Rethinking Adult and Vocational Education
Hauling in from maritime domain

by

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BSc, Sistan and Baluchistan, 1990
MSc, World Maritime University, 1993

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Supervisory Committee

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Abstract

This dissertation investigates the nature of learning and knowing in adult formal vocational education and training. In a two-year period, I attended a training institute in western Canada and collected data from a variety of courses that were designed for practitioners to initiate a career or promote their rank in maritime industries. My research consists of four separate yet interrelated studies that, as a whole, comprise core chapters of this dissertation. I used video-mediated ethnography as my method to record and socio-cultural and situated perspectives as my primary framework to analyze and better understand my research data, participants' interactions, and the learning and knowing possibilities in the course of the activities. In my first study, I looked at the assessment system for certification, a major impediment and contradiction that prevents the current vocational education system from reaching its objectives. I analyzed how current practices adversely affect the performance of the system and how it can be improved. In the second study, I examined and addressed the shortcomings of vocational education policies. I proposed a conceptual framework for policy analysis and design that affords the reduction or elimination of the current impediments in the implementation processes. In the third study, I developed the concept of *quasi-community* as a theoretical framework for theorizing the learning and teaching of adult practitioners in formal educational

settings. I theorized learning as the membership and co-participation in a quasi-community developed by its members. The aim of a quasi-community is to create an interactive environment for the participants to share their expertise and utilize cultural resources in order to provide opportunities for collective activities and collaborative learning. In my final study, I focused on a new phenomenon in workplaces, namely the introduction of technology and the demand it created for change in educational systems. Based on the concept of quasi-community, I proposed a distinct pedagogical method for adult technology education. This dissertation provides empirical evidence that the conceptual framework of quasi-community allows for the creation of effective pedagogies that provide authentic learning opportunities for adult learners to develop vocational and technological competencies required in their workplaces.

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This dissertation would not have been possible without the support and guidance of many great people who supported me during my endeavors in the last five years.

I dedicate this dissertation to my family: to my dear wife Leila and my two wonderful children, Houtan and Arsham, for their encouragement, inspiration, and love, and to my parents for their care and support.

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Most importantly, I am grateful to God for His presence in each and every step of my life.

CHAPTER 1: Introduction

This dissertation is about learning. More specifically, I am interested in adult learning and knowing for vocation and work. My immediate interest in this research is in how adults learn in vocational formal education to be competent practitioners and by what means the process of development of competency can be improved. I have researched how and what people learn in those settings and in what way it relates to their interest for their workplaces. I placed my research in the context of the maritime domain and looked at the trajectory that mariners take in the formal education and training systems to be certified practitioners. Derived from my ethnographic research, I propose a theoretical framework that allows for the creating of effective pedagogies for providing authentic learning opportunities for adult learners in order to develop the vocational and technological competencies required in their workplaces.

This dissertation is also the product of my professional trajectory in life as a practitioner, faculty member, and researcher. In the following sections, I would like to share part of my professional background and thereafter my involvement with this study as they have intimately intertwined with my doctoral research agenda. At the end, I briefly introduce the general context in which I placed my research.

My professional autobiography

After I received my Bachelor of Science degree and my professional certification, I started my job in the maritime industry. I have always loved teaching, so a few years later I earned my Master of Science in the field of vocational education and training. I then started my teaching career in technical colleges and universities. This change in career

path had a great effect in shaping my teaching philosophy and methods. Although I had a specialized graduate degree in teaching methods and pedagogical approaches, my experience as a trainee and a practitioner greatly affected my way of teaching. The teaching methods that I was exposed to and have been taught during my post-secondary education were not fulfilling the expectations of the education and training system that I have developed as a practitioner at work.

My initial teaching practices were satisfying the expectations of academic administrators and, to some extent, the students, especially those in the early years of their post-secondary education. However, it was satisfying neither to myself nor to the students in their later years who had gained some work experience from their practicum in the industry. Based on the knowledge and experience that I was gaining, and the constant feedback that I was receiving from students and the industry, I was continuously evolving my teaching methods to be able to produce meaningful outcomes. I employed different approaches to improve my teaching practices. For example, I tried to give students some ownership of their learning experiences by providing them the chance to participate in their own learning processes. My students could take responsibility for and engage in the teaching practice of their course by co-teaching with me those parts of the syllabus in which they were interested. Integrating related students' interests into the course objectives became an immutable part of my practice. My course activities regularly constituted group-work and promoted collaboration among students.

For more than a decade of my teaching, I was in a constant struggle to modify and perfect my teaching and pedagogical practices. However, the biggest constrains to providing more effective pedagogical method were my limited theoretical foundation and

the shortcoming of adult and vocational education literature and research. These concerns persuaded me to take on my own research, a research that would fill this gap in the literature and would be useful to others like me who are interested in and engaged with adult and vocational education.

The story of this study

I wanted to do a PhD because I felt my work would never be complete without it. This could give me the possibility to work *at the elbow of another*[1], the ones who have already experienced the path similar to that I wanted to take. The task of finding a supervisor to oversee my endeavor was not an easy one. There were not many people with related expertise who are willing to undertake the responsibility of supervising this type of research. When I contacted Dr. Michael Roth, he was engaged in a project related to workplace learning and school-to-work boundary crossing. I explained my research agenda, and he agreed to supervise my PhD. Indeed, my agreement with him exceeded my initial expectations. He asked me to commit to submitting my research results for publication in international peer-reviewed journals. That was a bonus to everything I had planned.

I started with becoming a member of Michael's research team named CHAT@UVic.ca (Cultural Historical Approach to Thinking), with eight members at the time. The group members were working together as a community. The knowledge and expertise in the group were continuously developed through collaborative work and the discussion of ideas either from scholarly literature or produced within the group. Our

[1] This is the metaphor from the book of the same title co-authored by Wolff-Michael Roth and Ken Tobin (2002).

group met regularly to analyze data mainly in the form of video-clip and transcriptions of interviews and interactions of research participants. We normally utilized *Interaction Analysis* as the primary data analysis method. Interaction Analysis is a method for the empirical investigation of human interactions with each other and with objects and resources in their environment (Jordan & Henderson, 1995). According to this method, humans' knowing and actions are socially oriented as they are situated in particular social and physical ecologies. It signifies that knowledge and competencies of experts are not so much placed in the minds of individuals but situated in the interactions of particular community members while they are engaged in their activity.

This social and situated view of cognition needed a particular methodology for research and data collection. The data should be able to represent detailed social interactions, particularly in the natural setting of everyday practice. Based on the Interaction Analysis method, the world as it appears to the participants in daily human interactions can be accessible to analysts while observing such an interaction recorded as video. Analytic work here, at least in part, draws "on our experience and expertise as competent members of ongoing social systems and functioning communities of practice" (Jordan & Henderson, 1995, p.3). Therefore, to be able to competently analyze my data, I had to become a competent member of the community where I was going to collect my data. Participating in these meetings and being immersed in such a strong research environment allowed me to develop a new understanding of research processes, including its methods, objectivity, and credibility. This experience constituted an important part of my apprenticeship processes through which I have developed competency as an analyst and researcher of human learning and knowing.

I started my research early in my program. I chose a community college that had a Maritime Department as the research site. The department offers training programs to prepare its participants for careers at sea. Programs range from providing basic level training to long duration courses, leading to preparation for different levels of certification needed for working at sea. The course participants are typically adult practitioners from different parts of the marine industry, mostly local and from the same geographical area. These adults attend college to initiate their professional careers at sea or to upgrade their qualifications to move up the rank onboard ships. The department's classrooms and labs are well equipped for the purpose of the courses it provides.

To start my research process I met with the Department Head. He showed great enthusiasm and willingness to participate in my research. He stated, "I think it is a great idea what you are doing… I see a definite mutual arrangement that we can reach and of course it can help me improve what I do, as a bonus." Shortly after, I obtained my ethics approval and started going to the College to collect data. Throughout my research, I enjoyed the cooperation and enthusiasm of the Department Head and his academic staff. To collect data, I went to the College every weekday to participate in the classes, labs, fieldtrips, and other academic activities. Soon, I was fully engaged in their programs. I met instructors, course designers, and the Department Head almost everyday. In our regular meetings, we discussed matters of interest, which were mainly relevant to the current events of the domain or the teaching and learning of the domain. For the better part of two years, I attended a variety of courses that were offered by the College for the marine practitioners. I observed and interacted with course participants who were at different stages of their careers. During the whole period of data collection and even in

my data analysis period, I had productive collaboration and regular meetings with my research participants.

In the following section, in order for the reader to have a better appreciation of the context of my research, I provide a brief introduction to the maritime domain.

The context of my research

The maritime domain enjoys an international nature as most of the maritime activities lay outside the normal jurisdictions of countries. To create global harmony and prevent chaos, there are international standards for different sectors of this domain, which includes education, training, and certification systems. The International Maritime Organization (IMO) is the responsible body for the development and maintenance of these standards. The IMO is a technical agency of the United Nations that is responsible for establishing standards for the education and training of seafarers. The organization introduces and regulates these standards through a series of international conventions, recommendations, and codes. The International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) sets qualification standards for practitioners who work aboard ships. The maritime administration in each country is the responsible body for the national implementation of the Convention. In Canada, like many other countries, the certification authorities provide or approve the educational programs of training institutes and are responsible for the assessment of competency certification. In many cases, marine training institutions provide the training programs, yet it is the maritime administration that conducts the related competency examinations.

Despite the extensive international system, which requires mariners to develop and continuously upgrade their knowledge and skills throughout their working lives, there

continues to be a large number of accidents and incidents ultimately attributed to the practitioners' lack of competency. Several years after the worldwide implementation of the first marine training and certification convention (STCW78), it turned out to be unfruitful and could not meet its mandates. As a result, during the 1990's the IMO revised the convention and created a new version (STCW95). Currently, many years after the implementation of this new convention, the reports indicate that the convention is not successful and the competencies of marine practitioners have not improved. This is contrary to the result expected from decades of efforts that vocational education and training systems worldwide expended to improve the competency of mariners.

This dissertation is based on my research of this domain and provides empirical evidence of the shortcomings and contradictions that may be responsible for the unsuccessful vocational training and education system. Derived from my research, I provide a novel framework that may be considered as a breakthrough in improving adult and vocational education in general, and maritime education and training system in particular.

CHAPTER 2: Theoretical Framework

This dissertation is the result of a two-year ethnographic study conducted with college instructors, curriculum developers, students, and practitioners in British Columbia, Canada. I used video-mediated ethnography as the method to record and socio-cultural and situated perspectives as my primary framework to analyze and better understand my research data, participants' interactions, and the learning and knowing possibilities in the course of their activities.

I composed the four main chapters of this dissertation as stand-alone studies, thus readers do not need to be introduced in advance to the theoretical frameworks I used in each study. What I intend to do in the following section is to describe the foundational frameworks in which I rooted my research. These frameworks were not lenses that I used as *the way* to look at my research data for each of my studies. In my research these frameworks were not standardized theories or comprehensive conceptual structures that I used to design my research and analyze my data. I did not treat them as autonomous entities, giving them power to act as mere agents thus to make myself nothing more than the executer of models built by these theories and incapable of acting as the analyst of my data. I did not treat them as a paved path to pass through the landscape. Rather, these frameworks are providing a theoretical *vista* that gave me a solid ground on which to pursue discoveries in my research. These theories were resources that I chose to situate and orient myself in the research journey on which I embarked. I utilized them as the guiding elements in my naturally emerging research agenda. These frameworks were the guiding beacons for when I was developing the method of my research, data collection, and analysis.

Here, I start with a recent addition to the socio-cultural family, i.e. cultural historical activity theory (CHAT) or activity theory, which framed my worldview throughout my research. Thereafter, I will elaborate on other concepts that are more on the surface and are used or addressed in studies that comprise different chapters of this dissertation.

Activity theory

The activity theoretical approach was developed from the work of Lev Vygotsky (1896–1934) on socio-cultural studies on cognition and learning. He based the framework on the idea that actions cannot be understood outside the praxis in a particular human *activity*. Based on this idea, whatever humans do is framed within a culture and can be traced back to a human activity (Vygotsky, 1978). Activity theory was expanded by Alexei Nikolaevich Leont'ev and Aleksandr Luria (Vygotsky's students) to incorporate social, cultural, and historical dimensions of human mental functioning (Eilam, 2003). The difference can be noted in the scholars' work in the use of the term "socio-cultural" compared to the use of the term "cultural-historical" by those who based their work in the original Vygotskian philosophy (Roth & Lee, 2007). Later on, activity theory's legacy continued through the development of its third generation by Engeström (1987) as the Cultural Historical Activity Theory (CHAT). He made explicit the mediation of tools by the subject when interacting with the object in a human activity system. CHAT assists in the uncovering and understanding of how people go about their everyday activities in collaboration with others by allowing social actions and cognition to be analyzed holistically. The theory broadens our understanding of learning, which here is considered to be a social phenomenon is realized through interaction and collaboration.

The *activity* in activity theory is seen as a system of human doing. Here, the main

conceptual, mutually interconnected, and constitutive elements are *subject*, *object* and *outcome*, *tools* (means of production), *community*, *division of labor*, and *rules* (Engeström, 1987). In this system, the subject works toward an object in order to achieve a desired outcome. The subject is an individual or individuals (subgroup) whose agency (mediated by means of production, instruments, and/or tools) is directed to transform the object into outcomes. The object is the focus of the activity, and it gives the activity direction and outcomes. Achieving the outcomes is what motivates the existence of the activity system. In the process, the subject employs tools, which may be physical and external (e.g. a hammer, a book) or mental and internal (e.g. a plan, signs). The tools mediate between the subject (e.g. the carpenter, students) and object (e.g. making a chair, learning). Any human activity that is mediated by culturally produced tools (either physical or mental) develops consciousness (cognition, memory, identity) and society. The *community*, its *division of labor*, and *rules* further this mediation. In this process, the human interacts with the environment as an agent of change; subsequently, the process itself changes the human as well.

The tool use allows access to the accumulated wisdom of the community as tools embody cultural history and the experience of generations of the community members. The community consists of people who share the same object and so distinguish themselves from other communities with different objects. The rules are explicit or implicit regulations, norms, and rituals that regulate, assist, or constrain actions within the activity system. The division of labor refers both to the hierarchical and power status and to the division of tasks among the community members (Engeström, 1999).

Activities are recognizable from each other according to their objects. Many subjects

may be involved in an activity, and each subject may be involved in more than one activity. Activities retain evolving complex structures that exist and interact with the network of other activity systems. The activity system is normally represented in a triangular model (Figure 1). Through this graphical representation, the interdependencies of the acting subject and different levels of activity are represented.

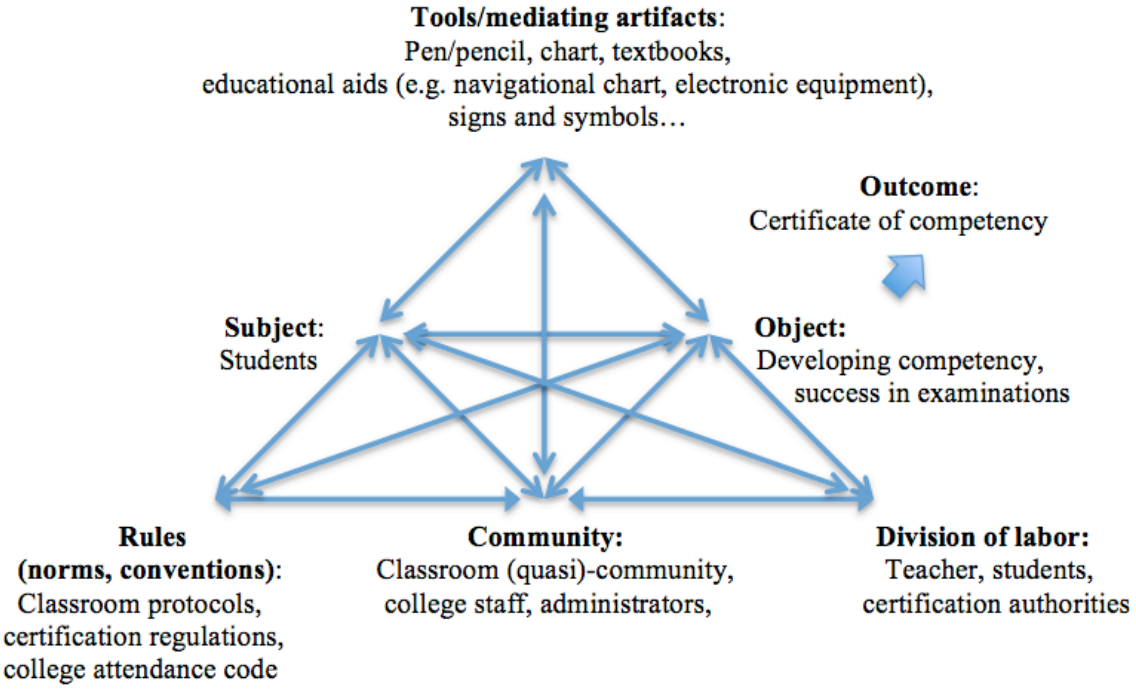

Figure 1: Graphical representation of Activity System

The minimum unit of analysis in CHAT is the activity system in relation to other activity systems (Engeström, 2001). This means that the subject and other elements in the activity system cannot be looked at as independent components that the activity system is assembled from; rather, they are all related and each element depends on the others (Roth & Lee, 2007). In an activity system, each pair of constituents has relations, which are

mediated by the entire activity system. This implies that the product (outcome of the activity) carries traces of the activity as a whole and cannot be attributed only to the subject of the activity and his or her mind. The activity system is a dynamic entity, and there is continuous movement between its nodes and changes in its parts and relations (Engeström, 1996). The outcome of an activity may become a tool, which later is used by the activity system itself; by doing so, it changes the mediation between the subject and its object. In the course of time, the activity system may evolve and alter the initial purpose of its existence to something entirely new.

Learning in activity theory is considered to be the product of social processes. Cognition arises in the dynamic transaction between an individual and the socially constituted settings of the activity and not the mere product of the individual's intellectual capacity as a psychological phenomenon (Barab & Pluker, 2002). Compared to the earlier theories, which privileged either social or inter-psychological processes activity theory proposes that the origin of higher order cognition is in the intra-psychological processes (Vygotsky, 1981). For example, students learn when they collaborate in activities related to the use of technology or when they engage in discussions while using language, which they have culturally mastered and internalized. Here, the learning can be seen as a process of participation and engaging with others while using artifacts such as electronic equipment, textbooks, and language (which is considered by Vygotsky as the "tool of tools") in meaningful socially oriented activities. In activity theory, learning is manifested through the practice, as the students gradually change their participation (from novice to skillful) and thus change their identity (Lave, 1993).

There are three cognitive levels in every activity system, namely *activity*, *action*, and *operation*. Activity systems are realized and reproduce themselves by generating actions and operations (Engeström, 2000). Activities are realized through goal-directed conscious *actions,* which in turn are constituted by unconscious *operations* (Leont'ev, 1981) the motivation for activities derives from the desire to achieve the objects. Objects are motivating because they satisfy human needs. Actions are goal directed and are subordinated to activity at the functional level. In other words, the actions of individuals contribute to the objects of the activity system although the identity of the activity is not reduced to the actions. Individual subjects often are not consciously aware of the object of an activity (normally, the contribution to sustenance of the greater society), but they consciously realize the goal of the action. Actions in turn are realized through operations, which are below the level of collective activity and individual actions. In contrast to the actions, the operations are on the unconscious level and are automatic although still conditioned in how the action is performed. Operations are originally actions, but when the related skills are well developed by the individual, they become unconsciously operable. That is, operations are developed automatically with increasing competency in use.

For example, students in my research, in order to consciously learn how to solve a type of problem, had to use the formulas and write down and solve the same types of problems several times. They used many of the tools in the action such as pen, paper, and writing techniques. These tools had been used at the level of unconscious operation, as the students were not thinking about how to hold the pen or write down numbers on the worksheet. On the other hand, they used a formula to solve the problem. At first, the

students used the formula on their conscious level, but when they became skillful in the use of the formula, they started utilizing it on the unconscious operational level. After a period of time, the students became competent in the action of solving that type of problem mainly through performing a series of operations. Here, through the constituted operations, the action contributed to the realization of the object of the *activity*.

Activities by nature are an evolving complex set of mediated human doings that contribute to the sustaining of human society. Thus, farming, commerce, and (a more recent form) mass schooling are activity systems with objects and motives that maintain individuals and the human society as a whole (Roth & Lee, 2007). Activity theory is not a master theory that tries to explain everything about human life; rather, it engages us in concrete human actions to make us understand how human activities realize themselves. The overarching theme of activity theory necessitates accounting for various activities in which teachers and students are involved. For example, because of the performance level in certification examinations, the class engaged in preparation for the tests. This can be considered as an activity system that is separate from but overlapping with another activity system that binds the teachers and students to fulfill the requirements of the standardized curriculum. Activity theory, therefore, allows us to understand that these activity systems exist at the school level and are evident at the classroom and interpersonal levels. This avoids assumptions about teachers' and students' actions and emphasizes the importance of involving their opinions in the analysis.

The activity framework also allows scholars to analyze human cognition and social actions holistically by uncovering how individuals go about their activities in collaboration with others. The activity refers to collective socially motivated human

actions. This makes the framework ideal for broadening our understanding of learning processes and identity development. Focusing on actions instead of individuals and their thoughts allows us to realize that teachers and students are socially related with one another and with other elements of the activity system. Actions are important in activity theory mainly because they are what is available to the analyzer. Activity theory allows making sense of the separate actions by relating them to each other and to the activity as a whole.

These actions determine and are determined by the activity (Roth, 2004). Actions are performed to realize goals that make sense only within the activity that constituted those actions. From such an angle, for example, the teacher and students' actions are not reduced to psychological or sociological processes, but they are considered in relation to the educational activity system that they belong. Their actions contribute to the realization of the overall goal through the achievement of the given object of the activity. To illustrate, the teacher and students contribute to the realization of competency development by accomplishing the task of problem solving. Thus, from the activity theory perspective, single actions cannot be analyzed meaningfully as they are interdependent on other aspects of the activity. Thus, the minimum unit of analysis is the activity system as a whole.

The activities are always motivated toward collective objectives. Without an objective, there cannot be any activity. Formal schooling as a human activity means that there is a common objective salient for the students and teacher. For example, the object and motive of the students who attended one of the courses in my study was to learn certain types of knowledge so that the success in the certification examination emerges as

the outcome (chapter 5). In other instances, the collective aim of the course attendees was to develop a kind of competency that is useful and required for their place of work so that the outcome materialized itself as competencies for their workplace (chapters 7 & 8). Utilizing the cultural-historical perspective in analyzing the schooling activity has the potential to divert the attention away from the curriculum evaluation, allowing the actual object of the activity (as the motive in learning process for students) to be at the center of the analysis. This is important, as the object defines and forms the final outcome of the course.

There is no subject without an object, and an object does not exist in vacuum unless it is to be accepted by a subject. Therefore, the subject and object are dialectically related and co-constitute each other. What is salient is the fact that the students as adults have prior personal objectives for attending the courses. School programs can succeed in their goals only if the objectives of the course mirror the collective objectives of the course participants, as they constitute the subject of the educational activity. On the other hand, in an activity system, the object cannot be reduced only to a specific motive of subject or to the dominating structural conditions. The ontology of the object always remains flexible to the interpretation of the subject and the way s/he experiences the object and the material conditions (Roth, Bowen, & Masciotra, 2002). These motives may be weighted differently based on preference, immediate necessity, or the dominant culture. These differences can create conflicts, which in turn may affect the way the activity is realized or even prevent the activity from taking place at all (Kaptelinin, 2005). So, for example, if passing the exam requires the type of knowledge that is different from the student's required expertise for work, he or she may either try to acquire the specific

knowledge to get the certificate or, as an extreme, may even decide to quit school. The recognition of the subject's multiple and sometimes conflicting motives is important in recognizing what the objective of the activity might means for the subjects. The wider objects of activity include an emerging central binding state of affairs by which subjects' intentions, needs, and endeavors are summoned, although never in permanent form.

At the same time, in the activity system, the relationship between the subject and the object is mediated by other elements. Figure 1 shows that there are four components in the activity system that further mediate the relationship between the subject and the object. *Tools* can have a material form such as whiteboard, computer, paper, and pencil or they can have a cognitive nature as in formulas, sign systems, and concepts. *Rules* can be a set of implicit or explicit conventions ranging from the timetable to the norm of teacher/student relation. *Community* in this case may consist of the teacher, students, and administration personnel. Finally, the *division of labor* indicates the role that people assume, for example, to be a teacher or an attending student. As each of these elements interacts in the system, they may evolve during the life of the activity; therefore, the relations between them and consequently the activity system may change entirely as well.

Another important dimension of activity theory is the structural tension in the activity, within its entities, or between different activity systems. These *contradictions* are not negative or harmful to the activity *per se*, as they are potential sources of learning, change, and development of the activity (Il'enkov, 1977). The term contradiction does not refer to everyday conflicts or troubles; it pertains to the structural tension that has historically accumulated in the system. For example, a teacher wants the students to be successful in their future jobs by developing related competencies in the course. However

for the students to be able to qualify for their jobs, they would have to pass a certification test conducted by a third party (referred to in chapter 5). To pass the test, students need to have different types of knowledge compared to what they appropriated in their workplaces. The limited timeframe of the course did not allow for both competencies to be developed. This fact created a structural contradiction within the activity. This also created a contradiction between the activity systems of schooling, certification, and work (referred to in chapter 6). These contradictions are important aspects of any developing activity. The contradictions do not cause change, but they act as resources and products for the agent subject during the development of the activity system (Sewell, 1992).

A micro-level example of contradiction can be shown at the time that a student aims to replicate a product that was earlier made by the teacher. The object of the student's activity is the final product, but what the student has is the idea of that product. If the student's action is not able to produce the same product as s/he aims for, it will result in a contradiction between the product in the form of idea (of ideal product) and the product in flesh (what the student was able to make). This contradiction motivates the student to try a new action different from, and probably better than, the first attempt until the ideal product is produced. Through this process, the student learns the skill of production. As soon as the ideal production is achieved and coincides with the idea of the product, then the contradiction is resolved and the student stops the practice (Roth, 2004).

Application of activity theory in my case studies

As I mentioned earlier, the activity theory forms an overarching framework in my entire work, even though I do not explicitly describe activity theory in the texts when I present my case studies in this dissertation. Activity theory allows me to go beyond the

actions that my research participants performed. This framework provides me with a comprehensive view of activity systems that my research participants engaged with. This provides possibilities for a better understanding of the participants' goals and motives for performing their actions. In the following, I will provide a brief description of how I perceive the activity theory and its application in my four studies. I elaborate in what way different elements of activity systems (as illustrated in Figure 1) are represented in my studies.

In the first study (chapter 5), activity theory allows me to realize about a contradiction in the education and training system that prevents the system to perform well. I analyzed an activity system where the *subject* of the activity consists of the students whose *object* of achieving the knowledge and skills required for their workplaces motivates them to attend the college. The ideal outcome of the activity system for the students is to develop a kind of competency they needed as mariners in their workplaces. In this activity system, the participants performed actions mediated by tools such as textbooks, whiteboard, pen and paper, signs and symbols, and so on. The *community* includes the students, the school staff (teachers, course designer, administrators), and the certification authorities. The *rules* among others include the implicit and explicit norms, rules, and regulations of the schooling and certification systems. The *division of labor*, which permits me to see the role of a person perform as a teacher and others as students, provides the hierarchy, position, and responsibilities of each actor in this activity system. The activity theory in this case study allows me to have a better understanding of the dissatisfaction of the students and the low performance of the education and training system. Instead of blaming the students and teacher's actions or the curriculum content as separate entities, I

view them as interrelated elements of a preforming activity system. In my analysis, I found a contradiction in the system between the true objective of the students and the objective of the assessment system. This contradiction prevents the activity from to reach its objectives.

In my second study (chapter 6), I analyze two activity systems, which although separate but related to each other. The first activity system that I focused on is the implementation of an educational policy by the college. Here, the *subject* includes the teachers, course designers, and program leader of the college. The *object* of this activity system is to implement the policy in order to achieve the *outcome* of receiving approval from the certification authorities. This activity system was related to the second activity system of implementing the international policy of the maritime education and training system (STCW) by the certification authorities as *subject*. The aim of this activity system is to develop the *outcome* as the international recognition of the country. When I assign these two activity systems together as my unit of analysis, I understand why they are not successful in reaching their objectives. I realize this condition is a complex arrangement of interacting activity systems each having their own object, mediated by different tools, and placed in a context distinguished by a division of labor, set of rules, and interrelated communities (Engeström, 2001). In this study, I examine the roles of different mediating artifacts in achieving objects of activity systems by means of employing the notion of boundary object (Star & Griesemer, 1989). This concept has recently been explored in the activity theory literature (e.g. Tuomi-Gröhn & Engeström, 2003). For example Lambert (2003) while examining the school and the workplace as two interrelated activity systems analyzed how collaborative interaction presupposes utilizing mutually

relevant boundary objects. Using this analytical technique, I consider the educational policies as boundary objects that mediate communication between, and within, different communities. In this study, I focus on how the boundary object can be developed as a tool for developing objects (e.g. educational policy) for the mutual use of different stakeholders (teachers, course designers, certification authorities, and practitioners) and analyze the effects they may have on educational system at the time of their use.

In my last two studies (chapter 7 and 8), I analyze two activity systems that perform successfully and allow their subjects to reach the objectives of the activity systems. The activity theory allows me to realize that the formation of the community developed by the classroom members is the greatest contributing factor in overall success of both activity systems. The concept of community is well emphasized in the activity theory. The role of community is important in a sense that it comprises the individuals and their actions, which constitutes the existence of the activity system. Community negotiates division of labor and mediates the rules and customs that describes how the community functions and the way it supports the activity (Jonassen, 2000). The first activity system, which is at the center of my third study (chapter 7), is formed by the students and teacher (*subject*) in a course; its *object* of success in the certification examination in order for the students to achieve the certificate of competency as the *outcome*. The second activity system, which is highlighted in my fourth study (chapter 8), is established in a course designed for the students to develop the technological competencies that they need to perform well in the current conditions of their workplaces onboard ships. The analysis provides the evidence that the pedagogy formed and performed in both courses allows for the optimal performance of the activity systems. This pedagogy developed from the collaboration of

members of a (quasi-)community, which is formed by the course participants. To have a better understanding of the community, its formation, and sustenance, I need a theoretical framework that allows me to put the community at the center of my analysis. After all, there is no single theory or framework sufficient to give a complete analysis of building of successful communities (Barab, Schatz, & Scheckler, 2004). The concept of communities of practice, an "important strand of cultural-contextual theorizing" (Engeström & Miettinen, 1999, p. 12) rooted in the activity theoretical perspective, is precisely designed to analyze naturally developed human communities.

Utilizing activity theory as the overall lens and communities of practice as an analytical framework provide harmonizing perspectives for better understanding the community component as well as its interrelation with others elements of the activity system. By examining the community aspect of activity system through the concept of communities of practice, I gain better understanding of the effectiveness of the community development and its sustenance. In this, the important point is not to treat the community as an isolated component but to examine this component in terms of the overall transactional dynamics of the system (Barab, Schatz, & Scheckler, 2004). Considering classroom as a community and the community of classroom as an activity system offers valuable insight into interrelation of classroom members, participation, resources, and the emerging pedagogy.

In the next section, I elaborate on the characteristics of the theoretical notion of communities of practice, which forms the underlying analytical framework in my last two studies.

Communities of practice

Based on Vygotsky's cultural-historical psychology, which emphasizes learning to be a set of social practices, scholars presented the idea of situated learning. Situated learning maintains that learning and cognition must take account of social interaction and work (Brown, Collins, & Duguid, 1989). Jean Lave (1988, 1991, 1996) is one of the first researchers who addressed this new approach to cognition and learning. Lave and her associate Wenger's analyses of apprenticeship learning, in its natural settings such as tailor shops, brought a new perspective to understanding learning as a kind of social practice in the learners' everyday lives.

Based on this theory learning, is understood to be not so much a way of knowing the world, but as a way of participating in the social world (Gherardi & Nicolini, 2002). Knowing and learning are seen as consistent with changing participation in continuously evolving social relations that make mundane everyday living (Lave, 1993). Lave and Wenger (1991) coined the term *communities of practice* to emphasize the role of collective activity in bonding individuals to their community and to show how community shapes, forms, and legitimatizes the individual's actions. This concept stresses equally the practice and the community. Scholars of this perspective argue that it is inappropriate to search for knowledge in the mind of individuals, as knowledge and cognition reside in communities and their artifacts. Knowledge is produced and reproduced in the interactions between people and their engagement with settings.

Lave and Wenger's idea of communities of practice evolved through their understanding of what is involved in apprenticeship learning and the process through which a *newcomer* into a practice gains competency and becomes a master and *old-timer*.

In communities of practice, learning and formation of identity are the result of participants engagement in social practices. These communities are recognizable by the common tasks and associated practices their members are involved in and the tools, language, resources, common sense, and mundane reasons they share (Roth, 1998). Thus, not any community is a community of practice. A community of practice is focused on a specific domain of a shared interest, which results in a communal competence that distinguishes its members from others. In pursuit of this shared interest, people form a community by interacting and engaging in joint activities and sharing information. Over time, they establish their community's shared practices.

Communities of practice are characterized by three dimensions: mutual engagement, joint enterprise, and shared repertoire (Wenger, 1998). People who have common objectives are brought together by joining in common activities in a joint enterprise to reach their goals. Organizing around some activities and particular areas of knowledge gives the members an identity and sense of a joint enterprise. These people learn through mutual engagement in a shared practice that binds members together into a community as a social entity. Members are involved in a set of relationships over time and develop a shared repertoire of communal resources (artifacts, routines, documents, vocabulary, common language). These shared repertoires are resources that carry the accumulated knowledge of the community as memories.

New members of each community join at the periphery. As they engage in practice and learn, they become more competent, which allows them to move toward the center of the community. This perspective looks at learning as a process of social participation rather than acquisition of knowledge by individuals. Through the process of moving from

the periphery to the core and becoming full participants in the socio-cultural practices of the community, newcomers develop mastery of knowledge and skills. The concept of *legitimate peripheral participation* provides a framework to theorize the way a community of practice reproduces itself. It shows the trajectory for a newcomer to enter the core practice of the community and the process of enculturation. It gives an indication of the relation of the new member of the community to old-timers, activities, and practices. The process of becoming a full member in such communities can thus be described as a trajectory of legitimate peripheral participation of increasing intensity in the ongoing practices of a community. Although the trajectory is defined to be along a centripetal path, this does not mean that the path is predefined and stable. Communities of practice are not homogenous so that all the members learn the same thing at the same period of time or access the same resources or practice. Rather, learning and knowledge are situated, and expertise is distributed in social and material environment (Roth, 1998). Here, learning is conceived as a trajectory of progressive legitimate peripheral participation until participation resembles that of the core practitioners. This process also constitutes the renewal of the community, where newcomers constantly join, thereby introducing variations into the practice, and gradually replace the old-timers and old practices.

The community's history of activities, practice, and production develop and maintain an organizational memory. Memories are an important aspect of the life of communities, and they emerge as members engaged in practice. These memories constitute the culture (rituals, routines, and common knowledge) of that community. These collective memories allow the practices to outlive any single individual and belong to the whole

community (Roth & Lee, 2006). These types of memories act as valuable resources for the newcomers to capitalize on and enrich their learning. This also provides motivation for newcomers to contribute to the community's practice by the production of the long-term memory through application of what they have learned (Lesser & Storck, 2001).

The idea of communities of practice embodies a theoretical notion of learning in which engagement in social practices is fundamental to the process of learning and formation of identity (Pór, 1995). Here, learning is defined as taking place through the sharing of purposeful, patterned activities that are considered to be an inseparable and integral aspect of social practices (Lave & Wenger, 1991).

The theory suggests that the proper unit of analysis of a skilled human activity is a community of practice rather than an isolated individual (Lave & Wenger, 1991). From this perspective, learning occurs in the field of social interaction between people and not inside the mind of individuals (Hanks, 1991). This promotes the idea that by engaging in legitimate peripheral participation and interaction with members of a community, one gets a sense of the enterprise, picks up its perspectives, and learns its language. Therefore, the purpose for newcomers "is not to learn *from talk* as a substitute for legitimate peripheral participation; it is to learn *to talk* as a key to legitimate peripheral participation" (Lave &Wenger, 1991, p.109).

Based on this notion, being a marine practitioner is more than just knowing the marine skills. There is more to membership in a community of practitioners than being competent in their skills (Schoenfeld, 1989; Lave, 1993). The apprentice should develop a way of thinking and seeing the practice. This requires being an insider and having a set of perspectives and values. The learning takes place in the context of the workplace while

engaging in real work in the community of mariners. An apprentice learns the skills from experts and other apprentices in the workplace onboard ships. While living among them it is not only the skills that s/he learns but also their values, attitude, and culture. The latter may not be part of the formal and explicit curriculum of being a practitioner but it is a significant feature of what an apprentice learns. The learners are apprenticing into a community and, if successful, they have adopted a culture and a way of thinking as well as the related set of skills. This is what defines them as practitioners of the field.

Community of practice and formal education

Community of practice is one of the most celebrated concepts for exploring non-school informal learning. This concept has made a great impact on research in workplace learning, organizational learning, knowledge management, and related aspects of learning in context. The idea of communities of practice in recent years has become one of the most influential concepts within the social sciences (Hughes, Jewson, & Unwin, 2007). Although further studies showed its suitability and appropriateness for informal learning, its inability to conceptualize and identify learning and knowing in formal education remains one of its shortcomings (Roth & Lee, 2006).

The notion of communities of practice and situated learning has a considerable impact on educational theory, research, and practice. There were some attempts to bring the idea into the formal educational design for school children. The most prominent attempt resulted in developing the concept of *cognitive apprenticeship* (Brown, Collins, & Duguid, 1989; Collins, Brown, & Newman, 1989). This situated approach to teaching practice had sparked a great interest in educational communities in the last two decades. Cognitive apprenticeship, essentially, is based on an apprentice model present in

communities of practice to support learning in the cognitive domain. Scaffolding, modeling, mentoring, and coaching are all methods of teaching and learning that draw on social-cultural and situated learning theories. This method focused on educating school students to think like practitioners who work on ill-defined problems.

Cognitive apprenticeship followed the principle introduced in the communities of practice: appropriate use of a tool is possible when the culture or community that the tool is being used in is understood. Here, the academic discipline and professions are seen as communities and cultures. The aim is for the students to use the tools as practitioners by entering their community and its culture as an apprentice does. This approach asks for authentic scientific activities in schools, which implies that it should comprise the ordinary practice of different science cultures. As in the apprenticeship model, the teacher plays the role of practitioner and students act as apprentices. The teacher's role includes confronting the students with the strategies that are used in solving everyday problems with the goal of the students' development of expertise within the varied science communities. In cognitive apprenticeship, the teacher appropriates different techniques to develop students' cognition and provides possibilities for the students to use their everyday procedural knowledge. The method tries to ground school education in practical experience.

Although this method is considered an important contribution in improving the teaching and learning of children, it provoked some criticism as well. The opponents claimed that for the cognitive apprenticeship, the main focus is on the everyday practice rather than the content in the practitioners' culture that plays a more important role in developing expert competencies. They argued that it is logistically too overwhelming to

enculturate students into various disciplines and their cultures, especially when most of them have many years to decide what they are going to pursue as a career. They also questioned the possibility of the teachers themselves understanding all of those disciplines that they never practiced. Even if the teacher were able to bring the practitioners from the disciplines, would they be able to teach children—a skill which is not part of the practice in workplaces (e.g. Brown & Palincsar, 1989; Wineburg, 1989)?

In the community of practice, the apprentice's life is incorporated into the cultural practice at work. However, in the cognitive apprenticeship approach the relation between cultural practices presented in the classroom with the students' everyday life experiences is not clear. The framework is too narrow for integrating social knowledge of the practice with the students' personal knowledge (Hedegaard, 1998). Opponents argue that the cognitive apprenticeship neglected the role of community development (in the classroom) and its importance in learning, which is the natural product of membership and participation in the practices of a community.

In addition, the focus of these theories is on understanding learning as it is realized for children and young adults. As a result, they tend to overlook the needs and characteristics of adults and practitioners learning in formal educational settings (Niewolny & Wilson, 2009). Adult learners come to attend school to achieve specific objectives, which allows them to have greater control over their lives. They bring their own values, experiences, and competencies that they developed by participating in life activities in and out of their workplaces. Adults value their own and others' situated knowledge and are willing to share their experiences and learn from others (Knowles, Holton, & Swanson, 2005). They are problem-centered and interested in relevancy and

immediate applications of knowledge they are learning (Knowles, 1980). To address these characteristics, I have developed and introduced the concept of *quasi-community* as a theoretical framework for understanding adult and practitioners' learning in formal settings.

From community to quasi-community

From my research, I developed the concept of quasi-community to theorize learning and knowing in adult formal education. For this concept, I extend the unit of analysis beyond the classroom and its community to include the activity system where the participants crossed its boundaries to attend their formal education. I theorized learning as legitimate membership in a quasi-community developed by its members.

Due to the nature of conventional schooling, the communities created in the formal educational settings cannot be considered to have the same nature as defined in the original concept of the community of practice. I proposed the concept quasi-community to differentiate between the community of practice and communities of the kind that I have studied. The concept emphasizes both similarities and differences of quasi-community with true communities. For example, the concepts of mastery, memories, and the difference between core and periphery are realized differently in formal adult educational settings.

Internal memories are one the important elements that develop through the life of a community and are visible in any authentic community. Formal education tends to be deprived of this type of memory, as classrooms are disassembled at the end of each year, leading to the disappearance of collective memories. However, parts of these memories exist within the staff community because their membership turns over only slowly. In

quasi-communities, praxis allows the classroom community to bring about and develop its own collective memory. This memory constitutes the members' collective experiences, expertise, and knowing that they bring to the community.

The hierarchy and distribution of expertise is another main factor that differentiates between the quasi-community and the original concept of community. The expertise in this type of community is dynamic and distributed across the community members. The mastery is a dialectic relation between members at the time of problem solving. Any member has the possibility to be the master by providing expertise needed to solve the problem at hand. Here, old-timers are considered to be those who contribute in the ongoing problem-solving processes and act as a resource for others in achieving the objectives of the community. Any member at any time can bring insights and competencies into the community and act as a master—old-timer—or be a novice—newcomer—and learn from other members' expertise. Hence mastery in quasi-community does not have a temporal nature as it is observed in true communities. Hence there is no permanent structure in the quasi-community as there is no core that the peripheral members move to. Here, the renewal processes of the community—where the new members join while the old timers leave—do not exist. All the members of a quasi-community join at the start of the course, create the community, and leave when the course adjourns, leading to the end of their community.

The aim of the quasi-community is to create an interactive environment for the participants to share their expertise and utilize the available cultural resources in order to provide opportunities for collective activities and collaborative learning. Membership in a quasi-community encompasses all of the course participants, including, the teacher. This

framework allows the classroom to be a venue for adult practitioners to collaborate for reaching their collective objectives.

These objectives of the community are determined by negotiation between the course participants and teacher at the beginning of the course. Adults are internally motivated to learn when they know that their objectives are realized in the pedagogy. They pursue learning activities when the outcome is applicable to their life situations (Knowles, 1994). For them, learning is a by-product of the pursuit of their objectives, which are aimed at the expansion of their action possibilities. In the quasi-community, the objectives of the course reflect the members' needs and the goals they want to achieve. A quasi-community forms when all of the course participants have consent on communal objectives and every member collaborates to achieve them.

The pedagogy in the quasi-community is a co-production of the community members. The members' common objectives and needs cast the community's activities. In the quasi-community, the teacher's practice and the way the course participants engage in the activities allow them to produce and shape the pedagogy. Thus, the pedagogy lays the path for the course participants to achieve their objectives in the trajectory of the course and through the daily practice of their community. The participants' objectives are reflected in everyday classroom practice. The teacher's role in this community is to manage and guide the community to collaborative learning. The teacher acts as a valuable resource, an expert and a manager that coordinates the activities and leads the community members toward their objectives.

The quasi-community questions the conventional cultural ways of education and promotes diversity as a means to enrich the practice. A quasi-community is a dynamic

and evolving environment that creates an inviting space for adult students with different levels of academic and intellectual achievement, work expertise, and experiences to participate in their knowing and learning processes.

CHAPTER 3: Method and Credibility

In this third chapter, I discuss the characteristics of my methodological approach, its quality, and its emergence. I then elaborate on the form of my engagement in the research including ethnography of the field, the process of data source collection, and the way I went about analyzing my data. Next, I allow the readers to know how I assured the credibility and trustworthiness of my qualitative research findings.

Method

My research was designed to examine the nature of current adult and vocational education in an effort to identify relevant and salient factors that might be used to improve the system. I used qualitative research because I did not want to test a hypothesis but to analyze and interpret a human activity in the social world (McLeod, 2001). My variables were unclear and unknown, and information about the topic of my research was limited (Leedy & Ormrod, 2005). This study was developed within authentic natural settings (Lincoln & Guba, 1985) such as classrooms and labs. The events were not experimental but a natural part of the everyday life of the school. For example, the types of courses, their arrangement and frequency, and the number of participants in each course were not arranged by me or necessarily predetermined by the college since these emerged based on the demand of the market and the affordance of the training institute. Naturally, the research had its effect on modifying the practice in the course of time—as it is mirrored in the progress of the core chapters of this dissertation.

Over the course of this ethnographic research, my method gradually transformed from *participant observation* toward the *observation of participation* (Tedlock, 1991). By that,

I mean moving from being an observer, centering and reporting on the participants, to becoming more self-conscious as a researcher and at the same time a participant in the research. I started as an amateur observer and gradually evolved into a trained, professional, bicultural (insider/outsider) ethnographer. This transformation was achieved through my progressive engagement with all the activities in the college and the gradual effect it had on the teaching practice and the pedagogy employed by teachers. I progressed through the process of undertaking intensive fieldwork and collecting ethnographic information, which provided material for my research. It is through this necessary experience (as the rite of passage) that the process of becoming a professional ethnographer was initiated.

To describe my research site, I use the term ecosystem as a metaphor. In order to know the ecosystem as a living system, I had to be a living part of the system. I tried to settle down among my research participants, share their endeavors as much as I could, be an insider, and ultimately be one of them. This meant that as an insider, I might not depend only on asking questions or observing what the participants do, but gain insight as an informer of the culture by experiencing what they experience. Thus for my ethnographic field study I attended the college everyday. Through *prolonged engagement* and *persistent observation* (Guba & Lincoln, 1985), I began to understand and appreciate their ideas, concerns, expectations, and the common culture they shared.

The flexibility in my research design allowed me to experience and discover uncharted waters and understand things that I did not expect. The situated nature of experiences in the field continually afforded modifying my research questions and facilitated the emergence of new ones.

Ethnography of the field

I conducted my ethnographic study in a relatively large college in western Canada. My goal was to understand adults' learning and knowing in formal education for work and to identify how they learn in those settings. I placed my research in the context of the maritime domain and looked at the process that a mariner had to follow in the formal education and training system to be a certified practitioner. I collected my data from a maritime department that is part of a technical faculty of the college. The department was well equipped for the program. It had its classrooms fitted with audio-visual equipment and a variety of educational aids. Two walls of the classroom were covered with whiteboards. There was a computer lab dedicated to course participants' use. A variety of educational software including basic simulation programs was installed on all of the computers. The department had a simulation lab fully equipped with marine electronic equipment and a ship simulator. The academic staff members were certified marine practitioners with many years of sailing experience who changed their careers to be maritime instructors. The department and the instructors were certified by maritime administration to conduct a series of maritime courses leading to specific ranks of marine certification. The ranking starts from the basic level marine training courses to different levels of professional certification programs.

The age of the course participants ranged widely and both genders were represented, although the majority of the participants were male. Most of the participants were from the geographical area where the college is located. The participants of the professional certification courses had to have work experience for more than a certain minimum period of time onboard ships, as crewmembers, before attending the college. Almost all

of my research participants were practitioners of the domain and were in different stages of their careers. Although they were from the same domain, they had varied experiences. This was due to the fact that the maritime domain is versatile and includes different industries. These industries ranged from eco-tourism and fishing to passenger ferries and oceangoing shipping. Normally each course should be designed for a specific industry, but the economy of education demanded for most of the courses to be created for and attended by practitioners from different sectors of the marine industry. This resulted in diversification of participants in most of the courses. Many may consider this type of diversity a negative and a disadvantageous aspect of the training programs. However, as it turned out in my research, this heterogeneity brought a distinct expertise into a single classroom, which through an innovative pedagogy resulted in productive outcomes.

Before conducting my ethnography, in order to become familiar with the context and the environment, I visited the college several times. At first, I approached the Department Head. He became interested in the idea of my research and promised the full participation of his department. After I obtained my research ethics approval from the University of Victoria and made arrangements with the college, I obtained consent from the Department Head, instructors, and all of the course participants before I started my data collection.

Data source collection

My method of engagement in the field as the *observer of participation*—one of the hallmarks of anthropology—entailed long-term involvement in observing and making sense of social practices and structures (Tedlock, 1991). The method also asks the researcher to be a full participant in all of the activities in order to get an insider's

perspective and point of view. This dictated my prolonged engagement and persistent observation. Respectively, the data collection of my ethnographic research took the best part of two years during the academic years of 2005–2006 and 2006–2007.

During this period, I attended the college every weekday. I participated in all the courses provided by the department for the practitioners. The courses were varied and included theoretical, practical, and simulator courses. Some of the courses outside the classroom included hands-on and fieldwork components. The number of participants in different courses varied from eight to 18. Some of the courses, such as simulations, had a limited intake of only a few students at a time for their practical sessions. Field trips to maritime organizations, workplaces, and ships were integrated into a number of courses. The duration of courses varied from a few days to as long as a few months. In all of the courses that I attended, every course participant agreed to participate in my research.

During the data collection period I was engaged in all the activities that the course participants undertook. For example, in the second year of my data collection, I followed a group of students who attended the college to participate in a group of courses that led to a certification examination. The whole program was presented as a package that took about one academic year to complete. I attended the whole program as a participant and simultaneously as a researcher.

I collected a variety of data in video-recording and text format. Video recording complemented my field notes and personal observations. I did not have to rely only on my memories to recall an event when I had a recording of every moment. The transcription of recorded interviews and moments of interest were of significant importance in the data analysis processes. I videotaped all the courses and activities in-

and-out of the classroom. I also captured the interactions and moments that seemed important or of interest, even in 'non-academic' moments, such as during the break between class sessions. I interviewed instructors and course participants on different occasions. The interviews were either formal (semi-structured) or informal (in the form of a conversation). I made field notes during the observations as word-processed files. These notes complemented my data with ethnographic descriptions of events that could not be captured by the video recording. I collected relevant documents such as national maritime educational policy, course curricula and syllabi, students' handouts and textbooks, sample examinations, and examples of students' work.

During the period of my data collection I participated in all departmental meetings. To enrich my data source and have a better understanding and more comprehensive view of the maritime education and training system, I attended all major maritime educational events. These included national venues such as the Canadian Association of Maritime Training Institutes and the Canadian Marine Advisory Council national meetings. I also presented my preliminary research results and received valuable feedback in international professional and educational conferences such as the International Maritime Lecturers Association and the American Educational Research Association conferences.

Data analysis

Analyzing data sources started from the early phase of data collection. I transcribed as soon as possible the interviews and moments of interaction that seemed interesting and thereafter I started writing down brief notes and coding the data. The coding process also included the field notes, artifacts, and documents, allowed me to summarize the data sources, which was essential in managing my large database. Data coding and

categorizing gradually made visible useful information. This led me to more purposeful data collection in subsequent site visits. As the process of data collection and analysis moved ahead, the main and core categories started to emerge. The frequent appearance of a main code was a sign of data saturation and thus guided me to stop data collection from that place, course, or category. The related categories guided me to develop my analytical frameworks and write my narratives. Each time, I tested the entire data source collection to seek both confirming and disconfirming evidence before making any assertion. Whenever an issue raised enough importance and interest, I checked the literature to see how the work of other researchers may contrast, problematize, complement, or complete my work. The progression of this process led to the formation of consistent ideas.

After the initial assertions emerged, I shared the results with my colleagues in the research lab for further data analysis in a peer group-meeting. In these meetings, we normally watched the video excerpts from the data source, either from interviews or participants' interactions. The multi-perspective interactions on a single event were important to make observable what might still remain invisible to me. These data and video assessments played a significant role in analyzing interactions. I learned a great deal about the structure of learning and teaching through the collective watching and analyzing of the video excerpts from course participants' action in their natural environment.

As mentioned earlier, in these data analysis meetings, we used different methods recommended in the domain of interpretive inquiry, particularly *interaction analysis* (Jordan & Henderson, 1995). This method uses an in-depth microanalysis technique to understand how people interact with one another and their environment including its

artifacts and materials. In general, the method looks for orderliness and patterns in people's interactions. This interpretive analysis is based on the presumption that cognition is socially structured and can be observed as an embodied activity (Suchman & Trigg, 1993).

In my data analysis, the participants' conversations were treated as natural protocols of their effort to interact with others, structure their environment, or make sense of events (Roth, 1996). The collective analysis approach was rich, in that the different personal interpretations were discussed and through the process evolved into collective sense making of the data. I later tested the generated hypothesis of these meetings in the body of the data sources for additional evidence to support or reject the ideas before making it final. This process was complemented by follow-up interviews and discussions on site with my research participants.

Throughout the data analysis, an effort was made for the assumptions to remain true to data. I did not make an assumption based on what I thought my research participants intended, thought, knew, or learned. Rather, I based my hypotheses on what they actually did or said. My assumptions are all based on empirical evidence and what was actually available to me as data, such as through video or interview talks.

Another factor that I considered in the final stages of the analysis and dis/confirmation of the hypothesis was to present and thus test my findings at national and international academic conferences. Through the interactions with fellow researchers and professionals of the field, I received valuable feedbacks, which generated new ideas that greatly impacted my subsequent analysis. The process was finalized by me writing

narratives for publication in peer-reviewed journals. Through the reviewers' comments, I further validated and refined my findings.

Credibility

My major concern in this research was the credibility of my findings. To ensure the validity of my research, I implemented the criteria of the fourth generation evaluation of qualitative research proposed by Guba and Lincoln (1989). This tradition of authentic research is based on the assumption that there is no objective and fixed reality to be sought through repeated experiments. The equivalency of the research findings and the objective reality corresponds with the constructed realities of participants, as compared to the researcher's reconstruction of the phenomenon within qualitative research. This method proposed different criteria and implementing techniques that qualitative researchers may pursue to ensure the credibility of their findings. In the following sections, I describe how the implementation of each of these criteria was assured.

Prolonged engagement and persistent observation in the field

My prolonged participation in the field took the better part of two years. I attended the field every weekday and observed and participated in all the activities that my research participants were engaged in. This included not only the classroom, lab, and simulator observation but also incorporated all the fieldwork and fieldtrips. I was not only engaged in the training aspect of the participants' activities but also their non-academic and social life as well. I established friendly relationships with the academic staff and many of the course participants, which in turn eliminated the possible tension created by my presence as an outsider. This eased communication and consequently made the

process of data collection and analysis more productive. My prolonged engagement, full participation, and persistent observation in the field gave me many opportunities to be able to observe and capture any infrequent occurring phenomena. I was able to capture natural dialogues, interactions, and discussions that happened outside normal class hours. These not only validated but also enriched my research findings.

Peer debriefing with disinterested peers

Throughout my data analysis, I engaged myself with my peers in the research lab. They were graduate students and post-doctoral fellows working on different projects. Although the entire team consisted of qualitative researchers, the narrowness of their research interest made them disinterested in my research field. During my data analysis, I had extensive discussions about my research findings with my peers. These discussions resulted in authentic testing of my hypotheses by those who had no interest in the results. They posed valuable questions which helped me better understand my position and role in the research. These interactions provided valuable opportunities to examine my assumptions outside their context.

Negative case analysis

I used negative case analysis to revisit my hypotheses to examine and refine them by being tested for all known cases. Comparing negative cases with other assumptions in the data allowed me to reassess the quality of those hypotheses. For example, I deployed a negative case analysis in chapter 6 to examine an educational document, which followed the pattern of boundary object and analyzed what effect it had on the implementation process by training institutes.

Progressive subjectivity

This criterion asked for the checking of how my subjectivity evolved through the process of research. Throughout my research, I continually compared my field notes and checked my initial assumptions with those I made in the course of time. The progressive change of my anticipations, predications, and concepts assured me of my progressive subjectivity. The change of interest, point of view, and analyzing criteria in my four studies as it shows in this dissertation is more evidence of my progressive subjectivity in the research that I pursued.

Member checks

Before finalizing my hypotheses, I confirmed with my research participants to be sure that my interpretation of the data correlates with those that I collected data from. This is considered to be the most crucial technique for establishing credibility. Member checks ensure that the assumptions that the researcher made from the data are acceptable and valued by those who provided them. Member checking was a continuous process in my research. As I started my data analyses from the beginning of my data collection, I had continuous opportunities to check my findings as soon as they emerged. It also gave the research participants the opportunity to point out my errors or misunderstandings. This feedback provided me with additional data that enriched my analysis and authenticated my findings.

The following chapter is a brief outline of the four studies that comprise the core chapters of this dissertation. Although I composed the main chapters as stand-alone pieces so there is no need for elaborating on each study separately, what I present is how these pieces tie together as a dissertation.

CHAPTER 4: Outline of Chapters

Analyzing data from the beginning of my research project provided me with the opportunity to develop my research agenda in the form of a series of studies. Rather than define a fixed research project to frame my discoveries before even getting started, I designed my agenda in the thick of researching. This allowed me to start from whatever seemed interesting or problematic in the data and define it as a study agenda. Later on, I went back to the data sources with a different understanding and framework to design another distinctive study agenda, which led me to further discoveries. After all, it is not uncommon for qualitative researchers to use multiple perspectives, as researchers often find that there is a need for more than one theory or method to explain all of their data (Fowler, 2006). Following the sequence of these studies also represents my emerging understanding and progressive subjectivity in the greater research program that encompass these studies.

As a result, my research comprised of four independent but connected studies. Ultimately, each piece represents one of the core chapters of this dissertation. This dissertation at the same time is the product of my research competency and resembles its trajectory, the pathway that I traveled during the last five years. These introductory chapters are a road map that makes the reader familiar with the territory before he or she steps into the road that I traveled. In this section, I briefly present the content of these four core chapters and provide a description for the readers to be able to appreciate how these pieces fit together.

First study

The first group of adult students that participated in my research was a class of practitioners with long and varied work experience in the maritime industries. They already had the experience of attending college and obtained their first level of certification. They worked for several years in the industry, in the capacity of their certificate. In order to get ready for obtaining the next level of certification and improve their ranking at work, they were attending a series of courses in the college. Obtaining the certificate played a very important role as it would expand action possibilities in their lives and thus strongly motivated them in their education.

While analyzing data from this group, I was struck by the participants' general discontent and dissatisfaction with the certification's education and training system. For example, in one of the first interviews, a course participant mentioned in a typical way that "this is the education designed to screw you up, not the education designed to help you in the working world." That was something of interest to me and a problem that needed to be addressed. Based on this, the purpose of my first study became to highlight this contradiction in the maritime vocational education and training system and to theorize this failure to provide a possibility for improving the system.

In this study, I found that the assessment system is the fundamental reason for the contradiction. The certification examination is separated from the education and training system. It means that the examination was going to be conducted by marine certification authorities. Thus, the teacher had no control over the assessment process. In this study, I found that adult students' perception of the examinations mediates their approach to learning while attending college. The assessment was in the form of a written

examination to evaluate students' knowledge. There was no specific requirement to assess the competency of the candidates through evaluating their performance. This created a contradiction in the training system because it was not necessary for the students to develop the job-related competencies yet they only needed to acquire the knowledge necessary for success in those examinations.

I concluded that the assessment greatly impacted the way that the instructors teach and the students learn. Basically, the assessment system had changed the objectives of the education and training practices from developing skills and knowledge required at work into learning how to pass the certification examination. Accordingly, the primary demand of the students to the course instructor was to prepare them for those exams and not necessarily for their jobs. My classroom observations showed that the instructor put substantial effort into the delivery of information that historically appeared on the certification examinations. This was in direct response to students' requests and also the teacher's desire to have the students succeed on the certification examination. The objectives of the course shifted and created a contradiction that became the source of the low performance of the education and training system.

Second study

The findings of the first study led me to my second study, where I did further analysis of my data source. This time, I had a more comprehensive look at the existing problem in the system. For my analysis, I included a wider range of data such as educational policies, historical evidence, and related documents. In this study, I have realized that the problem goes further than the assessment system by itself, as it was a systemic problem. The assessment process is defined and regulated by the educational policy. That led me to

focus more on the educational policy itself. The educational policy in my study was designed by the certification authorities. I found that there was a disconnect between policy designers and policy users, which are the training institutes. This gap was a major source of conflict and contradictions in the system. The lack of a robust connection and active engagement of the training institutes as the end-users in the design of the educational policy created many challenges for its implementation.

In order to examine the current status of the educational policy, I adapt social science's concept of *boundary objects* as a theoretical framework for policy analysis. A boundary object is an object such as a document, form to be filled, and so on, that crosses the boundaries and is used by different communities. Based on this framework, a boundary object should be both plastic enough to be adaptable to the local needs and constraints of each of the several communities using it and at the same time be robust enough to maintain a common identity across sites.

Using this framework, I analyzed the problem I found in my research and recommended that the educational policy be co-created by the members of the communities of stakeholders. This allows them to be able to incorporate their needs and informational requirements in the policy. I suggested, in case there is a limited possibility for all the members of these communities to participate, that there is a need for a facilitation agent to act as a medium. This medium that can be named a boundary organization should have the ability to cross the boundaries and represent members while collaborating in the design of the policy. I further recommended that during the implementation stage of the policy, there is a need for managing the boundaries.

Boundary managers move across the organizations and clarify the objectives of the policy and resolve misunderstandings and misinterpretations.

In this study, I provided evidence that the concept of boundary object can be used as a suitable framework for the design of educational policies. The concept can also be utilized as an analytical tool to analyze the status of the current educational policies and help to develop solutions for removing the existing problems and ameliorating the system.

Third study

During the course of data collection and throughout my research, I was constantly in touch and working with the program leader and instructors of the college. During the data collection period, we met almost everyday. The meetings were friendly and informal, held mostly during coffee breaks and lunchtime. We were discussing problems that we found and the possible ways to improve teaching practices. I normally shared the results of my analysis and asked for their feedback. They were willing to improve their teaching practices and keen to apply the outcomes of these discussions in their work in the classroom. This engagement and collaborative work proved to be fruitful. The implications of the outcomes of these meetings in their pedagogy and course delivery resulted in augmenting their practice and great improvement in students' learning. Over time, the students' success rate increased and their self-efficacy improved significantly. The students were motivated and self-driven toward their own learning.

For my third study, I aimed to understand and theorize the rationale for these successful practices and pedagogy. Accordingly, I performed an in-depth investigation of the processes that facilitated these achievements. I deduced that the important factor in

creating a learning-centered environment for adult education was the creation of a community that allows its members to reach their specific objectives. These objectives were set by the consent of all the classroom members.

None of the available theoretical frameworks could conceptualize such a community. On the one hand, the original concept of community was not applicable to this type of relation among people that I found in the classrooms; on the other hand, this phenomenon could not be defined by any of the existing educational frameworks. There was clearly a need for providing a theoretical framework that is able to conceptualize these findings. As the result emerged from my study, I developed the concept of *quasi-community* as a conceptual framework for theorizing the teaching and learning of adult practitioners in formal settings.

Based on this concept, to create such a learning-centered environment for adult education, the aim of the instructor should be to facilitate the creation of a community that encompasses all of the students, which means the entire course participant population. The objective of this community has to be negotiated by all the members at the beginning of the course. The community should reach consent about the objectives of the course, so that the course practices would serve all of the community members. Adult students are internally motivated to learn when they know that their objectives are realized in the pedagogy. I proposed a pedagogy that an instructor may use to facilitate the creation and maintenance of the classroom quasi-community.

The classroom activities should mainly consist of group and collaborative work. The collaboration between students has to be encouraged at all levels. Students have to be persuaded to take responsibility and actively participate in their own learning. They

should be encouraged to share their findings and act as resources for their peers. The instructor here plays the role of a facilitator, a manager, and a resource for the students. S/he should provide time and space for the students to engage, share, and collaborate with each other on their own.

Fourth study

In my final study, I focused my attention on the new phenomenon in the workplace, namely the introduction of technology and the demand it created for the change in adult and vocational education and training systems.

The introduction of technology in today's life and work environments created a new context and culture. People naturally learn by observation and participation in practice. Today's advanced technology and rapidly changing work environments preclude many authentic learning opportunities that traditionally existed. The use of technology and automation made invisible both the equipment's functions and the mental processes of practitioners while working with the equipment. This leaves limited visible traces for the trainees to learn the job through the observation of experts. The current adult and vocational education and training systems do not adequately address this phenomenon and are not able to fully meet the demands of today's practitioners. Consequently, a new learning and curriculum theory needs to be developed for the context. In this final study, I examined the novel concept of quasi-community in a technology course presented to the practitioners in the college.

In this study, I expanded and proposed a quasi-community pedagogical method for adult learners that encompasses the characteristics and requirements of technology education. In this pedagogy, the aim is to externalize and make visible the hidden

processes of the equipment's function and the mental processes of the operator while using the technology. Thinking aloud and verbalization is one of the effective methods that a teacher has to use while working with the technology. Use of simulation is a great asset in creating the environment, which replicates the workplace reality. The important factor is creating the culture of the workplace rather than the merely replicating the workplace environment. In this pedagogy, the teacher models the use of the technology and then coaches the students while replicating the practice. The method allows the students to gradually develop their own problem-solving strategies. The teacher then encourages them to articulate these strategies for their peers and allow their peers to reflect on the validity of the methods.

This study provided empirical evidence that the novel concept of quasi-community as it is presented is a distinctive framework for theorizing teaching and learning of the technology education in formal settings. This framework may afford the schools to bestow an authentic learning environment for the adult learners to develop the required competencies for their technological workplaces. I concluded that adult and vocational pedagogy using the concept of quasi-community has the ability to re-contextualize the field of practice and translate it into curriculum. It allows the disciplinary knowledge to create meaning for the practitioners of the field. The quasi-community provides possibilities for learners to develop disciplinary knowledge and technological expertise in the context related to the workplace. This allows learners smoother transformation of knowledge and expertise into applied competencies when they cross boundaries of school to workplace.

CHAPTER 5: Contradictions in the Practices of Training for and Assessment of Competency

The purpose of this chapter is to highlight the contradictions in the current maritime education and training system (MET) and to theorize the failures in order to make the training useful. To do that, I conducted a case study of vocational education and training system in the international maritime domain. My study shows that there are contradictions in the education and training system that do not allow its targeted objectives to be fulfilled. The main contradiction is created by the assessment system that consequently has changed the objectives of the education and training practices from learning skills and knowledge required in workplace to passing competency examinations. This research identified and bridged the gap in literature and research of adult and vocational education, particularly in competency-based training and assessment, and provides practical solutions for improving the system. My research outcomes also have practical implication for vocational educational policy designers and training institutes and allow them to improve the present training and assessment system in order to achieve its authentic objectives.

Introduction

Despite an extensive international education and training system, which requires marine practitioners to continually upgrade their knowledge and skills throughout their working life, there still are large numbers of accidents and incidents ultimately attributed to human failure and their lack of competency. As an example, Secretary-General of the

International Maritime Organization (IMO; a technical agency of the United Nations), following a series of recent major marine accidents, noted:

> It is extremely sad and disappointing that accidents (by ships) still happen, in spite of the extensive and thorough work… that IMO has done over the years… Meanwhile and although we have not yet reached the half of the year, I am concerned… for the number of people who have tragically died since the beginning of the year. (Mitropoulos, 2006)

It is widely quoted that more than 80% of maritime accidents are attributable to the so-called human element on-board ships: "Maritime accidents are not new phenomena, they have been with us for a very long time. We should be clear that the reason why accidents continue to befall ships is, in the vast majority of cases, because somebody, somewhere along the line, did not take proper action to avert a problem, or did something wrong" (O'Neil, 2003). In response to that problem and with the aim to diminish accident rates (O'Neil, 2001), the IMO adopted a convention on the *Standard of Training, Certification and Watchkeeping* of seafarers 1978 (STCW78) to set standards for training mariners. It turns out, however, that the STCW78 did not prove effective (McCarter, 1999). Consequently, IMO completely revised the convention and introduced the Competency Based Training system (CBT) as its new approach to training marine practitioners. After years of implementation, even though the proposed training system aimed at improving competencies, the rate of attribution of the human element in accidents continues to be high (Alop, 2004).

This study was designed to find out where there might be problematic spots in education and training practices in the maritime domain that leads to sub-optimal effects of the training system. I begin by providing a historical background to the problem and

the changes in maritime education and training system. Following a description of my research method, I report on my case study in the maritime domain. I then proceed to articulate the ways in which assessment practices mediate learning and foci of the trainees. I conclude with suggestions for the improvement of the system.

Historical background

Seafarers, including deck officers and engineers, operate merchant ships around the world. Each one of these marine practitioners has specific, multiple, and varied duties and responsibilities to perform. The needs for a well trained, skillful, and reliable workforce to operate ships resulted in the creation of a certification system. Originally, individual governments established their own standards of training, certification, and watchkeeping of marine officers and ratings, often without reference to practices in other countries. As a result, standards and procedures varied widely (Alop, 2004). However, the fact that merchant shipping historically has been the most international of all industries means that it needed a harmonized single standard for certification.

Developing universal standards

It has always been recognized that the best way to improve safety at sea is to develop international regulations that are respected by all shipping nations. To realize this, in 1948, the United Nation established the *Inter-Governmental Maritime Consultative Organization* (since 1982, the *International Maritime Organization* [IMO]). The original vision of the IMO was to promote safety by improving the technical aspect of shipping. It was not until the early 1970s, when statistics showed that the main contributory factor in maritime accidents and incidents was and continued to be the human element. In response

the IMO officials attempted to curb accidents by setting standards of training for seafarers (Wilcox, 2000). As a result, the IMO created the *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978* (STCW78). The STCW78 sets qualification standards for masters, officers, and engineers on seagoing merchant ships, which signatory countries are obliged to meet or exceed.

At the time, the IMO was only a consultative organization with limited political power; therefore, it left part of the standards to the satisfaction of governments. Sometime after 1984, many in the field felt that the *STCW78* was unsuccessful (Zec, Komadina, & Pritchard, 2000) because it included vague requirements that were left to the discretion of each government (Bobb, 2000). The lack of clear standards of competence resulted in different interpretations of the convention (Fink, 2002). At the same time, there were demands to bring the convention up-to-date (Moreby, 1999). Finally, in 1992—after a series of major shipping accidents with disastrous consequences (environmental pollutions and loss of lives) and faced with demands for action from politicians, press, and the public—the IMO decided to review the Convention.

In 1993, the IMO embarked on a comprehensive revision of STCW78 to establish the highest practicable standards of competence. On 1st February 1997, the newly amended *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1995* (STCW95) entered into force. It laid out greatly improved seafaring standards through the Competency-Based Training system (CBT). The training mandate of STCW95 is outcome based; it requires that candidates for licenses demonstrate their ability to perform the task for which they are going to be certified. It means applicants for

the competency certificate are expected to show that they are able to "do" what they are trained to do (Hardin, 2000).

Competency-based training

The competency-based movement has been around since 1960s in the USA through the performance-based vocational teacher education (PBTE) movement. However, its origin can be traced further back to the 1920s, where the idea of educational reform linked to industrial/business models centered on specification of outcomes in behavioral objectives form (Burke, 1989). It has been noted that the idea of CBT is not new; it is ancient, as we look back at how job training was carried out hundreds of years ago (Blank, 1982). It is a way of returning to a personalized and individualized approach to transfer of skills from master to novice. Competency-based education and training, sometimes modified by adjectives such as *performance-based, outcome-based*, or *criterion-referenced/validated*, was riding a new wave in the 1980s and 1990s especially in Europe. In some countries, CBT was integrated into the national education system (Lewarn, 2002) such as the National Vocational Qualifications system in England followed by Scotland, Wales, Australia, and New Zealand (Kerka, 1998).

Competency-based training is based on explicit behavioral or outcome-based statements (Smith & Keating, 1997). This means that it relates to everyday life out-of-school requirements of performance and reflects outputs rather than inputs (Fletcher, 2000). There are mainly two concepts of CBT presently in practice, the U.S. and UK models. The UK standards or *competences* are considered as units of assessment of workplace activity where as in the U.S. model it is the use of *competencies* within the learning process that takes priority. The U.S. model is related to a training program

whereas in the UK it refers to training and assessment in the workplace or in a job-like environment—although the focus in the US has also now shifted to the on-the-job training (Fletcher, 1991). The IMO adapted the UK standards model of CBT for its STCW95 (Winbow, 2005).

Competency-based education is perceived by some as the answer, by others as the wrong answer, to the improvement of education and training for the complex contemporary world. Proponents of CBT promote it as a way to improve the correspondence between education/training and workplace requirements (Harris *et al*., 1995). CBT makes as clear as possible what is to be achieved and the standards for measuring achievement. There is no necessary bifurcation in CBT between competence and education (Wolf, 1995). "Competency-based training is perfectly compatible with the learning of higher-level skills, the acquisition of generalizable knowledge, and the understanding and development of broad based courses" (Burke, 1989, p. 5). For its opponents, CBT failed to integrate learning and human action (Hager, 2004). From this perspective, it is thought to be excessively reductionist, narrow, rigid, atomized, and theoretically, empirically, and pedagogically unsound, and therefore "largely unsuitable for the teaching and learning which goes on in higher education institutions, whether this occurs in general/academic or professional/vocational contexts" (Hyland, 1994, p. 336).

Method

This study was designed to better understand the apparent contradictions that exist in a system of education and training specifically designed to increase the competencies of practitioners—seafarers. This exploratory qualitative study is part of my larger project concerned with what and how people learn as they move from formal educational

settings—e.g., college—into their everyday work settings. The research focused on a course presented by the institute for the candidates of the second-level watchkeeping certificate of competency for navigating ships. There were 16 students attending this nine-week course. These students had acquired their first level of watch-keeping certificate of competency earlier. After working for some years and acquiring experience on-board ships, they pursued an upgrade to be certified at a higher level. The students were from different maritime industries such as commercial fishing, passenger ferry, and cargo shipping. They had considerable but varying backgrounds and work experience.

My data sources comprised of field notes, videotaped sessions in the classroom, and interviews. In the interviews I asked open-ended questions, and encouraged the interviewees to talk about and focus on the topics of their interests and concerns. The data sources also included documents such as lecture notes, syllabi, handouts, sample questions, Transport Canada's rules and regulations, and copies of the STCW conventions.

Practice in maritime education and training

The maritime education and training system is set by an international convention. As mentioned, the original convention—STCW78—was not successful, so it has been completely revised to meet its objectives. Despite this new set of standards—STCW95—the attribution of the human element in shipping accidents did not decrease. The lack of success of the new convention in reaching its objectives (Chawla, 2006; Wilson, 2007) may be due to the contradictions that my study found in the system. My study reveals that the mariners trained in this system are not generally convinced that the education that they receive is of much benefit to them. Thus, one participant, a certified mariner,

expressed his experience with the system: “Now I am qualified (air quoting) but really I didn’t learn very much, learned a little bit.” As he mentioned, although he was successful in competency exams and received his certificate, he did not believe himself to be qualified. These types of comments from experienced mariners attending a prerequisite course for a second level certificate of competency are not uncommon. The question is: How has the current practice in maritime education, training, and certification resulted in these apparent contradictions between the intentions of the curriculum and the experience of the students?

According to the new standards, each candidate for certification—as officer in charge of a navigational watch on-board ship—should be able to demonstrate the competencies prescribed in the convention. These competencies are to be achieved through a combination of *education* and *training* plus *practical experience on-board ship* (IMO, 1996). To match those requirements, maritime education and training generally consisted of *training* of skills (in a number of practical short duration courses) and *education* of knowledge (of defined theoretical subjects) in training institutes plus a mandatory period of seagoing experience on-board ships. The education and training models are based on interaction and turns of these segments. The maritime administration of each country is responsible through the IMO for the implementation of STCW Convention and issuing the certificates of competencies. In the following sections, I discuss the functions of the different sections of MET in practice and elaborate on their shortcomings and contradictions.

College education

Formal education is designed to provide the knowledge and understanding required by the students to underlay their future tasks on the job. This is also the case with the maritime education and training system. Even though the main purpose is to give the students the theoretical background and knowledge that they require on-board ships, the evidence shows that it is not doing so. My study reveals why this part of MET does not fully achieve its objectives in practice. The mariners and instructor in my study did not believe in the idea that knowledge could be transferred to the job. A contradiction therefore emerges between what is expected to be the case and what actually happens during education and training. The main reason that my study revealed is the certification system and the way its competency assessment is arranged by maritime administration. What is taught for certification assessment does not correlate with what is required on-board ship so that the students learn to pass tests rather than learn for on-board work.

Education in the college is not a pre-requisite for obtaining a certificate of competency but success in certain written and oral examinations implemented by the administrator is a compulsory requirement. Written examinations are in the form of multiple-choice and long answers, and after success in those, students also attend an oral exam. There is no specific requirement from the administration to assess the competency of the candidate for all required tasks through evaluating their performance—while they are actually doing the task either on the job or in a job-like environment. This happened to be a source of contradiction in the MET system as there is no necessity for the students to develop job-related competency but to learn the knowledge required to successfully pass the examination.

Students have the choice to attend the courses in the college or to prepare for the examination by themselves. My study shows that the students generally find it easier to prepare through self-directed studies. However, for the more difficult exams—mainly those involving mathematical calculations and higher order cognitive processes—they prefer to attend college courses. It turns out that the course attendees' primary concern is passing the exams rather than the development of job-related competencies. As one student (who studied on his own and passed all but one exam) stated, "so I, upon not being able to get the proper amount of knowledge to pass this exam on my own, decided to come to do this particular course just for this one exam." He articulated his objective for attending the course, which is learning the type of knowledge required for passing the test. I found that in general, students' perception of the certification examinations mediates their approach to learning while attending college. Thus their primary demand from the course lecturer was to prepare them for the exams.

To attract students to the courses, maritime colleges have to consider the students' objectives, as they are their clients. The driving force for the training institutions is the concentration on teaching the students how to pass the examinations. This fact is evident from the comments of the course instructor: "From here, my students, after they complete my course, they go back to TC (Transport Canada, the administrator) to be examined and to me it is an obstacle… I spend way too much getting students to prepare to write examination as data." For the instructor, the examinations constitute an obstacle, as he believes that the students do not even need to understand the tasks *but merely provide correct answers*. My classroom observations reveal that the lecturer put substantial effort into the delivery of information that historically appeared on competency examinations.

This was in direct response to students' requests and his desire to have the students succeed. This shift in objectives from the acquisition of job-relevant knowledge and competence to passing examinations is a source for the less than optimal benefits mariners gain while engaging in this educational system.

College-based training

In contrast to the education, the training in the maritime colleges is more successful in reaching its objectives. Unfortunately, the college-based training covers only part of the skills that mariners need on-board ships. As a result, the training in the colleges by itself, although effective, but may not close the existing gaps between what is learned in training institutes and what is needed on the job. Successful training in a series of short-duration technical courses in maritime colleges is a compulsory aspect of the certification system. The training courses generally are approved by the administration. It means that in most cases, the colleges have the authority to assess the students for the courses and issue the relevant certificate. This part of the MET most closely matches the criteria set by the competency-based training system, as the main criterion for assessment in these courses is successful performance of the task in a similar environment to the ship.

For every level of certificate of competency, there are certain short-duration courses that the mariners have to participate in. The duration of these courses—which mainly focus on emergency, safety, and other specialized topics—varies, depending on the requirements. The courses are mainly hands-on and consist of theoretical and practical parts. Students in my study generally were satisfied by what they were able to learn from most of the courses. The students are assessed primarily while they are engaging in doing tasks. Students have to convince the course instructor that they are competent in

performing those tasks when on-board ships. Dave, one of the participants in my study, who after attending one of these courses was satisfied with the result, mentioned: “It was very useful, very applicable… I really enjoyed that course. I got a lot from it and I used it and it helped me a lot and it kept me off the rocks.” Students experienced that they would be able to transfer the newly acquired skills to their on-board work. The practical nature of these courses and the direct relation that the students could establish between their training and the practice on-board ships was an important motivating factor for students.

In part, the usefulness of some of these courses derived from the fact that the students worked on simulators, which constitutes an environment replicating the reality. Additionally, the associated assessment therein comes closest to the requirements set by the CBT: “The SEN (Simulated Electronic Navigation) course, I got a lot from that. I was really comfortable after having taken the SEN course. We were working on boats (in the simulator) and running at night and all of that stuff” (Dave) and “I found, when we did SEN… I found it really fun; it was all practical, very useful stuff” (Kim). The short courses are very close to competency-based criteria and provide the satisfactory result. My analyses reveal that the students are more satisfied by these courses than by other aspects of their college-based education. Consequently, they felt more confident, prepared, and competent to do what is required of them in their workplace.

Training on-board ship

Among mariners, on-the-job training is generally held to be the most effective part of the training system in which they develop the competency needed to act successfully on-board ships. Whereas there is great potential, my study shows that in practice, on-the-job training is not taken seriously by most of the ships’ staff, thus its learning outcomes are

unpredictable. The main problem encountered was the lack of supervision on and cooperation with the students' learning on-board ships on the part of ships' officers, shipping companies, and training institutes (Lewarn, 2002a).

Working on-board ships for a specific period of time is a prerequisite for the certificate of competency. Candidates are asked to provide proof that they have worked as a mariner for a certain period of time on-board ships before they are eligible for the certificate. The idea is for candidates to spend time in the workplace where they can appropriate the required job-related competencies. There is no supervision on the training of mariners on-board ships and thus no assurances that students *actually* develop the required competencies. This fact compromises the effectiveness of this part of the vocational education and training system.

There is an alternative method to the structured on-the-job training mentioned above. The alternative method to the structured on-board training (as stated in the STCW95, regulation II/1 part 2.2) is to spend longer period of time on-the-job. In this way, candidates do not have to provide any evidence of supervised in-service training. The only requirement is for the candidate to spend a specific period of time on-board ships. In this method there is no requisite for the supervision of the students' workplace learning and as a result there is no competency assessment. All the mariners who participated in my study had received their on-board training in this manner.

The unstructured and unsupervised on-the-job training on-board ships creates unpredictable training outcomes. There is no training system in place to control the variables, which affects the development of competency by trainees. My study revealed the mariners do not believe that they receive the target level of skills and as a result the

competency required. Thus, one of the experienced mariners stated, “sea time is not structured at all in any way. I am just a body on-board that does the job that anybody will be doing. You are not training at work; you’re just learning by yourself and you know, if you are motivated it will work out good and if you are not you can just be a body that is in a mess doing the bare minimum.” Although the STCW95 stipulates that on-the-job training is one of the most important parts of training system, it turns out that in actual practice, this most promising aspect of training is associated with the least predictable outcomes.

Assessment for certification

Assessment is an important part of every training system. It gives an insight into whether the objectives of the system were met and trainees developed the required skills and knowledge (Lefrancois, 2000). However, as studies in high school science demonstrate, assessment may actually contravene attainment of educational objectives (e.g. Roth, 1998, 2000). My study shows that this is also the case in vocational education and training system for mariners, which leads to a contradiction whereby some aspects of the system become impediments to achieving the goal of the program.

To qualify for the certificate of competency, after completing education and training in college and on-board ships, an administrator ascertains the candidate’s competency. Although STCW95 stipulates maritime certification to be based on competencies, my study reveals an emphasis on knowledge assessment by means of written and oral examinations rather than evaluation of skill performance. This changed the way that the mariners perceived learning and shifted their objective from developing competencies to memorizing what is required to pass the examinations.

The students' perception of assessment shaped their approach to learning. They discussed the examination from the beginning of the course, wondered about the nature of assessment's questions, and mediated their prior experience of competency examinations from earlier certificates. Students were concerned about specific issues in the exams. For example, they doubted the validity of the exam questions, considering the questions to be outdated and not to have practical implications for their on-board work. Thus, Kim suggested, "a lot of the stuff on the exams was like, out dated information, completely irrelevant to what is in practice and even in theory today." The instructor appeared to be in agreement: "Quite often the examinations are reflecting history and have not been up-dated**.** For example, my student may go down and write an examination for a topic in an examination that was put together in 1976."

Considering the examination questions are drawn from a question bank, they may appear identically across different examinations: "they were all the same. They haven't changed in thirty years, forty years, you know, they had converted them from imperial to metric. They are that old" (Rick). My findings are consistent with those of other studies that revealed the severely compromised nature of examinations that reuse the same questions year after year (Stutman, 1997). This approach to assessment significantly influences the students' approaches to learning and studying (Boud, 1995; Struyven, Dochy, & Janssens, 2005). Consequently students aim to pass the exams knowing that all they have to do is get ready for the set of largely known questions: "Ian or Pal or any other instructor have to teach you to pass the exams; right, they have to teach you the kind of trickery to get you through the exams as well, which is the waste of his time, our time and the industry's time" (Dave). Answering these questions became the primary

objective of teaching and learning, leading the instructor to muse, "so what I am having to do is trying to figure out what TC may want and what I end up doing is wasting a lot of students learning time teaching history instead of teaching today." Because the instructor wanted the students to be successful in the certification examinations, he oriented toward teaching outdated knowledge, rather than focusing on teaching useful, present-day knowledge.

Students were also very concerned with the practicality of problems expressed in those examinations but their main concern was to know the type of answers that the administration required for specific questions and not necessarily the valid practical answers. The following is part of a conversation that happened between students and the instructor in one of the classes when they were working on previous competency examinations questions:

> Raymond: is it really possible? It is practically impossible. I cannot believe that Transport Canada is still trying to teach that.
>
> Instructor: it is a principle question.
>
> Raymond: I know but it's… it is completely against all practical sense; it goes against all practicality…

After a series of discussion between the students about the possible answers, Dave asked the instructor: "For the purpose of Transport Canada, which answer would they prefer to see?" The last part of the excerpt demonstrates again that the students' objective was not necessarily to find the correct answer but what is needed to pass the exam.

Students' demand resulted in final sessions of the course being assigned for reviewing the sample questions from the available previous competency examinations' question bank. When the students are under pressure for the score they have to give up or beat the system (Ebel & Frisbie, 1991); teaching the test questions and corresponding answers is one response (Muirhead, 1997). The administrator is informed of this flaw in the system but came up with the solution of creating a new set of questions. This is a temporary solution as one of the students stated: "Now I understand they are coming up with new questions, but twenty years down the road everyone is going to have those questions." The students noticed the solution presented by the administration may not solve the problem, but at the most it may postpone it. Inappropriate assessment procedures encourage superficial learning, and varying the examination questions may not be enough to fully evoke deep approaches to learning (Ramsden, 1997). It seems that the administration's solution to the problem might not change the perception of students about the examination, and as a result it most probably does not affect the way that they approach learning.

Discussion and conclusion

My study reveals considerable contradictions inside a system designed to improve the vocational education and training of mariners. I am not claiming that these contradictions *cause* poor competencies and directly *contribute* to accidents and incidents; human error is possible even among the most competent individuals. However, practitioners obtaining certification contributes to the belief that they are competent when no (little) evidence has been gathered as to whether this belief is justified and therefore constitutes factual knowledge.

As a way of addressing what is required to make education and training more relevant, I asked mariners who were participating in the course about their suggestions for improving the system. Some suggested that the improvements should mainly come from the administrators, as they are the regulators and also the invigilators. The mariners' suggestions were centered mainly on better and greater supervision and monitoring of on-the-job training—on-board ships—and certification examination process. One of the students mentioned that there is a need for supervision of the entire training and assessment process. He even suggested that this might be performed by a third party who has the authority to supervise the administration, shipping companies, and the colleges: "It would have to come from the federal government I think because they are the regulator." He then added, "someone that sort of encompasses all three of those that regulates the colleges, the employers, and the examiners and Transport Canada. You know, someone who could have a better picture, a better picture of the whole scenario." Other suggestions were focused mainly on two issues, the courses themselves and the examination. For example, Kim noted: "modernize it, like we spend all that time on chart work and sounders and stuff like that but it is all obsolete equipment. Realistically, when we all go back to work, we are going to fire up our computerized charting system and everything like that." These and similar suggestions are directed to the administrators, as they are the ones who provide the course objectives either directly or through their assessment system.

My study implies that the policy makers and certification authorities have to do more than just prepare guidelines that reinforce the current practice; rather, they have to develop a new training concept. The aim has to be for the prospective practitioners to

learn more than how to be successful in the examinations but to be authentically competent and perform better on the job. The certification system has to be modified as it has a direct effect on the way that the training institutions and workplaces deliver and the students develop the skills and knowledge required to be competent practitioners.

The implication of the competency based training in its intended form will help the students to attain the required competency. To do so, the policy maker (IMO) and subsequently the administrators have to establish performance standards for competency certification. These standards have to be detailed and clearly defined so that the students and the trainers know exactly what is expected from them and assessors know what and is to be assessed and how. Assessment might be amalgamated into training as a continuous process in college and on-board ships. The instructors in training institutes and the mariners on-board ships—responsible for the training of the students—need to be familiar with the competency based assessment technique. They would then evaluate the students for each competency standard that he or she is able to perform. The cumulative record of the success in performing all the required standards of competency can act as *prima facie* evidence for the administrator that the candidate is competent and eligible for the *certificate of competency*. This requires the role of the administrator to shift toward supervising and appraising the entire process of training and assessment instead of direct engagement in assessment of practitioners.

CHAPTER 6: Challenges of Vocational Education Reform in the Maritime Domain

The failures of many educational reforms are blamed either on their objectives being unachievable or on the unwillingness of its implementers (e.g. school's staff) to change. My study of the vocational education reform in the maritime domain brings an alternative perspective on the matter and suggests that this is not always the case. Based on an intensive case study, I claim instead that the lack of active engagement of implementers as end users in the design of the educational policy creates challenges for its implementations. Using a theoretical framework based on the notion of *boundary objects* I bring an alternative to current practice by creating the potential to illuminate and remove tensions and challenges for policy implementation. From there I infer that adopting this concept for policy design may prevent such conflicts and contradictions and result in successful implementation of the policy.

Introduction

The design and implementation of an educational policy are not as easily separable as they sometimes appear to be. Policy designers have much at stake in the final use of their policy whereas users' actions are greatly mediated by the structural designs in the policy that they implement. In this chapter, I explore the effect of the design of a national maritime vocational education policy on training institutes during the course of its implementation and discuss the conflicts created by its design. I illustrate some of those challenges from the perspective of the practitioners in one maritime training institute. Using the theoretical concept of *boundary objects*, I examine the current status of maritime vocational education policy and the challenges it faces. I then discuss the benefits of considering the educational policy as a boundary object at the time of its design and the effect it may have on the implementation of the policy. To do that

following a historical background, I focus on the social worlds of the designer and users that influenced the development of the policy. Next, my emphasis shifts to the policy itself and to the contradictions it created for its users. Then, I investigate how in designing a policy, the concept of *boundary objects* may reduce or remove those obstructions. I identify a group of documents in the maritime educational domain, which can be considered as boundary objects, and I discuss the effects they had on the system. I conclude that there are possibilities for experimentation and further research.

Background

The international maritime domain became interested in harmonizing and regulating its educational standards for all mariners in the mid 1970s. The International Maritime Organisation (IMO)—a technical agency of the United Nations—is responsible for all the international shipping activities including training and qualification of mariners who navigate ships around the world. In 1978, the IMO introduced its first educational policy in the form of an international convention—the *Standards of Training, Certification and Watch Keeping for Seafarers* (STCW78). It was considered a breakthrough, as there were virtually no international standards in maritime training and certification at that time.

After almost two decades of implementations worldwide, it became evident to anyone interested that the convention was not promoting the changes it was initially designed to bring about—meaning it has not reached its objectives (e.g., Lewarn, 1999; McCarter, 1999; Moreby, 1999; Zec, Komadina, & Pritchard, 2000). Some of the reasons claimed for its failure or the inability of many countries to implement the policy included (a) the terms and provisions in the convention were vague and open to diverse interpretation; (b) the educational method introduced by the policy was not suitable for marine vocation; (c) the policy itself was not clear about the responsibilities of different parties; and (d) the compliance to the convention was left to the satisfaction of the maritime administrator of each country.

As a result, the convention was futile in harmonizing maritime education and training standards around the world. To overcome these shortcomings, the IMO made a comprehensive revision to its policy and virtually created a new convention known as STCW95.

The new STCW95 Convention seeks to rectify the shortcomings of its predecessor STCW78 (Sampson, 2004). For example it introduces a new concept of education and training for mariners, namely competency-based training and education (CBT). It defines the competencies that a mariner should be able to obtain and demonstrate to be certified. The new convention also aims to clarify the responsibilities of each party (IMO, 1996). However, the introduction of STCW95 also created many challenges for different countries, as they have been facing difficulties in implementing this policy (Chawla, 2006; Kanji, 2000; Nakazawa, 2000; Wilson, 2007). There were concerns about the shortcomings and challenges of the convention from sometime after the implementation of the convention. Lewarn (2002), based on empirical evidence, claimed that the challenges posed by the convention are not fully adopted by institutions and marine administrations in many countries, and their implementation was not successful. Several surveys conducted by different countries and organizations revealed that many mariners holding the certificate of competency lack the required competence and skills (IMO News, 2006; Seaways, 2006). Many of the experts in the field believe that one of the important shortcomings of the convention is that the performance criteria and objectives are not well defined and are open to different interpretations (Sampson, 2004; Teo, 2006). The purpose of this chapter is to elaborate on some of these challenges that I found in my study and propose suggestions toward removing those impediments in the implementation of the policy.

The study of the vocational education system of the maritime domain is important because it can give us a better understanding of the implementation of a large scale educational policy as all the maritime educational systems around the world have to

pursue the standards of the same international educational policy, namely the STCW Convention. With increasing globalization in all aspect of human life, moving toward an international educational system is not far from reality. The study of maritime education, which has already undergone internationalization, would improve our understanding of this predicable phenomenon.

Theoretical framework

Educational systems are heterogeneous and different kinds of worlds are involved in constructing the settings in which they are relevant. Educational systems, especially in vocational fields, engage multiple sectors and employ many actors (stakeholders); each has its own characteristics, viewpoints, community, and culture. Each community engages in its own activity within its boundaries but needs to work collaboratively with others. These communities cross each other's boundaries to be able to constitute the society we live in and experience on a day-to-day basis. Thus the design of an educational policy is embedded in larger social and cultural processes, which involves negotiation, persuasion, and lobbying (Garrety & Badham, 1999).

The basic assumption among many scholars in policy research is that the policy design is fundamentally a process of negotiation (e.g. Deelstra et al., 2003). Cooperating while having diversity and different viewpoints make the potential for tensions, conflicts, and contradictions, resulting in a lack of consensus between parties (Easterbrook et al. 1993). Educational policy designers, who do not carefully consider these elements in their design, may experience difficulties in reaching their objectives. Hence, in designing policy, similarities, differences, and effects of each culture, which may include national, organizational, and domain cultures, have to be distinguished and accounted for. The question is how these communities with different concerns, languages, forms of interaction, and practices can succeed in cooperating toward the same goals. How can their actions be managed to achieve agreement and get work done? For this, I need a

method that specifically accounts for the diversity of worldviews and justify the miscellany of cultures.

The concept of *boundary objects* evolved precisely to understand what happens when different cultures and communities come into contact and for different understandings that emerge when people from these cultures and communities use the 'same' artifacts (e.g. Corcoran, 1992; Fujimura, 1988). Boundary objects are defined as entities (forms to be filled, objects, etc.) that move between communities of practice (cultures) where they entail different practices and understandings; or, in other words, when entities give rise to different practices (understandings), a boundary can be identified.

Pragmatically, boundary objects can be used to connect different perspectives and viewpoints (Harvey, 1997). For example, data collected by different individuals about some natural environments become comparable when the same data collection forms are used (Star & Griesemer, 1989). Research shows that in such situations, boundary objects are shared by different communities but may be viewed or used differently by each of them. Yet, the boundary object coordinates and articulates these different understandings and uses. According to this framework, creating boundary objects, which are both adoptable to different viewpoints and robust enough to maintain its identity across them (Star, 1989), is one activity that helps translate between viewpoints and resolve tensions (Bowker & Star, 1999). The term boundary object, therefore, is an analytic concept for those objects that inhibit several intersecting social worlds and satisfy the informational requirements of each one of them. Boundary objects facilitate interactions and cooperative work between social worlds and increase their opportunities for being transferred into an enrolling member of another community (Fujimura, 1992). In the context of my study, I contemplate a vocational educational policy to be a boundary object. It is because it crosses the boundaries of different communities—policymakers and policy users—in which they orient different forms of activities while facilitating the communication between them.

Creation and management of an authentic boundary object needs collaborative work and communication between the respective communities (Star, 1989). A number of studies have identified the importance of boundary work, and managing the interactions between social worlds, to make the collaboration possible. There is a need for *managing boundarie*s where the boundaries that separate the communities of decision makers and experts cross (Cash, 2001; Gieryn, 1995; Jasanoff, 1987). The boundaries of the intersecting areas of these communities can be managed effectively through (a) communication between people and across communities (b) translation of the language—local exchange language (Gallison, 1997)—experience, and presuppositions of both sides, and (c) *mediation* act to make processes transparent, bringing all perspectives to the table, and establishing criteria for decision making. These functions can be institutionalized in *boundary organizations* (Cash et al., 2003). A boundary organization, mediates new boundary negotiations in its routine work, and stabilizes the boundary by performing successfully as an agent for both policymakers and practitioners (Carr & Wilkinson, 2005) through creating and/or managing boundary objects.

Individuals (instead of an organization) can also perform the analogous concept. Different terms such as boundary analyst (Garraway, 2006) and organizational translator (Brown & Duguid, 2001) are proposed by scholars for individuals who can frame the interests of one community in terms of another communities' perspectives. Boundary spanner (e.g. Kleinman, 1995; Lewenstein, 1991; Moore, 1996; Wolfle, 1989) is yet other term suggested for the people who manage and bridge the gap between multiple organizations and communities (Hirsch, 1972).

In the next section, I elaborate on how the nature of the maritime educational policy can be characterized as a boundary object.

Educational policy as boundary object

The STCW95 is an international treaty, and countries that are parties to the convention—which includes almost all the maritime nations in the world—are bound to its content. As a result, each country has to accommodate the requirements of the convention into their national legislation. This would comprise their vocational education policy for maritime domain, namely: *national maritime educational policy*. For Canada, Transport Canada is the maritime administration responsible for organizing and regulating the implementation of the Convention. To do that Transport Canada designed a national maritime educational policy.

The national maritime educational policy requires mariners to have a Certificate of Competency to show that they are competent to work on-board ships. Transport Canada, the maritime administration, is the responsible body for issuing the Certificate of Competency after verifying that a mariner is competent and meets certain requirements. In the current practice, the marine administrator asks mariners to attend approved maritime courses and those who have passed the examinations are certified. In turn, the maritime institutes have to fulfill the requirements of the national maritime educational policy for approval of their courses by the maritime administrator. They have to fulfill the requisites of the national policy, or in other words, implement that policy.

The characteristics of the national policy are analogous to the concept of *boundary objects*. The national policy is a document, which has to be usable by different communities in the maritime domain including training institutes and maritime administrators. Maritime schools utilize the educational policy as a source for designing their courses and modifying their teaching practices. This policy at the same time is nonetheless a working document for the maritime administrators. Maritime administrators employ the policy as a standing document, which is a base for assessing the competency of the mariners and issuance of a certificate of competency. It is also a

benchmark to check the performance of schools regarding the implementation of the policy. Schools and administrators are different communities engaged in diverse activities toward the same goals yet as the school administrator noted, they have different mandates toward the same policy:

> Yeah, different mandates, their mandate is to produce Canadian certified officers and that's strictly what it is. And our mandate as an education facility is to produce a product that's able to work in the work force today. So they are looking at a piece of paper and we're looking at what makes up that piece of paper.

So the national policy has to accomplish multiple tasks for different communities. The main communities are maritime schools and marine administration—not to mention other communities such as students, mariners, and shipping companies. The theoretical concept of boundary object suggests that when the same entity appears and is used in different communities one should expect to see different practices. Whereas the boundary object can be used to articulate the two different practices, these nevertheless become the same, which means that the same documents leads to different actions. Albeit having different mandates and viewpoints, they have to cooperate to reach the same objective of implementing the requirement of the convention and producing competent certified mariners. In other words, the policy is used by both communities and resides where the boundaries of these communities crosses each other. Because it both defines and creates the boundary, the policy document has a complex nature: it describes and creates different worlds (Law, 2004). The same policy should be useable by different communities for different mandates, yet it has to be understandable, adaptable, and clear to all of them.

Challenges with the national maritime educational policy

My study shows that schools encountered many difficulties in their attempt to implement the requirements of the national maritime educational policy. These difficulties and challenges resulted from the fact that the administrator designed the policy in isolation. There are flaws in the design and structure of the policy. The lack of active communication between the administration and schools intensifies the effect of these flaws and reduces the possibilities for improvement. In the following, I discuss the related challenges I found in my study.

Ambiguously experienced terms and objectives

A major dilemma this study revealed is due to the fact that the maritime administrator has created the national maritime educational policy mainly by directly transferring the content of the convention into its policy format. On the user side, the unfamiliarity of the content-related language led users to experience ambiguity of the terms and objectives described in the policy document. For instance, Ian, maritime school administrator noted:

> So of course what Transport Canada does, they take STCW objectives and the code itself, the STCW code, and to make that something as a standing documents of Canada; they take that and injected it into their own system.

Little effort has been made for adjusting the policy to the language, current practice, and culture of the maritime educational institutes in the country. This, as many participants in my study pointed out, constitutes a major problem. A drawback I found in the implementation of the policy is that in the college the policy is judged to be vague and unclear. Thus, one course designer said, “so that’s how vague this syllabus is. We get no other information on this to put together a course. I have to put a course together based on this.” The designers have to fashion their curriculums based on objectives that are not clear to them. They also mentioned that the terms and objectives expressed in the policy

are brief and as a result open to different interpretation. Another course designer and instructor suggested:

> Transport Canada will tell me ((i.e., in the policy)) that for this topic these are the types of the objectives you need to meet and a very brief… Based on what that is, I need to generate a course to fulfill those very brief objectives that they have set. … I am not given guidance from Transport Canada and I have to read that objectives. It's just very broad.

Looking at the content of the STCW95 document, one can see that the marine administration in Canada adopted the same terms and objectives that have been used in the Convention itself. The STCW95 Convention is an international policy, and it is created for a very wide range of audiences around the world. These include a large number of countries with a variety of educational systems, maritime practices, resources, and limitations, not to mention their different maritime social and cultural backgrounds. The STCW is a document providing the requirements of the maritime education system in general and national policy should provide it country specific.

The STCW Convention is a document with the same characteristics as a boundary object. It is designed to form a common set of standards to coordinate the related actions of maritime communities around the world. A boundary object should be both plastic enough to be adapted to the local needs and constraints of each of the several communities using it but robust enough to maintain a common identity across sites (Star, 1989). The STCW has to contemplate the informational requirements of maritime communities of different countries. As the informational needs, limitation and abilities, understandings, practices and cultures of the target communities are vast and greatly different the boundary object (STCW) has to be very plastic to accommodate these varieties. The STCW has to be flexible and plastic enough for the maritime

administration of different countries to be able to adapt it to their own national educational system.

However, a national maritime educational policy addresses only a limited number of communities, mainly the maritime schools and administrator of a country. This artifact plays a different role from that the STCW convention plays in its context. The standards, objectives, and syllabus included in the policy have to be understood and implemented by relatively homogenous communities of schools of that country. These factors delineate the extent to which the object should be plastic. Transferring the content of one into another would create challenge for respective communities. What the marine administrators are generally anticipated to do is to act as mediators and translate the requirements of the STCW Convention for their implementers based on their needs, abilities, and limitations. National policy designed for a specific and relatively homogenous group of implementers in a country or even region or state depends on the size and characteristic of the maritime, educational, and political system of that country. Maritime administrators are expected to design a national policy, which considers the characteristics of their national maritime educational system based on the objectives and requirements of the convention.

Lack of participation in design

My data provide evidence that there exists a lack of effective communication at the time of design of the policy between the administrator and schools. Miscommunication continues after design and during the implementation process, and it creates dilemmas for schools in understanding and implementing policy. Thus, my participants complained: ‘I am not given guidance from Transport Canada’, ‘I am not given information on which textbooks they use for their examinations and that will create difficulties’ and, ‘We get no other information on this to put together a course’.

Using the notion of boundary object in design of a policy requires the incorporation of viewpoints of its users in the design process. To be able to incorporate the viewpoints of its users the national maritime policy as a boundary object needs participation of all stakeholders in the design process. The effectiveness and the *extent* to which implementers have participated in the design of a policy are the critical factors affecting the degree of its success (Gross, Giacquinta, & Bernstein, 1979). The reasons behind the importance of the participation are as follows: (a) participation leads to higher staff morale which is necessary for successful implementation; (b) participation leads to greater commitment that is required for effecting changes; (c) participation leads to greater clarity about the goals and objectives of the policy which is necessary for implementation; (d) participation reduces initial resistance and thereby facilitates successful implementation; and (e) implementers tend to resist any innovation (King & Anderson, 1995; Sabatier, 1991) that they are expected to implement if it is initiated solely by their superiors.

Successful policy needs parties to take effective part in the design; in this way, their viewpoint, informational requirements, their abilities and constraint would be accounted for. 'When participants in the intersecting worlds create representations together, their different commitments and perceptions are resolved into representations' (Star & Griesemer 1989, p. 413). Effective participation and having a voice in the design help to set realistic and implementable goals. In this way, the end users will take part in defining the terms and objectives and would be elucidated about and cognizant of what they have to implement.

Systemic problem

My study reveals that the weakness of the maritime national educational policy goes further than its vagueness and ambiguity: its structure and processes also create problems for its implementers. The major dilemma that I found is with the assessment and

evaluation process for certification (refer to chapter 5). As one of the instructors pointed out:

> What I foresee today to be one of the biggest obstacles in the pathway for a learner . . . is the evaluation process . . . That's a huge obstacle in this field.

This problem arises from the fact that the assessment system is separated from training and education so that it comes to be conducted solely by the administration; hence, it created an obstacle for colleges. The absence of users—especially the schools—during the design phase contributes to this flaw in the process of implementation. The current assessment for the certification system presented in the policy, arranged by maritime administration, lead to a contradiction: it created another impediment and obstacle in the process of implementing the policy by colleges. A course designer and instructor exemplified the problem:

> From here, my students after they complete my course they go back to Transport Canada to be examined and to me that's an obstacle, in that, umm, the level of education that's delivered to that learner is based on my experience and *my interpretation* of what that objective is.

The earlier dilemma of ambiguous objectives combined by the evaluation process presented in the policy created this impediment. Further investigation into the assessment system revealed that the disconnect between the designer and users caused inability of the administrator, as provider and conductor of the assessment, to afford an assessment, which is reliable and valid for the users, as one instructor stated:

> Quite often the examinations are reflecting history and haven't been up-dated. For example, my students may go down and write an examination for a topic, examination was put together in 1976. So what I am having to do is trying to figure out what Transport Canada may want and what I end up doing is wasting a lot of students and learners' time teaching history instead of teaching today.

The excerpt shows that disconnect between the policy designers and practitioners resulted in unrealistic and unexpected demands from users. This in turn causes unwillingness and resistance from colleges and creates virtual objectives ("trying to figure out what Transport Canada examiners may want") with resultant unauthentic implementation of the policy ("teaching history instead of teaching today").

Designing the policy by employing framework of the boundary objects makes the implementation process less problematic and helps reduce the contradictions by having agreed-upon terms and definitions and incorporated viewpoints from all the users. This is in line with the course designer's concern about the need for guidance and clarification of the terms and objectives in the policy by the maritime administrator when he mentioned, "I am not given guidance from Transport Canada and I have to read the objectives. It's just very broad." According to my boundary object's analogy this policy could be made collaboratively by engaging all parties. When all the parties have their voices in the design and share their experience and understanding of the objectives expressed at the time of preparation of the policy, the possibilities of different or mis-interpretations will decrease. As a result, there is a definite need for cooperation, communication, and collaboration between all the stakeholders—in my case mainly maritime administration and schools—in creating the boundary object (policy). In the next section, I will explain how these collaborative works should be done and managed and discuss utilizing the existing possibilities.

Moving toward collaborative work

Collaboration among different communities for creating an authentic boundary object is a necessity yet establishing an effective collaborative work is challenging (Star, 1989). The work required for establishing collaboration between communities can be facilitated through creating networks that link together the different maritime training institutes (Lewarn, 1999). Establishing a forum or association is a key factor in sustaining and improving the successful networking. This can be a venue for effective communication between the training institutes and between the institutes and the maritime administration. My study revealed that there are similar concerns among maritime training institutes in Canada. They took initiative and created an association that consisted of major maritime training institutes in the country. The institutes are attempting to negotiate the implications of their concerns with the maritime administration, as the school administrator in the institute I studied suggested:

> Across Canada the seven major institutions we formed an association, Canadian Association of Marine Training Institutions (CAMTI) and twice a year we meet with Transport Canada in Ottawa. I just got back two weeks ago, and we do it in November and we meet again late April into May. So we meet with Transport Canada and we discuss issues, like this one, and umm I would get still, what we get afterward, is sometimes ((laughs)) sometimes a different story. But there is an opportunity for concerns to be addressed.

As the excerpt shows, they established the network and they meet on a regular basis to discuss their concerns and problems. Generally, the outcomes of these meetings are discussed with marine administrators, yet although there is a relationship, it is not always effective. The school does not believe that the final result of their efforts in meetings and discussing their issues with the maritime administration is all the time fruitful or meets their expectation.

Even though it was not fully functional at that stage, this association has the potential of playing the effective managing and communicative role it intends to do. It has the capability to facilitate organizing the boundaries between administrator and training institutes when they cross.

CAMTI as a legitimate boundary organization

In my study, the Canadian Association of Marine Training Institutions (CAMTI), which is a legitimate organization created by and representing the maritime training institutes, can be contemplated as a boundary organization. It serves as venues for negotiation and mediation among training institutes and between training institutes and the marine administration. A boundary organization could provide a forum in which information can be co-produced by actors from different sides (Guston, 1999) through the authentic creation and use of *boundary object*. This boundary object is a joint production created through collaboration, which forms a process more likely to produce salient information because it engages end users early in defining data needs.

My research follow-ups show that during the course of time, the meetings become more meaningful and constitute authentic engagement of different sides. One of the main factors which I believe had a great effect on the willingness for productive collaboration from both parties were constraint in meeting the deadlines—especially by the maritime administration—set by the IMO regarding the implementation of the STCW convention. This, along with other timelines, set by a supervisory national organization compels, motivates, and drives more effective corporative work and productive communication between both sides.

My investigation reveals that there have been outcomes from the current meetings that created positive results toward the implementation of the policy. For example, the outcome of the recent CAMTI meetings with maritime administration was the agreement that allows the creation of a single set of curricula for the courses by cooperation of all

the maritime training institutes and approval of maritime administration. It is contrary to the current practice that each institute has to design its own courses based on the broad objectives and requirements of the national policy. This agreement was the result of effective communication between training institutes and between the CAMTI as boundary organization (mediator) and maritime administration, through the creation of boundary objects (the curriculums). In this way there would be homogeneity in the interpretation of the objectives of the policy by all parties and the possibility of reducing one of the biggest contradictions I found in implementing the policy. These course curricula have the potential to be authentic boundary objects, as they will be created and used by different communities—i.e. schools and the maritime administration. They are the outcome of negotiations between all the parties and the involvement of the end users in creating these boundary objects that can satisfy the informational requirement of all of them. It will reduce the ambiguities in and vagueness of the terms and objectives of the policy.

In the next section I discuss the historical evidence that I encountered in my study for collaborative work in successful creation and use of documents that acted as boundary objects. I elaborate and argue the rationales for its successful effect on the implementation of the earlier version of the convention.

Model courses as boundary objects

Historically, the maritime educational society is not unfamiliar with the concepts similar to boundary objects. In my study I recognize documents that acted as boundary objects. The creation and use of those documents as supplements to the earlier version of the Convention facilitate the implementation of that policy. Those documents have been created by the consultation and cooperation of a group of maritime institutes, as end-users, with the IMO, the policy maker. The introduction of these documents was a breakthrough in the implementation of the earlier convention (STCW78) for some

countries. It helped maritime administrations and training institutes in those countries with implementing the requirements of that Convention, mainly regarding course design and delivery.

The creation of those objects was initiated by some members of the IMO when they encountered extensive variation of understanding and interpretation of the terms and objectives of the convention (STCW78) throughout the world. To remedy the situation, the IMO, with active cooperation of a group of training institutes, initiated the design of *model courses* to create uniformity by making the terms and objectives expressed in the policy clear, understandable, and implementable for maritime schools and marine administrations. Model courses are basically detailed lesson plans for each course. Those documents acted as a supplement to the convention for the end-users.

In order to establish more uniform implementations of the policy, the IMO recommended schools to use model courses as a guide for designing their own courses. It was welcomed by some schools and maritime administrations as they struggle with implementation problems of STCW78. It served mainly maritime administration and schools in the countries that participated in the creation of the model courses. It also assists those countries which had their educational system match with the format chosen by the model courses, or had a system which was flexible enough to accept the model courses format and were able to adapt it.

The relative success of the model courses was mainly due to the fact that they were prepared by collaborative work of some of the end users with the policy maker. The process allowed the informational requirement of the participating end-users to be fulfilled by the document. Through encompassing viewpoints and cooperation of some of the implementers, the IMO created a robust supplement to the flexible and plastic policy for the purpose of reducing the possibility of misinterpretation of its terms and objectives. Model courses were prepared separately for each course. They contained a detailed lesson plan with definite topics to be covered and the exact time required for each

subtopic. One of the countries whose educational systems appropriately matched with the format of the model courses was Canada. Maritime institutes were familiar with them, and most of their course designers used the model courses for the implementation of the earlier version of policy. As a course designer participated in my study mentioned:

> So for navigation when I am looking at this topic right here, I am looking at charts or umm pilotage [name of a courses] that block right there [he was looking and pointing at a part of a related model course]… for pilotage there is six or eight pages in here [compared to one small paragraph in related section of the national maritime educational policy—TP2293] so here is very defined. For example, when you look at this [TP2293] *a thorough knowledge of*, now look at here [model course] *a thorough knowledge* defined as: being able to define this; being able to explain this; being able to use this; proper descriptive verbs. Now this is a usable document to me. This is very clear to me. I can fulfill these requirements then I can achieve the task. Unfortunately, these don't directly relate to that [current national policy]

As it can be understood the course designer was confident in using the model course and because it expressed clearly the objectives, it reduced ambiguity and fulfilled the informational needs of the school. The objects such as these model courses can be called *supplementary boundary objects* or as Garrety and Badham (1999) called *secondary boundary objects* relative to primary boundary object. They aim at supporting the implementation of primary boundary objects; the national maritime educational policy in this case—the material artifact around which all the activity is organized.

Failure of model courses in some countries

Controversies regarding the use of model courses arouse occasionally after its introduction by a group of countries around the world. The literature provides evidence for concerns of the use of the model courses in those countries (e.g., Horck, 2003; Lewarn, 2002). The model courses were so robust that the schools in those countries with different educational systems and frameworks could not take much practical benefit. It was because they could not adapt it to their educational systems. Also, some senior instructors, even in those countries with the same framework, resisted using or fully implementing the model courses requirements because it was too rigid and had an authoritarian nature (Horck, 2003). The challenges I found with the model courses are the lack of provisions for the individual schools' program designers and instructors to interact and update or improve the course design and content by applying their own experience and perspective or by appropriating innovative ways of teaching and presenting the course material.

Based on our study, we do not recommend the creation and use of model courses on a large scale. It is not possible within a single set of documents to accommodate in detail all the needs, view points, and informational requirements of every stakeholder in a large and diverse user group. Instead, I suggest the supplementary documents for current policy can be prepared at the national or regional level through the cooperation of all the users, especially schools and maritime administration in that region or country. They could use the boundary objects criteria in creating the documents. The document could easily incorporate the same format that the national or regional educational system required. Such documents might have sufficient plasticity to accommodate the provisions for

further modification and updating content of each course or the delivery method and also consider the current and future needs of the marine industry (Beer & Meethan, 2007). As it is prepared locally, it could take into account the present educational culture, experiences, criteria, and limitations so it would be a product useable by the same educational community.

Discussion and suggestions

This interpretive case study illustrates how educational policy can be seen as boundary object that connects disparate communities and by doing so allows them to communicate and cross each other's boundaries. In this study, I demonstrated some of the challenges in the maritime vocational education system and its reform from the perspective of practitioners. The national maritime education policy that is prepared by the maritime administration created challenges for maritime schools. Using the notion of *boundary object,* I discussed the possible rationale for the unsuccessful educational policy: the maritime administration did not consider the viewpoints and informational requirements of the schools in the design of the policy. This study shows that the framework of boundary objects has the potential to expose tensions and challenges of policy implementation. It is from these tensions that policy execution can be reviewed and subsequently revised.

One of the ways to reduce the challenges in the implementation of the present national maritime educational policy is redesigning or adjusting the current policy for its shortcomings using the theoretical framework of boundary object. It would be an opportunity for the maritime administration to recreate the policy and/or its supplements as boundary objects, which may result in reducing the current challenges it created and increase the possibilities of the successful implication of the convention.

The creation of the national policy as a boundary object needed representation of the schools—and preferably other stakeholders—to work closely with maritime administration. When participants in the intersecting world create representations together, their different commitments and perceptions are resolved into representation (Star & Griesemer, 1989). If there are difficulties, such as political constraints, in modification of the national policy, I suggest parties collaboratively create a new (secondary) boundary object—in the form of supplement, guidelines, or instruction. This can be achieved by participation of all stakeholders with the goal of successful implementation of the agreed upon objectives of the current national maritime educational policy. My research also suggests the need for managing the boundaries through effective communication, translation, and mediation when boundaries of maritime administration and schools crossed at the time of modification or creation of policy and its supplements. My model may fit best when the end users are not in acute competition and are willing to participate.

How effective these can be remains a question for a further scholarly research study after the practical experimentation. The historical evidence regarding the successful use of model courses, which followed a concept similar to what I proposed**,** bestows an exemplary case for prediction of positive outcomes of our proposal for analogous situations. Further research can be done using the method of boundary-crossing laboratories (Engeström, 2001). In such laboratories, different social worlds are brought together in a controlled environment to discuss the salient problems at hand. These are then videotaped and analyzed by researchers in order to highlight enabling and disabling actions at follow-up meetings for further discussions. This method has proven to be successful in developing workable solutions. The idea of this type of study for the development of a more responsive educational policy is a potentially interesting and useful idea for future research.

CHAPTER 7: Rethinking Learning in the Adult Classroom: Quasi-Communities

Socio-cultural theories of situated learning, such as communities of practice, provide a rich conceptual framework for analyzing the processes by which newcomers become full participants in their workplace communities. However, some research shows that these concepts have shortcomings for theorizing learning in formal educational settings. To redress these problems, I propose in this chapter the theoretical framework of quasi-communities. This theory retains some of the dimensions of the original concept of community while abandoning others. I use a case study of the continuing training of mariners as evidence to show how this framework is developed to identify and eventually improve learning in formal adult and vocational education. My analysis illustrates the various learning opportunities in adult formal educational settings that are available or might be developed within this framework.

Introduction

The findings of my ethnographic research project presented in the earlier chapters of this dissertation revealed tensions between the competencies the adult practicing mariners had developed and were required for their jobs on one hand and the competencies needed for successfully completing college training courses on the other. In this chapter, I propose a conceptual framework that allows better understanding of the interactions in the complex social environment of the classroom of adult learners. I take a socio-cultural perspective on situated learning, which tends to be overlooked in adult learning literature, as my theoretical lens (Niewolny & Wilson, 2009). However, important theoretical

concepts of this perspective such as *community of practice* and *community of learners* have been subjected to recent criticism. Furthermore, since the concept of community is still an evolving concept (Li et al., 2009), and in order to optimize specific characteristics of the concept, here I move from the community to that of a quasi-community.

In socio-cultural learning theories, the community of practice and community of learners have changed the perspectives on learning from the individual to the collective. Based on these theories, learning is defined as participation and engagement in a collectively motivated activity that is mediated by history and culture/society (e.g., Lave, 1991; Rogoff, 1990). The notion of a community of practice emphasizes the role of collective activity in bonding the individuals to their community and shows how collectivity shapes, forms, and legitimatizes the individual's actions (Lave & Wenger, 1991). In recent years, this idea has become one of the most influential concepts that have emerged within the social sciences (Hughes, Jewson, & Unwin, 2007). However, the concept of community of practice was originally developed through research on learning in its natural settings such as apprenticeship training in workplaces. Although further studies showed suitability and applicability of this concept for informal learning, its ability to conceptualize and identify learning and knowing in formal education remains one of its major shortcomings (Boylan, 2010).

Most of the drawbacks originated from the fact that the concept of community comes from the dialectic relation between the individual and the collective, but it has been falsely integrated into dualistic epistemology which reduces knowing and learning to either the individual or the collective pole (Roth & Lee, 2006). Further endeavors to expand the theory tended towards the application of the concept for informal learning in

businesses and industries (e.g., Wenger, 1998). Thus, implication of this concept in formal educational settings remained problematic.

Additionally, there are major differences between formal and informal learning that prevents the use of the concept of community in its original form in both domains. For example, school classes or university courses do not carry any collective memory that characterizes communities of practice. Moreover, in true communities, individual learning changes collective practices, whereas in classrooms individual learning generally has no effect on the community (e.g., Roth, Lee, & Boyer, 2008). Thus, the concept of community of practice is unable to conceptualize the learning processes in formal learning environments. Although historically the conventional praxis of schooling does not promote the classroom to be an authentic community, such research as presented here shows that the concept may be suitable in a modified form to theorize learning in some adult classrooms.

Theoretical framework: towards quasi-communities

In cultural-historical psychology, which emphasizes "mediated action in context" (Cole, 1996, p. 104), knowing and learning are theorized as social practice since individuals are continually shaping and at the same time being shaped by engagement with their social contexts (Roth & Lee, 2007). This idea problematizes the conventional view that considers knowing (and learning) as an individual psychological process. Socio-cultural scholars present learning as a process of individuals' participation in the social and cultural activities of their communities (Rogoff, 1994). As the forms of participation change in participation itself thus participation is considered to be the learning. The concept of *community of practice* emphasizes the role of the collective in

learning. This type of community is formed when a group of individuals—in pursuit of common objective(s)—share mutually defined practices, beliefs, stories, and understandings over a period of time. Communities are recognizable by the common tasks and associated practices in which their members are involved and the tools, language, resources, common sense, and mundane reasons they share (Roth, 1998a). However, much of what we know about learning in these communities comes from studies in conventional workplaces, industrial settings, and businesses (Merriam, Courtenay, & Baumgartner, 2003). The study of this type of community in educational settings allows us to better understand and develop insights into the social nature of learning, which in turn can afford us to utilize the enhancement of adult and vocational education.

From a socio-cultural perspective, a community of practice, rather than an isolated individual, is the proper unit of analysis (Lave & Wenger, 1991). Although members of a classroom do not fully constitute a community of practice (Roth, 2008), the idea of learning through participation in a shared enterprise might be useful in thinking of quasi-communities, when the unit of analysis also includes the activity of the vocational domain from which the practitioners come to attend college courses. In this study, I use the term *quasi-community* to allow differentiation between the original concept and the type of community that I observed in classrooms and formal educational settings. The main contrast is in the hierarchy and distribution of expertise in the community. In the original concept of community, there is a hierarchy in which the apprentices are at the periphery and masters are at the center of their community. Here, learning is conceived as a trajectory of legitimate peripheral participation that changes with competency until

participation resembles that of core practitioners. This process also constitutes the renewal of the community where newcomers constantly join, thereby introducing variations into the practice and gradually replacing the old-timers and old practices.

In the quasi-community I present, the mastery does not have a temporal nature as it is observed in true communities. Here, the concept of competence and providing expertise has a dynamic nature and is not one sided as from master to novice—old-timer to newcomer. There is no sensible core and periphery in this community. In other words, the quasi-community lacks the spatio-temporal nature of membership in true communities, such as on the bridge of a naval vessel (Hutchins, 1995). The hierarchy, in the quasi-community, is not structured, thus it is dynamic and distributed across the community members. Quasi-community defines the mastery as the dialectic relation between individuals and their community. In my study, I view old-timers as those who have more experience with the task at hand and can contribute in the ongoing problem-solving process. Masters are those who are perceived by other members as a major resource for achieving the objectives of the community. Any member at any time has the possibility to bring expertise into the community and perform the role of the master—old-timer—or be a novice—newcomer—and learn from other members' competencies. In my study, the research participants were adults from different sectors of the maritime industry who worked in multiple geographical areas and diverse trades and were able to bring distinct competencies to the group.

Method

My ethnographic database consists of video recordings of students' activities in-and-out of the classroom, interviews, and field notes from a series of courses offered for

mariners. The research I am presenting in this chapter focuses on one of the courses delivered by the institute for the candidates of the maritime watch-keeping certificate of competency. Fifteen mariners participated in the course: 12 males and three females of various ages. All except one are from the same geographical region. The course lasted eight weeks, which included 120 hours of classroom activities and three field trips. All participants had prior practical experience onboard ships. They had worked as ships' crew-members for a period of time and, in an attempt to advance their rank to navigating officers, were seeking to obtain the related certificates. Their experiences are varied as they came from different parts of the marine industry including fishing, passenger ferries, tugboats, and coastguards. The instructor is a professional mariner who used to work onboard ships as the certified navigating officer and captain.

The course featured in this chapter for exemplifying purposes was part of a package offered by the maritime training institute based on the criteria set by the marine administrator for mariners who are applying for the certificate of competency. The title of the course is Chart-work and Pilotage. The aim of this course, as mentioned in the curriculum, is for the participants to develop skills and competencies to plan and conduct a passage and determine a ship's position. The certification examination at the end of the course, which was conducted by the certification authorities, consisted of two parts: (a) a multiple-choice and long answer test and (b) a chart-work exam (a written examination, which included drawing and use of specific tools on a marine chart).

Praxis and quasi-community development

In the following section, I show how a group of adult practitioners who wanted to be certified and move up their rank attended college and developed competencies they

needed. I feature the quasi-community pedagogy and analyze the key elements of the praxis that allowed the course participants to develop their community and succeed. I show how the praxis provided opportunities for them to become conscious of their common objectives, which in turn mediated their collective motive for their community creation. I then discuss how the pedagogy, which was co-produced by the teacher and students, utilized the tools and communicative resources to shape the quasi-community, mediate its progress, and allow the course participants to become competent problem-solvers of their domain.

Collective motives and community development

At the heart of the community development is the shared understanding, common interest, and collective motive(s) of its members (Lave & Wenger, 1991). A key element for the formation of a quasi-community is the common objective. It provides a reason for its members to come together as students are internally motivated to form a collective when they feel that their interest is shared by others (Lompscher, 1999). It is crucial for the pedagogy to provide possibilities for the students to realize their common interests early in their program. Analogously, at the start of the course, the teacher asked the course participants to introduce themselves to the class and to give a description of their professional background and their objectives for attending the course. As he told me, it is one technique that he uses to reduce anonymity and to promote classroom members to know and communicate with each other. Almost all of the participants mentioned that apart from the competency in working with marine charts, their main intention was to get ready to pass the certification examination. Obtaining the certification of competency is a necessity for promotion or change of direction in their career. As, for example, one

participant indicated, “my goal is to get that certificate, and by achieving that certificate, I hope that I’d be a Second Mate.” Another participant mused:

> The reason that I attended the course is so I can possibly take over the boat… run it, in the future . . . step up. Umm tired of being deckhand . . . I wouldn’t be ready for the (certification) exam if I was to challenge it, so I had to come and learn more of chart-work.

The praxis allowed participants from early in the course to realize that they share common objectives. The shared purpose bonds members, internally motivates them, and provokes their community development (Hildreth & Kimble, 2004). The pedagogy and teacher’s practices can play a significant role in facilitating the students’ realization of their mutual interest, which in turn promotes the development of their quasi-community. The teacher of this course was aware of the course participants’ mutual objectives (i.e. success in the certification examination and gaining competency related to chart use) and aligned the pedagogy with and incorporated them into the classroom practice. This invited students’ attention toward participation and sensing meaning and authenticity in the classroom activities.

To promote the students’ collaboration and engagement in their community, the teacher designed a series of group activities. During the early stages of the course, most of the interactions occurred in small groups consisting of students with shared commonalities and interests. These groups mainly consisted of those who were from the same sector of the industry or even worked for the same company. They communicated, collaborated, and participated in the conversations and activities in their small groups.

The common objective across groups provoked cross communication with other groups, and soon the interactions became widespread and all the class members engaged in each other's discussions and activities. Through the practice, the knowledge shared or produced by students in each group became available to every individual member of the classroom. The contribution of all of the course participants made these discussions more rich and relevant to the interests and objectives of the class (community) as a whole. This was demonstrated itself in the progressive coordination in students' collaboration and engagement in ongoing classroom activities. In fact, the teacher's role in the coordination of activities played an essential part in establishing mutual interest or common ground as a necessary element for engagement and collaboration of community members (Gibbs & Mueller, 1990). In the course of time, the face-to face communicative encounters between individuals helped shape their community, its rules of conduct, social behaviors, rhetoric, and culture. One of the cultural tools I analyzed that facilitated the richest communication in this classroom community was story-telling.

Story-telling as a source of communication and knowledge production

In communities of practice, stories tend to be the most important means by which knowledge gets to be shared (Orr, 1990; Roth & Bowen, 2001). This turns out to be the case in the present study, so story telling is an integral feature of quasi-communities. A large portion of knowledge and competencies shared by the course participants was not explicit or in the form of abstract knowledge but as articulated personal experiences in the form of stories. These narratives were expressions of knowledge and competencies in the contexts where they were developed. For example, in one instance where the teacher

expressed a series of angles to be memorized by the students for solving one type of problem, some of the students showed concern:

> Mark: Do we have to know all of these?
>
> Teacher: Yes, Uhum, I think they are all in your manual.
>
> Kate: Do we need to memorize these special angles or is it just something that we should sort out?
>
> Kim: It's pretty easy angles to remember. It's 3, 4, 5 at 26.25 and the other ones are 1, 1.
>
> Teacher: ya.
>
> Kim: If you like 26.25 angle one, that's the one that we (marine) carpenters use all the time to square the stuff up. So when it says beam distance that would be a 3, distance run would be a 4, that's the bottom line would be a 4 and the hypotenuse is 5…so you can do that to measure up 3 feet one direction, 4 feet another and the points join at the 5.
>
> Kate: Yah, its a nice way of remembering that.
>
> Kim: That's a 3, 4, 5 triangle and then the 90 degrees triangle one; there is just the one-one, right? And the hypotenuse is there….
>
> Teacher: So…and what's the slope of the roof?
>
> Kim: 5, 12.
>
> Kate: Interesting.

These narratives are cultural tools that contextualize the knowledge through the prior experiences of the participants (e.g. carpentry onboard ships). The stories' contents were related to the classroom community's concerns and the problem at hand. These stories ameliorate students' understanding of the problem as they could relate the problems to

real life contexts. These narratives engage course participants in collaborative discourse, which form, maintain, and reproduce a shared repertoire (Brown & Duguid, 1991). The shared repertoires are imperative for development and dissemination of the communities' knowledge and problem solving ability (Wenger, 1998). The knowledge conveyed in the form of stories was better understood as the stories expressed knowledge as it is developed in the context of practice. For example, in a problem solving session, a course participant asked the teacher what they should do if in real-life, onboard a ship, the process did not go the way it is expressed in the exercise. In response the teacher initiated a conversation by articulating the idea and encouraged the others, who had experience relevant to this case, to bring about their competencies and share them with the rest of the course participants. The original exercise was designed for a local waterway area well known to the participants. This allowed the students to be able to relate to the context and those who had similar experience to afford sharing their competencies.

> Teacher: Umm…turn toward the tide to take another direction and hopefully, you know, it'll change because …you can imagine you're dragging something along, you know 1 or 1.5 knots, what's gonna happen. No matter what's gonna happen, you are over here (pointing to the drawing on the board)…so….
>
> Murray: Once you drop the anchor, it's all gonna change.
>
> Teacher: That gotta be quite an anchor.
>
> James: Ya, the anchor wouldn't hold along.
>
> Murray: Yes, it would probably.
>
> James: No, probably get your anchor off.

> Teacher: Ya, but it's a good way to lose your anchor when you are in a hurry…so try to find a beach to lean on…ya, if not you are lost, well….

Here the teacher allowed the participants to elaborate on their expertise for the rest of the class, but at the same time he acted as a manager and guided the students' conversation. For example, here, James had previous experience with anchoring in the area for which the problem was designed, and as a result, his experience was more relevant and applicable to this context. By supporting James's suggestion, the teacher legitimatized James's expertise and his related competencies. At this moment, there were small talks and discussions among the course participants. Most of the students were paying attention by orienting toward James, and after some moments:

> Kate asked James: What do you do to just lay her? Lay the toe on the beach and then stay on the tide or something?
>
> James: Ya, [Teacher nods as a sign of confirmation] find a beach that is straight up, like, as possible [Teacher: ya] on low tide so it doesn't get caught on the rocks.
>
> Kate: Okay.
>
> James: Just throw a beach line to the biggest tree you can find.
>
> Murray (toward James): then you tie off the toe and wait for the tide?
>
> James: Yes.
>
> Mike: Tie off the toe?
>
> James: Uhum, ya, it's better to use the ones on the outside.

This conversation continued for a length of time. James's expertise is manifest in this enriched conversation, which in turn afforded competency development and community promotion. This issue was stated by the interest of one of the students, promoted by the instructor, and developed by a quasi-community member who is an expert in the topic at hand (James). As the discussion was related to the topic of interest of students, most of them as community members participated and engaged in the discussion and competency development process. During this discussion James, as the expert on the problem at hand, became the center of attention and took the role of a teacher. The praxis allowed the community members to be aware of the expertise of one of its members, in that specific field. The conversation developed a cumulative knowledge for the community and a memory that members could draw upon for solving their similar problems. My observation showed that the course participants returned to James on different occasions when they needed related expertise and competency.

In the above example, the teacher designed an exercise in the context relevant to the course participants' experiences. He then provoked the students' participation, discussion to utilize the participants' expertise in solving the problem. As the students engaged in the process, the teacher's role was to facilitate and coordinate the collaborative activity. He played his role as an expert by guiding the discussion and supporting the appropriate contribution of members. The teacher provided an open space for the students to share their knowledge and, by doing so, allowed the community to be aware of its members' competencies.

Narration in the form of sharing expertise played a key role in facilitating communication among the members. The relatedness and quality of the stories also to

some extent bestow storyteller status and hierarchy in the community (Orr, 1990). In the above fragment, James, who had worked in the tugboat industry, had many opportunities to travel through the passage used in the exercise. Additionally, because of the nature of his industry, he had varied experiences in handling emergencies of the sort that the students were discussing. Expressing his experiences that are rare in other sectors of the marine industry made him a master, expert, and valuable resource for developing this specific type of competency.

During the course of my observations in the class, story telling gained legitimacy and became part of the community rituals. I observed that these narrations eased communication, motivated the course participants, and played an important role in facilitating their participation. In many instances, the stories afforded the students to cultivate authentic and relevant knowledge, which could have been very difficult to develop by mere participation in the course. The story telling gradually became legitimized and amalgamated to the pedagogy as the teacher also shared his experiences in the form of anecdotes and stories.

In the quasi-community I observed, the stories were not generally iterations of an occurrence, which happened earlier in the community. The function of these narrations was not the verbal reproduction of the knowledge that had been developed by the old-timers in the community in order to be transferred to the novices and newcomers. In fact, they were a form of participation in the activity and thus a source of membership legitimacy. This sharing of expertise was the contribution of the members of a newly developed community to its growth. In this quasi-community, these narrations allowed for legitimacy but not so much the production of a hierarchy. The quasi-community did

not function based on conventional hierarchical relations, at least on a permanent basis. The hierarchy, if any, was momental and task oriented rather than structurally stable. As it is observable in the above example, the hierarchy in the quasi-community was dynamic and shaped by its members as they act and interact in everyday practice of their classroom community. The dynamic structure of the quasi-community allows for participation of all of the members with their varied levels of expertise.

Tests as a mediating practice for community development

A community constitutes itself through the activities in which its practitioners participate (Lave, 1991). In the quasi-community, the course activities should mediate its members' collective motive. The pedagogy has to design activities that encourage course participants to invest in the collaborative practices that allow them to develop competencies related to their objectives. Appropriately, (as in the course presented here the success in the certification examination was the collective objective/motive) as the course progressed, working on the tests similar to the certification examination became the central activity of the course and one of the most important components of the pedagogy. The tests in the course were not intended to grade and rank the students but to facilitate participants' competency development for success in the certification examination. The participants were developing this competency through participation in the practice (i.e. attending similar exams). At the same time, these tests were instrumental for the instructor and for the students to assess their progress toward the targeted competency. The results of the tests had no effect in the final evaluation of the students, which was going to be performed by certification authorities. My analysis showed that the course participants judged the testing practice as a legitimate part of their learning

processes as it was supporting them to reach their objective. This is in sharp contrast to common school practices where examinations provide a tool for ranking students and a means for reproducing hierarchy (e.g. Foucault, 1979). The testing practice in the course redefined the conventional power structure in schools. Here the teacher shared his hierarchical and historical power in the classroom with the students. This empowered the learners and gave them a sense of ownership of the activity. For the participants, this change in the power structure transformed the role of the teacher from an authority to a valuable source of knowledge and expertise. The class was able to utilize the test results as a valid indication of the progress toward their objective—i.e. competency in success in these types of tests.

Students' contribution to the pedagogy

The pedagogy in a quasi-community is the co-production of the community members. The members' common objectives and needs have to be casted into the community's activities. Consistently in this study the teacher's practice and the way the course participants engaged in and directed the activities to serve their objectives allowed them to collectively co-produce the pedagogy. For example after each test the class reviewed all of the questions in the test. The teacher read through the questions one at a time and for each question asked one of the students to provide an answer. He then encouraged the remainder of the class to contribute by discussing and evaluating that answer. The process gave each member of the class a chance to participate in the practice and show their related competency and then allowed the rest of the community to evaluate and also contribute.

My observations yielded an interesting phenomenon in that the course participants were not only interested in knowing the correct answers to the questions but also concerned with the types of answers the certification examiners expected. The following is a fragment from an exam review session during the third week of the course. After the class discussed one of the questions and agreed on the answer, and before going to the next question, one of the course participants asked:

> Len: So, what would a run like that worth on the (certification) examination?
>
> Teacher: Like he just wear off? I think it's four on that one.
>
> Len: Is that four?
>
> Teacher: Yea, but it's a four if the other two are complete.
>
> Mack: So what do you need to get four 4 marks? I mean you need to list every…
>
> Teacher: Arc of visibility, umm and you need to know the ranges…
>
> Mack: You need to know the ranges?
>
> Teacher: Uhum (yes).
>
> Katy: So if we put arc of visibility and where it is, we get two (marks)?
>
> Teacher: yeah, you probably get two out of four.
>
> Morgan: what about the color of light? Is it going to get any points? …

This fragment is an example to show that the class community had consent of orienting the activity toward their common objective. They participated in shaping the pedagogy not only by making the test a legitimate part of the practice but also by fine-

tuning the process to meet their objective. Here, the community members collaboratively co-produced the pedagogy that allowed them to develop competency and an understanding of the marking criteria of the certification authorities. At the same time, the praxis allowed the students to draw on the teacher as an expert and resource for leading them to develop the type of competency they need to pass those tests. The development of the pedagogy in the quasi-community is a dynamic process and continues throughout the course. Its progressive development is situated in the evolving context of the course. The emerging co-produced pedagogy in this course promoted students' participation and facilitated the co-development of their quasi-community.

Additionally, the exam reviewing activity allowed the course participants to contribute to the teaching practices of their classroom. The teacher required each student to provide an answer to a question and then the rest of the class discussed and evaluated the answer. This process asked the course participants to be engaged and actively contribute to the teaching/learning activity, by acting as a resource in providing the answer or by asking inspiring and productive questions. In this quasi-community, the participation and learning were one and the same, and knowing was progressively developed by legitimate participation in the activity. The praxis allowed the assessment process to go beyond the mere evaluation and evolve into a learning process.

Sense of belonging to the community

Although the learning needs alone might be strong enough to attract students to the activities, it may not be enough to retain them. It is the social interaction and sense of being part of a community that keep them motivated in their participation (Ashar & Skenes, 1993). As the course progressed, the participants' progressive collaboration

resulted in the development of a sense of belonging to their community. There were many instances when that the course participants admitted to this fact. For example, at the end of a test reviewing session where students collaboratively participated in answering a series of questions, the teacher marked their answers and mentioned:

> Teacher: 100%. Congratulations (then all the students clapped and cheered)
>
> Tim: We are all courageous; no one was going to do it alone.
>
> Students collectively: ya ((laughing)).
>
> Teacher: Your collective consciousness is 100%.
>
> Mack: Yes. We are a team.
>
> Students collectively: Ya, ya

Here is an example where the students represented themselves as members of a team and a community that encompasses all of them. The pedagogy facilitated collaborative works of students and afforded a sense of belonging. The students' sense of belonging was necessary for them to value, be motivated by, and fully participate in their community's activities (Finn, 1989). The requisite of a community goes further than a shared goal and participation in a common practice. In fact, research suggests that there should be an interdependency where individuals become part of something larger than themselves (Barab & Duffy, 2000) and be a team member. In my study, the course participants worked together as a team within the context of the course and became interconnected. The teacher's facilitation for all of the students to take part in team-work and collaborative classroom activities was important for the membership of all the

students in the quasi-community. Here, the students' learning can be viewed as collaboration and engagement in the process of developing a sense of belonging to their community.

Bringing the expertise into the open

One of the main features that determines the effectiveness of knowledge sharing processes in a community is for the members to know and be aware of the other members' knowledge (Cross et. al., 2001). Community members' lack of awareness of their peers' knowledge and competencies is one of the barriers in nurturing communities (Lesser & Fontaine, 2004). Quasi-community promotes knowledge sharing through brining into the open the knowledge and expertise of its members for others. The pedagogy— including teacher's practice and students' participation—should make available each member's related expertise for the rest of the community. Referring to the test review example, the teacher asked all of the participants in turn to participate in the activity. Students contributed to the activity by answering questions; by complementing, confirming, or correcting answers; and by showing appreciation for the contributions of their peers. Through this practice, the students collectively participated in the development of their quasi-community's expertise. The following is a typical example:

> Teacher: Question 8. Masthead-light. Umm, Tom, what is a masthead-light?
>
> Tom: It's a white light, placed in fore and aft line… showing an unbroken light from right ahead to … 22.5 degrees abaft the beam…
>
> Teacher: Uhum, on each side? [ya] Any idea of the range?

Tom: Umm depend on the length of the vessel. Umm…

Teacher: Uhum, it's?

…

Katy: 6 miles

Dan: over 50 meters is 6 miles, 50 to 20 meters is 5 and 20 to 12 meters is 3 and for vessel less than 12 meters in length is an all round white light …center line…

Teacher: Boy you well handled that one. [students start cheering] what a …that was….

Dan: I read this yesterday.

Mack to Tom: Are you jealous of that? (laughing)

Teacher: You jealous?

Students start laughing…

Teacher to Dan: That's pretty good.

Kim: It seems you already knew that.

Teacher: Ya that's good.

Len: That's a nice one.

Mack: Ya, that's a good one.

Katy: Well done.

One of the important effects of questioning all the students in turn was to bring about a possibility. It is evident from the above fragment that the participation of students in the practice and sharing their knowledge not only allowed them to evaluate their own expertise—by receiving instant feedback—but also provided possibilities for their peers to know about the expert. This was one of the affordances brought about through the test-reviewing practice. By asking each individual student about a certain question of the test,

the teacher gave students their opportunity to demonstrate their relevant expertise. Members were encouraged to elaborate on their respective knowing and competencies regarding the testing activity. Students had many chances to evaluate their peers' knowledge and skills related to the objectives of the community. The classroom members showed their appreciation for those peers who demonstrated and provided the community with its required competencies.

The practice made visible each member's relevant knowing and competencies, which was used as a resource for the rest of the community. Without the practice, these resources might have remained hidden or taken a longer period of time for the rest of the class members to discover. I observed that the awareness of community members of each other's knowledge and skills provided possibilities for the members to turn to their peers whenever they needed. This afforded effectiveness of knowledge sharing processes by bringing into open the competencies of its members in a relatively short period of time. I was able to observe that the possibilities provided by the practice eased the communication and facilitated the collaboration in the classroom quasi-community.

Affording a culture of problem solving

A quasi-community promotes the culture of problem solving and allows the students to develop their own situated problem solving methods. Analogously, at the later stages of the course, the pedagogy asked for the class to work on the final chart-work problems and related sample certification examination. These written exams, which included drawing and the use of specific tools on the marine charts, were analogous to the competency examination that the participants were preparing to attend. While working on the sample examination questions, the teacher initially provided the course participants

with the answers to different sections of each question. In so doing, the emphasis of the students' activity shifted from finding the answer to developing a valid process for discovering the answer. The teacher encouraged the students to focus on developing possible methods with which a problem might be solved. He resisted the request from the course participants to provide a template for solving each type of problem. Instead, he supported them to develop their own templates. There were constant collaboration and knowledge sharing between peers. The participants produced their templates with the use of resources, tools, and knowledge available to them in the culture. The teacher then encouraged them to compare their templates with others to appreciate the fact that a problem can be solved using different approaches and methods, thus promoting a problem-solving culture and critical thinking.

The pedagogy of the quasi-community promotes the culture of problem solving by encouraging students to aim at developing the situated processes of problem solving rather than solely replicating the existing method of solving problems. This practice is distinctive to some extent from apprenticeship in communities of practice in which the practice is limited to expert's modeling and apprentice replicating the practice, thus bound to the reproduction of the culture (Collin, Brown, & Holum, 1991). In the example above, through diversifying and augmenting the practice, the pedagogy afforded to go beyond the mere reproduction of the culture. Encouraging students to generate their own problem-solving methods provides the possibility for the learners to be creative and conscious members of their domain. This allows the community members' agency to expand beyond what is available through conventional apprenticeship. The practice promotes students' contribution to the cultural development of their quasi-community.

By enculturation through this activity, the participants develop the problem-solving competencies through appropriating their own situated solutions. Moreover, the practice of students producing their own rubrics and problem-solving methods allow them to develop ownership of their learning.

As one of the objectives of the course participants was the success in the competency examination, the practices related to the test dominated the learning experiences and motivated student collaboration and community development. The competency in providing appropriate answers to the certification examination questions required an expertise that the students developed by participating in a similar practice. As the course progressed, the students became competent in answering these types of tests. Their competencies related to success in these types of tests later became evident in the students' very high success rate in the certification examination that they attended at the end of the course.

Discussion

The research presented in this chapter showed how a group of adults in the process of becoming certified practitioners attended a formal educational setting, developed a community, and succeeded in reaching their objectives. I analyzed how the pedagogy motivated them to engage socially, realize their common objectives, and pursue their joint enterprise and create a quasi-community. Praxis actively promoted the creation and cultivation of students' community in the classrooms and created an environment in which the participants were provided possibilities to develop new competencies. In this chapter, I discussed how the quasi-community pedagogy can be co-developed through the teacher's practice and the students' participation.

The type of community created in this formal educational setting cannot be considered to be the same type as defined in the original concept of the community of practice introduced by Lave and Wenger (1991). I proposed the term *quasi-community* to differentiate between the community of practice and communities of the kinds that I introduced here. The concept of quasi-community emphasizes both similarities (community) and differences (quasi). For example, the difference between core and periphery is realized differently in the quasi-community of formal adult educational settings. In a quasi-community, any of the members can act as an old-timer (expert) in one instance and as a newcomer (trainee) in the next. I viewed old-timers as those who have more experience with the task at hand and contribute as a resource for achieving the objectives of the community.

Memories are the other important aspect of the life of communities. They constitute the culture (rituals, routines, and common knowledge) of that community and emerge as members engage in practice. These collective memories allow the practice to outlive any single individual and become the property of the whole community (Roth & Lee, 2006). These types of memories develop through the life of a community and are visible in any authentic community. School classes tend to be deprived of these memories, as at the end of each year for administrative purposes classrooms disassemble, leading to the disappearance of their collective memories. (Memory, however, exists within the staff community, as their membership turns over only slowly.) Nevertheless, as my study showed, praxis may allow the classroom community to bring about and develop its own collective memories. I discussed that in a quasi-community, these memories constitute

the members' collective related experiences, expertise, and knowing that they bring to the community.

My study showed that in the context of this course, the absence of end-of-the-course evaluation and grading by the teacher played an important contributory role in the success of the quasi-community. The lack of anxiety of being judged by the teacher grounded the absence of the conventional power relation between the teacher and the course participants in the classroom. This afforded the teacher to play his role as a resource, facilitator, and manager rather than as the only authority. There was no comparison between participants as the result of course assessments, thus students viewed each other as resources, not competitors. This in turn promoted the development of interpersonal communication, which was vital for community development. It was not in the focus of this paper to discuss the effects of conducting assessment by a third party, but in the context of the case that I presented, this approach facilitates the formation of an activity system that afforded the participants' authentic learning. The teacher utilized the assessment as a means to allow students to develop the competencies they needed and to authentically evaluate students' progress throughout the course.

This study demonstrated that in adult formal educational settings, a motive is created when a common goal emerged for learners to work collectively to accomplish success. Through the practice, course participants consciously realized their objectives and were motivated, so they fully participated in the course activities. Put differently, course participants and teachers find themselves legitimately drawing on one another by a force that is both social and professional, a force that mediates instruction and learning. My

study showed that if praxis affords, classrooms can (at least) be authentic quasi-communities.

CHAPTER 8: Quasi-community: a Novel Framework for Adult Technology Education

Today's advanced technology and rapidly changing work environments precluded many authentic learning opportunities that traditionally existed. The use of technology and automation makes invisible both the work processes and the cognition of practitioners while working with the technology. This leaves limited visible traces for the trainees to learn the job only through traditional apprenticeship and on-the-job learning. Current adult and vocational education and training theories do not adequately address this phenomenon's inability to meet the demands of today's practitioners. As a consequence, new learning and curriculum theory need to be developed for the novel context. In the previous chapter, I introduced the quasi-community as a conceptual framework for theorizing the teaching and learning of adult practitioners in formal settings. The purpose of this chapter is to provide empirical evidence that this concept can be used as a distinctive framework for theorizing adult technology education.

Introduction

The value of workplace learning and experiences with authentic instances of occupational practice has long been known by practitioners (Billett, 2010). Apprenticeship, until recently, was the most common means of developing competencies for work (e.g. Hutchins, 1995). Indeed, currently many trades and professions, like the one that I studied, included an extensive period of practice in the workplaces as a mandatory component of their training programs. Apprenticeship training fosters learning skills and competencies in its social and functional context. It relies profoundly on the

trainee's observation of experts' performance and the processes of work (Lave, 1991). Through peripheral participation, beginners under the supervision of an expert engage in the practice (Lave and Wenger, 1991). This allows the apprentices to gradually develop various elements of the disciplinary knowledge, skills, and competencies.

In recent decades, workplaces have continually undergone environmental changes. These changes were induced mainly through the introduction of information technology (IT), electronic tools, and automation. The introduction of these new technologies have changed the way that the work is performed, which in turn resulted in a change of context, culture, and practice in most of today's workplaces. These new technologies beget a critical feature to workplace learning. As workplaces become increasingly organized around IT systems, the tendency is for disciplinary knowledge and mathematical processes to become hidden or less visible when they are performed by the new technologies (Bakker et al., 2006). The work procedures and the mental processes of operators while working with the sophisticated instruments tend to be invisible for newcomers. Consequently, new technical work environments provide limited resources for the apprentices to observe and understand practice and thus hinder the development of the required competencies. To put it in Lave and Wenger's (1991) terms, apprentices might be able to legitimately participate in their community of practice in the workplace, but they do not have access to the work as authentic peripheral participants. Thus, the apprenticeship system and on-the-job training alone are unable to fulfill the training requirements of the newcomers in technological workplaces (e.g. Saljo, 2003). This implies that technology education has to rely on the training institutes to provide the learners of new workplaces with the competencies they need.

Currently, technology education is integrated into conventional education and training systems and treated as such. Recent theories of learning and cognition provide evidence that the present schooling system is not able to provide trainees with the ability to develop and then transfer the required conceptual knowledge and competencies to their workplaces (e.g. Chaiklin & Lave, 1993; Bransford & Schwartz, 1999). Furthermore, the introduction of the new technologies demands education to take a new direction, which needs to be vastly different from the current view of education that pervades the culture of schooling (Collins & Helverson, 2009). There is a need for a novel epistemological approach to education in order to accommodate the learning needs of current and future technological environments.

In chapter 7, I presented the concept of quasi-community as a novel framework for theorizing knowing and learning in adult and vocational education. In this chapter, through an exemplary case study, I present a successful technical course that used a method following the principle analogous to the concept of quasi-community for teaching technology to a group of marine practitioners. I feature some of the elements of the quasi-community that are relevant to technology education and demonstrate their implication in the teaching and learning of practitioners in formal technical education. My study of the nature of learning in these communities afforded an insight that allows the enhancement of adult and vocational learning in the context of technology education and fills the gap in current theories and literature.

Quasi-community: A novel theoretical framework

One of the distinctive characteristics and essential features of traditional apprenticeship is the availability of the process of work for the apprentices to observe

(Collins, Brown, & Holum, 1991). There is a transparent relationship between skill, its use, and the result of its application. The visibility allows the newcomers to establish an understanding of the practice by observing experts at work. The same principle also makes available the application of the skill by the apprentices for the expert to monitor their learning and diagnose if there is any misunderstanding of the concept and/or error in the application of the skills by the learners. Recently, the introduction of technology in workplaces challenges this feature. The use of technology and performing higher-order cognitive skills are some tasks that are more internalized and do not leave visible clues. As applications of this kind of knowledge are mostly through cognitive activities, learners are not able to visually observe the application of the knowledge. Likewise, experts are not able to assess the apprentices' progress, as they have no access to learners' cognitive processes when learning technological skills and their applications. An alternative approach is necessary to provide newcomers with the theoretical and conceptual knowledge that cannot be developed through the traditional apprenticeship process in technological workplaces.

The situated and socio-cognitive theories of learning at workplaces, such as communities of practice (Lave & Wenger, 1991), provided us with an insight into the elements of traditional apprenticeships and the processes of adult authentic learning. These practice-based accounts of learning view knowing and competence as a social phenomenon as opposed to a distinct feature of individuals. In recent decades, these principles of learning processes in their natural settings have been inspiring educational researchers to develop conceptual frameworks for theorizing learning in formal educational settings. Concepts such as community of learners (Rogoff, 1990), cognitive

apprenticeship (Collins, Brown, & Newman, 1989), and knowledge building communities (Roth, 1998a) revolutionized the educators' understanding of learning processes and how they can be realized in formal settings. Unfortunately, the focus of most of these theories is on understanding learning as it is realized in children and young adults. As a result, current theories tend to overlook the needs and characteristics of adults and vocational practitioners when engaged in formal learning (Niewolny & Wilson, 2009).

Adults attend schools to achieve specific objectives, which allows them to have a greater control over their lives. They are motivated to learn when they realize that learning will enable them to solve problems and perform tasks that they confront in their everyday life activities (Knowles, Holton, & Swanson, 2005). They value their own and others' situated knowledge and are willing to share their experiences with, and learn from, others. Adult learners are problem-centered and interested in relevancy and immediate application of the knowledge they are learning (Knowles, 1980). To address these characteristics in the educational domain I have developed and, in the previous chapter, introduced the concept of *quasi-community* as a framework for theorizing adult practitioners' learning in formal settings. In this study, I focus on and highlight the aspects of this concept that enables learners to develop the competencies needed in today's technological workplaces.

Derived from my ethnographic study, I theorize learning as membership and co-participation in a quasi-community developed by its members. In this framework, the classroom is a venue for a group of adult practitioners to collaborate in order to reach their common objectives, which in turn serve as their collective motives. Quasi-

community is the term I chose to represent this type of community. Here, members encompass the entire group of course participants including the teacher. The teacher in this community is a facilitator, the manager, and an expert who guides the community to reach its goals through collaborative learning. The objective is to create an interactive environment for the participants to share their expertise and utilize the available cultural resources. This is a dynamic and evolving environment that creates an inviting space for adult students with different levels of academic and intellectual achievements and a variety of work expertise and experience to participate in the process of development of their own knowing and learning. The quasi-community questions the conventional cultural ways of education and promotes the diversity as a means to enrich the practice.

Unit of analysis

For every theoretical framework, the assignment of boundaries of the unit of analysis has important implications. In the conventional view of cognition, the individual forms the boundaries for analysis. However, recent cognitive theories show that the cognitive processes are not bound to the boundaries of the person, as different types of coordination and relevancies exist between the person and his/her environment (e.g. Cole, 1991; Lave, 1988; Pea, 1985, 1987). Extending the unit of analysis beyond the person brings into light the other relevancies that affect the cognitive processes pertinent to cognition and learning (Hollan, Hutchins, & Kirsh, 2000). In recent situated theories, such as communities of practice and distributed cognition, the focus of attention is respectively the community and the small sociotechnical systems—for example, the bridge of a ship– where the actions and interactions take place (Hutchins, 1995). The quasi-community extends the unit of analysis further than the classroom and its community to include the

activity system where the participants crossed its boundaries to come to attend their formal education.

Quasi-community's structure

One of the main contrasts between the quasi-community and the original concept of community is the hierarchy and distribution of expertise. There is no permanent structure in the quasi-community as there is no core that the peripheral members move up to. This is essential, as in informal education the renewal processes of the community—where the new members join while the old timers leave—do not exist. At the start of each course, all members join, gradually create their quasi-community, and leave at the same time when the course adjourns, leading them to end their community.

The expertise in this community is dynamic and distributed among members. The mastery is a dialectic relation between members at the time of problem solving. Any member has the possibility to be the master by providing the expertise needed to solve the problem at hand. Here, the teacher's role is not the delivery of the knowledge to a group of wonderers who have no experience and are ready to receive whatever the teacher transmits. The teacher is a manager, facilitator, and resource who coordinates the activities and leads the community members toward their objectives. The objective of the community is a product of negotiation between its members (course participants and teacher).

In this chapter, I expand this theoretical concept beyond what I have already presented for adult vocational education in order to count for the elements that are relevant to the development of technological competencies. I show how the quasi-

community is highly suitable for and in praxis and provide a framework for analyzing the learning possibilities in adults' formal technology education and training.

Method

The technology course featured in this chapter, for exemplifying purposes, is part of a package offered by the training institute for the candidates of the maritime certificate of competency. The course length is limited to 120 hours spread over four weeks. The course participants were from different sectors of the maritime industry and have diverse work experience onboard ships as crewmembers. Fifteen mariners participated in this course, 12 men and three women, with a wide age range. In order to advance their rank to navigating officers, they were seeking to obtain the related certificates and as a result they attended these courses. The course participants were adult practitioners with varied expertise who attended the course to develop the competencies they required to perform proficiently in their technological work environment.

Context

In this chapter, I present a case study of a technology course entitled Simulated Electronic Navigation (SEN). The course objective, as mentioned in the curriculum, is to provide the participants the knowledge and skills in the use of electronic navigational equipment onboard ships—e.g. RADAR. This course uses real and simulated equipment as resources and teaching tools to provide mariners with technological skills and competencies they need to operate the equipment in their workplaces. Expertise in the use of these domain-specific cognitive tools plays an essential role in what is defined as a competent practitioner in today's technological work environments (Kim & Reeves,

2007). The course has been developed and delivered by an instructor who is also a competent marine practitioner. Although he is an academic, he never distances himself from marine professional practice. He continues his career as a mariner by working onboard ships for a few months every year. He constantly modifies his teaching methods based on his experiences as a mariner and an instructor as well as the feedback that he receives from the industry. As he noted:

> I deliver a course that is up-to-date based on practices today from what I experience when I go back to sea during summer.

He is well known for his effective teaching methods and expertise. This fact was evident in the course participants' interviews as one of them pointed out that "Ian is a fabulous instructor. Probably the best I've ever had." Or as another participant mused:

> Teaching methods are great. Umm, who can find anyone better than Ian?! You know he is absolutely passionate about the marine industry. I've nothing bad to say about the man, you know. I couldn't even if I tried.

The following excerpt is from one of the participants who traveled a long distance to attend this course even though she had other opportunities in her hometown:

> -ya umm … I attended it because … umm … I had a friend that did it here and highly recommended the course and the professor.

The teacher had gained his reputation through many years of dedicated work and continuous refining of his pedagogical practice. As a professional marine instructor, he had a great sense of responsibility for the success of his students. For him, "a learner is somebody we want to be successful, not somebody that's as wishy washy and good walk, you know, we want these people to be successful." When I approached him about my research project, he was very cooperative and willing to participate; he mentioned, "I think it is a great idea what you are doing… I see a definite mutual arrangement that we can reach and of course it can help me improve what I do, as a bonus." During the research project's data collection and analysis periods, I as the researcher had productive collaboration and regular meetings with the program leader, course designers, and instructors of the college. We normally discussed the teaching practice and my research results. The course instructor later mentioned that his pedagogy and teaching practice greatly benefited from these discussions.

Collective approach to learning

Quasi-community is based on the premise that learning is a social phenomenon and can be realized through collectivity. In this study of marine practitioners, the collective started to form when the course participants agreed on their communal objectives. This course was the last course of a training package offered by the training institute for the mariners who were applying for a marine certificate of competency. The participants of this course had already taken part, as a group, in the rest of the courses offered in this package. The consented common objectives of the participants and the effective pedagogy in the earlier courses allowed the classroom members to establish efficient

communication and productive collaboration. This allowed them to form and maintain the quasi-community of their classroom (please refer to chapter 7).

For this technology course, the participants were conscious that they had a common objective. They all aimed to be competent practitioners in the technological environment of their workplaces. The teacher was attentive to the course participants' shared objectives and reflected that in the pedagogy and the course curriculum objectives accordingly. The course participatory pedagogy included group work and collaboration of all the members of the class. The students were engaged in different aspects of the teaching and learning activities. In the following sections, I discuss how the communal objectives for this course emerged and thus motivated the course participants. I elaborate on the successful pedagogical approach of this quasi-community to the teaching and learning of technology education.

Participants' communal objective

The use of technology is a significant feature of the mariners' everyday life at work, and for them developing competency in the use of electronic equipment is a necessity. Katy mentioned:

> We (on our ship) use RADAR a lot; that's our primary source of navigation; the RADAR… we always, always have a RADAR on, always navigating with the RADAR, always.

Although working with the electronic equipment was not part of their duties at that early stage of their career, working onboard ships allowed them to be in touch with and

observe the masters and senior members of their community while working with the technology. The fact that the nature of technological systems hides the processes and prevents the knowledge and expertise of their operators from being available for others to observe resulted in the limited development of competency of these mariners in working with the equipment. Accordingly, they did not develop a knowledgeable understanding of the way the system works even though the course participants had many chances to "see glimpses" and were sometimes allowed to replicate what the experts had already been exercising. For example, Mike, one of the course participants, stated:

> The stuff that you hear about by the time you work on deck, even as a quartermaster, you get to see glimpses of it. But you know, I've done a little bit of stuff on RADAR, parallel indexing, things like that but…if I had a stronger base out there, this would have been a lot easier for me. Because I've struggled through lots of this, you know… I wish I had been shown how to do a plot on a RADAR on the ship.

They felt the need and "struggled through a lot" to understand the process and to be able to utilize and operate the technology as it is the main component of their job and the current culture of their workplaces. Consequently, they were motivated to learn and develop these required competencies. This is clear when Mike pointed out, "I wish that I'd known the difference between, you know even like the basic principle stuff, you know… relative, true motion." Additionally, there were technologies that had been recently introduced to the industry, but the participants were not familiar with their

operation and would like to develop the expertise in operating them. One of the students said:

> Umm you know, like Nobelteck I've never been on a ship that they didn't have it, I don't know how to use it, so…I needed some point between now and signing up to a ship as an officer to familiarize myself with the stuff that is being used today in there, …

The above excerpts are examples that show the course participants had common and clear expectations for attending the course. They were determined to develop competencies they needed for their future jobs. The common objectives were essential for their community development (Lave and Wenger, 1991). The communal objectives provided inherent motivation, which is a driving force for the learning of the members and thus thriving of their quasi-community.

Accommodating elements of authentic activity

Adults pursue learning activities when the outcome is applicable to their life situations (Knowles, 1994). For them, learning is a by-product of the pursuit of their objectives that are aimed at the expansion of their action possibilities (Roth & Lee, 2007). In the quasi-community, the objectives reflect the members' needs and the goals they want to achieve. In the course I featured in this study, the marine administrator—the certificate issuing authority—prescribed the original curriculum and the elements that should be included in the course. The bureaucratic nature of the certification system constrained the regular updating of the curriculum by the certification authority. To accommodate the students' needs, the teacher continuously modified the course content.

He kept the curriculum up-to-date by including elements of the current work culture. For example, one of the main pieces of equipment that was not part of the original curriculum requirements but recently became part of the practice in most of the ships was ECDIS (Electronic Chart Display and Information System). As the teacher mentioned, "there is no legislative requirement for them (the course participants) on how to use the ECDIS but chances are there, for them on a ship today, they are going to have one." This machine plays an important role in today's marine practice and the course participants, as any other mariners, are aware of this fact. As one of them on the second day of the course pointed out by showing his concern:

> Mat: so the ECDIS isn't actually scheduled here (the syllabus)? Is it just we have to find some time for it along the schedule?
>
> Teacher: No it is not in the syllabus in this course but it is in the schedule. It is on the 28th. What is in the syllabus, which I have not put into this course, one thing, which is in the syllabus, is DECCA navigation. I refuse to teach that. There is only one DECCA system that I know is operating… it's in the coast of India [students start to laugh]. The chances are, you're going over there but you have a GPS with you…. and the principle of DECCA is basically the same as LORAN C so when I teach it I teach it in a way that covers that so its electronic principle is already covered.

Contemplating the students' common objective and being attentive to their needs is one job that a community manager should do to improve the integrity of the community (Scheffert, 2007). As the above excerpt shows, the teacher aligned the course content with the course participants' objectives and current workplace practices. He assured the

participants that he adjusted the course objectives for the parts of the syllabus, which is not compatible with the current practice of the domain. He managed to include all the technology that is in use and considered an important part of the marine culture. As a result, the objectives of this technology course have mirrored the students' common objectives of gaining competencies relevant to their technological workplace. This promoted internal motivation for the participants to get engaged and learn as they realized that their objectives were met in the pedagogy (Knowles, 1980). My observation shows that this practice also motivated the course participants to develop a sense of trust and respect for the teacher.

The Pedagogy: Laying the path

Adult learners fully engage in learning practices when they are able to correlate the outcomes of the learning activities with their personal goals (Atherton, 2003). For pedagogy to be successful, the participants' objectives need to be reflected in their everyday classroom practice. The pedagogy has to lay the path for the course participants to achieve their objectives in the trajectory of the course and through the daily practice of their quasi-community. In the course that I studied, the participants had a broad objective to accomplish. The teacher broke down the main objectives into meaningful, detailed, and achievable sub-objectives. He provided the participants with the proposed itemized course content and daily schedule. Early in the course, the class reviewed the detailed sub-objectives of the course and discussed the steps they may take during the course to achieve them. They conferred each step, its relation to the next step, and what resources were available to them to achieve each objective. In order to create a common ground and

to coordinate the classroom members' understanding of the scope of the pedagogy, at the start of the course, the teacher announced:

> One thing I will prelude this course … this is not a technical course. First of all, I'll be very clear I'm not an electrical technician. Okay. I am a mariner. I'm a user of this equipment and I have a good understanding of the concept of the equipment that I operate. With regards to going into the physics of how it operates or going to the physics of why things happen with regards to propagation (of waves) and equipment itself, I don't know. That's not the mandate of this course and certainly not the sort of knowledge that I have and I don't think it is the sort of knowledge that you are expected to have. We are users of the equipment. There is basic information that you need to know…

The teacher made clear the scope of the practice and the level of competencies the learners are expected to have. At the same time, he reminded the participants of his own role in the course and his position as an expert who is a member of the same community as the participants are, i.e. the marine practitioners' community. This promoted a sense of trust and relatedness of the course participants with the teacher. The teacher presented himself as an expert/mentor and a resource for the participants. He reminded the students the competencies that they are expected to have as a mariner on the job. Thus he reaffirmed what the participants needed to achieve through the *limited timeframe* of the course.

Limited timeframe

One of the differences between quasi-community at schools and the community of practice in workplaces is the timeframe. Economy of delivery of education constrains

schools by a time limitation. Timeframe is a key factor as it takes time for ideas to be explored and challenged through a collaborative process (Sylvester & Woodhead, 2003). Apprentices in workplaces normally have ample time to be engaged in the social context of their environment through peripheral participation and gradual development of skills. On the contrary, the students at schools have a predetermined schedule to meet. This limits the possibilities of social engagement and natural community development in a course. Quasi-community necessitates the pedagogy to provide extensive opportunities for social involvement of the participants in order to expand the possibilities for developing and sustaining their community in a limited period of time.

One of the methods that the teacher in my study adopted was to have the entire class engaged in one activity at a time and focusing on a single skill or sub-objective achievable in the specific timeframe. Commitment to achieve a particular objective demands a sharing of common resources that in turn improves members' communication and promotes their collaboration (Lave & Wenger, 1991). Analogously, the teacher arranged the agreed-upon sub-objectives of the course into a number of clusters. Each cluster was organized to be achieved by participants in approximately a single school day. Thus the students had a detailed schedule to manage their time for the skills and competencies that they were expected to achieve on a daily basis. These objectives were permanently available to the course participants in written form on a flip board that was placed in front of the classroom. The teacher reminded the students of the objectives of the day on different occasions and also prompted the course participants on how the topic that they were working on at that moment was related to the overall assigned objectives of the course. The process allowed the course participants to be able to manage their time

in respect to the overall length of the course. At the same time, concentrating the effort of all the members on a single activity increased the entire community's engagement and strengthened their mutual relationship.

Learning time-space

A pedagogy based on the quasi-community shall regularly provide the participants with open and informal non-teaching time-spaces. Open environments allow members to interact more often, discuss issues openly, update one another, and easily share the necessary information (Mattessich, Murray-Close, & Monsey, 2001). Interactions between peers in informal settings have been recognized to be one of the most predominant ways of learning (Boud, 1999). Analogously, the pedagogy of the course assigned some part of the everyday schedule as non-teaching sessions. In these periods, the course participants were given time, resources, and space to manage the development of their competencies assigned for the day. They had full access to the lab and technical resources including software, simulators, electronic equipment, Internet resources, and technical texts. Human resources available to them included the teacher as the expert (during school hours) and, more importantly, their peers. The possibility of personal selection of resources and methods for each learner provided opportunity for the possible demands of their varied learning styles to be met. As the course proceeded, the effectiveness of these learning periods encouraged the participants to ask for the extension of these sessions to afterschool hours and weekends.

My observations show that these time slots were the most engaging periods of the participants' academic life. During these periods, although they had access to a variety of resources, the most capitalized resource for the participants was their peers. Learners

tended to refer to their classmates more often than to any other resource available to them. Progressively, they relied more on each other as they shared their findings, knowledge, and expertise in these non-teaching collegial time-spaces. Another observable fact was the increase in the interaction among the participants in non-class hours, recess, and lunch breaks. Most of the time the participants spent their breaks in the classroom environment as they continued their tasks and discussions about their academic objectives. This pedagogy allows for the removal of bifurcation between formal learning and non-learning time and spaces in the course. These informal/non-teaching time spaces helped members to establish and strengthen the personal connections, which in turn allow for producing more effective and cohesive group-work. Through these interactive and collaborative efforts, they developed a stronger sense of engagement and belonging to their quasi-community.

Participation in the pedagogy

The pedagogy of the quasi-community is co-produced and performed by participation of the entire community. Providing opportunities for the students to collaborate in their teaching and learning processes will motivate them and stimulate their participation. This allows them to have a greater control over aspects of their lives' conditions and expand their action possibilities in personally relevant ways (Tobin & Roth, 2005). The quasi-community pedagogy promotes the dynamic participation of the students in their own learning. In the course I studied, this was partly realized in the contribution of all the students in the teaching practice. As the teacher announced early in the course:

> I'll be breaking you into groups… for you'll be responsible during the day, coming and meeting and getting the stuff together and then delivering the information to the class the following day. This is the way I'm going to run this course afterwards. I'll participate and you all are gonna participate as well. As guidelines I outlined on the (flip) board, here for the duration of this course…And also it will be your responsibility before the end of the day to check out what we will be doing the next day. Take a look at the skills and do some reading in advance. As well as you are supporting your groups; you are actually preparing course materials for this (pointing to the daily objectives written on the flip board).

The pedagogy invited all the participants to take an active part in the teaching and learning process. The practice provided opportunities for the students to be active members of their quasi-community and the agents of the pedagogy. The teacher asked the course participants for their collaboration and participation in the everyday practice of the course. To facilitate the collaboration of students, the teacher divided them into small groups of four members each. Membership in the groups was dynamic, and the students might change their groups for different activities throughout the course. Each group was responsible for a single part of the daily practice of teaching. The members of each group collaborated in the preparation of the material and the strategy for teaching practice, and finally all of them co-taught the subject for the rest of the class. Collaboration in groups not only increased participation and knowledge sharing of the community members, but it gave rise synergistically to collective ideas and solutions that would have been difficult or impossible for participants to create individually (Schoenfled, 1989). The pedagogy of collaboration, shared teaching, and an active role in the classroom's quasi-community was well received by the students. They appreciated this practice, as they mentioned at the end of the course that it reinforced what they had learned:

> I appreciate that when you teach somebody, you are reinforcing what you have learned, too. It is a good learning tool, you know, discussion and active participation (Mat).

Another participant pointed out:

> Certainly there is a lot to be said about, you know, teaching yourself and students helping each other learn. That's a very good way to learn (Rose).

The common consensus of the students about the effectiveness of the practice promoted the trust in the pedagogy and their active participation in praxis. My observation showed that the group-work encouraged collaboration and dynamic engagement of the students.

Taking responsibility and ownership

The quasi-community promotes collaboration and engagement in the learning activities and at the same time encourages the students to take responsibility for their own learning. When adult learners take responsibility for their own learning, it tends to increase their self-esteem and help them develop a sense of inquiry in their learning activities (Knowles, 1975). The learning practices should allow students to realize that they are capable of taking control of their own learning for achieving their objectives (Wlodkowski, 2008). The pedagogy throughout the course provided possibilities for the participants to take responsibility of their own learning. For example, apart from the main electronic equipment, there are auxiliary instruments that complement the complex

technological workplace onboard ships. The pedagogy required the participants to take full responsibility for getting familiar with each of the auxiliary machines. Respectively, at the start of the course, the teacher familiarized the course participants with the lab, which contained all the auxiliary instruments that are available in their workplaces. The teacher took all the course participants, one group at a time, into the lab and exhibited all the equipment—one by one—to the students. He described their functions and demonstrated how each of those machines operates. The teacher operated the equipment in order to model their operations by a marine expert for the participants to observe. He then explained how the participants could use the operation manuals of each of the pieces of equipment. At the end of the process he mentioned:

> So any time you want, you can come in (the lab), anytime at all, and get to any particular instrument you want and get yourself up to speed on your operation. The theory I will be covering in the class i.e. how we use and why we use particular controls versus another but with regards to instruments this is all what you need (pointing to the lab, the equipment, and manuals).

Here, the pedagogy delegated to the students part of the responsibility for their learning. Through the process, the students were in charge and actively participated in their learning. This promoted the students' sense of ownership of the practice. They had full access to all of the necessary resources, including the teacher as the expert operator and a competent marine practitioner. The students had the opportunity to decide the pace of their own learning. To promote further accountability, the teacher gave each student a checklist. The list contained all the electronic equipment that they had to be able to

operate by the end of the course. He then mentioned that it is the learners' responsibility to maintain the list. The teacher would sign off the form once the students practically demonstrated their competency in operating the equipment.

This type of practice contributes to the authenticity of the assessment process, as it resembles the process of apprenticeship training in communities of practice where students are evaluated whenever they feel they have developed the required competencies. It also allows assessing the students' competency based on their ability to perform the job rather than to describe their skills in a written exam. After all, "the central issue in learning is becoming a practitioner, not learning about practice" (Brown, 1998, p. 230). Here, the aim was to ensure that the participants have developed the targeted competency and are able to operate the equipment in practice. Those who failed were given feedback by the teacher and other chances to be evaluated later in the course whenever they were ready. The process continued until the time that participants were able to perform the job as a marine practitioner onboard ship does.

The pedagogy adopted for the development of expertise in the auxiliary instruments permitted the students to customize their learning experiences by adjusting its pace and structure. This is contrary to the fundamental notion of current formal schooling that emphasizes uniform learning: everyone should learn the same subject at the same time. Here, the teacher was not lecturing or passing on the information equally to everybody, but he remained a resource to be used when learners needed.

The availability of a variety of resources such as real working instruments, instruction manuals, simulators, and on-line resources plus the support of the teacher and their peers, in addition to an engaging learning environment, provided the students with versatile

possibilities to learn. This method provided students with different styles and speeds in learning. The teacher gave feedback, comments, and support for the students whenever they needed help. My study shows that this method was effective, considering the time limitation of the course. The method resembled, to some extent, the on-the-job learning and apprenticeship practice where the responsibility of learning goes to the learners rather than the teacher and institution.

Technology: A resource for learning technology

Advanced computing has the potential and unique capabilities to enhance students' learning. Through modeling and visualization, current sophisticated technology has the ability to provide a powerful means of bridging between experience and abstraction (Gordin & Pea 1995). Today's technology and advanced computation provides us with active representation of the technology in the natural environment of its use. In recent years, this flexible and effective representation (the simulation) became affordable and increasingly become integrated into educational practices. In fact, in many domains such as the one that I studied, it is the statutory requirement for the institutions to employ simulated technology for providing technology courses. The ability of the simulation technology to replicate the technological workplace for training purposes afforded boundless possibilities for providing an effective and meaningful learning environment at schools. In this type of environment, learners are able to interact with the technology in a replicated environment of the workplace. My study presents a concrete realization of how the pedagogy based on the concept of quasi-community capitalized the simulation technology for providing authentic and meaningful learning opportunities in technology courses. The pedagogy, using a simulated workplace environment, provided favorable

circumstances for the learners to participate in the culture of practice. Simulation is used as a valuable resource to facilitate, make visible, and bring into the open the processes of work for the course participants.

The affordability of the technology to record and subsequently replay the exercises and students' performance in the debriefing sessions augmented the authentication of the training outcomes of the course. The debriefing sessions following the simulated exercises provided possibilities for the learners to reflect on their proficiency. The process also allowed the other students to be able to observe and compare their own performances and strategies with one of their peers.

Workplace visits complemented the simulation training as it provided the possibilities for the course participants to contextualize their competencies for real work environments. In the following sections, I elaborate on how the pedagogy of the quasi-community utilizes simulation technology to bring the context of the workplace to the formal setting of the classroom and appropriate simulators as valuable resources for training purposes.

Making visible the practice

Essential to the meaningful engagement of learners is the ability to observe the process of work. The visibility allows the trainees to understand the activity as a whole, which is an essential element of apprenticeship training. In authentic communities of practice in workplaces the process of work and the thinking of experts while engaged in the practice is visible and available to the learners (Collins, Brown, & Holum, 1991). In technology education the invisibility of the work process of technology is a great challenge for educators. The quasi-community's pedagogy mobilizes different techniques

to make available to the course participants those hidden aspects of practice that are necessary for them to be able to get engaged in the process of learning. In the course I presented here, the teacher utilized the simulation technology to replicate the workplace practice. He designed a simple scenario exercise similar to the daily routine practice onboard ships at sea. He started with the fundamental electronic equipment for ships navigation (RADAR). The teacher projected the RADAR simulator's display on a big screen in front of the classroom, in order to make the display visible to the entire class. Thus everyone had access to what the experts—the teacher in this case—had access to. He then started the simulation to generate the exercise.

He ran the simulated equipment in real-time mode and extracted the data as the practice was unfolding. The teacher used real data to develop and introduce a typical everyday activity at work. Throughout the process, he used an overhead projector to project his work-sheet on the board and verbalized all the actions and calculations he was performing. The course participants were able to observe and hear the expert's data processing and calculation of the result in real-time. The exercise needed two sets of data to be extracted in a specific time-interval. After the teacher processed the first set of data and during the time period required for the next set of data to be extracted, he articulated what he had done so far and what the next steps would be. He then continued working on the problem to the end of the exercise. Throughout the activity, the teacher verbalized and described all the steps that he was taking in order to make available to the participants his—the expert's—cognitive processes while performing the task.

Following that, the teacher assigned a period of time for the class to examine the exercise. He then used the simulator equipment to automatically process the same data

set. The teacher then compared the simulation-processed result (as a true value) with what they earlier calculated manually in the classroom. There were small differences—as it may happen when the practitioners process the data in real situations onboard ships. The class then discussed the rationality and possible reasons for the difference between the results and how errors in manual calculation can be avoided or reduced. The teacher then ran another exercise, but this time he asked the students to participate by replicating his problem-solving procedures. Advancing to the next level involved the entire class to collaboratively engage in the problem-solving activity. In the following days, the exercises became more complex and were designed to familiarize the course participants with a variety of contexts.

In this course, the pedagogy did not provide a well-defined example with a pre-determined answer as a way to introduce the problem-solving procedure. Instead, the simulated version of real equipment is used to produce a live exercise. The teacher used the simulator to generate the exercise by unfolding a common everyday practice in the context of the marine workplace. The simulated equipment produced data in real-time for the class to exercise real-life problem-solving practice. The use of simulation provided possibilities for the pedagogy to introduce to the course participants the ill-defined problems of everyday marine practice in an authentic activity. This pedagogy provided a context for the students to apply their conceptual knowledge into real-life use. This method is contrary to conventional practice at schools, where the learned knowledge is to be used in an abstract way while students are asked to apply their knowledge to solve the prefabricated textbook problems. Here the use of the simulated version of the technology provided a relevant context for application of the knowledge of the use of technology.

This allowed for the participants' development of competencies similar to the context of technological workplaces.

In this practice, the pedagogy and the technological resources (e.g. simulated equipment) afforded the practice to introduce the entire processes—visible and hidden—of the work to the learners. Earlier in the day, the class discussed the theory and the work principle of the equipment and the nature of the data it provides. In the following session, the students observed the use of the equipment by an expert practitioner and listened to the teacher while describing the cognitive processes it involves. The visibility of the work processes was achieved in two ways, one with the cognitive activity of the practitioners working with technology and another with the function of the equipment itself.

The significant phenomenon here is the fact that the pedagogy made visible what would have been invisible if the apprentices observed an expert onboard a ship working with that same technology. In many of today's workplaces, particularly with rich technological environment, apart from the invisibility of the work processes, the experts do not have time or the opportunity to reflect on what they perform. The time demand especially in fast paced technological workplaces is so high that it leaves virtually no room for the practitioners to reflect for themselves or to verbalize for the trainees their cognitive processes while engaged in problem solving. Using the pedagogy of the quasi-community provided a learning environment, which afforded possibilities that may not even be available in technological workplaces. Additionally, the possibility of the repetition of the variety of practices in a short period of time speeds up the learning process. This fact plays an important role in the limited timeframe of the formal education.

As the course proceeded, the course participants gradually gained more self-confidence and control. They moved progressively into a more autonomous phase of collaborative learning, where they started solving problems on their own. This allowed them to consciously participate in the reproduction of the marine culture. The teacher assigned part of the class time for students to work on the problems at their own pace but encouraged them to collaborate and engage with their peers. While engaged in collaborative activities, the participants were prompted to continuously articulate their problem-solving methods and strategies for others. This allowed the participants to make available and accessible to the teacher and their peers their strategies and cognitive processes when solving problems. Furthermore, comparing their own strategies with their peers and the expert's—the teacher—allowed each member to assess his/her own learning. At the same time, the praxis provided possibilities for the other members of the classroom to observe, learn from, and reflect on the practice of others, which in turn fostered further learning and expansion of their knowing and competencies. My study shows that participation in the practice strengthened the participants' social networking, which in turn helped them to (re)produce the community, its language, and practice.

Authenticating the learning process: Participation in the culture

A rich cognitive ethnography of navigation onboard ships has shown that outcomes of the work processes are the product of the complex interactions of navigators with the environment (Hutchins, 1995). Here the environment encompasses the other navigation team members and the infrastructure including equipment and other physical resources. This implies that the authenticity of learning experiences does not lie in the task, the environment, or the learner in isolation, but it is manifested in the process and the

dynamic interactions among all of these components (Barab, Squire, & Dueber, 2000). The development of competency in the individual components of a system is an important step in the learning trajectory of a practitioner. However, although these competencies are valuable, they are not enough to make a learner a competent practitioner. The pedagogy has to provide possibilities for the course participants to expand their competencies in order to appreciate the work as an interrelated whole and not a combination of individual components. The learners have to be able to realize the relation of each component—including structure, social organization, and culture of the workplace—to the activity as a whole.

The simulation technology has the capacity to replicate the structure and physical environment, including the entire technological component and their relation to each other and the physical settings. This provides the "preauthentication" of the environment where the learning material and settings correspond to the real world (Petraglia, 1998). To make the experience authentic, meaningful, and relevant, the pedagogy has to replicate not only the physical setting but also social and cultural properties of the environment. The learning practices have to consider the processes of the engagement of practitioners with their workplace and the resources they employ to perform the job (Hollan, Hutchins, & Kirsh, 2000). This means the simulation exercises should also take into account the ways experts coordinate their actions with the dynamic behavior of other actors in their workplace. In addition, the tasks have to be relevant and similar to real-world problems so that they make sense to the learners (Young, 1993). This perspective provides a novel framework for the design of technology education in formal settings with authentic and transferable outcomes. This outlook resonates with the quasi-

community perspective for technology education, as it is accomplished in the course I am presenting.

As the course progressed and students became competent in the operation of the individual equipment, the pedagogy advanced to its next level. At this stage, the students were already familiar with the operation of different technologies and were ready to participate in the process of the work in its entirety. Accordingly, the teacher assigned a section of the lab to be the simulated workplace. He replicated a ship's bridge (navigators' workspace) by assembling its components including (simulated) electronic equipment and other relevant resources. His aim was to replicate a marine workplace as far as practicable for the participants to practice work in a similar context of a ship—preauthentication.

To authenticate the experience, the teacher divided the course participants into different groups. Each group was appointed to act as a navigation team onboard a ship. The team members in turn were assigned a specific rank in their navigation team. The teacher gave each team a specific task to achieve. The exercise areas, where the students had to operate their (simulated) ship, were chosen from local geographical areas. The participants were very familiar with the exercise areas as in real life they have worked onboard ships operating in those localities. The tasks for each group were specific but the exercises were not well defined, as each team could take different strategies and routes to best accomplish the same task. The teacher urged the students to fulfill their duties related to their specific role in their team but, at the same time, collaboratively engage with the task and resolve the problems as they arose.

This pedagogical method is in contrast to the dominant approach to simulation instruction, where the teacher engages students with prefabricated and problem-free training tasks (Verstegen, Barnard, & Pilot, 2006), and if any problem emerges the instructor typically steps in, resolves it, and then allows the students to go back and acquire the pre-determined result (Shambaugh & Magliaro, 1997). The conventional instructional methods are generally designed for the purpose of standardization and to meet the needs of assessment and grading. These methods ask for one specific way of problem solving, which consequently results in discouraging learners from any attempt of discovery and creativity. In contrast, everyday ill-defined problems have no single or specific way to be resolved, hence multiple and creative solutions or solution paths are permitted (Kitchner, 1983). The pedagogical method presented here provided the students with the opportunity to experience the everyday culture of problem solving. My observations show that although students were using the same techniques and tools, they adopted creative and varied paths to reach their assigned goals.

To manage the learning experiences and provide expertise, the teacher in the initial exercises supervised the activities of each team by playing the role of the master of the ship—as he is by profession. His supervision faded progressively as the team members showed confidence and competency in performing their tasks. The participants soon became engaged and fully involved in the activities. In the process, the complexity of the tasks advanced to the stage that the final tasks that were assigned to each group included the whole process of navigating a ship in a complete passage. This contributed to the authentication of the pedagogy of technology education in the course as it culminated the achievement of a whole product (Reeves, Herrington, & Oliver, 2002). My observations

show that the participants were in constant collaboration and shared their expertise with their team members for achieving the goals of their tasks. It is then that they, like apprentices onboard ship, recognized and resolved the ill-defined problems that arouse from the authentic activity (Roth, 1998a; Roth & Bowen, 1995). It became evident through observations that the participants did not behave as students anymore, but as practitioners who had developed a conceptual understanding through interactions and collaboration in the culture of the workplace.

Debriefing: A venue for articulation

Authentic learning activities need to provide opportunities for the students to reflect on their own learning and articulate it for others (Herrington, Oliver, & Reeves, 2003). One of the advantages of the use of simulation technology is the capacity to record and replay the history of students' performances. The function of automated gathering of activities' history provided rich opportunities for pursuing the visible and reflective pedagogy. After each exercise, the teacher requested the members of each team to articulate and verbalize their problem-solving processes in a debriefing session. In these sessions, each group member utilized the replay of their performance to visualize and elaborate for the rest of the group his/her strategies and techniques in solving problems. Students were asked to make clear and justify their own method and findings to compare and contrast with their peers. Through the process, the students made visible their thinking for others when they elaborated upon and justified their ideas. The process of making thinking visible created opportunities for the exchange and elaboration of ideas (Goldman et. al., 2002) and made resources accessible to the rest of the group. This activity favored debate among the team members and brought into the open and made

visible each member's cognitive processes in problem solving. The practice allowed new relationships to develop among the members of the groups and between them and the teacher. Additionally, it permitted the teacher to monitor the process of learning skills and the development of each participant's competencies.

Through these debriefing sessions, learners were able to critically reflect on their earlier experiences and had the opportunity to correct misconceptions and fill in where understanding was inadequate (Barab & Plucker, 2002). The debriefing sessions provided a valuable opportunity for the participants to reflect on their performance and to evaluate the efficacy of their actions. For the course participants, the debriefing sessions supported their learning processes by making the thinking of their peers visible and also illustrating the process of collaboration and teamwork. This visibility in turn provided an assessment opportunity for the teacher and also for the students themselves to evaluate their performances.

Crossing the boundaries: Extending the classroom activities to the field

Workplace visits allowed the course participants to observe and become engaged in the culture of workplace and to be able to reflect on their own practice (Nichol, 2002). Field-trips to workplaces were an important component of the pedagogy in the course. Throughout the course, the pedagogy accommodated a series of workplace visits for the students to observe the marine culture and real-world practice onboard ships. On each field trip, the course participants attended a different type of ship, each from a different sector of the marine industry. The main purpose was for the participants to become familiar with the technology in action and to observe the operation of the electronic equipment in the context of their use by expert practitioners. The students enjoyed the

experience and mentioned that the visits were of great value to the development of their competencies. As they pointed out in their interviews:

> It was good to actually get on the boat that has everything that we have been talking about and just kind of have a look at how it all works together. (John)

> Oh ya, there is practicality that could be three to four days worth of lesson in class you learn in just one trip on a ship. Ya, very good. (Danny)

> Umm it gives motivation, you know I think it gives a lot of motivation, plus it gives a visual of things that you did… Because you could see things, you could relate it to what you were doing in class and make a reinforcement… (Kim)

> Umm…I guess you just, you could see their practical use, like, where as just we set up parallel indexes and what not, to go on the bridge and some EBLs and BRMs before we make our turn. You could see on their automatic RADAR plotting aids on the ferry… you could see them setting up and you could actually see out the window and it all comes together…(Keith)

The workplace visits had a great impact on the students' perception of the use of the equipment in their context. It helped them to have a deeper understanding of the culture and context of different workplaces and the use of the equipment in real life operation. The workplace practice allowed the participants to observe the technology in its authentic context. Placing field trips and workplace visits as an essential element in the pedagogy motivated the participants and fostered the authentic learning by providing a bridge

between real-world experience and the experiences at school. They mentioned the experience in an authentic work environment assisted them in developing appropriate and effective understanding of the subject matter and provided relevancy and legitimacy to their prior experiences. In this course, these visits acted as a capstone and helped students to see how the competencies they have developed throughout the course "all comes together." Workplace visits are an essential element of the quasi-community's pedagogy as it provides access to expert competencies in its natural context upon which the students can base their own practice.

Development of professionalism

My study shows the pedagogy—analogues to the quasi-community—that was deployed in this technology course resulted in creating a sense of professional confidence in the course participants. Learners mentioned that they had developed the skills and competencies needed to act competently in their technological workplaces. My follow-up interviews revealed that the participants were satisfied with the course outcomes. They acknowledged that participation in the course enhanced their understanding of the disciplinary knowledge and its application in their workplace. Most of them stated that the pedagogy supported their learning process and that they feel competent in their career. As one of the participants pointed out:

> You've developed air of professionalism because of what you've been exposed to. This is what I've kind of taken in. I think I'm more professional. (Dave)

These practitioners were already familiar with the technology that had been introduced into their work environment. However, due to the nature of the technology and technological work environment, they were not provided with the appropriate opportunities to legitimately apprentice and develop the competency needed to work with the technology. The pedagogy was successful in providing the resources and possibilities for the learners to develop the required technological competencies. As the course participants pointed out at the end of the course, they felt professional and capable in the use of technologies in their workplaces. They also mentioned that the course improved their competencies in situational awareness through the competent use of electronic resources onboard ships.

> I take more awareness when I'm looking at the RADAR what exactly I'm looking at, like, trying to imagine myself on that boat looking at me and just having a whole better understanding of the nautical business. (Jack)

> I, you know, I'm just beginning, though… from where I'm standing right now I can say ya I'm really good, I know all that stuff now, because I didn't before, I took it for granted [that] the RADAR was … as close to true as you can get, I was, like, I thought I was, you know (Katy)

The quasi-community pedagogy exercised in this technology course allowed the participants to develop professional confidence and self-efficacy by expanding their understanding and ameliorating their (mis)conceptions of the technology and its use in context.

Discussion

In this chapter, I reported on a case study of a course, which was designed to provide its participants with the competencies they required for working with technologies that have been introduced to their workplaces. The technology course in my study has been used as an example of a pedagogy based on the concept of the quasi-community that provides opportunities for its participants to develop the targeted technological competencies for the context of their use. What the participants experienced in the course was broadly cultural and extended far beyond the scope of the course's explicit curriculum. My study provided evidence that the quasi-community as a novel framework may afford the schools to bestow an authentic learning environment for the adult learners to develop the required competencies needed for their technological workplaces. The pedagogy allowed the students to mobilize resources and rely on what the context provided them for performing the tasks. This is the competency that practitioners are being judged on in most of today's technical workplaces (Collins & Halverson, 2010).

In this study, I showed how the pedagogy based on the concept of quasi-community allows the technology to leverage the learning processes in a technology course. I illustrated how this framework might allow teachers to provide opportunities for learning, which may not even exist in contemporary technological workplaces. In the context of this study, simulation technology provided transcendent opportunities to bring the workplace context to the learning environment. The use of a simulated environment allowed the participants to learn how to interact with the technology in the context of complex processes of work. It also allowed the integration of performance-based

assessment into pedagogy, where the teacher and students assessed competencies based on the quality of their performances and ability to do the tasks.

I also discussed that the community development did not all happen in the teaching hours of the classroom. Many of the productive discussions happened during breaks or before and after the class sessions. In addition, the time and space that the teacher provided in the schedule for the participants to work on their own provided the private space they needed to be able to socialize and communicate with other class members. Many might argue that those times were not actually a learning time but my study showed that those informal learning spaces are as important as formal learning sessions.

Participants in this course provided invaluable evidence of what a quasi-community may achieve in the process of learning. The participants developed technological competencies in ways impossible without quasi-community involvement. The dynamic and interactive relationship between community members and their collaborative engagement with tasks and utilization of resources defined the effectiveness of the learning process. I conclude that adult and vocational technological pedagogy using the concept of quasi-community has the ability to re-contextualize the field of practice and translate it into curriculum. As a result, disciplinary knowledge makes meaning to the practitioners of the field. Quasi-community provides possibilities for adult learners to develop disciplinary knowledge and technological expertise in the context related to their workplace. This allows learners' facile transformation of knowledge and expertise into applied competency when they cross boundaries from school to workplace.

CHAPTER 9: Discussion and Implications

This dissertation is about adult learning, particularly learning for vocation. My research examined how people learn when they attend college to develop competencies for work. I placed the context of my research in the maritime domain and studied how marine practitioners navigate in the currents of their professional education and training system. I collected my data over a period of two years with an ethnographic study conducted with college instructors, curriculum developers, students, and practitioners in western Canada. I looked closely at the interactions and activities of practitioners while they attended their formal education in a technical college. Studying the contradictions within the vocational education and training system allowed me to discover the main factors that affect teaching and learning practices.

I used video-mediated ethnography as the method to record and socio-cultural and situated perspectives as my primary framework to analyze data and to afford theorizing the learning and knowing possibilities. I chose ethnography, as it is a method to make visible the real world's actions and interactions that comprise the sociality of a setting. This provided me with opportunities to better understand the research participants' activities within their specific contexts. My method of engagement as the *observation of participation* entailed long-term involvement in observing and participating in the practices. Through *persistent observation* and *prolonged engagement* with the practice in the field, I developed an insider's perspective and point of view. This meant that as an insider, I might not depend only on asking questions or observing what the participants did, but I was gaining insight as an informer of the culture by experiencing what they

experienced. I transformed through *progressive engagement* with the practice in the college, but at the same time the practice in the college changed with my participation. This change was observable in the gradual modification in the teaching practices and the pedagogy employed by the instructors.

Based on the findings of my studies, in this dissertation I proposed a framework for theorizing adult vocational education and training (chapters 7 and 8). This framework emerged from my research and the progressive effect it had on the practice in that domain. As I demonstrated in this dissertation, the framework is able to provide opportunities for the educators to develop teaching practices and pedagogies that improve the outcomes of the educational systems. These improvements provide adult practitioners with authentic opportunities to learn workplace related skills and allow them to make sense of their education and give them the ability to transfer their competencies to their workplaces.

This dissertation as a whole contributed to a better understanding of learning in adult formal education. In this concluding section of my dissertation, I provide a summary of the contributions of my research to the field. In particular, I articulate my contributions related to the assessment of competencies (chapter 5) and the educational policy design and development (chapter 6). I then refer to the theoretical contribution of my research to the field and how it provided a framework that allows the theorization of learning in current adult formal education and the pedagogical method it promoted, which affords authentic learning opportunities for vocational education (chapters 7 and 8). Furthermore, I elaborate on the implications of my findings for instructors, training institutes, educational administrators, scholars, and researchers of adult and vocational education.

Contribution to the assessment and evaluation of competency (Chapter 5)

The current theorizations of learners' evaluation are not well developed for assessing work-related competencies in formal educational settings. There is a gap in literature and research in this domain, especially for the assessment related to professional certifications. My research as presented in this dissertation contributed in part to filling this gap.

Assessment is an important aspect of every training system. It gives insight to whether the objectives of the system are met and whether the trainee developed the required skills and knowledge. However, the results of my first study showed that assessment might actually contravene attainment of educational objectives. The assessment may lead to a contradiction whereby some aspects of the system become impediments to achieving the defined educational goals. My ethnographic research revealed that this type of contradiction created challenges for the practitioners who attend college to prepare for competency certification. This contradiction in the system is the major source for course participants' disappointment and dissatisfaction with the education and training system. This problem rose from the fact that the current vocational education and training systems do not fulfill the needs of practitioners to develop the competencies for work; instead, it requires learners to develop the type of knowledge that is separate from what they perform on their jobs.

The practice in vocational education and training systems is greatly influenced by the requirement of educational policies for national and international standardization of vocational education and their related professional certification systems. The assessment for certification in most cases is separated from the education and training systems. It

means that the examination is principally conducted, supervised, or evaluated by certification authorities. Thus, training institutions have limited or no control over the assessment process. This structure of the competency certification assessment exercises an important influence on the learning of adult students (Emad & Roth, 2008).

My research provided evidence that the competency examinations are significant mediators for learning in that they provide a motive for the teaching practices as well as the students' learning objectives. Assessment served to define the objective of the entire learning activity as adult learners' perceptions about assessment significantly influenced their approaches to learning and studying. My study showed that course participants' primary objective for attending the educational system is the preparation for the exams. In response, the training institutes adjusted their programs and the pedagogy accordingly. This shift in objective from the acquisition of job-relevant knowledge to the development of competency to pass the examination is a source for the less-than-optimal benefits practitioners draw while engaging in formal education.

Implications

This dissertation highlighted a contradiction in vocational education and training systems and theorized this failure to provide the possibility for improvement. Based on my findings, I recommend that educational policy designers, course developers, and instructors be aware of the effect of the assessment for certification in the performance of the educational system. The competency certification authorities have to design the certification assessment processes as an integrated part of the education and training system. The professional certification system has to consider the fact that it has direct

effects on the way that the training institutions and workplaces deliver and the adult learners develop the skills and knowledge required to be competent practitioners.

Assessment systems have to be carefully designed in order to ensure that it actually evaluates the competencies that are targeted by the curriculum. My suggestion for removing the contradiction and, as a result, improving the output of the vocational education is to apply the principle of the competency-based assessment system. It requires the candidates to be assessed while performing the tasks. The cumulative track record of success in developing all the required competencies can act as evidence for the authorities that the practitioner is competent and eligible for the certificate of competency. As a result, trainees do not learn how to be successful on the examinations, but they learn to be authentically competent for the job.

Contribution to educational policy design and implementation (chapter 6)

Although the design and implementation of policies are not separable, there is a significant disconnect in the field of educational policy research between the policy design and policy implementation. This gap is particularly prominent in the vocational education domain. My research findings presented in this dissertation contributed to bridging this gap in literature and research.

Most often, educational policies are designed in isolation since the design is commonly considered to be independent and thus irrelevant to the implementation. I analyzed that the un-productivity of vocational education and training systems are primarily due to the fact that the policy designers did not fully consider the viewpoints and informational requirements of the training institutes in the design of the policy. My research findings suggest that this disconnect often results in conflict and contradiction

between policy-makers' intentions and policy-users' implementations. The lack of robust connection and active engagement of implementers as the end-users in the design of educational policies created challenges for implementations of the policies. The current research literature in policy implementation is impotent in proposing a solution to this problem.

In order to provide possibilities to highlight and remove the problem and challenges for policy implementation, I proposed a theoretical framework. This framework is characterized by the notion of boundary object and aims to bring an alternative to the current policy-design practice. Based on this framework, policies are seen as entities that connect disparate communities (e.g. policy makers and training institutes) and, by doing so, allow them to communicate and cross each other's boundaries. Policies, therefore, should be able to inhibit intersecting social worlds and simultaneously satisfy the informational requirements and practices of each group.

I showed that the application of this concept for the design might prevent the induction of contradiction and promote favorable implementation. I demonstrated how this framework affords a suitable tool to analyze the status of current educational policies and propose a solution to remove their contradictions. My study also provided historical evidence for the successful implementation of a group of documents in this domain that followed the principle similar to the one I proposed. My research showed that this framework has the potential to expose tensions and challenges of policy implementation. From these tensions, policy execution can be reviewed and subsequently revised.

Implications

Based on these findings, I recommend the co-creation of policy as a boundary object. This object would be able to cross the boundaries of different stakeholders' communities and be understandable by all the parties and at the same time is able to retain its identity. The participation of different intersecting communities in creating representation will resolve their commitments and perceptions into documents. The co-generation of educational policy allows the concerns and needs of all the parties to be preserved, thus affording their full participation. I also suggest that educational policies should be managed when crossing the boundaries of the communities—that is, the training institutes and certification authorities. This framework provides an analytical tool for evaluating the performance of educational policy or other instructional documents. The framework presents to the policy designers of adult and vocational domain a theory that allows for developing educational policies, which creates less contradiction at the time of implementation by the end-users.

Contribution to educational theory and practice (chapters 7 and 8)

The situated and socio-cultural scholars define learning and knowing as participation in social practices. These scholars present learning as a process of individuals' participation in the social and cultural activities of their communities. From this perspective, a community of practice, rather than an isolated individual, is the proper unit of analysis of knowing and learning. The original concept of community is developed and expanded through studies of diverse practices in their natural settings. The nature of these communities is different from those of educational communities we encounter in classrooms. The study of these communities in educational settings brings a new

perspective and allows better understandings of the social nature of learning. Current attempts in studying educational communities such as communities of learners and cognitive apprenticeship are focused on learning of school-aged children. As a result, the current theories tend to overlook the needs and characteristics of adults and practitioners when engaged in formal learning. There is a considerable gap in the literature and research concerning theorizing knowing and learning of adults, particularly in formal vocational education. My research as presented in this dissertation contributed to filling this gap, which in turn can be utilized for the enhancement of adult and vocational education.

From my research, I formulated the theoretical and analytical framework of *quasi-community*. I theorized learning as membership and co-participation in a quasi-community developed by its members. The unit of analysis of the quasi-community extends beyond the classroom community and includes the activity of the vocational domain from which the practitioners come to attend college courses.

I used the term quasi-community while taking into account the fact that the members of a classroom do not fully constitute a community of practice. Some aspects of communal practices may be realized differently in this type of community. For example, in contrast to true communities, the hierarchy in quasi-communities has a dynamic nature, and mastery is distributed across their members. The quasi-community provides no predefined path for newcomers, as there are no sensible peripheral and core section in this type of community. Here, the mastery is based on a dialectic relation between individuals and the community. Masters are those who have more experience with the task at hand and can contribute in the ongoing problem-solving process and act as a

resource for others in achieving the objectives of the community. There is also no continuous renewal in the quasi-community as members all join at the same time and the community disassembles at the end of the course.

In this framework, the classroom is a venue for adult practitioners to collaborate for reaching their collective objective, which in turn serves as their collective motive. Here, members encompass all the course participants including the teacher. The quasi-community promotes a dynamic and evolving environment that creates an inviting space for adult students with different levels of academic and intellectual achievement, work expertise, and experiences to participate in their knowing and learning processes.

The quasi-community provides a new perspective into the concept of community. It contributes to a better understanding of the interactions in the complex social environment of adult formal educational settings. The conceptual framework of quasi-community provides novel dimensions for the collectivity, which allows theorizing practices in communities of vocational classrooms.

Implications

In this dissertation I recommended the pedagogical implication of the quasi-community framework in two curriculum streams, namely lecture based (chapter 7) and technology education (chapter 8). I demonstrated how this framework, which was developed from praxis, can be adopted by training institutes for their pedagogical practices.

I provided evidence from case studies of marine practitioner professional training to show how this novel concept can be developed to identify and thus improve learning and knowing in formal adult vocational education. This framework bestows variable learning

opportunities that facilitate authentic learning in these formal settings. The pedagogy using this framework motivated adult learners in the process of becoming certified practitioners. It allowed them to engage socially, realize their common objectives, and pursue their joint enterprise. Through the process, they collaborated, developed a shared repertoire, created a community, and finally became successful in reaching their objectives. Praxis actively promoted the creation and cultivation of students' community in the classrooms and developed an environment in which the participants were able to evolve new competencies. The role of teacher in the quasi-community is to facilitate and manage the activities and to act as an expert who guides the community to collaborative learning. The objective is to create an interactive environment for the participants to share their expertise and utilize the cultural resources in order to provide opportunities for collaborative learning. Using this framework, the teacher may initially spend time and effort to make the concept work, but then his/her job basically is to maintain the classroom as a learning community.

Implications for technology education

In recent decades, the introduction of new technologies has changed the way work is performed. Technology has changed the culture, context, and practice in most of today's workplaces. The use of new technologies brought a new feature relevant to workplace learning. The disciplinary knowledge and mathematical processes have become hidden or less visible when they are performed by technology. These new technical work environments provide limited resources for the apprentices as newcomers to observe and understand practices and thus to become able to develop the required competencies. Consequently, the introduction of technology demands education to take new directions,

which need to be vastly different from the current view of education that dominates the culture of formal education. Unfortunately, current technology education is integrated to conventional educational systems and treated as such is unable to provide appropriate framework for this novel context.

In my research, I examined the theoretical concept of quasi-community in the field of technology education. This dissertation provided empirical evidence that the concept of quasi-community is a distinctive framework for theorizing the teaching and learning of the technology education in formal settings (chapter 8). I recommend the novel pedagogical approach of the quasi-community for the teaching and learning of technology education. Through an exemplary case study, I featured the relevant elements of the quasi-community and demonstrated the ways it can be employed in the teaching and learning of adult practitioners in formal technology education. The pedagogy based on the concept of quasi-community makes visible and brings into the open the hidden processes of work and cognitive skills of practitioners while working with the technology. The pedagogy promotes the technology to leverage the learning processes in a technology course. This framework allows teachers to afford opportunities for learning, which may not even exist in the contemporary technological workplaces. The quasi-community provides possibilities for learners to develop disciplinary knowledge and technological expertise in the context and culture related to the workplace. This allows learners' easier transformation of knowledge and expertise into applied competency when they cross boundaries from school to workplace.

Coda

With my research presented in this dissertation, I expanded the boundaries of knowledge in the field of adult and vocational education. I contributed to the body of knowledge in this field by developing new perspectives and a theoretical framework. I conclude with the hope that this dissertation inspires other researchers and scholars and opens the door to further studies in the field of adult and vocational education.

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