ambulance calls, states,

> The example that I would give on this is that the way you make a high fidelity mannequin work is to program the call into it so you start with an instructional problem, you turn that into a physiological condition, you define the two or three paths that are most likely to occur based on whether the attendant does the thing you want them to do, the thing that they might do and the thing that they really shouldn't do.

Rob thus far describes a typical scenario oriented to specified pedagogical outcomes. But below, he critiques why this is not always a good idea.

> But you've started with the idea that there is an outcome and that there are right outcomes…and poor outcomes and the call is sort of preordained and everybody through from the mannequin to the person with the checklist through to the student who looked at the schedule and saw that we're doing conscious medical sims this week knows that what they're after is the right answer.

As Rob outlines, simulations typically have a "right" answer which students need to find. However, he then goes on to make the case that looking for the right answer does not always work in real work practice.

> But at the end of that, the transition into practice…when you walk into an ambulance call, you don't even know if it's a real ambulance call. You know a man down call could just be a third party call from somebody with a cell phone who saw somebody snoozing and you get there and the guy's gone or you get there and you wake the guy up and away he goes, and it wasn't even a real ambulance call. You can walk into a call and one of the things I think people struggle with is that in the real world there isn't necessarily a right answer.

Rob's reference to "when you walk into an ambulance call, you don't even know if it's a real ambulance call" requires some explanation. In one sense, the call is always real because an ambulance has really arrived to assess a patient. But on the other hand the situation is only imagined to be real by the person who called the ambulance, because the "man down call" was really just somebody snoozing on a park bench. So not only is Rob stating that simulations should be open ended because the real world is open ended, he is saying that the confusion of what constitutes a real call from an imagined one in the real world must be purposefully incorporated into simulation.

As Rob points out, there is frequently a difficulty in transitioning from the simulation world to the real world, in part because, in the real world, ambulance calls do not always have right answers. He thinks that training in a simulation can be made more real if the simulation too does not always direct the participants to a right answer. Simulations which do not have "right answers" seem to provide an opportunity to develop the kinds of complex experiences that are helpful in dealing with real world proble*m*s.

Continuing with this line of thought, Rob provides a vivid example of an experience he obtained in a particularly dynamic simulation. His remarks pertain to a simulation he was in approximately 25 years prior where, as a paramedic in

training, he was asked to assess a “man down.” As he approached the individual who was lying on his back, he was suddenly and “ferociously” attacked with a real knife. The action profoundly startled him.

> All of a sudden it wasn’t a learning experience anymore; it was a learning experience, as contradictory as that sounds. It wasn’t a contrived moment leading me towards a prescribed objective in the curriculum. It was one of those moments, that I mean, it’s kind of grown into something. All it really was was just another sim, right. But the immediacy of it, the fact that it got my attention, the fact that I honestly thought for ¾ of a second before I remembered I was in a sim…I honestly just saw it as a **flash of steel** coming at me. So it was probably the fact that it **immersed me in the moment**.

Rob’s instructor played the role of the patient in this simulation, and according to Rob, showed him (in a way that he would never forget) how fast something can go wrong with a real ambulance call. The event remains in his mind as an exemplary pedagogical example of the kinds of experiences that can be acquired while in simulation. What emerged out of the engagement between Rob and his instructor was a revelation of the importance of fostering a complex social interaction between two individuals in the simulation. This was undoubtedly a purpose of the simulation but it was likely obscured by more overt pedagogical purposes until the simulation had been enacted. Rob’s immersion “in the moment” is also significant, and I shall come back to this later.

It is perhaps a measure of the complexity of simulation that some simulations are undertaken with the pedagogical purpose of learning how to do other simulations. Anyone who has ever attempted to land a plane in a computer flight simulator knows that this is not an easy task. The simulator program must be learned before the simulation of flying an aircraft can be

reasonably attempted. This is exemplified by Clarissa who learned to use Microsoft® Flight Simulator so she could practice flights prior to flying them in more advanced cockpit simulators. Rob comments, “the irony is that to do well in the simulations we almost have to teach you not to do an ambulance call but teach you to do a good simulation which just seems ironic somehow.” What Rob is saying is that the way to do things in the “real” world does not necessarily work in the simulated world. There are different and sometimes conflicting purposes, rules, and consequences.

The study participants affirm that an important purpose for simulation is that it should foster engagement in complex aspects of work. A simulation can provide practice for the workplace, and one important way it can do this is by throwing the “open-endedness” of the world at the participant. Simulations can more accurately mimic real workplace conditions if they do not always come with a right answer. This may mean that the pedagogical construction of a simulation should allow for the emergence of purpose recognized only after the engagement has taken place. It is indicative of the complexity of simulations that some simulations are designed to mimic, not the real, but other simulations. This again serves to confuse what is imagined with what is real.

Conflicts of Purpose in Simulation

As I have already stated, purpose can be contested and conflicted, and multiple purposes are always at work. Overt purposes can clash with each other, and subtle purposes can contest dominating purposes in the same way that Ricoeur (1986) has suggested utopias may contest ideologies. Purposes of credentialing can clash with purposes of safety or purposes which forefront the fostering of work practice through complexity. Safety as sanctity can conflict with safety as guardianship. These ideas seem to be particularly important with respect to simulation purpose. Power issues are at play in terms of which purpose receives priority, and this affects how the simulations are played out.

Dave provides an example, drawn from a firefighting context, which demonstrates that contrary purposes, at least when they are overt, can confuse the "experiential sense" that participants garner from a simulation.

> You do the same simulations over and over again but months apart with different personnel, and they all have their own ideas of how things should be done. So you do it this way one time, and it's the wrong thing to do the next time depending on who is in charge. So you kind of got to wait and see, and sometimes they want you to do the simulation exactly like you would at a fire, and sometimes it's take your time and you know do it right. Sometimes you do it slow and do it right, and they want you to do it fast and quickly not necessarily do it right. So you gotta make sure you know what method they want [at a simulation] or they [management] might not be happy afterwards.

Dave's quote above demonstrates a particular power arrangement best understood through what Fenwick (2008) has termed the *radical view* of power. He refers in a general sense to the workplace that comprises the fire department, and he demonstrates it as a site of ideological contradiction where knowing "who is in charge" is required to guide the direction of workplace performance. However, even though Dave recognizes the hierarchical structure of power which resides in the fire department, he nevertheless is able to tolerate the ideological inconsistency, support the inequitable power relations that exist, and conceptualize how his own learning may be able to succeed through this aspect of work. This is a good example of how power relations which reproduce their own hierarchies can be intertwined with learning processes in everyday work and even though institutional purposes may not be in alignment with the learning of the participant, learning still occurs.

As Dave points out, purpose that is overtly ambiguous can cause simulation participants to alter their performance based upon a particular perception of the desired outcome. Sometimes the simulation participants may not know or guess the pedagogical outcomes desired by the controllers or instructors resulting in behaviour which may be perceived as being in error. However, from the standpoint of the participants, it is not error. Rather, it is an attempt to fulfill an expectation. Because perceived purpose alters purposeful behaviour, behavioural based evaluations that correlate individual learning with observable behaviour are contingent upon clarity of purpose. In the quote above, Dave demonstrates that his behaviour in simulation can be contingent upon what he thinks others expect.

Purpose may conflict in even more fundamental ways. Every study participant reported that simulation was important for (a) credentialing or qualification attainment and (b) provision of a safe place to make a mistake. However, in terms of consequence, these two purposes can be starkly at odds. On the one hand, the consequence for making a mistake in simulation can be dire with very significant real world connotations such as failure to achieve an employment credential. On the other hand, mistake making in simulation is often seen as an important aspect of learning what not to do in the real world. However, credentials are not acquired by making mistakes but rather by the opposite.

Furthermore, simulations involved in credentialing processes carry consequences which can work contrary to purposes that affirm simulation as a safe means to achieve experience. Melanie and her crew were certainly in some risk when they inhabited the isolated FMARS station in the Canadian arctic. Firefighters engaged in live firefighting simulations are at some risk. Soldiers can be at risk in combat simulations. In all of these cases, the conflict between achieving a qualification that may put life and limb in danger and maintaining a safe simulation experience tends to be normatively balanced in “acceptable”

ways. However, it is possible for credentialing and safety purposes to diametrically oppose each other, and when this happens the impact upon experience becomes obvious. High risk military simulations where death or injury is very possible provide a case in point. Kris comments.

> In one of those trainings, one of my – one of my brothers got killed – not my brother you know – like I said brothers in arms – we were climbing this rope – and they had two M60 7.62 machine guns placed on every side and then the rope sort of swinged to the side, and he just got shot to death.

In the above example, the live-fire exercise results in the death of one of Kris's friends, and the anguish he carries is visible in his face even as he tells the story 15 years later.

Kris' simulation experience is clearly a violation of the individual sanctity that simulation is "supposed" to maintain. As well, safety as an issue of guardianship seems not to have been appropriately upheld. The event was of course called an accident because the military could not be viewed as purposefully engaging in the death of its own soldiers. In a radical view of power (see Fenwick, 2008), Kris' military is definitely an organization centered on ideological contradiction which serves to exploit its soldiers. In this case, safety has been subordinated to the credentialing processes of an army that determines training qualifications. Certainly, this experience for Kris is extreme, but it nonetheless serves to make an important point. Conflicting purpose can dramatically affect lived experience.

There is also a finer point to be made. In Kris' simulation experience, what was imagined has been made forcefully real in the simulation, because the imagined deaths and injuries became real deaths and injuries. This is another form of dissimulation and is evidence that this simulation is pedagogically confused because it is directed at cross purposes. One purpose (safety) points to

a particular real world signifier (sanctity) and another purpose (military efficiency) points to a different and conflicting signifier (death). This entanglement between purposes and their differing assumptions on what constitutes the real and imagined confounds how participants (in this case Kris) make sense of their experience in simulation.

Purpose Summary

There are many purposes for undertaking a simulation, and these purposes can affect the nature of the learning that emerges out of simulation. The study participants considered three types of purposes to be particularly important. These are (a) attaining credentials or qualifications, (b) providing a safe experience and (c) fostering practice in complex environments. More than one purpose is often at work in simulation, and when this happens purposes may conflict. This in turn can affect the kinds of experiences that are obtained while in simulation. Issues of power arise through the dimension of purpose. In a radical view of power (Fenwick, 2008) organizations set purposes according to ideological preferences that reproduce existing ideas of legitimacy and hierarchy even though these purposes may subjugate and exploit individuals. This happens in simulation just as it happens in the workplace. The pedagogical claim that simulation cultivates subtle and complex experience through an immersion in complexity (where the simulation contains history, tells a story, is contextually rich, etc.) is premised on the fact that participants immersed in the simulation are able to make sense of the simulation in ways that allow them to function appropriately. Finally, there is a sense in the data that purpose in simulation can confuse what is imagined with the real and vice versa. These points need elaboration and will be further discussed in relation to the dimensions of experiential learning: engagement, interpretation, self, and context.

Engagement as a Dimension of Experience

Fenwick (2003) notes, "We engage different experiences with a range of positions, processes and intensity" (p. 16). The sense of responsibility we have to ourselves and others influences the degree to which we participate in particular situations. Engagement is dependent on a sense of competence, on opportunity (unfolded through power arrangements), and on desire. Sometimes we can desire to participate but are not granted privilege to do so. In this section, I consider engagement as "doing something with someone" and thus restrict the discussion of engagement to a social sense. This is a limitation I recognize. An individual can engage in an existential way with the series of crises that have formulated her own conception of identity. However, that is the topic for another work. In narrowing the discussion, I reference the community of practice perspective of Wenger (1998). These are (a) the ongoing negotiation of meaning, (b) the formation of trajectories, and (c) the unfolding of histories of practice. Wenger 's idea of engagement as a three-fold process is in keeping with Fenwick's idea that engagement occurs through a "range of positions, processes and intensity."

The Ongoing Negotiation of Meaning

Meaning is arrived at through negotiation. As I have pointed out in chapter two, Ricoeur (1986), Kearney (2004) and others are emphatic that all meaning requires interpretation. The interpretation of meaning correlates with two frames of reference: the individual and the social. On the one hand meaning is revealed as experiential/cognitive understanding, and on the other it is revealed through the social imaginary. In all cases, meaning is never static, never *a priori*, never undisputed. As Ricoeur has pointed out, we view the world from within an ideology, and our thinking and our meanings are influenced by ideological notions which serve to reproduce and legitimate forms of the social

imaginary. We are also influenced through utopian ideas that attempt to resist dominant ideological power structures in favour of alternative power arrangements. For Ricoeur, negotiation is an expression of non-foundational knowledge. As I have already pointed out in the section on purpose, the structure of the organization that establishes the simulation tends to hold the reins of power and can exert substantial control on the actions and attitudes of the participants in ways that consolidate a dominant workplace culture. Nevertheless, negotiation implies that resistance is present in simulation. This reveals that dominant forms of meaning do not go uncontested and that the negotiation that goes on in simulation serves as a means to decentralize control.

Individuals attempt strategies that can work towards their own advantage while in simulation. Some very clear examples of negotiation are revealed in the data. One instance involves the student that attempts to alter the scenario by arguing with the high fidelity simulator. As Pat has observed, "You'd be surprised how many students argue with the simulator patient." Pat is referring here to a student that refuses to accept the vital signs she is presented with in the simulation. Presumably, students that contest the scenario are trying to alter its path and renegotiate its intended meaning. But such an attempt at negotiation is almost always doomed to failure. The student typically does not have the "political" power to alter the direction of the simulation by an appeal to outside power structures. Below Pat describes the feedback the student was given after the simulation.

> Then we went into the debriefing room, the [other] students said, 'Could you have handled that differently? The more the patient said that he couldn't breathe, the angrier you were getting, the more agitated you were getting, the more anxious the patient was getting.' The students debriefed it beautifully. It was wonderful. It

> was the best learning experience that I think that student will ever have.

In stating, “the students debriefed it beautifully,” Pat is asserting that her students made meaningful connections to the experiences that emerged from the simulation. The implication is that the student who “got angry” also learned that “getting angry” displays inappropriate behaviour for a registered nurse.

The feedback given above is another form of negotiation with different power structures. This time the negotiation is with peers, presumably undertaken in a setting that aspires to decentralized control, though without a doubt under the auspices of an instructor and within the larger confines of the governing power structures of the educational institution and the workplace. Power in simulation feedback sessions is most commonly conceptualized in what Fenwick (2008) calls a *community view* where “power is viewed as benign energy, exercised mainly in mobilizing individuals around shared vision, mutual engagement, and sense of belonging” (p. 23). In the best feedback sessions, this view of power may be entirely appropriate. Pat states,

> Students seem to respond better to the feedback that their peers give them than the feedback that their tutor gives them, because when the tutor gives them the feedback the students almost seem to want to take that away as it’s all derogatory.

However, if a student wishes to receive a passing grade on a simulation, the student will usually have to accept the feedback from the instructor, which means conforming to the ability norm valued by the instructor. It also means that feedback sessions, through instructor influence, will tend to consolidate dominant workplace cultures in ideological ways.

A further example of negotiation is provided by Melanie who was the mission commander of the Mars simulation on Devon Island. Her command style

was not authoritarian because as she stated, “that would not work.” Rather, she valued a consultative process with her team prior to making important decisions. She states,

> At times the consultative thing got a little stressful because when people actually did have differing opinions, we really had to try hard to respect everyone’s opinion and come to a conclusion together so it took a little bit longer to make some decisions than if I had just put my foot down and said “no this is how its gonna have to be” but ultimately we’re all still friends so I think that that is the most important part, the most important point here…we accomplished all of our mission goals; we’re safe, happy, healthy.

Melanie really stresses the importance and value of negotiation in both remaining friends and accomplishing mission parameters. Here, the mutual engagement of the team in simulation led to the negotiation of the meaning of power in a communitarian way. However, power, here, is not benign because inappropriate use of power can destroy the chain of command, result in mission failure, and destroy friendships. Melanie incorporated an individual strategy of cooperation to manage her engagement with the team while undergoing mutual engagement in the simulation.

A third example is supplied by Rob. He advances the idea of simulation as an important forum for figuring out how to negotiate meaning in the real world. He speaks at length about “the call” as a construct used to negotiate a meaningful answer to work questions in paramedicine. Calls are structures with rules. There are correct ways to run calls and by implication wrong ways to run calls. Students engaging with others in simulation learn which ways are acceptable. Rob states,

> One of the challenges that we've got is that our curriculum is built around a curriculum structure which assumes that we're building people towards a common set of competencies so they'll give you consistent performance in the field when the whole point of the field [call] is that the right answer is a negotiated thing. It's what you and the doc and your partner happen to agree on given what's in front of you today.

There are three important points here. The first point is that avenues for the negotiation of meaning can be constructed in simulation, and this demonstrates a form of non-foundational knowledge. The second is that all negotiation is power based. Negotiation cannot be undertaken without a claim to legitimacy. In the case above, Rob is not suggesting that the power to negotiate the right answer lies equally with both the paramedic and the physician. Rob knows the physician has a status which (professionally speaking) trumps the paramedic. However, to ignore that a negotiation actually occurs is to ignore the significance of the engagement that takes place with respect to individual meaning making. The third point is more subtle. The negotiation that occurs in the meaning of the simulation is often an imagined negotiation. In the case above, it may occur between a real paramedic and an imaginary physician. Perhaps a paramedic instructor is playing the role of the physician. This type of negotiation is not a real negotiation. Because it is imagined, the negotiation is founded upon premises that may not exist in the real world and the meaning may be utopian in Ricoeur's (1986) sense of the term.

The ongoing negotiation of meaning emerges as an important aspect in the mutual engagement of individuals in a simulation. Meaning (both individually and socially) is negotiated via particular power arrangements which typically favour and reproduce the dominant ideological structures. This reveals itself as a form of non-foundational knowledge. However, negotiation also implies

resistance, through utopian appeals to alternative power arrangements. Participants in simulation employ strategies to resist the hierarchical power structure that a simulation imposes but these are infrequently successful. Feedback sessions advocate the use of benign power to encourage mutual engagement, promote peer review, and foster meaning making through reflection on experience. However, these sessions may also require conformance to a normative standard which is valued by those in charge and which is dictated by the ideological aspects of the social imaginary.

The Formation of Trajectories

In addition to the negotiation of meaning that happens through engagement, individuals trace a trajectory or path as they learn through experience in a simulation. Individuals move through the space-time of a simulation and trace out "future" narratives in relation to their activity, the collective history of practice, and their individual meaning making. According to Ricoeur (1984) prior experience prefigures individuals in ways that enable the configuration and refiguration of current experience. Within simulation, trajectory is bounded and mediated by the very real parameters of space and time and involves a movement through time that forms a coherence between the past, present and future. In this sense, trajectory is the same in simulation as it is in the real world. However, unlike the real world, in simulation, trajectory is also bounded by an imagined sense of space and time that conforms to the design of the simulation. This results in a re-imagined coherence between the past, present and future. This re-imagination has a profound effect upon the ways individuals engage with a simulation. Undoubtedly, the trajectory that participants follow is also affected by the fiscal and technological constraints that constitute the simulation system. This is most obvious with aviation simulators. It is beyond the scope of this study to examine these technical constraints in any

detail. Rather, issues of space and time are more relevant given the theoretical perspectives I employ in this study.

Spatial considerations

Space in simulation is usually believed to be a copy of space found in the workplace. However, it is much more than that. Simulation requires a space for activity to occur, and this space determines the proximity and boundaries (including neighbouring interactions) for engagement with others and the expanse available for activity. It also acts as a reservoir for the tools, symbols, and stories that comprise the social imaginary relevant to a field of work. In talking about workplace learning, Fenwick (2008) states, "Space is not considered a static container into which work and workers are poured, but a dynamic multiplicity that is constantly being produced by simultaneous 'stories-so-far'" (p. 24). Fenwick's view is also appropriate for simulation. Given that I write in some length about space in the *Context* section of this chapter, I shall keep this discussion focused on its relevance to individual trajectory.

Dave reported on fire simulations which fill a confined space with (a) smoke or (b) foam bubbles in order to limit vision. Both types of simulation obscure vision but in different ways. Smoke physically blocks light while foam bubbles scatter it. With smoke it is dark, while with foam it is bright. As Dave points out, the training effects may be the same, as in claustrophobia, or they may be different. Psychologically, smoke is bad and foam is good, and you smell better coming out of a foam filled confined space. It is also fun to walk through foam as Dave declared. For Melanie, the correct geographical space is vital for analogue simulation sites, and in this sense, space operates as an enabling constraint. The proper (analogue) space reproduces the inhospitable Martian environment and affects every activity undertaken in simulation. Much of what Melanie's says, in some form or fashion, emphasizes the unique nature of space, whether it be inside the "tin can" which simulated the Mars habitat spacecraft

(and its thin walls which defied any sense of privacy) or outside in the Arctic landscape as she laboured over rocky ground in a space suit (simultaneously experiencing the threat of both the cold and polar bears).

These examples show that space alters the nature of the engagement that occurs within a simulation. Space provides boundaries, encourages neighbouring interactions, enables and constrains opportunities for activity, and carries with it psychological and physiological parameters pertinent to the way the space is interpreted in an individual trajectory.

Moments in time

Space is always linked to time. As I have demonstrated at length in chapter two, time can be conceptualized in many different ways. The standard view of time is that of physical time. In this sense, time is what clocks measure, and in such an understanding, time is composed of an endless series of autonomous instants. However, Heidegger (1996), Ricoeur (1980, 1984), Kearney (2004) and Slattery (2006) have strongly opposed this view. They argue that such a view distorts the social reality that time conveys in everyday life. In the following section, I examine the notion of time as a "moment" in the history of a trajectory that contributes to temporality in simulation.

Every study participant talked about physical time. Simulations, as social constructs in the world, are obviously constrained by this form of time. For example, aviation simulators are charged out by the hour. Curriculums apportion set periods of time for simulation experience. Mars analogue simulations rely on timely renewals of supplies and so must conform to a timed schedule. Sometimes simulations are run in real-time to facilitate practice in managing situations with time significant parameters as in cardiopulmonary resuscitation simulations.

However, typically these kinds of constraints are imposed from the outside world upon the simulation, and they are not enabling. Inside the simulation, time is not measured by clocks. It is determined in moments.

Three of the participants (Rob, Pat and Clarissa) talked specifically about the multidimensional moment in time. Pat implies in the term a state of being.

> We don't have to interrupt the scenarios and break the realism and take them out of the moment cause the goal is to keep them in that moment cause if you don't keep them in the moment that's when you've lost them.

The suggestion here is that the pedagogical task is one of ensuring that the student trajectory flows through one or more "moments." Whereas for Pat "the moment" is recognized by the simulation controller, in Rob's usage the important aspect of "the moment" is recognized by the student. Rob's use of the moment in time repeatedly refers to its significance in the learning process. His conceptualization is best represented in the following quote.

> If it's going to be meaningful learning it has to be an experience that is making you pull from what's behind you into the moment that you're doing and making you think about "ah, next time I will" or "ah, that works" or "ah, I should try" – it has to be more than **that** moment for it to…have been meaningful.

When Rob says, "it has to be more than **that** moment," he is speaking about the moment as a multidimensional concept that is laden with both history and possibility. A moment in time is not an "instant," as I pointed out in chapter two. It carries a history and projects an intention. The "now" is always a "now that." The moment allows for what in complexity theory is termed recursive elaboration. It produces something of worth based on a connection with history.

The moment forces a culmination of past and future into the present. For Rob, the moment carries a history that both arises out of the future and is pertinent to the future, as it is acted upon in the here and now. The moment forces, through its linkage of the past with the future, a re-imagination of the present. I think this is what Rob is referring to when he says, “Ah, I should try.” The possible is known to be possible only because the moment has brought the past into alignment with the future. It is time not only with an eye to the future, but because the simulation has a physical endpoint, with an eye to the end of times. This concept of time here is eschatological (Slattery, 2006) because in some sense it views the future as already determined; it requires that it carry a history of that determination towards an end yet to be accomplished. The participants move towards the known end of the simulation not through time but via the recursive elaboration of moments in time.

“Moments” were mentioned in the stories of Rob, Clarissa and Pat. The idea of the moment is foundational to the way simulation can be viewed and as a construct accurately describes an important aspect of how trajectory affects engagement. A moment of immersion in a simulation involves a multi-dimensional experience that is threaded to other experience and becomes relevant to experience as soon as it is noticed. Recursive elaboration is an important concept here because moments produce something worthy of notice and this fosters new and meaningful interpretation. The moments are recursive because they also foster reflection and analysis which ties that which is new to that which is known.

Peculiarities in the direction of time

Time in simulation can have some other very peculiar characteristics which affect the emergence of the moment within the simulation. The engagement that goes on inside the moment is facilitated through a disruption in time. A simulation can start at the end of time and run back to the beginning,

or it can start in the middle and go in both directions at the same time. In this regard, it is similar to Ricoeur's (1984) notion of narrative time discussed in chapter two. As Clarissa points out sophisticated aircraft simulators can pause, jump forward, or jump back with significant impact upon the learner.

> The…thing that is a little disconcerting…is when we were practicing the single engine failure in flight. When…we had finished the maneuver, the instructor would pause the simulator, and it was very disconcerting, disconnecting, when the instructor hit the pause button…it was very difficult for the brain to accept the fact that we were no longer moving, but we still see that we are in the middle of the sky outside…it was bizarre.

In this example, Clarissa's flight instructor provides an opportunity for a moment to occur by stopping time with the simulator. Clarissa's trajectory through the simulation is abruptly altered, and she finds it "disconcerting." The same kind of effects can be achieved with train simulators as Mark pointed out. Medical simulations too can have their arrow of time directionally altered by knowing the patient outcome before the simulation starts.

The rate of time may also be variable in simulation. The best example here is provided by Melanie. Melanie's site for simulation was above the Arctic Circle in a season when there was constant sunlight. Her Mars' crew simulated Mars time where the day is 37 minutes longer than an Earth day. Over the period of the simulation, the Mars day became the Earth night and the days of the week and the calendars lost synchronization with each other. She states,

> It was perfectly bright daylight so you knew in the back of your mind somewhere that it was really midnight but in your schedule that day it was actually twelve o'clock in the afternoon. So you know we could still carry on with operations in the middle of the

> actual Earth night because it was our Mars day….They've done Martian time studies and other different time studies in labs…but doing it with this real true Mars simulation in a 24 hour sunlight environment where we could go outside will hopefully be very important….I learned that I love living on Mars time, so it'll make me very happy if I can go to Mars and do that some day.

Martian time became a feedback loop. It continually reinforced its presence as the Martian day became increasingly out of phase with the Earth day.

When I asked Melanie why she loved Mars time she simply replied, "An extra hour a day." She later explained this gave her more time to fit in all the things she wanted to do in a day. Perhaps this relates to her Western academic culture, perhaps not. Nevertheless, Martian time allowed and maybe even forced Melanie to re-imagine her own notions of time.

In simulation, though perhaps not in real life, a trajectory has a starting and ending point, which tends to correspond to the start and finish of the simulation. An interesting aspect of the data is that every participant was able to relate their simulation experiences through a range of trajectories. But while they would typically describe a protocol or an emergency procedure drill in a sentence or two, pages were required to contain the information they would tell about some of their immersive engagements with simulation. In this section, I have concentrated on space and time. Certainly other physical parameters affect trajectory in simulation as they do in the real world. However, the ways in which space and time play out in simulation are different from the real world. It is these differences I have attempted to reveal. In subsequent chapters, I shall return to the idea of space and simulation time, relationship to the moment, and how ethical obligations distinguish simulation moments.

The Unfolding of a History of Practice

History of practice broadens the personal history (viewed above as trajectory) into a larger sociological view. Practice involves participation according to socially understood norms and imaginaries. Understanding social constructs requires an understanding of how and why each construct is or was developed. Each work specific domain carries a history of practice that needs to accommodate and invite participation. Simulation can unfold history by providing varied points of entry into a community of practice or domain of work. The entry points require authorization but also validate and legitimize entry. For example, as Clarissa is quick to point out, only certain pilots can learn to fly in certain simulators (or actually even sit in the pilot seat). Only medical professionals can engage in the medical simulation of an Advanced Cardiac Life Support (ACLS) course. In this respect, simulation is like legitimate peripheral participation in that it requires both approval for entry and prefigured knowledge.

There is an implied responsibility on the part of the simulation participant to learn the rules that govern the simulation and for the controller of the simulation to establish clear rules. In the passage below, Pat provides insight into the responsibility of the simulation controller in order to make the simulation more real. “Buy in” is related to knowing the rules and roles of the simulation.

> We try never to deviate from our roles in simulation because if you break the scenario by interjecting it really kills the buy in and that immersion and that engagement…Sometimes the students will break it, they’ll break the scenario instead of talking to the patient, they’ll talk to the control operator…So they’ll look over there and then they say, “well is this simulator supposed to do this?” And then so the control operator will come back and say, “well who are you talking you? What simulator? What are you

> talking about?" staying in the voice of the patient. And it forces the student back into the situation.

In the passage below, it is clear that the responsibility for understanding the rules is intertwined with the nature of the simulation. Melanie talks about her Mars simulation.

> There were times when you just couldn't be in full simulation, but we had guidelines so we sat down and talked about what actually constitutes breaking the simulation and what can we explain away with simulation. So for example, using the internet, we were allowed to use a few sites. We couldn't use Google. We could use Wikipedia. So we made our rules that way, so likewise with the polar bear monitors, we just pretended they were robots for example.

In Melanie's case, the simulation rules were an enabling constraint because they guided the way she constructed belief within the simulation. Individuals were required to watch for polar bears every time someone was outside the spacecraft. Rather than ignore them and pretend they were not there, they were incorporated into the simulation as robots and could be legitimately engaged within the simulation.

There is strong evidence in the data of the importance of an unfolding history in manifesting engagement. Rick, Pat and Rob all strongly assert that in order for a simulation to be pedagogically effective, it must be run by an individual with real life experience in the domain specific area of the simulation. According to Rob, you must draw upon real street experience to run a paramedic simulation. "The reason that you want somebody who's been on the street in the classroom…it's about making the stuff real. Making the stuff real is adding that layer of tradition and experience on top of the curriculum."

The same opinion is held by Rick and Pat. A simulation is not an order of events that can be directed by just anyone. The simulation controller must reveal competence in being able to interpret and act out the professional social imaginary. Rick states,

> It's pretty hard to take all the realism back from a theatre of operation and bring it here [to Canada]. But the more time that you can have guys that have actually been there [Afghanistan] and done the stuff, it adds realism. It's hard to simulate or add something prior to us being involved in combat roles. When we were a peace time army, it's hard to have guys be able to simulate things that they've never actually seen or done themselves.

In the second interview he continues with this thought.

> I think it's always easier to pull on real life experiences and yourself as a paramedic still working in the field…you know that yourself…to be able to take scenarios from the street that you did and apply them to your students when you are teaching them is easier, and it's the same thing for the soldiers. For us having been to areas where car bombs have blown up or having been in camps where you have been constantly mortared or on convoys where you have been shot at. It's easier to put those kinds of things in play for the students when they are going through the training.

In the passage below, Pat talks about having hired a computer savvy technical person with no medical experience to be a simulation controller for nursing simulations.

> The control operator was a lay person that was a person with computer skills, no medicine background. Oh my god, that did not

> work! It did not work because, yes the computer equipment and everything functioned phenomenally, but they didn't understand the disease process…like the diabetic ketoacidosis with a blood sugar of 30. The patient is not good natured; the patient is not chatty. All those weird things, so it didn't match, the control operator was being good natured and talkative with a blood sugar of 30 in diabetic ketoacidosis. Regardless of how much education, having that medical background and the more experience the control operator has in their own nursing practice makes for more believable [experience] because I found that the control operator is drawing on experiences that they've actually encountered from the real world.

The tradition that is carried into the simulation provides a point of anchorage for engagement. Unfolding a history of practice requires knowledge of the aspect of the social imaginary that relates to the workplace and this knowledge incorporates a certain amount of internal redundancy into the simulation system. It relates the present to past workplace rituals, traditions, and experiences, and provides direction for the future. Unfolding a history of practice elicits a certain respect which adds to the realism, and it consequently deepens the degree to which the participants engage with the simulation as a legitimate experience.

Engagement Summary

I have premised this section on Fenwick's (2003) dimension of engagement and Wenger's (1998) idea of engagement as a process involving (a) the negotiation of meaning, (b) the formation of trajectories and (c) unfolding histories of practice. Negotiation between participants, instructors, and designers about the nature of simulation is possible only within the context of

particular arrangements of power. Power is often viewed by the participants as a benign communitarian entity even though it is probably more appropriate to view it as a force of ideological legitimation and domination. The data provide evidence that certain forms of negotiation within a simulation are not always possible, but when negotiation does exist, it reveals itself as a form of non-foundational knowledge. Typically, simulation as a social construct provides opportunities for negotiation in ways that can broaden the engagement of the participants. The trajectory or path taken by a participant through a simulation is influenced by the conceptualization of time and space. These may function as enabling constraints, or they may foster neighbouring interactions (in a complexity sense). The moment in time seems to be particularly relevant as a recursive elaboration. Certainly, other parameters affect engagement in ways pertinent to experiential learning but because the data demonstrates that the flow of time and the aspect of space can be very peculiar in a simulation, I have placed my emphasis here. The physical parameters of simulation, including space, will be examined in more detail in the section on *Context as a Dimension of Experience*. Unfolding the histories of practice involves an examination of the nature of simulation as a construct with a history. The history that instructors are able to bring to the control and design of a simulation seems to be particularly relevant to engaging the participants in the simulation experience. Overall, engagement fosters experiential learning in simulation through the negotiation of meaning, the formation of trajectories and through unfolding the histories of practice.

Self as a Dimension of Experience

Purpose, engagement, interpretation, and context are powerfully influenced by notions of self. Fenwick (2003) states , “To understand experiential learning we must probe the relation between self and society.” She points out that in contemporary views of experiential learning there is the assumption that

humans exist as individual selves who naturally develop to greater levels of maturity and fulfillment. However, this view is contested by many who dispute a single unitary self. In this alternative understanding, there are always multiple selves that shift with circumstance to fit into positions in various communities. I make the assumption that the latter view is more relevant to understanding the nature of experiential learning in simulation. Furthermore in this study, I limit the extent to which I examine the self to considerations of the self in a narrative sense.

The Multiple Self

Ricoeur (1992) proposes that a split subjectivity is evident whenever we try to think or talk about our experiences. The *I* doing the speaking is distanced from the *me* which is the object of the talk. Below, Kearney (2004) describes Ricoeur's thought.

> Ricoeur proposes the notion of self-as-another – a *soi* that passes beyond the illusory confines of the *moi* and discovers its meaning in and through the linguistic mediations of signs and symbols, stories and ideologies, metaphors and myths. In the most positive hermeneutic scenario, the self returns to itself after numerous hermeneutic detours through the language of others, to find itself enlarged and enriched by the journey. (p. 2)

According to Ricoeur's (1992) narrative theory of identity, we are subjects in others' stories just as others are subjects in our stories. Others are authors of our stories just as we are authors of their stories. Narratives are interwoven with other narratives. While in discussion and interaction with others, they facilitate the direction of our narratives just as we direct their narratives. Identity is not simply our own. Clark and Rossiter (2008) have

suggested that narrative is an important way in which adults learn. They state, "Narrative is...how we craft our sense of self, our identity…." (p. 62). Below, I explore the theme of the self as a narrative within the context of simulation.

"Understanding identity as a narrative construction is another way of conceptualizing personal change" (Clark & Rossiter, 2008, p. 62). Clark and Rossiter point out that we "story" our identities in multiple and sometimes contradictory ways. We can imagine ourselves as a hero or a goat. Sometimes we have agency and power, and sometimes we view ourselves as the victims of power. They suggest that narrative can be a transforming process because when a story of the self loses its relevance to life and no longer helps us to make sense of our experience then we must change the story. In so far as simulation is a part of the stories that we tell about ourselves, simulations influence our narrative understanding of ourselves.

In the example below, Clarissa tells a story about taking off in a twin Comanche airplane after learning to fly the Comanche in a sophisticated cockpit simulator. Her story (much abbreviated here) is a demonstration of the complex involvement of the first person singular pronoun "I" in a set of experiences that mix the real world with simulation.

> So when I jumped in the airplane for the first time, I knew exactly where all the switches were. I knew where all the radios were. It just felt comfortable. It was very comfortable. And so that was a positive thing. We taxied around, did a run up, and that sort of thing. And as we were getting ready for take-off, now keep in mind in the simulator we didn't taxi around, because you can't really see where you are taxiing to….When we took off **I remember** looking at the instrument panel while we were trying to take off. And of course, the airplane has a tendency to want to yaw to the left. And I was staring at the instrument panel instead

> of looking at the end of the runway because that's what I was used to….A part of it could have been just experience level. At that point I would have been less than a 200 hour pilot. And then I realized I have got to look outside (emphatic) and I looked up, and yep I was heading off to the weeds. But it was kind of scary because that was the conditioning, to scan the instruments, but now when you take off you really have to look outside and then once you're in the air then you transition to the instruments. But we'd never done that before because you didn't need to [in simulation].

In the above, Clarissa is represented by multiple conceptions of self. There is the self that is present in the now. This is the self that is reporting the past experience during the interview. There is the self flying the airplane that is a relatively inexperienced pilot as evidenced in her phrase, "At that point **I** would have been less than a 200 hour pilot." Finally, there is the self that learned to fly the plane in simulation as evidenced by the second "I" in the statement, "And I was staring at the instrument panel instead of looking at the end of the runway because that's what **I** was used to…." In fact, there are so many potential selves that it is difficult to keep each "I" oriented to the experience it references. For example, when Clarissa says, "When we took off I remember…" does the "I" have the same temporality as the "we" in the sentence or does the "I remember" refer to the same "I" doing the interview? It is difficult to tell. Perhaps the "we" also represents a form of multiple selves.

Clarissa's understanding of her own character as a 200 hour pilot is certainly challenged by a current character that rebukes staring at the instrument panel on takeoff. Because she attributes this mistake to something ported over from simulation in a "different past," there is another self that is thrown into the mix. The "I" that is in the present during the interview must

consider views of self-hood that are in two distinct but related experiential pasts. This is significant with respect to the ways in which experiential learning arises in simulation. In this case, the experience is confused because the experience derived from simulation is not necessarily considered equivalent to the experience obtained flying the real airplane.

Rick believes that it is an important component in military training that soldiers are always able to tell a positive story about themselves. This is part of the esprit de corps. Rick reports that simulation can inadvertently condition soldiers in training to inappropriate responses. He was careful to support his point by citing Grossman (1996, 2004). He states,

> That's why one of the things I advocate is to use force on force, so we can use real simunition and try not to take people off the training grounds as losers, **make sure that they leave with a positive note**, and that they keep fighting no matter what, so that they get used to sucking up the bullets, and never shutting down, never turning off, just for the element of realism, cause if they quit in practice, they'll quit in real fights.

Rick, in keeping with Grossman (1996, 2004), is suggesting that individual soldiers need to acquire the concept of self that a single bullet cannot stop them and that they must never quit in battlefield conditions.

According to Rick, the military conducts live-fire exercises to enhance the reality of the conditioning process. In so far as possible, Rick wants the individual in simulation to be the same individual as in real combat, and he is concerned that incorrect use of simulation will not yield this result. Rick's concern here is echoed, I think, among firefighters where live–fire exercises are also live *fire* exercises. Dave has commented that you really only have confidence in your teammates once you have been in a real fire with them.

The point I am trying to make here is that there seems to be a tacit fear that a different self may exist in simulation than exists in the real world. There is the simulation self that has a tendency to quit when the going gets tough (or takes the easy way out) and the self in the real world (be it in combat or a house fire) that does not quit, that sucks up the bullets so to speak. The fear lies in the uncertainty about which self will show up for work. Live-fire exercises (in both applications of the term) seem aimed at bringing the appropriate self forward.

Eventually, Clarissa reinterprets her experience as a 200 hour pilot within the context of her own students. Clarissa notes that novices learning how to fly tend to do the same thing she did (stare at the instrument panel on takeoff) if they have practiced on Microsoft® Flight Simulator before taking their first flying lessons. She states,

> I would get students who come in and say, I just bought Microsoft® Flight Sim (emphatic), and it's like oh no! (sigh)…with Microsoft® Flight Sim people are gonna stare at the instruments. So the first time I get into the airplane with them guess where their eyes go, to the instruments. But the thing is we're not ready to stare at the instruments yet, so quite often I would have to cover the instruments and force the student to look outside.

In telling this story, I think it is clear that Clarissa has meshed her experience with that of her students where it is difficult to interpret her original experience without the "Other" experience of her students. Both sets of experiences have become part of her as a pilot and pilot instructor. In a sense, she is authoring a narrative of their experience in light of her own.

There are other cases in the data where this meshing of experience is evident. It is evident in Pat when she says, "I think I learn just as much as the students do about simulation." In complexity theory, this understanding of learning is expected because all participants are viewed as co-participants in the

learning process. But whatever Pat means by this statement, it must involve a sense that the student experience in simulation is key to forming her own experience in simulation. It is also present in Rob.

> [The] instructor told me that I'd blown the call and I'd missed it and the coordinator came back the next day and said, 'you know what you were the one that was right and the instructor was the one that was out to lunch, and we need to talk about that.'

Rob implies that the self that received the initial feedback was a different self the next day when the coordinator supplied a contrary opinion. His instructor's need to talk with Rob about the experience coupled with Rob's memory of that incident reveal an entangling of experiences. In this case, Rob has meshed his experiences with the instructor to the point where neither instructor nor student can separate them in ways that make narrative sense. A story told about the experience necessarily involves interpretations of both sets of experiences.

Clarissa also provides an interesting example of how simulation experience may be distanced from the self that is in the here and now. Clarissa had videotapes of herself flying in simulation eight years prior to the interviews for this study, and at one point in the interview, we watched one of these videotapes. The videotapes were initially recorded so that student pilots could better understand how they were functioning in the cockpit. Clarissa stated that after seeing herself on video she was able to learn how her body language served to shut out her flying partner even though she did not consciously intend to do so. This was the point she was trying to make when she showed me the simulation videotape. But, while we were watching her interact in the cockpit with her partner, she referred to herself not as "me" or "I" or "we" but as "she" and "they." She did this several times. At one point she said about her activity in the cockpit, "I don't know why they did that." From my perspective, it seemed as though she was looking at a different self. It seemed that while the Clarissa on

videotape had the same qualitative character as the Clarissa watching the videotape with me, there was something different about her selfhood in the sense that the self in the video was different from the one watching the video. In a subsequent interview, when I asked her why she referred to herself in the third person, she responded with the following,

> What do I think about that? I probably see myself in that case as someone younger and less experienced. As I've progressed in life, I have really tried to make a very conscious effort in how I interact with people…and so I think maybe I detached myself from what I was seeing on the screen because I've grown since then and grown in many different ways.

Clarissa's story here demonstrates the difference between sameness and selfhood. There is a feature of Clarissa known as character. According to Ricoeur (1992), this is the set of distinctive marks that permit a human being to be re-identified as the "same" at a later time and in a later place. It involves an uninterrupted continuity and a permanence in time. I can recognize the younger Clarissa and some of her mannerisms in the videotape, for example. However, there is also an awareness that an individual takes up when they attempt to answer the question. "Who am I?" This is answered by what Ricoeur calls selfhood. This is the part of the self that does not have to stay the same. It is the part of the self that matures, grows and develops. If Ricoeur is correct, these two versions are in a dialectic with each other. The bridge between the two is the narrative identity. It is the story we tell of ourselves.

Space does not permit a detailed analysis of character, selfhood, and narrative identity for every study participant. However, other examples are present in the data. They exist when Pat states, "I am the voice of the patient" and when Rick says, "I'm the non-commissioned officer's nightmare." Melanie in particular emphasizes the importance of narrative identity. Below she is speaking

about reintegrating back into society after being isolated in the Mars habitat on Devon Island.

> We were worried, when we were up there. We were like…oh my god, we're going to be so weird when we get back, we're not going to be able to reintegrate. There have been studies done showing that people do not necessarily always reintegrate well into society, that you have issues, that you just feel that maybe you're just separate from the rest of society or whatever, but I think all of us adapted a lot more quickly, and a lot better than we kind of feared that we might…but luckily though we had a very gradual reintegration. We flew from Devon Island into Resolute….We only interacted directly with maybe ten or twenty people, and we were there for a few days, **so it was enough time to tell our stories** to maybe five or ten people **and just kinda get that out of our system** and cause one thing we worried about was you know that first plane that you get on to fly home, you're sitting beside someone and they're like, "So where have you been?" and you're like, "Ha ha ha, you really want to know?"

In the first part of the quote, Melanie reveals that she may have become a little "weird" during her seclusion in the north and that she is aware of this from "studies" that she has read. However, something about having "enough time to tell our stories" was important in making the transition from the previous months in isolation/simulation back to urban society. Perhaps the opportunity to tell her story gave her the opportunity to solidify her conception of what the story was and narratively formalize a relation with her experience in the north.

The need to tell a story is evidenced in every story that I was told. However, there is something significant about a story that forms an experiential

transition from what has occurred in simulation to what is expected to occur in the real world. Rob believes that the "richness" of the stories that are told by students about their simulation experience validates the importance they hold for that experience. He states,

> The richness of the story they [the students] give you back [as an instructor] is really a descriptor of what they chose to attend to, how they weighted it, what they did with the information and how they give back….I mean if our [pedagogical] goal is change the way people think, act, believe, feel…if the goal of a learning activity is to change those things then certainly what the student gives us as opposed to what we see the student do should be a fairly significant part of what we look at.

Self as a Dimension of Experience: A Summary

In this section, I have restricted the notion of self to one that is in alignment with Ricoeur's (1992) conception of the narrative self. I have concentrated on examples for which the data is particularly rich. The data illustrates, at least for the cases of Clarissa, Pat, Rick, and Melanie, that there are multiple selves at play, which (in the context studied here) are influenced by simulation experience. There is the self evidenced by character which constitutes the sense of permanence that permits identification through time and space. There is also the self represented as selfhood: the self that is capable of maturing, which has undergone learning. Finally, there is the narrative self that tells a story, as a composite of others' stories, even as others tell stories about the narrative self. This section ends with a brief story of Melanie and her assertion on the importance of telling her story. In the next section, I examine interpretation and its importance with respect to experiential learning in simulation.

Interpretation as a Dimension of Experience

A significant portion of the data relates to how individual participants interpret their simulation experience. However, in a broad sense, this entire study is about the interpretation of experience. I have already implied that narrative is vital to the interpretation of experience as indicated by Ricoeur (1980, 1992), Kearney (1988, 2004), Clark and Rossiter (2008) and many others. In the previous section on *Self as a Dimension of Experience*, I touched upon the importance of narrative in interpreting simulation experience. In this section, I limit the discussion to particular aspects of interpretation which serve to prefigure, in some manner, the stories that are told about experience. As Fenwick (2003) notes, "Our interpretation is mediated by the concepts and language we bring to an experience" (p. 15). Interpretation, according to Fenwick, is based upon theories we already hold.

I concentrate here on two concepts particularly relevant with respect to interpretation: the "suspension of disbelief" and the "construction of belief." These arise out of the data in ways that directly influence the interpretation of simulation experience. I also concentrate on the interpretation of simulation experience and the ways in which it varies according to how a simulation is imagined. How simulation is imagined is both a teaching consideration and a learning one. The manner in which simulation experience is meshed with other life experience is complex, and this complexity is evident in the ways in which the participants describe their experience.

The Suspension of Disbelief

The suspension of disbelief is typically utilized in the simulation literature to describe a participant in immersive simulation who either pretends that the non-real is, for the moment, real or else (in the existential view of Sartre) that the real is negated into the unreal. Many of those interviewed commented on

the importance of suspending disbelief. As Rob points out, “There are people that are better at pretending [simulation] is real, so they can learn from it, than others.” Pat comments, “There has to be a bit of buy in from the tutors and the people using simulation.” She states,

> I don’t know what it is, what piece, but it happens and you’ll see it. It’s like I said that light bulb going off. They become immersed in the situation – not all of them but some of them get to the point that they’re immersing, that’s that whole buy-in piece.

Below Clarissa speaks about her own responsibility in achieving disbelief.

> It’s like oh you want me to role play and some people have a problem…with that. So the initial transition to doing this might be a little difficult but really once you get into a groove, once you get into – all right we are going to fly the airplane, it really is a mindset and you just learn to develop that mindset and pretend as if [simulation] is the real thing.

These statements support the view of the suspension of disbelief as one of pretending the non-real to be real. Participants in simulation and instructors of simulation tend to deem this concept to be important. I have already spoken of the contrary idea that simulation experience, as a pathological negation of real experience, is an example of the existential view of the suspension of disbelief. It is pertinent here to demonstrate this view.

The simulation literature still largely considers simulation to be “simulated experience” and hence pseudo-experience. The belief that simulation experience is a false experience or a type of “pseudo-experience” is often suspended by those involved in complex immersive simulations. Rob is fully aware that the idea of complex simulations purposefully constructing experience

is not typically given authentic recognition or support by institutions and their prevailing pedagogies. He states,

> When you look up the definition of simulation, the older definitions of simulation all had a sinister connotation to them, the sense that you were trying to pull something over on someone….I think that definition comes in the early 1900s, the late 1800s, but there was this sense in the older definitions of the simulation that it was a falsification or that you were trying to pull the wool over people's eyes and that connotation of the sim we still keep.

Nevertheless, in order to affirm reality, the participants did at times cast aside the traditional belief that a simulation was not real. Dave bluntly states, "Fire is fire whether it's a simulation or a real fire." Also, the implication that a suspended belief will automatically be reinstated as an authentic belief after the simulation is completed does not seem to be necessarily correct. Rob states, "In simulation you are doing things. It is a real experience to the person that's in it." Rob's assertion that simulation experience is real to the person that is in it suggests that he has not reinstated a belief in "pseudo-experience."

Furthermore, not every belief can be suspended in simulation. There are, for example, judgments made about what beliefs/practices should not be suspended. Certainly, the suspension of disbelief is subject to the ideological power structures of legitimacy and domination in the ways that Ricoeur (1986) has imagined them. For example, the idea that paramedics should be subordinate to physicians with respect to patient care is not a belief that is typically suspended in simulation. It is too deeply entrenched in the medical social imaginary. Similarly, belief in the military hierarchy is not suspended in military simulations, and neither is command structure in firefighting simulations as Rob, Rick and Dave (respectively) have all pointed out.

The suspension of disbelief is advocated both in the literature and in the data as an important aspect of learning processes that occur in simulation. But the conceptualization is confused by differing philosophical notions about what exactly the suspension of disbelief means. The data reveal that the suspension of disbelief tends to be regarded by participants as one of vivifying the real, whereas, the literature tends to view it in existential terms. Two important points are revealed: (a) belief is not necessarily reinstated once it is suspended and (b) some beliefs are more difficult to suspend than others.

Constructing Belief in Experience

Belief can be constructed in simulation, as well as, suspended. Complex simulations, through the construction of belief, seem to show the way in which pilots, locomotive engineers, fire fighters, paramedics, and others interpret the world. Experience is biased to particular work based conceptualizations. A "flight" is an aviation construct (as per Clarissa) which links preflight (e.g., filing a flight plan) and postflight (e.g., closing out a flight plan) with actual aircraft flight. "Running on the wire" conceptualizes efficient use of train speed and schedules (as per Mark). However, the idea of the construction of belief is best exemplified in the data by the notion of a "call." Paramedics and firefighters implicitly understand what makes up a call. Emergency services organize their understanding of segmented portions of work around the construct of the call. Simulations in EMS or Fire can be oriented as calls, so when Rick and Dave relate their experience to specific "calls," as a paramedic, I understand exactly what they mean. The concept is a foreign one to pilots who have no similar construct in their repertoire of professional language. At least, as a pilot, I am not aware of any. A call does not have a symbolic charge in aviation. In nursing, it may be erroneously confused as being "on-call" but this carries a different signification and a different symbolic charge. I shall speak more to what a call is in later chapters, but for now it is important to know that a simulation may be designed

to achieve an understanding of a domain specific construct that has no parallel outside its own paradigm of work. Rob eloquently speaks at some length on this, but a couple lines will suffice to make the point.

> [A call] is a very deliberate construct. You are taking your experiences and reframing them and restructuring them using the cognitive processes that we've taught you are the way the paramedics interpret the world.

According to Rob, paramedics are taught (in part through simulation) to believe that the signs, symbols, tools and metaphors of the world function in a specific way. Paramedics are taught to believe in the "call" as an important aspect of their professional social imaginary.

Pat provides a nursing example of how simulation was able to construct experience in ways deemed to be legitimate to students. Below, she talks about a student who was required to attend a simulated cardiac arrest patient lab and then days later encountered a cardiac arrest patient in the hospital.

> She was able to deal with it, "oh my god this happened in simulation I can do it. I know what to do. I know how to do this." She was able to capitalize on that learning that had occurred and the experience that we had presented her with.

In the case above, experience constructed in simulation was found to be directly relevant to later real life encounters with similar circumstances. Kris sums it up. "The key is to learn to apply [simulation] in real life."

Sometimes normalcy is able to be constructed in simulation by taking aspects from the real world and inserting them in simulation. This constructs the belief that the simulation is "real." For Melanie, this involved baking and singing in the Mars habitat. For Pat, it was including doctor's notes in the chart at the

foot of the simulator. For Dave, it was wearing the bunker gear with his own name on it while in simulation. The construction of what is normal is an aspect of simulation that makes it "feel" more real and thus makes it more believable.

Experience and belief in experience can be constructed in simulation via social constructs taught in and through simulation. These constructs can socially categorize aspects of work as they do with pilots via "flights" and paramedics or firefighters via the "call." Simulation can also construct a belief in the legitimacy of the experience through the incorporation of normalizing events. The "normal" aspects of a simulation can make an abnormal event (like a cardiac arrest scenario) seem more real, perhaps by normalizing the imagined activity.

Imagination of the Real

In many ways, the "suspension of disbelief" and the "construction of belief" are based upon an interpretation and imagination of the real (as I have suggested in chapter two). Every participant interviewed believed in the difference between what can be imagined in simulation and what is found in the real. The data suggest that how the real is interpreted guides how simulation is imagined especially if the simulation is intended to be imagined as real. I shall illustrate this point from the data in three ways.

First, the data suggest that imagination in simulation is always subservient to the real. The real must come first. Melanie must really get to Houghton crater on Devon Island before the simulation can start. Chance encounters with polar bears must be considered not just because they may disrupt a Mars simulation but because polar bears are a significant safety risk. In practicing firefighting simulations, fire must always be controlled even during the simulation of an uncontrolled fire. Real fire control simulates pedagogically directed "out of control" fire. Also, the geographical terrain of a train simulation or an aviation simulation is more "real" when it is based on real geography (a normalizing function) be it a section of track from Edmonton to Jasper (to use

Mark's example) or a specific section of restricted airspace (to reference Clarissa). The real provides the foundation upon which the imagination can act.

Second, the real is always something that has already been imagined if it is being portrayed in simulation. There has to be a familiarity with the real (again a normalizing function) in order to imagine variations of it as Rob, Rick and Pat all assert when they require that the simulation controller must have real life experience in the domain of practice that is being simulated. Simulation, as a construction of reality, is an imagination of the real because it is only one view of the real. It is an "image" of the real (not just in the sense of the negation of the real as in Sartre, but also as a brought forth representation of something that exists in a different place and time). Simulation can never be the whole real. This is implied in every story told about simulation. Melanie's Mars simulation imagines a desolate, dry, cold planet. Had the simulation occurred in the 1800s (and it could have) the reality of the Martian surface would have been imagined very differently (e.g., surface water would likely be present). Firefighting simulations imagine the way that fire will react and tailor the simulation accordingly, though as Dave pointed out, fire can be unpredictable, and it can turn a simulation fire call into a real fire call. Something known to be real in simulation can only be known because it has been imagined to be known.

Finally, there are real things that cannot be imagined, and therefore cannot be simulated. Epistemologically speaking, there are things we do not know that are either so far beyond our current understanding that we cannot even imagine them to exist or that are forever beyond our ability to know. When Melanie talks of using an American or Chinese lunar base as a simulation center for future Mars expeditions (in other words, putting a human colony on the Moon by 2020 and using it to simulate a Mars base in order to train for a human mission to Mars in 2040) she is suggesting that there are things about living on Mars that cannot be simulated on earth now. This is not just a technological limitation; it is a limitation of the imagination. It is a recognition that the

imagination of what is in simulation must follow along and behind what we learn from real encounters with the world. When Kris speaks about his experience in the military at the age of 16 most of us can have no idea about what he really means. There will always be things about the experience of others that are unknowable for us.

In simulation, therefore, there seem to be three important aspects surrounding the way the real is interpreted. First, the real takes priority over the imagination in the way that a simulation is constructed and operated. Two, the real is always something that has already been imagined because the social imaginary is the interpretation of the real. Finally, there are things that are real but have never been imagined and so cannot be purposefully simulated.

Interpretation Summary

The interpretation of simulation experience involves a consideration of the concepts and language which prefigure the nature of the simulation experience. Simulations typically rely upon the idea that there is a required suspension of disbelief. Simulation participants are expected to “buy in” or pretend that the simulated reality that makes up the simulation is real. A particularly important point is that simulation experience has traditionally been considered a form of “pseudo-experience.” Simulation has often proceeded on the premise that participants should suspend this belief and treat the experience as real in order to most effectively learn within a simulation. However, once suspended, beliefs may not necessarily be reinstated, and it seems difficult for simulation participants to reinstate a belief of “pseudo-experience.” Furthermore, not all beliefs are easily suspended especially those involving hierarchical power arrangements. Another important point is that complex simulations foster belief in work related constructs. Sometimes these constructs help simulation participants to make sense of simulation experience. Sometimes constructs help to normalize a simulation to make it more real. As Fenwick

(2003) states, “We actually produce our experiences, because, among all the complex and contradictory dimensions in a given event, we are highly selective in what we notice or highlight” (p. 15). Simulation, as an imagination of the real, forces an interpretation about the ways in which the imagination and real interact. There are three important considerations. First, the imagination that is expressed through simulation is subordinate to the real. Second, everything that is real in simulation has already been imagined otherwise sense could not be made out of what is interpreted to be real. Third, there are things that have not and cannot yet be imagined.

Context as a Dimension of Experience

Context, as one of Fenwick’s (2003) five dimensions of experiential learning, appears particularly important in understanding the nature of how learning emerges in simulation. As Fenwick reminds us, “context includes historical location, and meanings of an activity, its geographical space and movement, as well as its cultural meanings and socio-political dynamics” (p. 18). In the simulation literature, context does not typically carry such a broad range of meaning given the tendency to equate it only with the physical environment. Furthermore, physical context in simulation is often privileged over the previously discussed dimensions of purpose, engagement, self, and interpretation. This is especially so, when context is conflated to environment as in virtual reality simulation utilizing mechanisms for haptic (tactile) feedback (Srinivasan & Basdogan, 1997). More generally, in popular culture, context seems to garner more than its fair share of attention whether the simulation involves desktop computer gaming (where graphics are the “be all and end all”) or science fiction cinema (as exemplified by the “Holodeck” concept of Star Trek). As expected, the participants in this study hold to the belief that simulation context is an important part of the experiential learning process and most often reported environmental factors as being the key to a simulation’s

success. However, context is much more than an environment that fosters sensory input. Context includes not only the physical environment but also the history, culture, signs, symbols, and tools which foster practice and manifest pertinent aspects of the social imaginary. At an even more basic level, context is about space. Fenwick (2008) states, “Issues for learning and work include how spaces are constituted in ways that enable or inhibit learning, create inequities or exclusions, and open or limit possibilities for new practices and knowledge” (p. 24). Context in simulation, as I am referring to it here, is always pedagogically constructed to a certain degree. Context is always an important constituent of simulations that are consequently deemed worthy of remembering. Participants seem to remember simulations that have rich and unique contexts. The best stories told about simulation experience always carried with them a rich description of the context.

The Physical Context

Immersive simulations always contain an encompassing physical context. Pat states, “I think that a lot of [instructors] think that [simulation] should be skill acquisition, and I say really no. I don’t believe it should be skill acquisition, it needs to be the whole.” By the “whole” Pat is referring to a setting that comprises the complexly interrelated whole that is the simulation. The physical context in simulation is similar to the setting in a play. The simulation environment may be set up to include actual buildings intersected by roads built over several acres to simulate an Afghan village as Rick described. It may include the back of an ambulance removed from an automotive chassis and set in a lab, or a “tin can” ten meters in diameter set in the arctic to simulate a spaceship. It may also be a sophisticated airplane cockpit simulator or an emergency room in a hospital as outlined by Clarissa and Pat. All of these examples imply environments which provide multiple forms of enabling constraint (limitations which serve to encourage and channel activity in particular directions). They also

provide sensory input which contributes to the internal diversity of the simulation. These are the visual, auditory, olfactory, and haptic aspects of simulation.

The physical part of the environment constrains space, places people in proximity to each other, encourages or limits access, and confines the structure of the simulation. The ways in which a simulation environment modifies space seem to be a significant part of the simulation experience according to the participants in this study. This is obvious in Clarissa's descriptions of herself and her partner in a cockpit simulator (outlined in the previous section on *Self as a Dimension of Experience)*. It is also present in Clarissa's description of aircraft switchology (more thoroughly discussed in chapter 6 in relation to the concept of recursive elaboration), which is the idea that a simulator can help you get to know where all the switches are in a cockpit, what they look like, and how they feel. Switches in an aircraft are designed with different "feels" to minimize the chance of mixing them up. The physical aspects of a simulation are perhaps most apparent in Melanie's description of her simulated Mars habitat. Here is one example.

> The little tuna can that we're living in has such thin walls you could hear anything and everything that happened anywhere in the Hab at anytime, so it was impossible to have a private conversation when we were trying to talk to our psychologist. We'd have a private conversation with her and everyone else had to be listening to music or whatever cause you could hear anything, so I was self-conscious.

A simulation environment implies a needed aspect of isolation as Melanie demonstrates above. Spatial boundaries are important in a physical sense in order to bound (and isolate) activity. This is why a Mars' simulation site is deemed to be an analogue site because it uses a specific geographical

environment on earth to constrain activity in a way that mimics the Martian environment. As I have already pointed out, this is an important example of an enabling constraint. It is not optimal to set up a Mars' analogue site next to a big city where supplies would be readily available and where pedestrians could come knocking on the front door because such a site would lose its isolating boundaries. In an effort to further imagine the environment while in simulation, Melanie and the members of her crew wore "space suits" whenever they were outside of the habitat. This is symbolic of another form of boundary and isolation where the individual is isolated from practice in "outer space."

The physical environment of a simulation facilitates sensory input and constrains the spatial activities undertaken in simulation. It physically bounds particular activities and isolates them from each other and that which is going on in the world. Space, depending on how it is utilized, brings together and keeps apart. It may contain important tools, such as aircraft switches and relevant symbols such as "space suits." It may also limit or encourage access and symbolize entry into practice.

Context as History

The data also reveal that along with physical context, historical context is an important component of a simulation. In medical scenarios, this might be the history of the chief complaint which is written into the script of the simulation. In aviation, it might involve the history of the aircraft, such as time since last inspection, which a student must check before starting out on a simulated cross-country flight. In military simulations, it might involve understanding what happened on the previous mission. History can also include real history which is made pertinent in the simulation. Rick comments below on mission briefings given prior to combat simulations.

> The briefing that you'll get will be similar to something that somebody in the past will have received in Afghanistan.…they're gonna try and do the same things that have happened in Afghanistan.

Similarly, as Clarissa pointed out, aircraft simulators can be programmed to include things like hydraulic failure in circumstances that have actually happened in the past in order to improve pilot education and training. The same is also done in medical simulations where paramedic or nursing instructors set up simulations to mimic real ambulance calls or real clinical presentations that they have experienced in the past.

History in simulation always gives the "moment" in simulation meaning, and it often presents as unfolding (and recursively elaborating) the history of practice, as I have already discussed. Simulation as a reconstruction of a particular interpretation of history also bears an ethical responsibility. I have spoken of ethical responsibility in chapter two and shall speak more about this in chapter 6; however, one example will suffice to make the point here. Pat states,

> We can ethically shut off our mannequin and kill it so to speak. You can't ethically do that to real patients, [but] how are these students going to learn if they are not exposed to those situations that are unethical so to speak.

Pat realizes the importance that the context of a simulation has in relation to ethical aspects of patient care. Simulations may provide a context that is unethical in the real world.

History is a relevant form of context. It provides meaning to a simulated ambulance call, and it gives the "moment" a meaningful relation to the past. It may reinforce what is known about history in an effort to find out how it can be used in the present. Simulations typically unfold histories of practice to provide

the context for “competent” action. Finally, the historical context of a simulation has an ethical aspect which cannot be ignored.

Context as Workplace Culture

The term “culture” has often been related to lifestyle practices which until relatively recently has not included the workplace (Solomon, 1999). Furthermore, common use of the word culture implies a superficiality of its discourse that is illusory. It is beyond this study to deal appropriately will all of the nuanced subtleties that a more thorough discussion of culture would present. However, culture remains an important aspect that is contextually relevant to simulation. Culture distinguishes one group from its Other and enables interpretation of its Other. In the workplace, culture is often used to manage both work and people.

Workplace culture is present in the way that stories are told during a simulation. Each profession has a particular language with particular vocabulary (e.g., the call, on call, flight, switchology, etc.) and particular foundational stories (e.g., “war” stories for paramedics) which describe the cultural norms of the profession. Stories in particular offer legitimacy to newcomers in a community of practice and provide guidance for action. For paramedics, “war stories” provide a form of legitimate peripheral participation, because not just anyone is accepted as a legitimate storyteller and not just anyone is granted access to listen to particular stories. As a paramedic, I was acutely aware of this in listening to Rob recite particular stories about paramedics. He talked to me as one paramedic to another. A common occurrence in the data is exemplified by Clarissa when she stated, “I will tell you why after I have told you the story.”

Dominating cultural discourses are at work in simulation just as they are in the world. As Fenwick (2003) says, “These usually favor a dominant group, its symbols of power, its ideal images, its notions of what count as important things to know” (p. 19). Each participant describing simulation spoke in some sense

about the culture of their profession or domain of work. Simulation allowed participants to understand how professional relationships should be mediated and what constituted legitimate participation in a particular professional culture. Military and medical simulations have often utilized ethnic groups speaking in their native languages and presenting within particular cultural contexts as a means to simulate cultural disconnections and difficulties. Below is a brief excerpt from Rick's description of a large simulation center set up in Alberta and designed to reproduce particular cultural aspects of current Afghan society. The aspect Rick speaks to in this passage is about how the Afghan village simulation is used to both train and educate Canadian soldiers about the Other which in this case is the proto-typical Afghan civilian.

> It's like a simulated Afghanistan. And they have people that go in there and they have animals and people wandering around…they'll have the people dressed up in traditional Afghan attire. Some of them will speak. There'll be actual Afghan people that are working for the Canadian military speaking the language, doing the stuff and that makes it as real as possible.

The above simulation hints at the complexity of attempting to reproduce a "common workplace culture" (which for a Canadian soldier constitutes an Afghan village) while at the same time providing learning opportunities that foster the effective negotiation of meanings and values in a frame of reference that appropriately represents the differences that exist between Afghan civilians and Canadian soldiers. The "reproduction" of cultural complexity raises questions about what is typical and from whose viewpoint. The decision as to who gets to decide what is included and what is excluded from the Afghan village must, in large measure, be a political one. The "essentializing" and stereotyping of the Afghan characters/actors must be based on categorizations that include bias and which submit to Western "authorized" power-based

policies. I shall return to this particular simulation example in the next chapter in my discussion of ideology and utopia.

Simulations also utilize specific tools and mediate understanding through specific signs and symbols which also serve to distinguish work. I have already mentioned the symbolic charge that is present in a credential, as well as, particular constructs (such as a "call") which carry multifaceted meanings. Another example is illustrated by the requirement set by Pat that her nursing students must wear their uniform in simulation.

> I went to tour a whole bunch of nursing labs, and it's recognized within nursing education that the more realistic the environment the more actively engaged the students will become….It raised our expectation now. They have to wear their uniform.

Pat believes wearing a uniform improves the workplace cultural context of the simulation and increases the engagement of the student with the simulation. This is also a requirement in military simulation, firefighting simulation and some aviation and EMS simulations. The uniform signifies a specific profession by virtue of its appearance and composition. Symbolically, it represents discipline and professionalism.

Signs are also important in the interpretation of a simulation. Mark points out that the interpretation of track signs is an important aspect of successfully completing a train simulation. Missing a stop signal in a train simulation is a sign of incompetence. Clarissa pointed out that, in aviation, signs are important with respect to understanding maps, weather reports, and various manuals containing flight relevant data. Of course understanding medical signs (e.g., a blood pressure of 120/80) is a fundamental assessment skill of medical professionals.

Sometimes the sign is also a tool. A firefighter's bunker gear (as considered in the context of a uniform) is also a tool that can allow entry into a

fire engulfed building. On a related point, domain specific language contained in simulation may serve as a tool to teach vocabulary and the structure of communication as Mark and Dave respectively point out. For example, running a train “on the wire” does not mean literally on a wire. Structuring communication over a radio system to optimize safety and job efficiency is an important aspect of firefighter simulation.

These examples demonstrate that simulation fosters ways in which the participants can come to better understand particular aspects of the culture of practice through language, through the recitation and enactment of story and through the symbols, signs, and tools that make up the simulation. Workplace culture has power structures which legitimate or deny access into a community of practice, and it is through cultural understandings that the Other is known.

Variability in Complexity

The variability of the environment in simulation is also contextually important as I have previously pointed out. Immersion in a complex environment facilitates an awareness of how complex systems interact. Another example, derived from aviation, is the concept of situational awareness. Situational awareness is being able to notice what is important (in the cockpit to use the aviation example) from all that is going on and appropriately acting on it. It involves being able to determine priorities and make judgments. In a more sophisticated sense it involves the ability to understand neighbouring interactions. Clarissa referred to situational awareness as an important aspect of simulation training. She states, “[Simulation] really helped solidify that situational awareness.” Dave too directly references the importance of situational awareness as a means to guide appropriate decision making processes. “You know, number one, don’t get yourself into a situation where the other guy is going to have to risk his life to get you out and, you know, don’t take anything for granted.” Dave believes that simulations are important training

tools to help firefighters learn the complexity that hazards impose on particular situations.

Complexity in the environment is also important with respect to considerations of judgment (which also relates to situational awareness). Rob states,

> The other element that's really missing from the paramedic perspective I think is the open-endedness and the unpredictability and the uncontrollability of the environment and the variability in how important that environment is to the call at hand. That's a significant part of competence or clinical judgment from the paramedic perspective. You can walk into some calls and the fact that [a person] was sitting at a bus stop had absolutely nothing to do with that call, never will and never did….And it had no bearing on the call. And yet there's other calls where you walk in, and there are two or three really significant clues as to what's going on in this case that are embedded either in the visual presentation of the scene or the bystanders that are there. So it's not only that the environment is variable, it's the fact that sometimes it's important, and sometimes it's irrelevant, and sometimes it's a red herring.

Changing environmental conditions force discernment as to what is important. This demonstrates a form of situational awareness that is revealed through an understanding of what constitutes relevance. Rob continues,

> For us the environment is so much an element of what's different from call to call to call. Sometimes the environment is complicating. Sometimes it's providing you with information or

> hiding information about what's going on with the patient. Sometimes it's complicating whether you can gain access to the patient or get the patient out or whether or not you can treat them the way you want to treat them. And sometimes there's elements in it that are important to you figuring out what's going on. And other times there isn't.

Rob's comments demonstrate that complex and variable contexts keep learning fresh through novel immersions in complexity which provide both an increased sense of purpose and an increased impetus to further imagine the real. This speaks to the type of internal diversity needed to establish effective learning environments.

Context Summary

The study participants believe that contextual elements are an important part of the simulation experience. The physical context situates the simulation within a spatial structure that encourages or constrains simulation activity. This may be conceptualized in terms of enabling constraints. Because the physical structure of a simulation must in some way be familiar, it complies with the condition of internal redundancy. Historical context provides a temporal location for the simulation in ways that provide linkages to the past and opportunities for future action. Workplace cultural discourses flow through simulation as evidenced by the stories, signs, symbols and tools included within simulation. When workplace diversity is expressed in a simulation, it is evidence of the presence of internal diversity as a condition which fosters the emergence of learning. The workplace cultural aspects of a simulation also determine particular power arrangements especially in terms of legitimate access via simulation to particular communities of practice and allow the Other to be known. Context seems to be an important aspect in the construction of a

simulation that mimics the real. Overall, contextual richness seems to result in the emergence of rich sets of experiences that can be expressed in narrative ways.

Summary of the Simulation Learning Experience of the Participants

In this chapter, I have portrayed the key themes that have arisen out of the participant interviews. The thematic elements of the data are considered via Fenwick's (2003) typology of five dimensions of experiential learning: purpose, engagement, self, interpretation, and context. These dimensions guide the categorization of the themes with the understanding that much of the information cannot be confined to a single dimension. I supplement this understanding with aspects of Ricoeur's (1986) theory of the social imaginary, Wenger's (1998) community of practice perspective and also with insight from complexity learning theory.

The data show that **purpose** is an important dimension of experiential learning. Simulations typically have declared purposes which clarify expectations regarding program goals. Three purposes were reported by every participant. These are (a) attaining credentials or qualifications, (b) providing a safe experience and (c) fostering practice in complex environments. In terms of credentialing, purpose is related to the status and legitimacy of the credential. In terms of safety, the two aspects of individual sanctity and guardianship are important. Purpose in simulation helps to clarify what it takes to combine complex work related tasks into unified work practices and also provides opportunity for learners to engage, reflect and interpret. Simulation works at cross purposes because it is (a) an ideological representation of the social imaginary which serves to legitimate and represent the dominating power structures that created it, and (b) a form of utopia which seeks alternative power arrangements through an attempt to facilitate optimum kinds of experiences. This is particularly relevant when purposes of safety work contrary to

credentialing purposes. When this occurs the typical understanding that simulations should not have dire consequences becomes overturned, and what is imagined in simulation may be confused with what is real and vice versa. Simulation participants, instructors and designers view simulations with different purposes in mind.

Engagement is an important aspect of simulation and is relevant to experiential learning in a number of ways. In Wenger's (1998) terms, engagement includes (a) the negotiation of meaning, (b) the formation of trajectories and (c) unfolding histories of practice. The forms of negotiation that take place between the simulation participants, simulation instructors and controllers facilitate the construction of meaning. Negotiation itself is a form of non-foundational knowledge. Meaning is relevant in both an individual and social sense. It is negotiated via particular power arrangements which typically favour and reproduce the dominant ideological structures. However, through utopian appeals to alternative power arrangements, resistance to abusive power may be exercised. Participants in simulation employ strategies to resist the hierarchical power structure that a simulation imposes but these are infrequently successful. However, when they are, such resistance furthers a condition of decentralized control. Feedback sessions popularly advocate the use of benign power to encourage mutual engagement after a simulation through a peer review process. But while these may foster meaning making through reflection on experience, power in these sessions is rarely benign. These sessions ultimately require conformance to a normative standard which is valued by those in charge. Individual trajectories trace paths through simulation in ways that require the formation of experience. The trajectory or path taken by a participant through a simulation is influenced by conceptualizations of time and space. Time and space in simulation may be radically different from what happens in the "real" world. Especially important is the "moment" which stands out as an important example of recursive elaboration. The moment is an

emergence of learning where the present is made relevant through the confluence of both past and future. Whereas trajectory implies an individual connection to history, unfolding a history of practice requires knowledge of the aspect of the social imaginary that relates to the workplace. The tradition and ritual that is carried into the simulation provides a point of anchorage for engagement. In a broader social sense, the history of practice relates the present to the past through workplace rituals, traditions, and experiences. The data demonstrate the importance of an unfolding history of practice as another example of recursive elaboration that may serve to legitimize participation in a community of practice while in simulation.

It is also revealed that conceptualizations of **self,** as found in simulation, are intermingled with conceptions of experiential learning. The concept of self is represented in the data as being multi-dimensional. Self may be understood in terms of character. In this case, there is a sense of permanence which can be recognized by the self's Other as the self transcends both space and time. The self may also be characterized by the concept of selfhood which is the way the self answers the question "Who am I?" The self may be found as an existential self influenced by psychological principles and humanistic assumptions of the self as an individual self, and also as a social self determined in relation to a social context that is expressed and understood in narrative ways (as in the narrative self). Stories affect notions of self both in the stories that are told by the self and in the stories that are told about the self. Notions of self are narratively meshed with the experiences of others (and the Other) in complex ways. In simulation, there is often the sense that the self in the simulation is different than the self outside of the simulation. Simulation may even promote different conceptualizations of the self through a narrative understanding of the simulation. This is most apparent in Melanie's desire to tell people about her simulation experience immediately upon leaving Devon Island and also in Clarissa's third person narrative of her own simulation experience.

The **interpretation** of simulation experience varies according to the ways in which the world is interpreted. Because concepts and language prefigure simulation experience, both become important in the interpretation made of the experience that emerges out of simulation. One finding is that simulation participants typically believe in the importance of suspending belief. The suspension of disbelief most commonly involves the notion of pretending that something that is not real is real. It may also include the notion of pretending to believe in something that is contrary to the "popular conception of things." The data support both contentions. However, some beliefs are more easily suspended than others. Sometimes beliefs are not reinstated after they are suspended. Another finding is that belief in what is real is constructed through simulation in complex ways. Imagination of the real seems to affect how simulation experience is interpreted, and it does this in complex ways. A close reading of the data reveals that imagination is intricately interwoven with conceptions of the real, and this notion may be at the heart of ultimately understanding how simulation experience is utilized, inter-related, and interpreted.

Finally, **context** is important in processes of experiential learning. This is an expected finding given its emphasis in both the simulation literature and popular culture. Immersive simulations can rely upon complex physical settings to convey a real presence in a field of work through the manipulation of sensory input as in the science of haptics. This also speaks to the internal diversity present in a simulation system. Space also serves to set boundaries and establish neighbouring interactions which maintain seclusion and modify access. History, in a sociological sense, orients the simulation to a past, increases the internal diversity of a simulation, and calls for an ethical component to be present. Workplace culture sets context within a frame of governing ideologies that make possible an understanding of acceptable behaviours and norms and in so doing helps to establish internal redundancy. This may occur through story telling or

through the systematic presence of signs, symbols, and tools. Part of the benefit of undergoing a simulation is the opportunity for novices to learn how to interpret work related signs and symbols and to learn how to use profession specific tools. Varying the contextual parameters of a simulation seems to improve immersion in the simulation and evoke the emergence of learning.

It is important to note that the data categorization arises out of interviews that are composed of stories. Individual data elements do not do justice to the stories told and actually can be considered a form of violence to each story. A story is always a whole story. Each interview participant told me several stories. Some of these were conceptually complex. All of these were based upon complex immersive simulations. Though I have only been able to include a portion of the data in this chapter, I have attempted to represent the study participants fairly by focusing the theoretical frameworks primarily upon the organization of the data. In the next chapter, I move into a more abstract theoretical realm, where theory becomes the center of the discussion and interpretion of the data occurs in light of established theory.

CHAPTER 5 – THE RELATION BETWEEN THE SOCIAL IMAGINARY AND EXPERIENTIAL LEARNING

Introduction

In this chapter, I relate the theoretical work of Ricoeur and Kearney to the data in an attempt to answer the research question of this study: What forms of knowledge and processes of learning are generated in a simulation learning environment? My effort here is primarily hermeneutical. As Kearney (2004) states, "The adoption of hermeneutics – as the 'art of deciphering indirect meanings' – acknowledges the innovative power of imagination" (p. 39). New meanings emerge out of reconsidering literal interpretations. For example, this study reveals that the common understanding of simulation as that which leads to "artificial" experience involves a particularly naïve understanding of the relationship between the real and that which is imagined to be real. I maintain that in order to understand how learning emerges out of simulation, the entanglement of the real with the imaginary must be first sorted through. However, the presumption that there are actual distinctions between the real and the imaginary may be contested by particular scholars in both postmodern and positivist paradigms of thought. Prior to establishing my position, I briefly outline these two opposing views. Given that it is possible to re-interpret the data presented in chapter four in light of a framework which might contest the one I use in this chapter, this is a required endeavor. I then discuss the dialectic of the real and the imaginary in light of Ricoeur's (1986) understanding of the social imaginary. This involves a discussion of Ricoeur's conceptualizations of ideology and utopia along with Kearney's (2003) analysis of the Other to show how meaning is both symbolically and narratively mediated in simulation. I set aside for chapter six the aspect of the discussion which centers on the pedagogical implications that this study reveals for practice.

It is a central finding of this study that simulation is consistently interpreted (by those reflecting upon their experience in simulation) to be both real and an imagination of the real. There is a belief (which in a modern philosophical sense is ultimately derived from Sartre), that the imaginary cannot teach anything new since it is really a "nothingness" that is projected by consciousness. As I have shown in chapter two, this idea is common in the simulation literature, and as I have demonstrated in chapter five, this can be seen at times in the thought of the study participants. However, this view is strongly opposed by Ricoeur and Kearney. Kearney (2004) states, "Ricoeur would retort to Sartre that imagining is simultaneous juxtaposing of two different worlds – real and unreal – which produces new meaning" (p. 38). The data show evidence that this is indeed the case. Ricoeur's thought is essential to understanding the nature of simulation and how learning emerges out of it. I contend that the experiences arising out of simulation comprise this juxtaposition of the real and unreal with respect to purpose, engagement, notions of self, interpretation and context even though individual participants may not recognize that such is the case.

The "real" purpose, engagement, interpretation, self and context are always entangled with a respective imaginary. This study shows that simulation is always real because the experiences that emerge out of simulation are real lived experiences. Simulations can stand out in memory. Simulation experience forms the stuff of story. A simulation can construct identity. The participants in this study verify that performance in a simulation may have real impact on professional credentialing, continuing education, or status within a community of practice. Simulation has consequences in both the physical and the social world. But simulations are also imaginary because they are not constrained in the same way the world is constrained. Consequences in simulation are often mitigated. The laws that govern a simulation are different than the laws of nature. Time may slow, pause or flow backwards. Events in simulation may

precede causes. However, there is always an end to simulation that is both real and imagined, a way of performing in simulation that is both real and imagined, and a context that is both real and imagined. These findings demonstrate that the real and imaginary are densely intertwined.

Unfortunately the notions of what is the real and what is the imaginary are as confused as they are intertwined. The position I maintain in this chapter, along with Ricoeur (1986), Kearney (2004) and Taylor (2004), is that the real and the imaginary exist as appropriate conceptualizations of the world in ways that reify and oppose, reproduce and produce each other. Simulation actually clarifies the dialectic of the real and the imaginary because simulation can be so obviously an imagination of the real. Simulation provides clarity around the way the world always confuses the imaginary with the real and vice versa. However, I would be remiss here if I did not point out that this idea of a dialectic is strongly opposed in two very different ways. I have already briefly alluded to them in chapter two but need to clarify them before proceeding on with the position that I privilege in this study.

Opposing view #1: Privileging the Real over the Imaginary

The "traditional" research focus on simulation has primarily been concerned with the conceptualization of the real as the generating force in experiential learning. A privileging of the real over the imaginary in studies of simulation is clearly evident in the literature (Issenberg et. al., 2005). Because all experience is real (you either experience something or you do not), it is typically advocated that studies of learning within a simulation should be concerned with the aspects of the events that are interpreted to be real (Gaba, 2004). For example, Gaba suggests that (a) the age of the patient being simulated, (b) the technology required for a simulation, and (c) the type of feedback accompanying the simulation are three important dimensions in the study of simulation. Such a rationale suggests that the entanglement of the imaginary with the real has the

overridingly negative effect of obscuring what is real and the learning that arises from it. In such a view, the imaginary is the "filler" superimposed upon what is real to perhaps either motivate participants or to further their suspension of disbelief so that learning may occur (as in Sartre). This superimposition, while practically necessary, is believed to confuse the learning process because it obscures the measurement of behavioural learning objectives. Accordingly, as the rationale goes, simulation is ontologically flawed since, because of financial, pedagogical or technological limitation, the real must contain an imaginary component. The implication, both in terms of pedagogy and research, is that stripping the imaginary from the real can provide a clarified perspective of the learning processes thereby enhancing behavioural measurement, clarifying pedagogical outcomes and supporting quantitative research initiatives. So when learning occurs in a simulation, it is the reality invoked by the simulation and the processes thereby that require understanding if the learning is to be understood.

This idea, I think, forms the basis of research for people like Gaba (2004) who advocate the reduction of a simulation into 5^{11} concrete variables (a number he derives from his assumption that simulations are composed of eleven dimensions with five variations each). Similarly, I think this accounts for the observation in the literature, generally, that simulations are deemed to be pedagogically better if they are, what in the literature is termed, high-fidelity. In other words, the more real the simulation the better the simulation. It also may account for the reason that simulation experience from an institutional perspective is rarely considered equivalent to real experience except in certain specific cases (e.g., aviation simulator flight time).

However, I have identified three problems with this rationale. The first is that the interpretation of what is real must vary. It will vary at the most basic level of sensibility as Hanson (1958) has ably demonstrated. Even when the same phenomenon is being examined, what one person observes is not necessarily the same as what another person observes. Similarly, interpretation will vary in

phenomenological (van Manen, 1997), hermeneutical (Kearney, 2004) and deconstructionist ways (Lawlor, 1992). There is no interpretation that yields universal agreement on what exactly constitutes the real. Because the interpretation of the real must vary then disagreements on what constitutes the real must necessarily invoke disagreement on what constitutes the imaginary. Consequently, a restrictive focus on the real in simulation and its relevance to experiential learning will miss the learning processes linked or otherwise emerging out of what is provisionally deemed to be the imaginary.

Second, because all meaning is in some way symbolically mediated as Freud, Ricoeur, Derrida and many others maintain (Lawlor, 1992), simulation as an imagination of the real, must symbolically maintain substantial relevance to the real. Engagement in simulation must involve engagement with real symbolic aspects of the social imaginary otherwise it cannot be a simulation. The way in which this happens may be obscure, sublime, or even covert but the effect of the causal power of imagination upon what is deemed to be real is itself real.

My third objection considers a philosophical argument which I alluded to in chapter two. Imagination does not have to be entirely reproductive; it may be productive as well. As was first suggested by Kant in his 1781 publication of the first edition of the *Critique of Pure Reason* (see Kearney, 1988), imagination may be the necessary connection between sensory experience and the faculties of reason. Plato would disagree, but if Kant is correct, as Ricoeur (1986) and Kearney (2004) hold, it is imagination that must first be understood if the interpretation of experience is to be comprehended.

Overall, this “traditional” view of the real and the imaginary results in a conflation of the imaginary into the real. Far from eliciting a deep hermeneutical analysis, such a view actually serves to “flatten” reality by removing much of its complexity. By failing to recognize that the nature of reality is open to conjectures of imaginative belief, the adherents of this view become restricted to conventional forms of thinking which lack imaginative potential. This

particular conflation is not helpful to the kind of interpretive analysis that I employ in this study.

Opposing view #2: Privileging the Imaginary over the Real

The second view is in many ways the direct opposite of the one I have just outlined. The contention that the real and the imaginary are engaged in an important dialectic is strongly disputed by some post-structuralists, the most obvious being Jean Baudrillard (2001). Given that Baudrillard is a respected philosopher, and given his fame in popular culture (his work being strongly associated with the 1999 Academy Award winning movie the *Matrix* which depicts life in a computer simulation), his argument too must be examined in some detail.

In the *Simulacra and Simulations*, Baudrillard (2001) starts with the telling phrase, "The simulacrum is never what hides the truth - it is truth that hides the fact that there is none. The simulacrum is true" (p. 164). He then references this to Ecclesiastes. This quote, of course, is not in Ecclesiastes; it is a lie. But it is no more a lie, Baudrillard would have us believe, than Ecclesiastes itself because there is no truth except the simulacrum. There is no truth but the false representation of truth. Baudrillard then proceeds with a brief discussion of Jorge Luis Borges' fictional story of a map which, because of the cartographer's desire to make as accurate as possible, became as big as the territory which it mapped. In reference to Borges' map, Baudrillard states,

> Abstraction today is no longer that of the map, the double, the mirror or the concept. Simulation is no longer that of a territory, a referential being or a substance. It is the generation by models of a real without origin or reality: a hyperreal. The territory no longer precedes the map, nor survives it. (p. 169)

For Baudrillard, the real has become instead the hyperreal where the hyperreal is endless simulation. Simulation in actuality is always the simulation of prior simulations.

But as Kearney (2002) points out, this position is essentially a conflation of the real into the imaginary. It excessively privileges the imaginary over the real. Baudrillard's (2001) position is the complete opposite of Gaba (2004). And yet it is a measure of the complexity of the real and the imaginary that evidence of this hyperreality (and support for Baudrillard's position) is found in the data of this study on at least three occasions. One piece of evidence comes from study participants who have described the use of particular simulations which have the pedagogical purpose of teaching how to engage in other more complex simulations. Another is simply a solitary comment by Melanie, "What I'm learning is that simulations are everywhere, not just in my actual analog or simulation research that I do, but if you think about it, so many things are simulations for other things, if you just wrap your mind around it." The last example is Rob's story of a map which is strikingly similar to Borges'.

> You could make a real good case that a practicum call is a simulation. And really that a simulated call is the just the same thing as a practicum call. Only a few of the variables have changed. It's a really porous boundary. It's just a simulation with more stuff there. Have you heard that story - it's a myth and I forget the context of it, but the king that wanted the perfect map so the guy started off drawing it, and the king got mad at him and said that wasn't good so he went out and added more stuff to it. It still wasn't it good. So he went and got a room and started modeling the kingdom, and the king still didn't like that so one day the guy got fed up and he said, "Your highness, I got the map finished come with me," and he opens the door from the

chambers and they walk out, and he says, “There it is, Sir. It’s a perfect replica of your kingdom” and the king was happy.

Despite the evidence of what might be interpreted as hyperreal, I think it would be an error to interpret Melanie and Rob in the passages above according to the premises of Baudrillard. It is not their intention to conflate the real with the imaginary. Rob as a paramedic understands that pain and suffering in the back of an ambulance are always real pain and real suffering, and Melanie as a geologist can tell a real rock from a simulated rock on a movie set. Both are suggesting in their comments, I think, that the imaginary can never catch-up to the real, that it chases the real in the social world. Kearney (2002) remains adamant that the distinction between historically real events like the Holocaust and narrative fiction must be maintained because one is real and the other is fiction. He consequently has what he calls a “bone to pick” with Baudrillard on this point. When it comes to the entanglement of the real with the imaginary neither conflation is acceptable.

A Dialectical View of the Relation between the Real and the Imaginary

It is the key finding of this study that in simulation the real and imaginary are entangled, and this entanglement both confuses and enhances the understanding of each. The confusion which arises may lead to a hypothetical conflation of one entity into the other in a manner such as I have described above. However, as the nature of the entanglement is discerned, the nuanced and complex relationship between the real and the imaginary enhances understanding of the social structures which make up the simulation world. In applying a theoretical frame to the data of this study, I have chosen to forgo the assumption that a study of learning in simulation should best proceed on the solitary basis of determining what is real. That kind of work already dominates the simulation literature. Rather, I focus on the importance of the imagination

and its complex relationship with the real. The way to understand the tangle of the imagination with the real primarily involves the work of Ricoeur (1980, 1984, 1986, 1991a, 1991b, 1992). Specifically relevant to this study is Ricoeur's theory of imagination which I believe unweaves the dense association of concepts that traditionally encumber the philosophical notion of imagination, and Kearney's (1988, 2001, 2002, 2003, 2004) elaboration of Ricoeur's theory especially in the context of the Other. In Ricoeur, the idea of imagination as merely the formulation of a visual image is much revised and any adequate interpretation of simulation must take Ricoeur's ideas into account. Imagination is not just something that is contained in the head of the individual; it spills out into the social world to form an "imaginary" as both Ricoeur (1986) and Taylor (2004) affirm. According to Kearney (2004), every physical object has an associated social imaginary which allows us to understand it. This social imaginary sits alongside the physically real and fosters interpretation.

The kind of interpretation of the social imaginary Ricoeur is talking about is critical hermeneutical interpretation. This involves more that an attempt to cognitively translate what is being done or said. As Kearney (2004) points out, Ricoeur believes one of the basic tasks of critical hermeneutics is to "debunk ideological inversions of the original relationship between the real and the imaginary" (p. 78). In other words, Ricoeur advocates sorting out what is real from what is imaginary. This can be accomplished, in part, through an awareness of the complex nature of the social imaginary and subsequently by distinguishing the ideological processes and interactions from the utopian ones. Ideology does not by itself complete an explanation of the social imaginary. Even though, according to Ricoeur, we can only speak from an ideology, an ideology cannot distinguish from "within" the difference between the real and the distortion of the real. This requires a competing ideology which Ricoeur distinguishes by the term utopia. The competing ideology is both ideology and something else. It is, as Kearney states, "the second function of hermeneutic understanding – the

utopian function – which Ricoeur sees as indispensable for a proper appreciation of our social imaginary" (p. 85).

Ideology, expressed as cultural symbolism within the social imaginary, will often present as literal and apparent truth. However, upon closer examination, the literal is found to be contested in ways which can only be understood through patient and careful interpretation. Consequently, ideology contains a falsifying function marked in most cases by distortion and superficiality. This is the dissimulative aspect of ideology. However, as Ricoeur is quick to point out, a hermeneutic critique must itself be subject to critique, so any assertion that ideology is entirely falsifying (as in the Marxian view) is countered by the possibility that the falsifying function obscures a more positive function of ideology. This points to what Ricoeur believes is the aspect of ideology which enables any particular society to identify itself, namely the integrative function of ideology. When combined, the two functions of ideology (dissimulation and integration) form a third aspect (domination) which raises the question of how a society (or a simulation) maintains its hierarchical structure, its power, and its authority.

However, ideology only describes part of what is needed to understand the social imaginary. Built into the social imaginary, according to Ricoeur, is a mechanism for invention. The symbolization of the social imaginary is not always falsifying, as Baudrillard (2001) would have us believe. Sometimes there are "genuine symbols of liberation" (Kearney, 2004, p. 85). The invention of these symbols speaks to the utopian function of the social imaginary. In this regard, Ricoeur does not focus on the invention of the symbols (Kearney) but rather on the possibilities and aspirations opened up by them. The utopian reference to symbols implies that symbols may contain some future consideration of value and a surplus meaning which transcends a narrower and more restrictive ideological meaning. Taylor's (1991) ideal of authenticity is utopian in this regard because such an ideal is always about the future consideration of what is most

valuable. In such an understanding, utopia involves an emancipating exploration of what is possible, and this is utopia's most basic and important function. Furthermore, when the social imaginary is "healthy," which is to say there is a balance between the existing ideology and utopias, utopia will serve to challenge an ideology's domination in society by presenting alternative forms of power and accesses to power. But like ideology, utopia has a negative side. A utopia may become so fixated on the future that it forgets its own past. Once the connection with history is severed, it becomes a fantasy which conjures up a fairy tale ending without a beginning and without a way to reach the end. The three aspects of utopia thus tend to balance the three aspects of ideology.

Ricoeur's perspective on the social imaginary provides a way to unravel the entanglement of the real and imaginary within simulation learning environments. In so far as simulation is an attempted replication of the world, simulation must necessarily forefront some aspect of the social imaginary that exists in the world even if it is not considered a pedagogical goal of the simulation designers. The simulation must incorporate some of the symbols, knowledge, ideas, and social constructions of the world if the simulation is to make any sense to its participants. This means that ideological dissimulation, ideological integration, and ideological domination, along with the utopian exploration of the possible, utopian alternatives to existing power arrangements, and utopian fantasy must in some fashion be represented in simulation. In the following sections, I shall show how Ricoeur's theoretical analysis may be used to provide an understanding of the processes by which learning can emerge out of simulation via these six aspects of the social imaginary.

Ideological Integration

Ideological integration fosters learning by forcing an engagement with the social imaginary. Ideology as integration is about the stereotypes and ritualization of social action which allow a group to identify itself as a group and

represent itself to the Other. It involves imagined self-images and recollections of foundational images which contain the purpose of justifying a social order. “Each society, explains Ricoeur, invokes a tradition of mythic idealizations through which it may be aligned with a stable predictable, and repeatable order of meanings” (Kearney, 2004, p. 78). This is what Taylor (2004) means by the social imaginary. It includes what Wenger (1998) calls a community of practice. In short, ideology favours tradition and maintains tradition.

Thus a simulation, at the level of ideological integration, and as revealed in the data, is required to reify or ritualize an aspect of the social imaginary. In the case of simulating a professional aspect of work, it is reification of the professional social imaginary. Reification may involve legitimate peripheral participation in a community of practice where the simulation mediates the “peripheral participation” of novices in safe but also legitimate ways and where the Other that is present in the simulation represents more experienced members of the community of practice.

More fundamentally, a simulation controller may tailor practice in a simulation to an occupational profile, a standard of practice or a governing body because of the drive to integrate curriculum with an ideologically driven norm. The professional imaginary reflects acceptable simulation purposes and performance environments. It reifies norms for which mistakes can be made and which cannot. This can happen through the coercive use of power structures seeking to maintain a standard or through more subtle and benign forms of power. Power is evident when Dave speaks as a firefighter. “The purpose, I guess, at a simulation, is to make sure you’re trained…make sure it’s done right.” The “right” way is determined not by Dave but by the Other. But Dave too, has power through his own self identification as a firefighter because he views himself as a legitimate participant in the field of work. In any case, Dave affirms that those new to a profession learn by being made aware of the particular aspects of the social imaginary which apply to their fields of work.

Military combat drills, medical algorithms, and aviation switchology procedures are all practiced in simulations that enforce and teach normative psychometric, cognitive, and affective behaviours which are based on existing expectations of what is considered to be the professional or work standard. Learning here requires not only engagement in an activity but also an acceptance of the tradition and a motivation to be a part of the tradition that evokes the social or professional imaginary. Another example is situational awareness where in aviation the goal is to develop an acute awareness of the inter-relatedness of all that is going on in the cockpit. But what situational awareness more generically involves is an understanding of the impact of the professional imaginary on the physical world as a form of neighbouring interaction. This awareness of the imaginary as it sits next to that which is newly noticed in the physical world is one way in which learning can be seen to emerge out of simulation.

Ideological integration through simulation can perform an important role in stabilizing society and professional processes in part because it is not accepting of change. However, it can also result in stagnation because of its resistance to innovation. Simulations display ideological integration when they uphold rather than challenge professional or social norms. Given that simulations typically are pedagogically oriented to purposes of professionalism, be they standards or practices, ideological integration often becomes itself a goal of simulation. Ideological integration fosters learning by forcing individuals to engage the social imaginary inside the simulation. This may involve a motivation to become part of the tradition that is evoked by the social imaginary, or it may involve an awareness of something new and actively seeking to interpret related aspects of the social imaginary.

Ideological Dissimulation

Ideological integration is not always a good thing. Sometimes, ideological processes can reify unethical work practices such as might occur in a stagnant community of practice. When this occurs the integrative component of ideology (discussed above) becomes pathological with respect, for example, to Taylor's (1991) ideal of authenticity which holds that some things, like human worth, are innately more important than others. Simulation that fails to uphold the ideal of authenticity becomes inauthentic in the world. It distorts or resists an inventive and emancipatory aspect of the social imaginary. This is simulation as dissimulation. According to Baudrillard (2001), dissimulation is feigning not to have what one already has. It also involves pretending not to know what one knows. Dissimulation includes the Marxian view of ideology; the aspect of ideology that is uncritical and consequently susceptible to deceit, alienation and intolerance (Kearney, 2004). Because it is the aspect of ideology that only allows the new to be accommodated in terms of the old, it too frequently results in a closure to new possibilities and resistance to change. It is the negative side to the community of practice, epitomized by cliques that restrict entrance because of intolerance, ignorance, or prejudice. Essentially, dissimulation conceals the gap between what is and what may be. The imagination of the possible is excessively limited. Enabling constraints lose their enabling ability. It is in this ideological mindset that the idea of simulation as a "simulated" experience or a "false" experience arises as in Rob's comment "the older definitions of simulation all had a sinister connotation to them, the sense that you were trying to pull something over on someone."

Dissimulation is the failure to recognize the nature of the symbolic by equating the real with the literal, when it is not realized that the literal is only the literal by virtue of a common social consensus. Similarly, dissimulation may objectify the social imaginary. This is what Baudrillard has in mind when he

discusses simulation in terms of the hyperreal. In other words, while dissimulation may involve a recognition that the real is real, there is a failure to consider that the social imaginary is always in need of careful symbolic interpretation. Dissimulation is also represented in either the conflation of the imaginary into the real or the real into the imaginary in ways that I outlined earlier in this chapter.

The data of this study contain many examples of dissimulation with one of the most obvious involving the use of the common phrase “fidelity” as a descriptor of medical simulators. A simulator by definition is an imagination of the real. A simulator is called a simulator because it is not that which it pretends to be; it is a representation. But sometimes a simulator may supersede the real that it simulates, and the medical competency of intravenous cannulation demonstrates the point. Intravenous cannulation (IV) may be taught by allowing students to practice on each other. In such an instance, a student serves as the simulator for another student. A student can be considered a simulator because the student is not a real patient and professional competency profiles (such as the Canadian National Occupational Competency Profile for Paramedics) typically do not recognize IV starts on students as being equivalent to starts on real patients for purposes of practice. Because a student will provide a physiological response to the IV start, (perhaps the veins will flatten) the student is considered a high-fidelity simulator. The real student is thus inverted through the simulation via the process of dissimulation into a simulator. However, because of purported liability reasons many educational institutions (such as Pat’s) do not allow students to practice IVs on each other. Consequently, the first real IV start for many nurses and paramedics will occur on sick people in the hospital whereas it could occur on healthy people in the lab. However, in response to the need for training, other “better” high fidelity simulators are being developed using virtual reality. In such a case, the simulator (using virtual

reality) supersedes the real person (the student as the simulator). Dissimulation is evident because the simulated IV start is privileged over the real IV start.

This example shows how liability and a threatened encounter with the legal system "powers" a "normative" pedagogical approach which itself is a form of ideological integration. However, this form of ideological integration (doing what is "legally" required) is also a form of ideological dissimulation because it is inauthentic. Furthermore, the example above is not just inauthentic because of the belief that a technology like virtual reality can present a more real physiological response than a person, it is also inauthentic because the liability held in the educational institute regarding the sanctity of the individual is not subsequently applied in the hospital. What sense does it make to practice IVs on sick people when healthy volunteers are available? Rob voices his concern about this very issue when he states, "The way I see people using the term high fidelity, first off I'm going to put on my critical hat, my critical theorist hat, and say that it's a marvelous sales job."

Rob's comment is particularly important to this discussion because when he says he is putting on his "critical theorist hat" he is verifying that the dissimulation is not complete, as people like Baudrillard might have us believe. The original can still be recognized from the copy. The real is still distinct from the imagined. As Ricoeur notes, dissimulation involves a closure to new possibilities of self-imagination (Kearney, 2004). It is therefore, something to be pedagogically guarded against as Rob demonstrates. Ideology as dissimulation must be recognized as a common aspect of simulation because simulation through the interplay of the imaginary with the real will tend to cultivate dissimulation.

To understand how learning emerges out of dissimulation, it is necessary to return to the important work of Sartre and the existential imagination (Kearney, 1988). As I outlined in chapter two, Sartre's view of the imagination involved a pathological negation of the real and such a view offers an

explanation for the suspension of disbelief in terms of dissimulation. In simulation, unlike in the real world, dissimulation is not always pathological. The dissimulative aspect of simulation (the negation of the real) functions to encourage the suspension of disbelief. It is through a willingness to believe that the "imagined" constitutes meaningful action that simulation can be pedagogically effective in allowing learning to emerge. In actuality, simulation often is designed with the purpose of dissimulation in mind because the simulation is scripted to ask the "what if" question. The "what if" question takes you from the "what is" to "what may be." "What if you encounter an engine failure in mid-flight?" "What if the fire is on the top of a seven story high-rise and people are trapped?" The "what if" question must always contain some ideological dissimulation precisely because such a question attempts to superficially close the gap between what is and what may be. There are procedures to be followed for a mid-flight engine failure as there are for people trapped in a high-rise fire, but the point here is that the answers to these questions contain aspects of dissimulation. "What if" questions work well in simulations, but they do not typically work very well in real life. "What if" the pilot that landed on the Hudson river had attempted to make it back to the airport? Who can answer what the consequences of that decision would have been? In other words, the answers given to the imaginary "what if" questions are not to be assumed to always be the real answers; they are simply answers that *may* be.

Sartre's view of the pathological nature of the imagination is also important because it helps to clarify how dissimulation can make simulation inauthentic. The danger and perhaps the ultimate outcome of the existential imagination is the fascination that comes in the creation of imaginary objects of desire. In the existential view, simulation can go very wrong, and as I pointed out in chapter two, the societal problems associated with pornography demonstrate this well. A simulation functions as dissimulation and dysfunctional simulation

when the ideal of authenticity (Taylor, 1991) has been diminished or overturned. This might arise from an inversion of the real with fiction in such a fashion that the inversion is either unrecognized or is able to resist a proper ontological reordering. By this I mean that (a) the real is imagined as non-real or (b) fiction is imagined as real, and even though the inversion is known to exist, it is maintained and propped up by mechanisms of power legitimated by ideological means.

Learning can arise out of pathological dissimulation in the form of bias and bigotry. The way this happens is through seclusion. Individuals can be solipsistic. Groups can distinguish themselves on the basis of class, race or gender. This happens just as easily in simulation as it does in real life. Sometimes simulation even actively teaches these types of distinctions especially in the case of gender. I know from my own experience that it remains a commonly held belief (among male firefighters) that women cannot perform in firefighting roles as well as men. The symbolic Ivan who was exemplified in my own experience with military simulations during the 1980s was constructed as the Other (as monster) whom I was taught to distrust and hate. Had I known a real Ivan, I likely would have thought differently. Ivan was the prototypical but inauthentic Soviet soldier.

However, this learning is not the kind of learning that contributes to education. At its worst, it fosters the kinds of indoctrination that once convinced the Nazi youth to publicly declare their parents as enemies of the state. If Sartre is correct, the existential imagination on its own will tend towards depravity. The answer then is to engage the existential self with the world, which means to replace the inauthentic Other with an authentic Other. This removes the seclusion and forces contact with authentic parts of the world. Dissimulation may thus be viewed as the form of ideology which is not kept in check by the Other.

Ideological dissimulation when present in simulation is the aspect of ideology which closes off the imagination. In simulation, unlike in the real world, it can have the positive effect of fostering the suspension of unbelief. This is important with respect to how learning occurs in simulation because it motivates and focuses the interpretation of the simulation experience in positive ways. "What if" questions are particularly effective in encouraging learning practices in simulation given that many simulations are constructed with the purpose of asking these questions. However, dissimulation can be pathological with respect to the ways learning arises out of simulation just as it can be in the real world. The ideology that integrates a particular profession or body of work my invert the real with fiction and in so doing distort either the real or the imaginary. Dissimulation is often the outcome of seclusion. One solution is to increase contact with an authentic Other.

Ideological Domination

Ricoeur (1986) maintains that ideology's role as both integration and dissimulation hinges upon a process of legitimation. This results in ideology's third level: ideological domination. Ricoeur believes that legitimation of authority is best understood in terms of a motivational framework such as the one advocated by Max Weber. According to Ricoeur, Weber holds the view that as soon as a differentiation occurs between a governing body and the rest of the group, the governing body has the power to implement order by means of force. Weber suggests that a defining characteristic of the state is the claim to have a monopoly on the legitimate use of physical force but that ultimately the state is not primarily sustained by physical force but rather by belief in its legitimacy (Ricoeur, 1986, pp. 194-195). It is in the claim to legitimacy that a motivational framework makes sense. This is the claim a simulation makes when it tries to construct belief (as revealed in the data in chapter four).

A key point then for Ricoeur and for this study is that there is a disparity between the claim to power by an authority and the answering belief of the people. The claim will always exceed the belief in the claim. The difference is made up through ideology. In other words, if the belief in authority matched the claim for authority there would be no need for persuasive or coercive ideological strategies to increase belief and sustain the claim. Kearney (2004) states,

> Ideology operates, accordingly, as a surplus-value symptomatic of a discrepancy between the legitimizing 'ought' of normative codes, on the one hand, and the 'is' of lived social existence, on the other. (p. 81)

The point here is that the governing authority claims the power to legitimize and control particular functions in society, and this claim always exceeds the value attributed to the authority by those living in society. The governing authority always attempts to convince the society that it legitimately governs, and it does this by various means of propaganda and power which are always ideological.

An example is provided by Melanie. For Melanie, truth claims in simulation are first and foremost tied to science. In Western societies, the claim to the scientific is as strong a claim as can be made, and it is worthwhile remembering here that in the latter Marx, ideology was not considered to be in opposition to the real but in opposition to science (Ricoeur, 1986). In the data, Melanie spoke about the importance of science as a guiding principle for conducting future Mars exploration. In advocating a scientific explanation, Melanie was acknowledging the importance of the scientific aspects of the social imaginary that justified her particular area of work. Melanie learned in simulation by referencing particular aspects of the social imaginary as she engaged in and interpreted the simulation.

All social systems (and simulation is no different) tend to legitimize their right to power through ideological means. This involves the hierarchical

organization of society and the accompanying questions of power and authority. Ideological domination is not necessarily evil. Emancipation, democracy, gender equality are examples which uphold the ideal of authenticity. But it remains pertinent to note that simulations can have, as an unstated purpose, ideological domination. Simulations may, in the case of allied health professions, function to reinforce the subordination of one profession to another as Rob pointed out in his discussion on paramedicine. This is simply done in a simulation, for example, by having the physician always function as the team leader and the paramedic, nurse, etc. function as the team. In other words, limiting exposure to novel aspects of the social imaginary, where the paramedic might actually run the "code team," limit interpretation and restrict the focus of the imagination. This serves to construct a legitimizing belief in a particular way of doing things.

Simulations may also function indirectly to legitimate power. Below, Clarissa mentions the use of simulation to understand and help prevent future plane crashes.

> There's lots of studies out there of crashes…in which case you know there were multiple problems…it's nice that we have the technology to be able to mimic those scenarios and try to learn from it and go through the motions of experiencing it so that we can properly or better multitask in dealing with multiple emergencies.

Few would dispute the necessity of this kind of endeavor. But there is more to the investigation of a plane crash than public safety. There is public confidence. At play is the ideological attempt to convince a public that it is safe to fly, which is also to say, that the government controls public safety. Individuals can learn from this type of ideological domination because in the process of legitimization, simulations may retell relevant historical events as case studies and provide participants the opportunity to vicariously experience real past events.

Unfortunately simulations may also bring out all of the worst things in ideological domination. For example, there is the purposeful use of simulation to "brainwash" child soldiers to die for the cause of the ruling elite. Kris states the following,

> I think they figured that they could sort of bend your mind or make it work to their advantage that's why they recruit you so young….Well because you know when you are that age, I guess anybody can brainwash you. You know you are told that you are fighting for your country and then even if you die it will be a great honour if you will give your blood for your country which a lot of us knew that that was gonna happen, but they say even if you get killed in battle, that was the price of freedom. And I don't know, like I said, but after I went to the war I realized that it was all political game. I found out very corrupted….you know that the government itself was very corrupted. Because there were generals like high generals that were supplying the rebels with weapons.

This is ideological domination as dissimulation, and it is not education.

The process of legitimation is inherently problematic with simulation and nowhere is this made more clear than with the role of the simulation controller. The simulation controller is typically the person that directs the course of events in the simulation from another area or room. Sometimes the simulation controller is also the voice of the patient or in fact may even be the patient in medical simulations. The controller directs the events with an authority that cannot be challenged from within the simulation. The controller by definition is legitimate. And the controller is by definition an "Other" which places ideology in a dialectic with the self as an "Other." I shall write more on this shortly.

Like the ideological aspects of integration and dissimulation, ideological domination affects the ways in which learning emerges out of simulation. But whereas ideological dissimulation is centered around the notion of the suspension of disbelief, ideological domination centers on the construction of belief (also see chapter four). Dominating aspects of power, alter conceptualizations of purpose and self, and limit engagement and interpretation of simulation experience. Limiting exposure to particular aspects of the social imaginary reinforces the integrative aspects of a simulation, because participants will tend to go with what they know. Learning under the umbrella of ideological domination is in large measure about the reification of the standard or of the tradition. When learning blossoms, it seems to be a result of the engagement that facilitates contact with new aspects of the social imaginary that are already there but in need of interpretation.

Utopia as an Exploration of the Possible

Learning in simulation does not just arise out of the ideological aspects of a simulation. When simulation is particularly effective as learning activity, it tends to have a utopian flair. Simulation, in particular pedagogical formulations, can rise above the reproduced ideology of the world and foster a utopian openness for new interpretations and reinterpretations of the world. A frequent pedagogical goal of simulation is that it represent (in terms of activity) the best of the best, that it represent the world not as it is but as it *may be*. Considering the world as it *may be* is a utopian notion. According to Kearney (2001), it requires rethinking the world in terms of what is possible rather than simply thinking about the world as it is now. The presuppositions and prejudices that govern our daily lives (and with respect to work practice also govern our simulations) are put into question and are subjected to the imagination in a utopian view. A simulation may remind us that what is impossible only seems to be impossible. This is one reason why there are aviation simulations. A flight

simulator allows the pilot to potentially experience “every” thing that *may be* conceived of occurring in a flight.

Utopia is an exploration of the possible, but in order to see how this affects the emergence of learning in a simulation, it is important to understand its historical, spatial, and temporal implications. The concept of utopia first arises as the title of Thomas More’s 1516 published book titled *Utopia* which described a cashless society based upon communitarianism, reason and idealized social structures. More’s *Utopia* symbolized the vision of the perfect society to the European colonizers, who after Columbus’ first voyage, were set to exploit the riches of the “New World.” Ricoeur (1986) sorts through the notions of utopia by first examining More’s use of the word. Utopia in its Greek derivation means “what is nowhere.” Ricoeur states,

> What must be emphasized is the benefit of this special extraterritoriality. From this ‘no place’ an exterior glance is cast upon our reality, which suddenly looks strange, nothing more being taken for granted. The field of the possible is now open beyond that of the actual; it is a field, therefore, for alternative ways of living. (p. 16)

Utopia makes a space for existence outside of normal space and time. Simulation by invoking this “power” is able to set itself apart from the ideological manifestations of the social imaginary that it attempts to replicate through the formation of context. The extraterritoriality invoked by utopia is what empowers the spatial context of a simulation. Space in simulation expands boundaries, fosters neighbouring interactions, provides connections, directs individual trajectories, opens opportunity for participation and legitimate peripheral participation in all the ways described in chapter four. That this space even is allowed to exist is because of the utopian power already present in the simulation.

The data clearly reveal that simulations frequently seek to explore what may be possible. This is evidenced in the previous chapter with respect to the formation of trajectories that were found to occur in simulation, in notions of time, and particularly in notions of eschatological time. Eschatological time is time moving towards the end of time, towards an eschaton, after which the concept of time holds no meaning. In Christianity, where it is popularly known, eschatology equates to the coming of the Kingdom and the remaking of Heaven and Earth. The concept is relevant to simulation not just through context but also through the dimensions of engagement and self. Because the *world that is the simulation* ends when the simulation is over, engagement in the simulation will be fundamentally different inside the simulation than it will be after the simulation is over, and so will the notion of self. The self in the simulation is a self moving towards the end of a simulation which will result in the termination of the actor-self being played. After the simulation, the self is situated back in the world, and in Heidegger's existential view, is a being moving towards "death." These are similar in analogy, but much different in consequence. The ending of the simulation is the eschaton at which point time and the world as *it is supposed to be now* become complete. The eschatological "sense" carries the idea that a future outcome is known as certainty not just possibility, and because of the certainty, the future exists prior to coming into existence (in the way that prophecy exists as a foretelling before the events come into history). Action taken in the now is in some measure a result of the coming eschaton. The ending of the simulation marks the arrival of utopia. In the case of simulation, it means moving past the world that is the simulation and forth into the world of ultimate meaning, which is to say the real world.

I include here two excerpts as representative examples from a much larger data set that I find to be particularly utopian. In chapter four, I quoted Melanie at some length to show how her notions of identity were altered by her simulation experience on Devon Island, and I also reported from other study

participants how aspects of engagement varied between participation inside the simulation and the feedback sessions occurring afterwards. Utopian influences were at work in both of these instances; however, I will not reiterate those specifics here. Below I attempt to show how simulation represents an exploration of the possible. The first quote, by Melanie, has a sentimentality that appeals to the exploration of space as a frontier in a manner reminiscent of Thomas More's view of the New World.

> I'm not saying that everyone should do a longer simulation, but I mean it's good to get a taste for what it's all about. It's great for inspiring people to keep up with their research and hopefully get to Mars or support a crew that will get to Mars or just get humanity to Mars.

Melanie's quote contains much of the tension between utopia and ideology. It suggests getting to Mars is possible given adequate research (an appeal to science) and adequate effort (an appeal to social reconstruction). The effort involves "inspiring people," which is to say convincing them that humanity should go to Mars. This illustrates a gap between people in the social world and the utopian notion of people as they should be. In other words, a utopian vision is purported with the hope that a new and better reality will be attained. In this case, simulation serves a utopian purpose because Melanie's belief in simulation tries to reduce the ideological gap between the imagined Mars journey and the real one. Certainly, there still exists in this utopia the ideological belief that human beings have the right to subdue nature, but this makes the point that utopian visions are still always immersed in ideology.

In a second example, I return to Rick's description of the simulated Afghan village (originally referred to in chapter four) which was set up in Alberta for military training purposes. Here, the imagined village represents a real village which attempts to cope with the totality of cultural possibility. Of course in this

village, the world works the way the world "should" work according to the "authorized" ideological mindset of the designers and controllers. The problem with this type of simulation is that in spite of the significance given to "cultural difference" (in terms of language, behaviour, signs, symbols, etc.) very particular sets of Western valued norms are reified and upheld. A pedagogical problem might be the tendency for soldiers to acquire, in the simulation, a view which identifies them as saviours to the (less powerful) Afghan people. As Solomon (1999) states in her discussion of workplace culture, "in spite of the rhetoric, there is still a presumption of sameness where those who are not the same… are seen to be in deficit" (p. 125). Certainly, the culture of this village is both legitimate and utopian as per the West. But it is not without irony, that the simulated villagers are considered socially legitimate in ways that their "real" counterparts, as ideologically denigrated, are not. Nevertheless, the ideological aspects of culture manifested in the differing traditions of the Middle-East and the West are brought together in a utopian forum that hopes for better outcomes than might be otherwise expected. Despite any critique, Canadian soldiers do learn from experience garnered in the simulation Afghan village. At least in part, this must be because they are forced to reconsider aspects of their own social imaginary in light of one that is different.

The development of new perspectives defines what Ricoeur (1986) believes is utopia's most basic function: its constitutive role that helps us to rethink the nature of our social life. Ricoeur's evidence for his conclusion turns to the work of Mannheim (1997) who strived to create a typology of utopias that (among other things) operated in history according to a particular sense of time. The utopian element of a simulation thus forefronts the temporal aspects of a simulation which can be so interesting and so peculiar. While Mannheim's typologies are in much dispute by Ricoeur, he notes that in these instances utopias are not simply imaginative dreams but rather are exemplified by a dream that works to be realized in a historical context. Utopias, as Ricoeur points out,

are real projects (like the simulated Afghan village) which optimistically are intended to provide an alternative view to the current established Western social imaginary. Simulations in so far as they are an exploration of the possible provide a vision towards actual goals. So the ideological goal of constructing simulations which foster healthcare teams needs a utopian vision (based on the ideal of authenticity) if it is to ever succeed.

In this regard, Ricoeur believes utopia acts as the counterpart to ideology's basic integrative function because the "nowhere" of the utopia provides a distance between the extraterritoriality that utopia creates and the ideologically dominating aspects of the social imaginary. This distance is not an infinite distance because ideology always seeks to close the gap, but rather it is a "critical" distance. The gap, as a distance, establishes the requirement of symbolic mediation which forms the conceptualization of distanciation in Ricoeur's hermeneutical method. The Marxian critique of ideology with its opposition to the real (or science) masks the more substantial opposition to ideology which utopian considerations provide. Because utopias, like ideologies, are symbolically mediated, the opposition of ideology and utopia is not one of facts but of conflicting interpretations.

The point above is important, so I shall reiterate it. In simulation, the *real* opposition to ideology comes not from an appeal to the real but from an appeal to the utopian aspects of the social imaginary. The utopian aspect of the social imaginary, distinguishes ideology from either fact or truth, and it does this in simulation just as it does it in the world. It is the reason Rob can report that a "call" in simulation is still a real "call" even though the ideological aspect that comprises a paramedic or firefighter's social imaginary decries such an assertion. But here is the crux, separating ideology from fact means (as Nietzsche is reported to have said) that there are no facts only interpretations of facts. The interpretation of the social imaginary requires symbolic mediation and in so far as simulation is a manifestation of a particular aspect of the professional social

imaginary, it too can only be understood through symbolic interpretation. What this means is that ideology is only part of the social imaginary; utopia is vital to understanding not only the social imaginary as a whole but also ideology in particular.

Utopia as an Alternative to the Present Power

According to Ricoeur (1986) an important function of a utopia is to challenge existing power and to present an alternative power arrangement. Utopia, in this sense, is the Marxian critique of ideology. It is the function of utopia to shatter ideology. In so far as identity is maintained by ideology, utopia's task is to transform that identity. Utopia reveals the gap between the legitimation of authority and the claims of authority that ideology conceals. As Ricoeur reveals, the turning point for both ideology and utopia in their most critical functions hinges on the aspect of authority. In this respect, utopia functions as the contrary ideological underdog which challenges the power of the hegemonic view.

It is evidence that Ricoeur is on the right track that this function of utopia is not as conspicuous in the data as is its ideological counterpart. However, I think that deep in the essence of the simulated Afghan village there resides a challenge to Western military and economic power. Western militaries now openly acknowledge that Taliban resistance cannot be overcome by strength of arms alone. The hearts of the people must be won, and this can only happen if the same soldiers who signify Western military power become symbolic of a West that legitimately seeks to understand its Other. As Ricoeur notes, rule involves a claim of legitimacy that must be recognized. There is a gap between the actual legitimacy of Western armies to protect individual Afghan rights and freedoms, and the West's claim to possess the right to put armies on foreign soil, and this is evidenced by the support that Taliban fighters have among a portion of the population. In this gap, is projected a vision which the West sees as

emancipatory, but which the Taliban sees as ideological. But, as Ricoeur would acknowledge, the vision is both utopian and ideological for both sides. Neither, should it be assumed that a utopian challenge to power necessarily involves an improvement in the human condition. It is the utopian aspect that opposes existing forms of power (and seeks to replace it with less well know forms of power) which legitimates the postmodern criticism of metanarratives (such as emancipation) as utopian constructs which conceal hidden power arrangements (see Slattery, 2006). That simulations are constructed in order to facilitate a kind of multidimensional social understanding demonstrates an attempt to make sense of a plurality of ideologies and proposed utopias which defy (as already noted) singular description.

There is not likely ever a single utopian vision at work in a simulation. Rather there are competing utopias in primary opposition to a dominant ideology. An excellent example from the data follows from Rob's comments on experience obtained in simulation. In the following, Rob re-interprets the nature of experience based upon utopian considerations of engagement with simulation. Rob starts with the assertion that simulation experience is real and concludes that a simulation call (for the student) is real. He states,

> We still keep thinking that the simulation is a fake experience. Well it's not. It's contrived but from the student's point of view it's a real experience. **It's one of the calls they've done.** They just did it in the classroom with their buddies as the patient instead of doing it on Christine at the bus stop with menstrual cramps. But… from the student's point of view, they're both real. I mean they may not be real calls [in the traditional sense of the word call], but they're both real experiences. They're both real times when they've had to encounter a patient with a problem. Look at the environment, they got the history, try to figure out what's going

> on, choose something to do, put it in into play, see what happens, and write it all up at the end. And then be critiqued by somebody. So even though a lot of the elements in the simulation are different than what's in the real world, from an experiential perspective, from the experience of the person going through it, **it's still a real call.**

The striking part in the passage above (which is easily missed by those not in an emergency services profession) is his assertion, almost in passing, that a simulation can be a real call. This is a profoundly unique statement! Every paramedic knows what a "call" is, and I can say with certainty that very nearly none would suggest that a simulation is or could be a call. A call can only be what is real. However, what Rob realizes is that a call is a symbolically mediated construction. It is a metaphor to describe the interpretation of meaningful events. Because there is meaningful action in simulation, the call is real. Learning emerges here because the dominant ideological interpretation is questioned in a utopian way which forces a re-interpretation of some aspect of the social imaginary.

This new interpretation challenges the authority of the standard interpretation that says a call is objectively based in, and contextually dependent upon, the environment of the real world. In this sense, Rob's view of a call is utopian. Rob's challenge of what constitutes a call critiques the pedagogical goal of high fidelity simulation, which is to make the imaginary as real (and as flat) as possible. While high fidelity attempts objectified descriptions of reality that only represent reality, in Rob's view, the "simulation" call does not mimic the imaginary of the real, it is the imaginary of the real. This is not a Marxian inversion of the real with fiction; it is the social imaginary. A "simulation" call signifies and symbolically exists as language, as metaphor, and as experience in all the same ways as the so called "real" call.

The utopian challenge to existing power structures is pedagogically relevant because of the implied need to cultivate an awareness that symbolic interpretation may be of utopian significance. A utopian interpretation will reveal the connections to power that a symbol maintains via its ideological understandings, and once forefronted opens such connections to critique and possible change. Simulation can provide an "idealized" environment which challenges all facets of ideological understandings.

Utopian aspects of the social imaginary reveal that there is a difference between the legitimation of authority and the claims of authority which ideology conceals. Simulation when it is overtly utopian can demonstrate the ideological concealment that might otherwise be evident. When utopia presents an alternative to existing ideological power, a re-interpretation of the social imaginary is forced. This re-interpretation is symbolically mediated, and because it is new, it provides new meaning, and learning emerges.

Utopia as Fantasy

Ricoeur points out that utopia has another function which corresponds to fantasy. It is utopia as escapism. Ricoeur (1986) demonstrates that the "nowhere" of utopia may become a pretext for escape from the authority present in a given situation and from the ambiguous use of power. However, this form of utopia may be pathological in similar ways to ideological dissimulation even as it serves to counter dissimulation. It can be identified with some of the regressive trends noted in utopian thinkers such as an excessive and uncritical nostalgia for the past. In terms of the existential imagination, utopian fantasy may enhance the negation of the real and promote ideological dissimulation. There are many who would argue that long term Mars analogue simulations are rationally divorced from the actual fiscal and social cost of making a Mars landing a reality.

An excellent example of utopia as fantasy comes in a passing reference from Melanie when she refers to the problems of *Biosphere 2*. *Biosphere 2*, built in the Arizona dessert, was an enclosed 3.15 acre ecosystem containing soil, air, water, plants, and animals with the purpose of supporting a crew of eight with adequate food, water and air for two years (Cohen & Tilman, 1996). Its $200 million attempt at using science and technology to simulate the earth's ecosystem was spectacularly unsuccessful. It is the utopia as fantasy par excellence. Why? Because a utopian fantasy can never become the real. In the data, Melanie's Mars' simulation might be classified by some as a utopian fantasy.

However, as I have already pointed out utopias are always plural. What is fantasy for some is exploration of the possible for others. Melanie would be the first to point out that Mars missions are only deemed to be unrealistic in an economic sense because particular cost estimates do not take into account the financial spinoffs of the space industry (e.g., global positioning systems, satellite communications, satellite television, weather forecasting systems, textile innovations, photovoltaic technologies, imaging systems, robotics, and propulsion applications to name a few). It might also be pointed out that in a social sense a human Mars' mission might demonstrate social responsibility because it would require and, therefore, foster international cooperation (as the space station does) and that a project of that magnitude could be used to provide a focus for an industrial/military complex which will otherwise occupy itself with war. The point that I am trying to make here is that utopian visions differ. They compete not only with the dominant ideology but with other utopias. This competition disrupts the equilibrium of the existing ideological aspects of the social imaginary, which means in terms of complexity theory, that the utopian aspect always inputs a jolt into the system and according to complexity theory such disruptions are necessary for learning to emerge.

It should go without saying that people learn through fantasy. Certainly, Baudrillard (2001) makes such affirmations. Having said this, utopia as fantasy is not always pathological. In some ways, simulation as fantasy is what Disneyland® is all about, and because Disneyland® can be a retreat from the world, it can provide a needed break from the world. Leave the cell phone behind, and ride the roller coaster. Simulation when it is fun, has this utopian aspect of fantasy. Mark enjoyed playing Microsoft® Train Simulator because it was fun. In fact, his enthusiasm for playing the game was contagious. Dave recites a similar example of simulation. I have already touched upon his story in chapter four where I referenced issues of spatial context by contrasting smoke with foam. Here, I relay the story in its more utopian aspects.

> Several years ago, when we still had the old training building, we filled it up with foam on the ground floor and sent guys in there just to see what it would be like… it was full of foam! With no air pack on, you could walk through the foam. There was enough air in the foam so that you could breathe, but you know you had to try to keep it out of your mouth and some guys would kind of get a little bit claustrophobic feeling in there because it's right in your face….It was interesting because you couldn't see anything in front of you…I mean that's what a real fire would be like and, you know, the foam was right in your face…The type of foam we used, wouldn't sting your eyes…It was unique, and it was kind of fun, you know. Fun having a big bubble bath….

When an activity is fun there is motivation to prolong the engagement with the activity, and there is something to be said for "time spent in simulation." Certainly, time spent in simulation is tracked by pilots according to Transport Canada regulations because it is deemed by governmental regulatory agencies to be an important determinant of pilot proficiency. Spending time in

an activity or simulation gives time for unexpected learning opportunities to arise. Furthermore, fantasy may allow participants in simulation to imagine themselves as different selves with more experience and more knowledge. Paramedic students in trauma simulations can imagine themselves to be trauma surgeons and thereby perform in ways which they believe trauma surgeons would perform. When this type of imagining occurs, in the safe simulation setting, it can force the student to "think outside the box" when it comes to solving problems. In my experience, encouraging students to imagine in such a way can result in an improvement in both confidence and performance. Of course there can be a downside if this imagining (or construction of belief) is maintained after the simulation and inappropriately applied to real world practice.

The designation of a utopia as a fantasy is always arguable, especially by the author of the utopia. Multiple utopias are always at work and what is utopian fantasy for one will be an exploration of what is possible for another. Ricoeur (1986) even suggests that utopian fantasy may be the cure for ideological distortion that has produced a narrow vision incapable of conceiving a "nowhere." In simulation, utopian fantasy can provide a worthwhile learning environment that is fun to enter. By improving the motivation to engage in an activity more time will be spent in the activity and new opportunities for learning may emerge. Fantasy can provide a holiday from the real pressures of the world, and this escapist aspect need not always be considered pathological. However, utopian fantasy can be detrimental when it leads, as Sartre has demonstrated, to a pathological abandonment of the real world in favor of an imagined world severed of any connection to an authentic past.

Summarizing the Dialectic between Ideology and Utopia

Ricoeur (1986) argues that ideology and utopia together constitute the social imaginary that vivifies the real. Utopia counterbalances ideology.

Consequently, according to Ricoeur, there are three broad levels of utopia that relate to those of ideology. Utopia may present as an alternative to existing power arrangements, it may foster an exploration into what is possible, and it may be revealed as escapism or fantasy. In complex ways, utopia counters the ideological aspects of integration, dissimulation, and domination. As Kearney (2004) states, “The utopian imaginary is authentic when it serves to explode the ideologies that disguise present injustice” (p. 87). The dialectic between ideology and utopia in a general sense comprises the part of the imagination that makes up the social world. When the social imaginary is authentic, “a community expresses aspirations for a better world” (Kearney, p. 87). Both ideology and utopia are forcefully and obviously present in the aspect of the social imaginary that is being represented in simulation. It means that particular aspects of the social imaginary will forefront particular signs and symbols which will open the world for varying kinds of interpretation and re-interpretation. Learning emerges via complexly derived processes. These processes cause disruptions in the way that simulation is understood, in the forms of engagement that are fostered, in notions of self, in the ways in which simulation experience is interpreted, and in the context of the simulation activity.

The Other

I have thus far concentrated primarily upon the symbolic nature of the social imaginary revealed through the conceptualizations of ideology and utopia. However, I have not sufficiently dealt with the aspect of the social imaginary which drives it towards an ideal of authenticity. According to Ricoeur (1986, 1992), Kearney (2003, 2004) and Taylor (1991, 2004) this necessarily involves the concept of the Other.

According to Ricoeur, all understanding is self-understanding, and the best way to know oneself is through the Other (Ricoeur, 1992; Kearney, 2004). In the path through the Other, the participant is de-worlded and opened to new

imaginative possibilities. Simulation mediates just such a path. As I have outlined in chapter two, Kearney (2003) demonstrates three categories of Other which are relevant to this study. The Other in simulation may be revealed as a stranger, a god or a monster. While such a categorization obviously limits the complexity of the Other, it nevertheless puts a face on what the Other means. Hermeneutically examining the Other in terms of these three categories forces a reinvestigation of the practice of defining ourselves in terms of Otherness. Kearney (2003) states,

> In an age crippled by crises of identity and legitimation, it would seem particularly urgent to challenge the polarization between Us and Them. What new forms do the emblematic figures of otherness take, we may ask, in a society increasingly dominated by simulation and spectacle? (p. 5)

I contend here that Kearney's categories of strangers, gods and monsters clarifies the Other that is experienced in simulation. It is the journey in simulation through a particular Other that forces an interpretation of the social imaginary. This is necessary for learning to emerge, for meaning to be constructed, and for a unique learning experience to occur. Because understanding is always about self-understanding then understanding the Other means understanding the self.

Other as Stranger

The Greek word for stranger is the same word as for guest, and it is sometimes used to imply the "Other." The Greek meaning suggests that the stranger is always the guest. Other as stranger invokes, through the notion of guest, the idea of hospitality. Hospitality as Derrida makes clear (Borradori, 2003) is about acceptance and not just tolerance. Acceptance of the Other is

necessary in professional practice and across professions. Acceptance of the Other in simulation means accepting both what the Other represents (e.g., another pilot, soldier, firefighter) and the person participating next to you.

Communities of practice when they are new or foreign are the Other. Communities of practice can encourage motivation given that they strongly inform identity through the establishment of community. Identity can be affected in simulation especially when the simulation is long and isolated as in the one undertaken by Melanie where the imagined self is separated from the normal social imaginary during the long months of a Mars simulation. The Other may be a different profession foreign to the familiar. Or it may be occupied through role playing the Other in simulation. The simulation might involve pretending to be the Other.

Simulations force strangers together, and they force individuals to consider the strangeness of the Other's identity, to brush up against that identity, to rub shoulders, to either tolerate or accept. Dave understands this when he talks about getting to know the names of new fire-fighters when they are in training simulations, so he will know their names when they are in a real fire. Clarissa acknowledges it also when she talks about her simulation flying partners who are not known well enough to be her friends. Rick understands that large scale combat simulations are attempting to force the individual soldiers in the field to come to terms with taking orders from a commander whom they do not know and seldom see.

The key thing about the stranger, as Kearney (2003) points out, is that you cannot always tell if the stranger knocking at the door is the Messiah bringing forth the Kingdom or a serial killer intent upon killing your family. In simulation, you cannot always tell if the simulation controller you are talking to is really there to help you successfully navigate through the simulation or to fail you out of a program. The controller is a stranger to the participants in the simulation, and the motivation for the controller's actions are always shrouded

in mystery. An example of the uncertainty of the controller, which typifies the other as stranger, is detailed in Pat's comment below.

> So they'll look over there and then they say [to the controller], "well is this simulator supposed to do this?" And then the control operator will come back and say, "well who are you talking to? What simulator? What are you talking about?" staying in the voice of the patient.

Because the self is unsure as to the stranger's purposes, imagination is allowed to cast its projections upon the real, to open up conjectured possibilities for the real, and consequently to modify interactions with the real. In this case, the controller, by staying in the voice of the patient, attempts to force a re-imagination of the simulation upon the student.

Other as Monster

Sometimes the Other is the vilified other. Sometimes the Other is the scapegoat, the alien. The Other may be viewed as a monster, if only because there is always an aspect of the Other that is also to be feared. But as Kearney points out (2003), seeking to understand the Other removes some of the terror that the Other evokes. Consider Rick's depiction of the state sanctioned Other in which the enemy is given dehumanizing and slanderous names. In Rick's example, the enemy soldier is given all sorts of derogatory names (e.g., Johnny Reb). The state, may claim the right to violence (via ideological means), but what an understanding of the Other implies is that monster status can only be maintained by viewing the Other from afar. The state must make sure that the monster does not become so familiar that it transforms into a stranger because from an ethical point of view strangers do not deserve death whereas monsters do. Military simulations do not always explore the history and culture of the

Other because they do not want them to be perceived merely as strangers. The monster is a military necessity. The Afghan village recreation is thus seen to work at cross purposes because the Other in the village is both the Other as stranger and the Other as monster.

Other as God

Gods are embedded with the power to make us inconsequential. As Ovid's *Metamorphosis* clearly demonstrates, gods should usually be avoided. But sometimes the god in the world cannot be avoided. The designer of the simulation has the power to create the world and modify the social imaginary. The designer of the simulation may be the voice of either ideology or utopia. The self that is in the simulation needs to be able to come to terms with the designer and understand how to interpret the creation of the gods.

The panopticon symbolizes god like power, and a simulation has many characteristics in common with a panopticon. The panopticon as a prison building allows for an individual to watch over the activities of prisoners without the prisoners being able to observe their observer. The panopitcon symbolizes omniscience by providing the prisoners with the perception that they are always being watched even though they are not. In the 21st century, cameras have largely taken over the panopticon's function, and there are many examples of cameras being used in simulation to observe individual engagement. Clarissa talks about being videotaped in simulation. Rob and Pat talk about using cameras in simulation. Mark in talking about a high fidelity train simulator states, "There were instructors that were in another room that had all the cameras and all that kind of stuff watching what you were doing."

At the same time that the structure of a simulation can act like a panopticon with an implied claim to omniscience, the simulation designer or controller manages the simulation in ways that approximate an omnipotent god. Rob illustrates this point below. He is using the term attendant to refer to the

person in the simulation who is being examined and then contrasting this with the collective decision making that goes on in a real call.

> You know again in our instructional model, you're the attendant so you're the guy who is on trial today and not only do we not want your partner to prompt you…if your partner prompts you, we will fail both of you. And yet you go out on an ambulance call and the decision making is collective.

Rob's example (and Ovid's) shows that it is necessary to be very careful when engaging a god.

It is an interesting finding that Rob, Pat, and Rick all comment on the importance of the controller in terms of being able to properly guide the simulation based on previous real world experience. Rob states, "The reason that you want somebody who's been on the street in the classroom…it's about making the stuff real. Making the stuff real is adding that layer of tradition and experience on top of the curriculum. Pat agrees when she says, "The control operator was a lay person…a person with computer skills, [but] no medicine background. **Oh my god that did not work.** It did not work…"

A confrontation with the Other as a god (as might occur in simulation) drives home just how intertwined the imaginary is with the real. In simulation, the need to exert a legitimation of power through ideological domination requires that simulation controllers stand with one foot in the simulation and one foot in the real world. Controllers are the portal from the simulation to the real world, and when they speak, they do so with a third person omnipotent voice. This voice carries with it aspects of the divine, because from the perspective of the student, the voice originates in a world that encompasses, but is also beyond, the simulated world. The voice is the voice of authority, only generically named (as "controller"), and therefore not something to be

completely known or critically questioned. It is like the voice of the burning bush in the biblical book of Exodus which would not give a name. And like the burning bush, which manifests as God in the world and which speaks and is not consumed by fire, the voice of the controller in simulation is not bound by the rules set for the simulation.

Yet, the participants in a simulation know they are in a simulation. The participants know, as does the controller, that they are beings immersed in situations that are artificially contrived. The controller is omnipotent only because the participants agree to being immersed in a simulation and are motivated to refrain from exhibiting their disbelief in an effort to conform to the legitimizing claim that is incumbent upon them. They are, therefore, by virtue of their suspension of unbelief, under the influence of ideological dissimulation and domination. But they submit presumably to learn what they can learn from their confrontation not only with the monster (that encompasses their fear of the unknown scenario the simulation thrusts upon them), but with the Other that is a stranger (who resides in the simulated world with them) and also from the Controller whom (as a god) they must trust and fear.

The emergence of learning that occurs in simulation occurs via the journey through the Other, because it is only through the Other that the symbolic representations of the social imaginary may be ultimately comprehended. Involvement with the Other in a simulation reduces the mystery of the Other and allows understanding and learning to occur. However, because the Other will always retain some mystery, the understanding can never be total. The Other requires interpretation, and this too is symbolically mediated. This Other may be categorized as either a stranger, a god, or a monster. Knowing the Other involves being able to interpret the meaning of the relationships found between oneself and the Other, and these new meanings reflect the emergence of learning.

Narrative Understandings of Simulation

I have thus far concentrated upon the symbolic nature of the social imaginary revealed through the conceptualizations of ideology and utopia that are ever present in simulation and the necessary journey through the Other which drives the simulation towards the ideal of authenticity. However, I have not sufficiently dealt with the narrative ways in which the social imaginary is made known in simulation. In this section, I contend that story is an important form of knowledge arising out of simulation and that story mediates the kinds of learning processes that are central to the meaning-making that arises from a simulation experience. Meaningful learning emerges because story operates on two levels within a simulation. Simulation is first an imagination of the world, revealed through a story scripted into existence by the designers, controllers and instructors of the simulation. Secondly, it is an interpretation of the participants who re-imagine the first story according to their own understandings. This forms a second story which necessarily considers the Other that is present in the simulation. The difference between the imagination of a story as proposed by the designers of the simulation and the re-imagination of the story by the participants creates an interaction between the two stories resulting in the emergence of new meanings. This comprises another way that learning emerges out of simulation.

Story as a Form of Knowledge

The assertion that story is an important form of knowledge arising out of simulation nevertheless remains a controversial one. Positivists (like White, 1984) would challenge such an assertion. In making this claim, I do not suggest that propositional or procedural knowledge is inconsequential within the context of simulation. Many simulations are constructed to teach or reinforce propositional and procedural knowledge. Simulations can be used to teach drug

dosages, as well as, procedures for administering drugs just as they can teach flight rules and procedural drill. However, when simulation is used in this fashion it typically involves the use of task trainers, and it is not immersive. Task trainers (like CPR mannequins) do not tend to cause students to re-interpret the world. The kind of meaning-making derived from task trainers is superficial at best. However, immersive simulation can cause individuals to re-interpret the world. This is amply demonstrated in the data. For Rob, immersive simulation has changed the meaning of a call. For Melanie, it has changed the way she understands time. For Clarissa and Pat, it has altered the way each interprets student experience. However, the assertion and the challenge beg the question, "What is the relationship between narrative and life experience?" The literature provides different answers to this question.

MacIntyre (1981), an often quoted source on this very question, believes that narrative is the substance of life. He states,

> It is because we all live out narratives in our lives and because we understand our own lives in terms of narrative that we live out that the form of narrative is appropriate for understanding the actions of others. Stories are lived before they are told – except in the case of fiction. (pp. 211-212)

MacIntyre finds support in Barbara Hardy's (1968) view of narrative.

> For we dream in narrative, day-dream in narrative, remember, anticipate, hope, despair, believe, doubt, plan, revise, criticize, construct, gossip, learn, hate, and love by narrative. In order to really live, we make up stories about ourselves and others, about the personal as well as the social past and future. (p. 5)

Hayden White (1984) does not agree. He represents a more positivist stance with regard to the function of narrative and its role in historical analysis. In his writing about historical theory, White says, “A discipline that produces narrative accounts of its subject matter as an end in itself seems methodologically unsound, one that investigates its data in the interest of telling a story appears theoretically deficient” (p. 1). But then David Carr (1986) asserts, “White’s value of narrativity regarding its representation of reality is ‘nil’” (p. 11). We thus end up with two opposing views regarding the relevance of narrative structure to real experience. On one extreme, traditional positivists and scholars like White (1984) believe narrative structure is imposed upon experience from the outside. On the other side is MacIntyre’s (1981) and Hardy’s (1968) view that narrative structure is constitutive in both action and experience.

Mimesis in the Simulation Story

The impasse in understanding narrative is overcome by Ricoeur’s (1984) idea of triple mimesis. Mimesis involves a cyclical relationship between narrative and life, and as I have stated in chapter two, involves the processes of prefiguration, configuration and refiguration. Ricoeur’s conceptualization of mimesis is supported by the data collected in this study. In the prefiguring context of mimesis, there is the sense that students coming into simulation are already aware of the rules, acknowledge the symbolic charge of a simulation, understand the composition of the simulation, and are comfortable in the temporal dyschronicity. If this is not the case then the simulation will not “work.” In complexity terms, this speaks to internal redundancy. Even when Dave talks about discrepant fire fighting expectations with respect to “doing it fast or doing it right” he still understands the rules of the simulation, the tools employed, the language used, etc. Prefiguration in simulation makes two assumptions. It firstly assumes knowledge of the aspect of social imaginary that the simulation

represents. Secondly, it assumes knowledge of the social imaginary that represents the simulation as a pedagogical tool in a larger learning environment.

Simulation immersed as it is in ideology and utopia configures the participants through embodiment into the narrative that makes up the simulation. Participants become actors in the story that is played out by the narrator/controller in a plot temporally and spatially (and hence contextually) constructed, and they are thus embodied as actors into the action. In simulation, the structure of time, culture, and history with a required beginning, middle, and end configure the narrative through which the simulation actor is compelled to navigate and force a negotiation with the Other. Here there is imitation of action without copy of action. The engine failure drills done on a multi-engine aircraft, search and destroy missions, advanced care life support medical scenarios imitate the real world without the pretense of being able to copy it. This, I hope, is known by the designers of the Afghan village. Simulations, like narrative, falsely represent reality more easily than they can faithfully reproduce it.

Refiguration is most obviously present in simulation through the feedback of peers, instructors and controllers. However, It is also present in the journey through the Other as a stranger, a god, or a monster. It is present in understanding the role of team in aviation, medical, fire, and military simulations, as well as, in notions of communities of practice, and identity. Simulation is a real re-telling. It is a narrative re-creation. It is imaginative re-description. As Kearney (2002) states, “It is the power, in short, to re-create actual worlds as possible worlds” (p. 132). It invents and in so doing it simultaneously discovers and creates. Mimesis forms a connection between what is actual and what is possible while acknowledging that a difference between the two is always present. The narrative of simulation entangles with life experience even as it helps to form it.

Verhesschen (2003) concludes that the constant struggle to maintain narrative coherence, as demonstrated in White’s (1984) criticism of narrative is

dissolved in Ricoeur's framework. The prefigured is pre-narrative with a plot that is yet to emerge, so different plots can emerge depending on the interplay that follows, along with different stories. The relation between action and narrative is not always clear but in the case of simulation at least two stories are at work. There is a story of the simulation designer and the story of the participants. The first is initiated in the process of prefiguration, while the second is initiated in the process of configuration but completed in the process of refiguration. Consequently, the meaning of events differs according to the resulting narrative perspective arising out of the journey through the Other reflected upon during refiguration.

Simulation, when it is pedagogically successful, reconstructs the social imaginary of the world through stories about the world. According to Kearney (2001), Taylor (2004), and Ricoeur (1986) every "real" object has an associated imaginary. This is the symbolic charge which contains the sense of meaning that is understood, mediated and passed on through cultural awareness, in other words, through story. Because the story of the simulation designers and instructors is founded upon the social imaginary, it is always ideologically biased in all the ways that Ricoeur (1986) has suggested. The scripted story, proclaims a legitimation to authority through its declared purposes, processes for qualification or credentialing, and means of justifying knowledge. In doing this, the scripted story provides the means to integrate the participants into a social group, perhaps even into a community of practice. But even as the scripted story claims authenticity, it cannot help but confuse the real with the imaginary, because as Ricoeur has pointed out, the claim of legitimacy always exceeds the answering belief of those to whom the claim is made. This story is thus always one of domination. It utilizes power, primarily derived from status (itself a claim to legitimacy) or privilege (as in the claim to power that the instructor has by virtue of position) to force truth claims upon recipients.

The reconfigured story of the simulation participants is also ideological but contests the scripted story's claim to power in utopian ways. The reconfigured story may claim a utopian imaginary and contest the dominant ideology represented in the scripted story. But typically (when there is not an overt clash in power), the central aspect of the reconfigured story, as it pertains to simulation, is in the re-imagination of alternative possibilities. This re-imagination takes into account the social imaginaries upon which the scripted story is based (in other words the social imaginary of the Other) but reconsiders them in various ways. Sometimes the re-imagination may be fantastical, but other times such a re-imagination may provide fresh insight into the nature of things.

The dialectic between the two stories reveals the nature of simulation as a forum for the mediation of knowledge via the interpretation of narrative. In so far as a simulation signifies a particular aspect of the social imaginary, there exists a concomitant possibility for an interpretation of symbolic significance. According to Ricoeur, a structure is symbolic if it contains first a primary, direct or literal meaning (literal here referring to the meaning that is in common usage) and secondly an indirect and figurative meaning which can only be comprehended through the first (Kearney, 2004). Interpretation is required to understand both meanings, but a more critical form of "hermeneutical" interpretation is required to decipher the hidden figurative meaning coinciding within the apparent one. This means that the hermeneutical interpretation translates into a surplus of meanings. It can do this not only because language is polysemous but also because the imagination is capable of generating new meaning especially when provoked to do so. These meanings emerge in simulation as learning. So a signification of the social imaginary in the scripted story (e.g., an ambulance call, a credential, bunker gear) may be interpreted symbolically in the reconfigured story in ways that reveal the power of the

imagination (e.g., a social construct to orient experience, a status symbol, professionalism).

The two stories conjoin. Each informs and regulates the other, because each is the Other for the Other. It is not a dialectic that shares equal access to power, but it is a dialectic that conjointly shares access to Fenwick's (2003) five dimensions of experiential learning. The scripted story constructs a simulation context with declared purposes intended to guide engagement towards particular interpretive outcomes. In so doing, it presumes a particular manifestation of self, the self as the ideal student. But the reconfigured story, while it may acknowledge, perhaps even acquiesce to the scripted story, reveals differing and conflicting purposes, as well as, conflicting notions of the self. The reconfigured story re-imagines the simulation context in unique ways and interprets the experience of engagement in novel and unpredictable ways. This is not to suggest that the reconfigured story is always an emancipatory story. It too can be exclusionary.

In any case, re-imagination can only happen because of a critical distance that separates the two interpretations that formalize the stories. A space exists between the interpretation of the simulation designers and the interpretation of the simulation participants. If no space exists then the participant's interpretation becomes the designer's interpretation and no re-imagining occurs. This recreates story as stereotype or transcription. This could happen when the designers are also the participants in the simulation or when there are insufficient utopian forms of contestation. If the space is excessively vast then the simulation participants will not be able to recognize the symbolic aspects of the scripted story and will not be able to re-orient and reconfigure it to their own understandings of the social imaginary. They will not be able to reconstruct the story. Such would be the case for a non-pilot entering into Boeing 747 simulator. The non-pilot would not understand the story coming at her in the simulation.

Summary of the Narrative Understandings of Simulation

Story is an important form of knowledge in simulation. Simulation when it is immersive, always comes with a prefigured story. It is most typically scripted to direct the participants along a particular trajectory. Participants will follow the story with varying degrees of reliability, but will in some form or fashion fulfill the role of a particular character in the story. Their engagement with the simulation will start a process of configuration through the experience of the story. This experience involves the Other that is present in the simulation, and this will form the basis of a new reconfigured story. Out of the relationship between the scripted and reconfigured stories arises new forms of interpretation and new forms of meaning. The stories that are told in and through simulation are real stories that are remembered and of consequence. The stories revealed in the data, like all stories, are retellings of earlier stories, in this case, the retellings of the simulation stories. Because they are stories of stories, they can be mistaken as simulated experience. But such a view is in error because it formulates the essence of simulation as dissimulation. There is always a tendency to invert the real with the imaginary as Ricoeur (1986) has pointed out, but the imaginary component when it vivifies the real is not dissimulation. Stories carry knowledge not simulated knowledge.

Summary of the Relation between the Social Imaginary and Experiential Learning

The learning that emerges out of simulation always involves the social imaginary. Simulation forces an engagement with the social imaginary, and it is because a specific aspect of the social imaginary is reproduced in simulation that a need for interpretation and re-interpretation is provoked. Because the social imaginary is the symbolic aspect of the world, it calls for interpretation. The social imaginary brushes up against the participants in a simulation, through

aspects of purpose, engagement, notions of self, interpretation and context, thereby forcing a response which may result in meaning making or even changes to the social imaginary itself. Conceptualizations of ideology and utopia appear to be particularly important in understanding how simulation imagines the social imaginary. These two notions interweave in a complex dialectic that can result in the emergence of learning. Simulation as an imagination of the world necessarily contains the real and the social imaginary. These present in simulation as ideological distortion, integration and domination. Ideology is countered in simulation through an imaginative utopia which seeks alternatives to existing manifestations of power, the exploration of the possible and escapism.

It is precisely because simulation is so obviously an imagination of the real that processes of ideology from its primitive manifestations of integration through to its processes of distortion and domination are readily apparent for investigation. The data are clear that these ideological processes are at work and that these processes are in a dialectic with conceptualizations of utopia. Ideological integration which attempts to maintain the rituals of past traditions is challenged by utopian visions, which seek to explore the possible. Ideological distortion which attempts to invert the real with the imaginary and desymbolize the social imaginary (typically through the conflation of both) is opposed by utopia (as fantasy) which works to sever the connection between the real and the imaginary. While ideological distortion and utopian fantasy are pathological in their respective tendencies, combined they are not necessarily so. Finally, while ideological domination and legitimation serve to maintain and justify particular manifestations of power, utopias advocate an appeal to alternative forms of power. Tallied up, the ideological and utopian dialectic constitute the social imaginary which is the aspect of the imagination that exists in the world.

The dialectic between the ideological and utopian aspects of the social imaginary are known and transmitted through story. Simulation participants must be prefigured to the scripted story that has been purposefully crafted by

the simulation designers and controllers. Participants must come with the ability to understand and interpret this story (and all of the signs and symbols contained therein) even though understanding can never be complete. In the context of the simulation, they must play a part in this story and engage with a story that allows them to authentically configure themselves (and their concept of self) within a proper frame of the social imaginary. Finally they must be able to tell their story, a reconfigured and re-interpreted story. The telling of the reconfigured story brings the hermeneutic of interpretation full circle. But it does not close the circle because the interpretation revealed in the reconfigured story is not the final say on the interpretation of the scripted story. It may modify the scripted story, but even if it does not, Others will reconfigure stories of their own imaginings.

The central finding in the study is that the real and imaginary are complexly intertwined. The real is not conflated within the imaginary as Baudrillard (1991) would have us believe. Neither is the imaginary conflated within the real as many neo-positivists assert. According to Kearney (2002, 2003), either conflation entails an incorrect approach, and I believe the data acquired in this study support Kearney's assertions. The real is intertwined with the imaginary and not conflated because the participants in simulation take a real journey through the imagined world of an Other. Paul Ricoeur has said that the best way to know oneself is through the Other (Kearney, 2004). We can recognize the Other in simulation and the institutions of the Other. In simulation, the Other may be the simulation designer, controller, participants or others. Kearney's (2003) classification of the Other as stranger, monster, or god provides a way to interpret how the Other may be encountered within a simulation. In Kearney's classification, the Other many be a human other, a cultural group, or it may be a symbolic conceptualization. Nevertheless for Derrida, Ricoeur, and Kearney the Other always carries some sense of the sublime. This is the sense

that there is always something more to reality. There is always a real that has not been imagined, is unknown, and lacks a social imaginary.

Simulation is a narrative journey through the world of the Other where we are deworlded from the common elements of our own world and forced to try to understand the unknowable world of the Other. Some of that other world will always remain unknowable because there is a phenomenological distance that cannot be breeched. Yet it is because of this distance that symbolic mediation of the world can be realized and that through narrative new meanings and opportunities for new interpretations are made evident. It is through a journey that tries to close this space and which attempts an understanding of the Other that we are forced to realize that the world is symbolically mediated and that it requires interpretation. The interpretation pushes us back into our own world with an enriched sense of self-awareness. Simulation provides the context for this journey, encourages it, mediates it, in some cases even demands it, and in so doing, fosters the emergence of learning.

CHAPTER 6 – IMPLICATIONS AND CONCLUSIONS

In simulation, there is always a confusion of the real with the imaginary. Simulation, because of its imagination of the real, forefronts this entangled relation and enables a critical hermeneutical interpretation of the two. This is of pedagogical consequence for educators seeking to incorporate simulation into the curricula of their programs. The complexity evident in the entanglement suggests that a re-imagining of the pedagogy of simulation is required. In this chapter, I suggest that conceptualizations derived from complexity theory are useful in organizing simulation in ways conducive to the emergence of learning. Rather than simplifying simulation by reducing it to a series of variables (as in Gaba, 2004), it is better to prompt complexity in order to facilitate the emergence of learning in new and unforeseen ways. Consequently, each of these conditions points to an area where further research is required.

This study also demonstrates that simulations have ethical considerations which must not be ignored. Simulation has ethical implications by virtue of the nature of the reality it attempts to construct. Ethical limits can be re-imagined in simulation. Indeed, computer simulation games are often criticized for their portrayal of extreme violence as a norm. Simulation designers bear an ethical responsibility to the participants engaging the simulation (e.g., to keep them safe) and to society as it exists in the world (e.g., to foster emancipatory values). This is of enormous importance to educators who pedagogically orient simulations for particular purposes. Fenwick (2003) has pointed out that forays into the experiential meaning-making of individuals are always intrusive. Ethical considerations must be incorporated into the pedagogical design of simulation as instructors and simulation controllers roll out simulations for participation. Such an interpretation reveals that the entanglement is not just present in simulation but also in the real world. This entanglement has implications for

both the nature of simulation (as a theoretical conceptualization) and the practice of simulation as a pedagogical tool that represents the real world.

Prompting Complexity

Complexity theory implies that there are a number of conditions relevant to the emergence of learning in simulation. Davis et al. (2006) outline seven of these conditions which I examine in this section: enabling constraints, internal redundancy, internal diversity, neighbouring interactions, decentralized control, feedback loops, and recursive elaboration. My contention here is that simulation designers and controllers should pay attention to these conditions and carefully consider how they influence the pedagogical nature of the simulation.

Enabling Constraints

Simulation can open possibilities by limiting choice. Simulations are guided, and the educational purposes for simulation should consider how possibilities for learning may emerge through the confines of a simulation learning activity. Simulation may be both a foci of individual learning and social learning. As Davis et al. (2006) suggest, the assumption is that effective teaching engages both of these systems of knowledge simultaneously. Individual learning benefits the collective and results in social learning.

Simulation as a complex entity is always rule bound, as I have pointed out in chapters four and five. This is a form of constraint. These constraints arise in part through the context of the simulation (via time and space), through co-action with the Other (e.g., the simulation controller or other simulation participants), and through ideological manifestations of power vested in the social imaginary. However, in effective simulation where the emergence of learning is apparent, these constraints do not dictate what action *must* be undertaken in simulation, but rather what action *may* be taken in simulation.

The constraints in simulation should be expansive not prescriptive. The constraints focus the activity of simulation in a direction as a joint activity between all involved. In this understanding, simulation controllers, designers, and instructors become co-participants of the simulation. The pedagogical intent for simulation here can be that knowledge will be reproduced and produced in what Davis et al. (2006) call a "creative mix" (p. 194). Knowledge is reproduced via the rules that bound the simulation system (e.g., as in practicing Clarissa's cockpit switchology procedures or Rick's military drills) and knowledge is produced by innovatively imagining what may be (as in Clarissa's engine failure scenarios). The key is a simulation structure that finds the right mix between constraining choice and opening the world to new imaginative possibility.

Internal Redundancy

Redundancy is the degree of sameness that allows individual agents to work together. In simulation, internal redundancy must be present in the sense of Ricoeur's (1992) concept of prefiguration. Participants must share common understandings of the social imaginary that the simulation is designed to reproduce. They must understand something of the vocabulary and traditions that occupy a field of work. There must be a sense of shared responsibility and an understanding of the declared purposes of the simulation. As Davis et al. (2006) point out, these types of redundancies tend to be backgrounded unless there is a rupture in the continuity of the learning environment. If the symmetry of the simulation is fractured via the removal of some relevant aspect (perhaps as in the breakdown of communication), then the aspect will be forefronted in terms of its importance to the learning context.

Redundancy is also important because it adds a certain robustness (stability) to the system. Simulation controllers are more effective in facilitating the simulation if they have real world experience in what the simulation is attempting to establish. This was noted explicitly in chapter four by Rob, Rick,

and Pat. Simulation controllers are not effective simply as simulator technicians. The experience they bring to the simulation is important because it makes the simulation "real" in ways that technology alone cannot.

Similarly, the emphasis on high fidelity simulators involves the attempt of designers to strengthen the learning effectiveness of a simulation by increasing its effectiveness in promoting a stable learning environment. The use of high fidelity simulators presupposes that the robustness of a simulation is increased because preprogramming the simulator is deemed to allow for a more consistent presentation of the simulation to multiple groups of participants in differing times and contexts. However, there is a danger in making simulation systems excessively robust. As Davis et al. (2006) demonstrate, a highly redundant system may be an unintelligent system which operates without critical appraisal.

Internal Diversity

Diversity both offsets and supplements the robustness of a simulation system. In certain ways, diversity may present in simulation as a series of discrepancies which exist for no obvious purpose. The pedagogical designers of a simulation may try to remove diversity in order to attempt conformity to an established purpose or goal (perhaps by advocating the use of high fidelity simulators) without realizing that diversity is a necessary requirement in the complexity and context of the simulation. Leaving a simulation scenario open-ended with no obvious right answer (as Rob suggested in chapter four) will reveal aspects in context which lead to differing learning outcomes based upon the interpretation of those aspects. A paramedic simulation may involve attending a "call" for a woman at a bus stop. However, depending on the context, the bus stop may have nothing or everything to do with the management of the "call." For example, a bus stop may be exposed to the weather or sheltered, so in the winter, hypothermia or frostbite may be relevant. Participants in simulation can drive the simulation in particular

directions based upon their own imaginative interpretation (e.g., through the history questions they ask of the controller). Diversity allows for simulation controllers to alter the direction based on where they see the participants heading. Diversity argues for rich context.

Diversity is also important because it puts different "Others" into the social context. In the journey through the Other, as suggested by Ricoeur (1992) and Kearney (2003) new opportunities for learning emerge. The Other should be not so *other* that it cannot be recognized. There must always be some prefiguration of the Other. However, for paramedics, it is not just the patient that is the Other. The weather is another Other. For pilots, the specific aircraft simulator always presents as a specific Other. Educators utilizing simulation should give careful consideration to the appropriate use of the Other. Given my contention that simulation is a form of legitimate peripheral participation for particular communities of practice, some understanding of the Other is a necessary requirement for full entrance into work practice.

Neighbouring Interactions

Simulation provides opportunities for individuals and ideas to bump up against each other. It is a central finding of this study that learning emerges via the engagement of individuals with a particular aspect of the social imaginary. This aspect is always a boundary just outside the familiar. In simulation, boundaries may be affected by challenging the ideological foundations of the social imaginary in utopian ways as I have discussed in chapter five. Pedagogically speaking, simulations designed to encourage teamwork may bring different fields of work into proximity. In a disaster simulation, police, fire, paramedics, nurses, physicians, engineers, civil authorities, volunteer groups, drama classes, and the public all interrelate in a bounded educational activity that opens up each group to new levels of interpretive awareness. These kinds of simulations are particularly well remembered as Dave reported when he

discussed his vivid memories of a simulation plane crash he participated in twenty years earlier.

The boundaries the simulation shares with the world are particularly relevant to this discussion. Simulation is important as an eschatological boundary (in the manner of Slattery, 2006). The always foreseen end to a simulation motivates participants to think about what comes next. It forces consideration of how the "now that is the simulation" relates to the "that which comes after." The danger is that the eschatological boundary may be viewed as a complete break from the real in ways that Baudrillard (2001) would affirm. But the data of this study show that this is not the case. When Dave asserts that fire in simulation is always real fire, he demonstrates that the boundary between simulation as an imagination of the real cannot be absolutely separated from the world that exists beyond simulation's eschatological horizon. Experience in simulation is interpreted in light of the engagement in simulation and the relation to the world outside of and after the simulation. The real in simulation finds its way into the reality of the world.

Designers of simulation can purposefully forefront utopian aspects of the social imaginary which challenge the legitimizing ideology that will otherwise dominate the simulation in an effort to foster the emergence of innovative and critical learning. Participants in simulation may imagine themselves to be unencumbered by traditional barriers which limit their practice. Participants might even imagine themselves as "experts" when they are in fact new to some field of work. Rather than trying to learn how to exhibit some expert attribute, students may be scripted to exist as the expert in the simulation. Challenging boundaries may also involve challenging entire communities of practice. Paramedics and nurses can participate as team leaders in simulations involving physicians, thereby generating opportunities for change not just in the self concept of the paramedic or nurse but in the entire healthcare system. In this example, professional boundaries come in contact but without the preordained

hierarchy that follows out of the typical healthcare imaginary. The imaginary may be re-imagined in simulation.

Decentralized Control

Simulation tends to have centralized control. Typically, this is manifested via the power manifested in the simulation controller. Decentralized control involves the idea of shifting control away not just from the controller but from any particular agent or agency in the simulation. In some ways, the very design of a simulation, with its simulation controller and prescribed purposes, speaks against the notion of decentralized control. The ideological manifestations of power which exist to legitimize some aspect of the social imaginary in simulation are challenged by any assertion of decentralized control. However, as Ricoeur (1986) maintains, any ideological manifestation can be challenged by a utopian counterpart.

A utopian view of simulation with decentralized control requires a re-imagination of the simulation controller and the curriculum in which the simulation is found. I have already hinted at how this might be possible in discussions of Rob's suggestion that simulation be open ended. In the previous discussion of the "bus stop call," this becomes apparent. Imagine a paramedic scenario situated in a lab and configured in some fashion to be a bus stop. The bus stop is thus part of the context of the call. If in the simulation, the student pays special attention to the bus stop by asking questions about its specific context for example, then the simulation controller can pay attention to the context of the bus stop by specifying its location as outside in cold weather. Cold weather then becomes part of the simulation. Imagination of the context transcends the physical context in the lab and cold weather becomes important in differentially diagnosing the patient's medical problem. The simulation paramedic will need to consider hypothermia. However, perhaps the student ignores the context of the bus stop and instead focuses on patient history. She

asks about allergies and coincidentally the person has a bee allergy. She then thinks to check for evidence of an allergic reaction. At this point, the controller can situate the "call" in the summer with the bus stop next to a tree that has a bee hive. This is part of a feedback loop (discussed in the next section), and none of this needs to be planned in advance. In this fashion, the simulation and participant construct the simulation together. However, all of this could be pre-empted by the participant asking the controller to clarify the weather conditions at an earlier point in the scenario. In this case, the controller's response locks the weather into the simulation for that scenario, but there will be other aspects that can be changed as the scenario progresses.

This type of simulation requires enormous flexibility on the part of the simulation controller. In actuality, it is only possible if the simulation controller is very experienced in the real world field of work that the simulation is presenting. A computer technician cannot do this for a medical scenario. This might be another reason why Pat, Rob, and Rick talk about the necessary requirement for experience on the part of the simulation controller. Simulations with decentralized control provide educational flexibility and allow for the learning system to proceed in unintended but fruitful ways.

Feedback Loops

The example I describe above illustrates the importance of feedback loops in the educative processes that comprise simulation. Positive feedback loops may amplify system processes while negative feedback loops buffer them towards equilibrium. A common way of utilizing feedback loops for teaching purposes is to ask a question and then wait at least a few seconds before expecting a response. This elicits deeper consideration of the answer. The more thoughtful answer tends to carry the discussion in a more fruitful direction. Utilizing feedback loops in simulation makes the simulation more responsive to the interaction of the participants by giving them time to react to the conditions

of the simulation and by paying thoughtful attention to their response. Feedback mechanisms thus connect participants and simulation controllers in dynamic ways.

In the bus stop example, the feedback loop is revealed in the ways in which the scenario changes based upon the controller's action and the response by the participant. Each response is based on the previous response. Sometimes simulations are designed to spiral out of control if participants make incorrect choices. So failure to maintain adequate rates of descent in an aircraft simulator may lead to a spiral dive which if not corrected will result in complete loss of aircraft control. Sometimes there will be opportunity to bring the aircraft back under control and sometimes the aircraft will be "predestined" to crash.

Simulators are classified as high fidelity by their ability to come into the simulation with preconfigured feedback loops. In this case, the increased interaction occurs between the simulation participant and the simulator. However, as I have already stated, high fidelity simulators are usually only high fidelity in one aspect (e.g., physiological fidelity as opposed to environmental fidelity) so this can miss the point of the increased interaction in ways that allow substantive learning to emerge.

Recursive Elaboration

According to Davis et al. (2006), "Learning isn't accumulative; it is recursively elaborative" (p. 201). The notion here is that nested systems of knowledge come into play with emerging understandings. Davis et al. hold that history is important in continually framing how experience is interpreted. This is significant both at an individual and a social level. Individual history and the collective history of practice that forms part of the engagement that occurs in simulation become relevant to how learning occurs in simulation. Learning activities can be more effective if the progression through a sequence of steps is re-imagined in light of a history of importance for each step and in light of the

product that arises out of each step. In aviation switchology procedures, this means that rather than the mindless flipping of switches in a particular order for particular events like an engine fire, it involves understanding carefully what each switch in turn produces. This aspect of switchology is most obviously different in the ways in which student pilots and experienced pilots practice the procedures in simulation. Experienced pilots are aware of the history of the procedures they practice as Clarissa demonstrated.

In simulation, recursive elaboration suggests that aspects of knowledge may be present in the simulation even though it is not necessarily present in an individual participant in the simulation. This is an important idea for the effective use of simulation as a pedagogical tool because it suggests that learning may emerge out of a social collective simply by allowing the collective the opportunity to share ideas and interpretations. This allows what already exists to be "reproduced" in new ways at new levels. This, of course, requires that simulation time be allocated to provide opportunity for such an effect to occur.

Prompting Complexity Summary

The pedagogical implications of using simulation as a forum for educational activity are complex. However, complexity theory does provide some insight into how simulation might be conceptualized and structured in order to substantively foster the emergence of learning. Several conditions have been proposed by Davis et al. (2006) which might be helpful in positively orienting simulation towards opportunities for learning. One condition is that simulations should possess enabling constraints which serve to confine the simulation in particular ways but through the rules that govern the simulation enable new imaginative possibilities for practice to occur. Two other complementary conditions are internal redundancy and internal diversity which speak to the robustness that is required in a simulation learning environment and to the kinds of surplus information that must be found in complex systems.

Internal redundancy provides stability through prefiguration to aspects of the social imaginary that the simulation reproduces. It involves the idea that participants must know how to participate in the simulation before they can engage the simulation. Internal diversity is reflected in immersive and contextually rich simulation which opens up the interpretation of experience to endless imaginative possibilities. Neighbouring interactions concern boundary conditions. These are of importance in the way that participation in simulation causes contact with the social imaginary. Decentralized control suggests that the center for control of the simulation does not necessarily have to reside in the hands of the simulation controller. Open ended scenarios provide a way for the participants and simulation controller to jointly construct the simulation. Feedback mechanisms can be incorporated which enhance the interaction of those involved in the simulation, and these also can serve to decentralize control. Finally, recursive elaboration concentrates not on the progression of steps which is so often stressed in simulation but rather in the product that emerges out of each step. This involves a recognition of the history and value that imbeds each step. These conditions are not intended as a prescription for how a simulation should be constructed. Rather, because these conditions have clear pedagogical implication for simulation, they should be considered in terms of their imaginative value in how to construct innovative simulations.

Ethical Implications

Complexity theory does not tend to handle ethical issues well, and there are ethical implications which necessarily arise out of using simulation as an educational endeavor. This happens (in part) by virtue of the unique way in which time is emplotted within a simulation. As both Ricoeur (1986) and Kearney (2002) point out, those in the present owe an ethical debt to the past. We are responsible in some fashion for history. The stories that we tell, in simulation or otherwise, must not ignore the real history of the past. Even though the past

cannot be narrated with absolute certainty, this does not mean that every narrative should be endorsed unambiguously. Kearney (2002) asks, “Would we be happy to accept, for instance, that retelling the horror of Auschwitz or Screbernice is a mere exercise in fabulation” (p. 147)? There is a difference between a story which tells the history of human beings along with their collective events and a story of fantasy that dismisses those events. The latter is utopia in its most unreal form. There is a difference between factual events and fiction. Also stories and simulation as a form of story can hurt as easily as heal. The story a simulation tells can attempt an ideological refutation of the past through either ignorance of history or by deliberate design.

The interplay between the varying aspects of narrative provides the means to move from the world to the simulation and back again. Alternative perspectives, alternative plots, alternative rememberings make for alternative stories that can be heard and retold. An educational institute or employer may believe that the teller or the message in the simulation is dominant. The simulation may even be constructed with that purpose, but it is just one of the stories that may be told. The untold story finds a way to be told. By shifting the point of balance, simulation may play with ethical imaginings. As Pat has pointed out, students can be immersed in simulations where ethical constraints have been altered.

Because as Ricoeur has stated, we are already prefigured, we come to the story, in this case the simulation story, already understanding that there is a designer, controller, message, and system of operation. We, for the most part, understand the expectation that lies upon us in the simulation. But the narrative aspects present in a simulation allow individual agency an opportunity for emergence. Interaction with the Other through the simulation is not only possible, it is required. Responsibility is inherent in the interaction, which may be in the form of an ethical commitment to the Other. A narrative identity among the actor or spectator, the student or the observer, ensues with its consequent

relevance to the experiential understanding of the self through the Other. We become responsible for what we know. We are both subject to narrative and the subject *of* narrative.

We are also the Other's Other. The ethical responsibility is multidirectional and multifaceted, and it cannot be ignored. Our identity understands this relationship, even needs the relationship. Ethical responsibility serves as a mode of belonging by sharing an imagined understanding of the world, by aligning with discourse and by engaging in shared histories as Wenger (1998) points out in his discussion on community of practice. Simulation imagines the world, involves the discourse of a world, and requires engagement.

In the following, I present three examples which illustrate some of the ways that ethical understandings can be altered in and through simulation. These examples center on the Advanced Cardiac Life Support (ACLS) course which utilizes simulations for teaching and examination purposes. I use this course as an example because I am very familiar with it; however, I intend that the pedagogical implications I stress extend beyond this particular course to simulation generally.

Example #1 – Simulation Time and Ethics

In a re-imagined sense of time, the future may precede the present. When the future precedes the present, it necessarily alters our ethical obligation to the past. I have often been in the position of examining students in the Advanced Cardiac Life Support (ACLS) course. The final practical examination involves a simulation which the instructors (as examiners) attempt to confine to ten minutes (or so) on a real world clock. But time, as I have demonstrated, is different in simulation. Paramedics, trained in simulation, will gather as much information from the simulation controller before "entering" the simulation as they can. They ask about hazards; they will ask if back-up (additional help) is available; they will ask how far they are from the hospital and what the weather

is like. In essence, they are trying to prefigure themselves to the simulation they are going to be immersed in before being immersed in it. Students do this to save "time," because once the scenario starts they know that certain aspects of the scenario are time sensitive. But while they are saving time, they are costing the examiner time. Because the examination clock starts running from the moment the student walks into the room, and because the examiner is always under time pressure to test a certain number of students in a certain amount of time, the examiner may find it necessary to speed the exam process up.

If the examiner (acting as the simulation controller) wishes to "speed" up the simulation, she can tell the participant that what they intend to do has already been done. So if a paramedic student says, "I am going to intubate the patient." The controller can say, "It has already been done." The controller can then quickly place the intubation tube into the patient simulator. However, such an intrusion is by no means an insignificant one. In such an instance, the entire cause and effect relationship has been altered within the simulation. For when the student has been told the patient has already been intubated, a typical student response is to query what came next. So for example the student replies, "Did I check tube placement?" The controller may then reply "yes" or "no." The scenario then becomes situated in the past where the past is being reconstructed in the present. Because the instructor is directing the scenario to a predetermined end, the reconstruction is done with an eye to the future. But this is a past in which the student has no memory and yet is still required to be responsible for the actions that have been taken. Some students, when disrupted in this way, become so disconcerted, to use Clarissa's phrase, that they are unable to function in the scenario. When this happens, (and when it is recognized as happening) the instructor may have to call a timeout (or in Pat's language "break the simulation") recap the scenario and resituate the student in it, this time starting from an arbitrary point. Sometimes, I suspect the apparent disconcertedness is misread as incompetence, and the student is incorrectly

failed in the examination. Because of a simplistic view of simulation and the learning processes entailed therein, the examination process fails.

This is of ethical significance because the simulation is an examination and sometimes a high stakes examination. Examinations in simulation are directly affected by what many examiners might think are insignificant intrusions. But when these intrusions break the flow of time and alter the nature of causality, they are always disconcerting to those in the simulation. Examiners must become aware of the impact that these types of intrusions can have upon the learner. Course designers, too, must acknowledge that these kinds of simulation abnormalities may adversely affect course outcomes. These kinds of concerns can be mitigated by simulation designs which adhere to complexity principles (as describe above), but they cannot be completely alleviated unless careful attention is given to ethical considerations.

Example #2 – Simulation Purpose and Ethics

Another example, again relying upon my own experience as an ACLS instructor, involves issues of ethics pertaining to examination structure. In the ACLS course, it is an objective that students learn to function in health care teams. Since ACLS is primarily about cardiac resuscitation, the course is oriented around the organization of the team where there is a team leader who manages the team and others who are delegated specific tasks. These may vary, but typically, one individual is assigned the role of achieving IV access and administering medications; one will operate the defibrillator; one will manage the airway, and another will perform chest compressions. There will also be someone who is delegated as the recorder of what is being done. In the practice sessions prior to the examination, ACLS scenarios always involve teamwork. Essentially, the students are configured to function as a team.

In the examination, the students are required to be tested in teams. However, in the examination, there is a different conception of “team.” In the

examination, the team members can only do what they are told. They cannot provide advice to the team leader. They cannot correct the team leader if the leader makes a mistake. This is entirely contrary to the way in which health care teams function in the real world, where team members perform their roles without waiting to be told. In real cardiac resuscitations, the team leader does not have to tell the team to start CPR or to start an IV or to do a number of other things. Individuals on well trained teams will advise the team leader on potential alternative courses of action to ensure that these have been considered. The practice scenarios in ACLS recognize these aspects and encourage them; the examination does not.

The examination presumes to objectify the simulation evaluation. Every student in ACLS is examined as the team leader even though many will never function in the capacity as team leader. This is an example where the simulation works at cross purposes. On the one hand there is the hegemonic ideal that examinations must be objective in the sense that they test everyone the same way every time. On the other hand, there is the objective to teach individuals how to fill their role on the team. The two purposes conflict because the way the students are configured in the simulation practice sessions is not the way they are tested in the examination process. This unnecessarily confuses the imaginary with the real because the expectation to perform a particular way in the practice sessions (and in real life) is not the same as the expectation to perform in the examination. This confusion is very real, especially to those students new to ACLS, and it is all the worse if it has gone unrecognized throughout the course. Students tend to know in the examination that they cannot expect their team to help them if they forget something, but (in my experience) this remains oddly disconcerting for those involved. Similarly, the team members, become very uncomfortable in the simulation examination when they notice something amiss. I contend that courses are ill conceived when they mismatch pedagogical purposes. Again the ethical aspects of the simulation go unrecognized.

Example #3 – Simulation Context and Ethics

In a final example, I again refer to my own experience. Every ACLS course has a physician that acts as the medical director. Physicians typically like to supervise the examination process. So the medical director will come into the exam room, sit at the back and watch students being evaluated. Sometimes the medical director will come into the examination in the middle of the scenario, watch for a bit of time, and then leave. The medical director will sometimes make a comment on the scenario, perhaps by asking for clarification (as on behalf of the student) or perhaps will alter the scenario by shortening it in ways that I have commented on in example #1.

The students often find these kinds of interruptions very disconcerting. A person opening the door and coming into an examination room, immediately diverts attention away from the simulation towards an event outside of the simulation. This "breaks" the simulation and again confuses the real and the imaginary. The student believes that the physician is coming in the room to view him. The instructor believes that the physician is coming in the room to view her. The dynamic of the entire simulation alters. Everyone is thrust out of the context by the interruption with the outside world.

These types of "eruptions" in the space-time continuum of the simulation are not inconsequential. Apart from the power issues at work (which are not inconsequential), the eruptions meaningfully disrupt the flow of the simulation, work contrary to the achievement of the particular pedagogical purposes of the examination and adversely affect the reliability of the results. Simulation controllers must remember that their control is in some sense perceived as omnipotent. A wave of their hand is interpreted by the simulation participants as important. Controller intervention must be carefully considered. It must be moderated by the understanding that interventions are always intrusive and

disruptive. This is especially the case when the interrupter has significant power and the interruption results in "breaking" the simulation.

Ethical Conclusions

In this section, I have attempted to briefly demonstrate that simulation is an ethically relevant educational endeavor. Complexity theory on its own cannot adequately deal with the kinds of ethical concerns that a simulation may generate. Simulation as a form of narrative may misrepresent the past or even deliberately attempt to alter the past. As Ricoeur (1984) and Kearney (2002) demonstrate, we always owe a debt to the past, and immersion into simulation as an imaginative form of the real does not relinquish this responsibility. Because of the unique way in which simulation is able to imagine time, the very nature of causality can be affected. When instructors or simulation controllers alter the temporal aspects of the simulation while participants are engaging the simulation, it can be profoundly disconcerting. This has ethical consequences for how students perceive their simulation experience and what they learn from it. The ethical consequence becomes more pronounced when this goes unrecognized on the part of the simulation controllers. In this section, I have provided three examples from personal experience which demonstrate that there is a pressing pedagogical need to reconsider the ethical ways simulation should be utilized for the achievement of particular educational purposes.

In the Way of Concluding this Study…

Many forms of knowledge and processes of learning emerge out of simulation. These are all complexly related and worthy of further research. The real and the imaginary are deeply entangled. Learning emerges out of engagement with the aspect of the social imaginary represented in the simulation. This engagement provides new opportunity for the interpretation of

experience which results in novel transformations of meaning. Engagement necessarily involves interaction with the Other and this furthers the processes of meaning making. These interactions necessarily affect notions of self and identity. The contextual richness of the simulation, with the implications of history, time, space, and power necessarily affect the kinds of experiences that are perceived to occur in simulation. Purpose, as well, guides the nature of the experience in simulation especially so, since simulation is always a purposeful activity engaged and interpreted with deliberation.

All of this is manifested in the perception of simulation experience, as the "flash of steel," where emotional response may jolt participants out of imaginative fiction into the real and where fictionalized opportunity for engagement with the social imaginary may extend beyond ideological prescribed norms towards utopian possibilities limited only by the extent of the imagination. The imagination that is the simulation transfigures narrative experience via access to the social imaginary into real perceived construction of belief and then again into story. The story that simulation tells is concerned with what we can know about both the physical and imaginary aspects of the world. What happens in simulation not only affects the purpose, engagement, interpretation, self, and context of the experience that occurs in simulation, it affects what happens in the real world. This is, after all, the central purpose of simulation, at least in the form that I have examined in this study.

The simulation literature abounds with the assertion that a quantification of pertinent variables must be undertaken in order to establish the justification of knowledge gained in simulation (Gaba, 2004). According to this perspective, simulation learning should be studied with control versus experimental groups involving numerous individuals; be randomized to ensure valid population representation; be prospective as opposed to retrospective; be double or triple blinded; and be evaluated using proper statistical analysis in order to demonstrate validity and reliability. This type of research, though it is not

commonly labeled as such, is a social construction, a form of research story, a genre preferred by some but not all. Its retelling is important by virtue of its repeatability. However, such a form of simulation research does not consider the stories of the individual or take them into account. Because this view purports ahistoricity in reverence to the goal of objectivity, it is ignorant of history and the ethical debt to history. Because it attempts a snapshot of time, it cannot reveal narrative time as that which flows backwards and forwards through the simulation story. In fact, such a view does not even recognize the existence of story as a relevant outcome of simulation. More research is needed to understand the extent to which narrative is manifested in simulation.

So the methodological question becomes, with respect to simulation, which research is more valid? Or is the question really about which story is more meaningful? Is it the documentation of the "objective" researcher who controls the variables present in simulation or the retellings of the stories of the "naturalistic" researcher? Flyvberg (2001) points out that engaging in a methodological war between the natural sciences (e.g., physics, biology, chemistry) and the social sciences accomplishes little. He suggests,

> The principal objective for social science with a phronetic approach is to carry out analyses and interpretations of the status of values and interests in society aimed at social commentary and social action, i.e., praxis. The point of departure for classical phronetic research can be summarized in the following three value-rational questions: (1) Where are we going? (2) Is this desirable? (3) What should be done? (p.60)

Simulation is primarily a pedagogical tool. So to answer Flyvberg's (2001) first question of "where we are going" involves first and foremost an educational response. Simulation is not typically concerned with its own raison d'être or any kind of proof of efficacy. It is concerned with experiential learning and how to

encourage learning to occur. The story of simulation involves a deworlding. According to Ricoeur the deworlding occurs in the journey to and through the Other. It may involve a deconstruction of hidden assumptions prior to an imagining and re-imaging of the world. It may also attempt to close off the Other or to partition the Other into a stranger, god or monster. In terms of education, simulation is always an intrusion into individual meaning-making. As for question two, simulation is desirable in the sense that it can help to justify a social order and can help to explore utopian alternatives to that power. Simulation provides opportunity to solve some pressing educational problems. It can do this on multiple levels ranging from domains requiring professional justification to national and international conceptions of citizenship. Simulation forces an acknowledgement that the real and the imaginary are entangled. In terms of the third question, simulation, as a scripted story waiting to be enacted, is subject to both language and ideology. It is, therefore, always in need of interpretation where the interpretations are never innocent and always open to the charge of dissimulation or domination. Neither ideology nor language are transparent, and no view can be taken that is completely outside of either. This means that further research into the way simulation is pedagogically designed is required.

The central finding of this study, is that the imaginary and the real are entangled in complex ways. The entanglement is represented by the social imaginary that is emulated in simulation, and it is because the participants are required to engage the social imaginary that they are also required to interpret it and learn from it. Simulation is most typically the scripted story of a designer/controller that engages participants with an Other through a narrative telling that provides the opportunity for the configuration of experience necessary to enable later retellings and reconfigurations of the story. The retellings occur with different emphasis, different memories and understandings, different and alternative points of view and reference. These are the stories carried in the memories of the participants. But the essence of

the story as a remembered experience identifying it as worthy of remembrance and identifying it as *the* story remain. This is the story of Rob's encounter with the bread knife, Dave's journey through soap bubbles, and Kris' assault on a simulated enemy encampment. Story thus exists not only as an important reservoir of knowledge but also as an important process for the construction of knowledge.

I end this study with a historical example which I think speaks to how simulation might be used to make the human condition better. On February 15, 2009, a couple became lost while skiing "out of bounds" near Kicking Horse Mountain Resort in the proximity of Golden, British Columbia. A search was not initiated until 9 days later even though on February 17 and 21 there were reports of an SOS that had been trampled into the snow. Rescue came too late to save one of the persons who succumbed to the elements. The question, forefronted in the media, was why did it take so long to activate a trained search and rescue team given that the international distress signal SOS had been observed on two separate occasions?

Part of the answer, I believe, lies in the failure to recognize the entanglement of the real and the imaginary. The SOS was not deemed to be real. Press reports stated that it was believed to be "old" and that a search was not undertaken because there were no abandoned cars in the parking lot and nobody was reported missing. Because the non-existent car was not present and the non-existent missing person's report was not filed an emergency response was not initiated. In the critical appraisal taken after the fact, it becomes deathly obvious that neither of these two reasons explains away the presence of the real SOS on the mountainside.

This story demonstrates that entanglement of the real and the imaginary is found not just in simulation but also in the world outside the simulation. When such entanglement goes unrecognized in the world, it may prove to be profoundly consequential within the realm of human affairs. It is in the

imagination of the unforeseen that simulations can demonstrate their worth, and it is in their practical capability to make the human condition better that their value can be revealed.

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APPENDIX

Consent letter

Date

Dear *Name of Participant*:

My name is Tim Essington. I am a doctoral student in Educational Policy Studies at the University of Alberta with a specialization in adult education. This letter is to request your participation in a study for my doctoral thesis. I am conducting a research study entitled "Simulation Learning: Perspectives of Learners and Instructors." My supervisor is Dr. Donna Chovanec. She is a professor in Educational Policy Studies at the University of Alberta.

The purpose of my research project is to study the experience of learning in simulation. I am interested in how people learn in simulation, what they learn in simulation and the meanings they make through their simulation experience. I will be interviewing students and instructors in the fields of paramedicine, aviation and aerospace.

Your participation will include two face-to-face interviews and a final interview that may be conducted over the phone or through email. Each interview will be approximately 60 – 90 minutes in length. If you choose to participate and then change your mind, you have the right to cancel the interview. You may withdraw from the study at any time, and I will destroy all of your interview data should you decide to do this.

The data I obtain from this research will be used for my doctoral thesis. In addition, I anticipate using this information for conference papers, presentations, and publications. All research using this data will comply with the University of Alberta research ethics standards. Should you agree to participate in this study, your anonymity will be maintained through the use of an alternative name unless you provide written authorization to do otherwise. The raw interview data collected for this study will be secured for five years following completion of the research project and then be destroyed.

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension and Augustana Research Ethics Board (EEA REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEA REB at (780) 492-3751.

I value your participation in this study and appreciate it greatly. By reviewing and signing the attached Consent Form, you are agreeing that I have provided you with all of the necessary information for participation in this study and that you wish to participate. Feel free to contact me if you have any questions.

Any questions regarding this research can be directed to Tim Essington via my work telephone 780-679-1198 or via e-mail at tim.essington@ualberta.ca. Alternatively my supervisor may be contacted via phone at 1-780-492-3690 or via email at donna.chovanec@ualberta.ca.

Yours sincerely,

Tim Essington

Consent Form

I, _____, agree to participate in a research project that studies the experience of learning in simulation. I understand the nature of the project, and its purpose, according to the information (consent) letter provided to me.

I agree to be interviewed by Tim Essington under the following conditions:

- I have the right to withdraw from the project at any time. If I choose to withdraw, the information I provide will be destroyed and not used in the project.
- I agree to three tape recorded interviews of 60-90 minutes in length. I understand that I can end the interview at any time.
- I understand that the researcher or his designate will transcribe the tapes.
- I understand that these tapes and the other raw interview data will be kept strictly confidential and secure for a period of five years then they will be destroyed.
- I understand that my identity will be kept confidential and a pseudonym used in all materials unless I give written authorization to do otherwise.
- I understand that the researcher will endeavor to ensure that no harm will come to me through my participation in this project.
- I understand the interview may be used for doctoral thesis research, conference papers, presentations, and publications.
-

I agree to these conditions:

Signed: _____

Date: _____

Researcher

Signed: _____

Date: _____

Please note the plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension and Augustana Research Ethics Board (EEA REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEA REB at (780) 492-3751

For further information regarding the purpose and methods of this project, feel free to contact Tim Essington (the principal researcher) or Donna Chovanec (thesis supervisor at the University of Alberta).

Tim Essington
Office phone: 1-780-679-1198
tim.essington@ualberta.ca

Dr. Donna Chovanec
Office phone: 1-780-492-3690
donna.chovanec@ualberta.ca

Confidentiality agreement

Project title - Simulation Learning: Perspectives of Learners and Instructors

I, *name*, have been hired to transcribe recorded interviews from audio to written format verbatim.

I agree to

1. keep all the research information shared with me confidential by not discussing or sharing the research information in any form or format (e.g., disks, tapes, transcripts) with anyone other than the *Researcher(s)*.

2. keep all research information in any form or format (e.g., disks, tapes, transcripts) secure while it is in my possession.

3. return all research information in any form or format (e.g., disks, tapes, transcripts) to the *Researcher(s)* when I have completed the research tasks.

4. after consulting with the *Researcher(s)*, erase or destroy all research information in any form or format regarding this research project that is not returnable to the *Researcher(s)* (e.g., information stored on computer hard drive).

5. other (specify).

_____ _____ _____

(print name) (signature) (date)

Researcher

Tim Essington _____ _____

(signature) (date)

Please note the plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension and Augustana Research Ethics Board (EEA REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEA REB at (780) 492-3751

For further information regarding the purpose and methods of this project, feel free to contact Tim Essington (the principal researcher) or Donna Chovanec (thesis supervisor at the University of Alberta).

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tim.essington@ualberta.ca

Dr. Donna Chovanec
Office phone: 1-780-492-3690
donna.chovanec@ualberta.ca

The Guide for Interview One

My name is Tim Essington. I am a doctoral student in Educational Policy Studies at the University of Alberta with a specialization in adult education. I am conducting a research study entitled "Simulation Learning: Perspectives of Learners and Instructors."

The purpose of my research project is to study the experience of learning in simulation. I am interested in how people learn in simulation, what they learn in simulation and the meanings they make through their simulation experience.

1. What experience have you previously had with simulation?
    a. Please describe, for me, your experiences with simulation.
    b. What about the simulation activity appealed to you?

2. Walk me through what it is like to be in a simulation or simulated activity.
    a. What would you see?
    b. What would you hear?
    c. What would you see?
    d. What would you feel?

3. Were there any other simulation experiences that were particularly significant for you?
    a. In what ways were the experiences significant?
    b. For whom was the experience significant?
    c. How does the experience, the feelings, the action of this simulation compare with real world activities?
    d. What was your role in simulation?
    e. In what ways does simulation provide experience for the real world?

4. Suppose I was a new person who was going to participate in a simulation, and I asked you what I should do to succeed in the simulated sessions. What would you tell me?
    a. What would you change about the simulated environment?
    b. What works particularly well?
    c. What kind of support is required to be successful?