OMANI UNDERGRADUATE STUDENT REACTIONS TO COLLABORATIVE KNOWLEDGE BUILDING: A DESIGN RESEARCH STUDY

by

DAVID SCOTT PORCARO

(Under the Direction of Janette R. Hill and Thomas C. Reeves)

ABSTRACT

While collaborative problem-solving has been suggested as a solution for linking classroom learning with workforce skills, it is still not entirely clear how personal, institutional and national factors work together to form student and teacher reactions. Oman provides an excellent case for exploring this intersection, as previously limited technology and an instructivist education tradition meet rapid educational and economic development.

Employing an education design research methodology, I explored how students reacted to a course built around Brown and Campione's Fostering Communities of Learners (FCL), and utilizing a blog-based Computer-Supported Collaborative Learning (CSCL) tool called Future Learning Environments 4 (FLE4). The course was implemented over three semesters: I taught the first two semesters and then transferred the course to an Omani instructor for the third semester. Mixed methods were used to collect data related to the students' reaction to the innovative pedagogy as well to the design and evaluation of the CSCL-based course.

This dissertation utilizes a multiple-article format, consisting of four journal-ready manuscripts. The first manuscript describes the conceptual framework for introducing constructivist methods into an instructivist-based learning culture such as Oman. The second is a

review of the published literature, outlining the application of CSCL and collaborative learning in the Arab Middle East, and Oman specifically. The relative lack of CSCL studies suggested that a design-based research study would fill a gap in the field, as well as provide a sustainable CSCL design for Omani higher education. The third manuscript is a report of student reactions over the course of the study, focusing on the Omani cultural elements that supported or hindered collaborative knowledge building in the course. The fourth manuscript provides an overview of lessons learned from the study, intended for a practitioner audience. It describes design principles that can be applied in similar learning contexts that may help facilitate CSCL adoption in other Arab nations. These principles include design considerations, teacher considerations, and technical considerations. All four manuscripts work to further our understanding of educational change in Oman, and document the efforts to link higher education with needed workforce skills.

INDEX WORDS: Oman, CSCL, Knowledge-building, Educational Change, Pre-service teachers, Knowledge economy, Design-based research

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DEDICATION

This work is dedicated to Dawnell, Ethan, Claire, and Audrey. Thank you for sharing this journey with me and helping me remember what is truly important in life.

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This work would not have been possible without the support and encouragement of so many people. I want to first off, thank Janette Hill and Thomas Reeves for your encouragement, advice, feedback and guidance. You saw in me potential from day one and have helped shape me into a scholar. For this I will always be grateful.

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And lastly, I could not have done this, nor would I want to do this, without the support and love of my family and my God. الحمد لله

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INTRODUCTION

In their 2005 World Report entitled *Towards Knowledge Societies*, the United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2005) outlined the current state of development in the "information age" and the growth of "knowledge societies." Within this report they noted the need for humanity to move beyond the notion of a "knowledge economy," which has done little more for development than increase the "knowledge gap" between the Global North and the lesser-developed South by employing methods that further limit the control of knowledge to the most powerful and wealthy. They suggested that the path to equitable development, on the other hand, is through the promotion of *multiple* knowledge societies which incorporate their own supply of locally-valued knowledge and culture, but are also tied together in global networks of research, commerce, and communication. Central to this vision is the move from simple information sharing, which is most common in recent Information and Communications Technology (ICT) innovations as well as education practices throughout the world, to knowledge building. In order for sustainable knowledge societies to grow and thrive, humans must have the ability to access information and create new knowledge in combination with local knowledge, as well as share globally that newly-built knowledge with others who can build upon this new information in a "virtuous circle" of knowledge building.

If social and economic development is to progress in this manner, it must be built on new ways of knowing—ways that no longer stress passive reception of sanctioned information through memorization and recall, but that foster skills in information gathering, evaluating

source quality, collaborating, problem-solving, and ultimately knowledge creation (Bereiter, 2002). For this reason, many educators have turned to Computer-Supported Collaborative Learning (CSCL) as a way to bridge the distances amongst learners (physically, temporally and interpersonally) as well as between learners and relevant performance (Collis, 2008) with the goal of fostering collaborative knowledge creation (Scardamalia & Bereiter, 1993). While it is admitted that ICT does not always provide a simple solution to education development's complex problems (Vrasidas, Zembylas, & Glass, 2009) and may further support inherent power-relations, innovations like CSCL also provide great opportunities for students to express themselves and become empowered in creating knowledge.

However, many of the nations that could benefit most as knowledge societies continue to promote education practices that are largely instructivist in nature; that is, they rely on verbal transmission of information through lectures and textbook readings and a heavy emphasis on memorization of discrete facts that can be assessed through high stakes exams. In this way they limit dialogue by transforming learning into a banking model, with teachers making information deposits that can be withdrawn from students during exams (Freire, 2000). This is especially true in the Middle East/ North Africa region, where traditional instructivist methods contribute to the gulf between education and the labor force, creating challenges as graduates are unable to find work due to lack of relevant and practical skills (World Bank, 2008).

While many policy makers advocate a shift to constructivist-based social learning methods to aid in educational development (see, for instance UNESCO, 2005), the debate about the relative effectiveness of instructivist versus constructivist learning is still ongoing (Tobias & Duffy, 2009). Others argue that efforts by groups like the G8 to link education with workforce are simply a way off selling off the "baroque armory" of used-up education commodities to the

postcolonial nations while establishing the economic agendas of the "magistry" (Donn & Al Manthri, 2010). While the debate rages on, the actual process of change from instructivist to constructivist methods has been poorly investigated (Catterick, 2007). Specifically, in a traditionally instructivist learning culture, such as Oman, there is little research into how personal and institutional factors affect the adoption of CSCL. Lin and Hatano (2002), for example, note the lack in cross-cultural studies of CSCL implementation that address questions such as, how do students who are used to quietly receiving information respond to the discussion and argumentation that are central to CSCL? Furthermore, in the development of knowledge *societies* (plural), the question of what locally-relevant values constitute a sustainable CSCL program is central, but too often ignored in education research.

Dissertation Overview

I undertook a research study to further explore how pre-service English as a Foreign Language (EFL) teachers in an introduction to educational technology course at Sultan Qaboos University (SQU) in Oman responded to the introduction of collaborative problem-solving through CSCL. In order to link theory with praxis, and work in communion with local practitioners to seek out solutions (Freire, 2000), I employed an educational design research methodology (van den Akker, Gravemeijer, McKenney, & Nieveen, 2006). In this way, I hoped to find a sustainable solution for the improvement of Omani education that could stand as a model for educational practice in an Omani knowledge society while also contributing to understanding of learning and educational change.

This dissertation is a compilation of four journal-ready manuscripts that together explain the process of introducing collaborative knowledge building into Omani schools. It follows the alternative format proposed by Duke and Beck (1999) in which a series of journal-ready articles

are compiled based on a single strand of research. Following their suggestion, I included articles for different professional genres, including scholars and educational practitioners. The dissertation thus consists of 7 sections: this introduction (chapter 1), four journal-ready articles, one chapter describing the methods utilized in the chapter and a rationale for utilizing education design research (chapter 4), and a concluding section that ties the findings together (chapter 7).

The first article (chapter 2) presents the conceptual framework of the study. It introduces briefly the differences between instructivism and constructivism in terms of underlying philosophy and pedagogical application. Then it proposes a model for understanding how the interaction of various national, institutional, and personal factors contribute to the acceptance or rejection of innovative pedagogies.

The second article (chapter 3) is a critical review of the literature related to adoption of CSCL, especially in the Middle East. It overviews the theory of CSCL, and further describes the educational setting in Oman that frame the national context of the study. It looks at attempts to introduce collaboration in Oman and the Arab Middle East, pointing out the strengths and weaknesses of this pedagogical strategy in an Omani setting. It concludes by saying that while CSCL is compatible with Oman education, there is a general lack of studies on CSCL in the Arab world, and more importantly, there is a greater need for design research studies that explore the reaction of Omanis to CSCL environments while at the same time developing sustainable education change in the region.

The third article (chapter 5) presents the results of the study's findings to the scholarly community. Because of the nature of education design research, the findings of the entire study are too large to fit in one journal article. Therefore, I focused on one theme within the conceptual framework—culture—examining in depth how culture affected the adoption of

collaborative knowledge building in the course over three iterations. Culturally-shaped elements played a major part in how the students and faculty reacted to the CSCL implementation. These included the oral-based learning tradition, the physical layout of the classroom, the authority of the teacher, gender, the acceptance of technology, religion, and the collaborative nature of society. These led to changes in the student, the teacher, and the course, which are documented in this article. The implications for instructional designers working in similar context are also presented. By dividing my research this way, I was much like an archaeologist, attempting to understand the complexity of an ancient site. One way to do so is to dig a trench into the layers of the site, examining only one small section of the site, but looking deeply through its layers. This article seeks depth, focusing only on one of many potential factors. The findings from the remainder of the factors are the topics of potential future articles.

The final article (chapter 6) presents an overview of the findings for a practitioner audience. To continue the archaeologist metaphor, this article instead is like a survey of the top layer of a site. While it provides an overview of the case under study, it does not provide depth on any one issue. Together the two articles provide a clearer picture CSCL adoption in Oman. This article presents an overview of CSCL in higher education, and its purposes and characteristics in the Omani classroom. It then describes the course through three iterations, and provides a list of design principles for consideration in similar courses. This article was co-authored by Ali al-Musawi the collaborator in Oman and instructor of the course during the third iteration.

Finally, the conclusion (chapter 7) pulls together the key ideas from the four articles and reflects on my journey through the dissertation. It focuses on the lessons learned from this study,

and how I can apply them to future research and my future career in international education development.

Using depth and breadth, my intention in this study was to sift through the complexity of education change in Oman. While this study has only focused on introducing collaborative problem solving in one course, at one university, in one country, I hope that the ideas of this study will spread, as will the design of the course, so that more Omani students will be prepared to build a knowledge society and collaborative solve some of the Middle East's most vexing problems.

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CHAPTER 2

APPLYING CONSTRUCTIVISM IN INSTRUCTIVIST LEARNING CULTURES[1]

[1] Porcaro, D. Accepted by *Multicultural Education & Technology Journal*.

Abstract

Purpose—Many educators have advocated constructivist-based pedagogies as a way to develop the skills needed in knowledge societies. However, many countries have a tradition of instructivist-based practices, which rely on didactic lectures, rote memorization and high-stakes exams.

Design/methods/approach—In this article, I employ a literature review to compare the philosophical and pedagogical differences between constructivism and instructivism, and propose a conceptual model for introducing constructivist-based pedagogies into instructivist learning cultures.

Findings—The needs of teachers, students, and institutions intersect during pedagogical innovations, which take place within national systems. The alignment between students' and teachers' educational philosophies, as well as an institutional system's resources, policy, and culture can bring conflict or congruence, as teachers, students, administrators and other stakeholders dismiss, adapt, ignore or celebrate the (mis)alignment.

Originality/value—The model described in this article is intended to serve as a guide for educators who are introducing innovative pedagogies in a variety of settings, and will continued to be validated through a design-research study in Oman.

Keywords—Constructivism, Instructivism, Educational change, Learning cultures

Paper Type—Conceptual paper

Introduction

In their 2005 World Report entitled Towards Knowledge Societies, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) outlined the current state of development in the "information age" and the growth of "knowledge societies." They noted the

need for humanity to move beyond the notion of a singular "knowledge economy," which has served only to increase the knowledge gap between the Global North and the lesser-developed South through methods that limit the control of knowledge to the most powerful and wealthy. They suggest that the path to equitable development, on the other hand, is through the promotion of knowledge societies: multiple societies based on their own supply of locally-valued knowledge and culture, but tied together in global networks of research, commerce, and communication. Central to this vision is the move from simple information sharing to knowledge building. In order for sustainable knowledge societies to grow and thrive, humans must have the ability to access information from which they can create knowledge as well as the capacity to share that knowledge globally with others who can build upon this new information in a "virtuous circle" of knowledge building.

If economic development and the resultant social progress are to proceed in a more equitable manner around the globe, education based upon new methods of teaching and learning will be a key factor. Progressive educators argue against instructivism, which assumes the effectiveness of passive reception of sanctioned information through memorization and recall, and instead promote the development of skills in collaboration, problem-solving, knowledge creation, and evaluating gathered information (Bereiter, 2002). With this end in view, many educators have turned to pedagogies based on constructivist epistemology, although the debate about the efficacy of constructivist learning models still persists (Tobias & Duffy, 2009). In many lesser-developed countries, traditional instructivism continues as the norm. The students, teachers, administrators, and policy-makers in these countries react in different ways when introduced to innovative constructivist curricula. In this article I will attempt to conceptualize the reactions to constructivist-based pedagogy in instructivist-based learning cultures by

presenting a conceptual model of this process. In order to do this, I first briefly outline the differences between instructivism and constructivism, reviewing their underlying philosophy and pedagogical practices. Upon this foundation I then describe a model for understanding the change from instructivist to constructivist learning. This model may guide other educators who are attempting to implement similar changes in their own learning environments.

Constructivism vs. Instructivism

Although a popular topic in education, constructivism represents a variety of disparate learning theories and pedagogical practices (Kivinen & Ristela, 2003; Phillips, 1995; Prawat, 1996). While some have derided constructivism's benefits and proclaimed its weaknesses (Fox, 2006; Meyer, 2009), others have enthusiastically promoted it (Duffy & Cunningham, 1996; Jonassen, Cernusca, & Ionas, 2007; Palincsar, 1998). Some believe it an innovation worth pursuing, while others believe it ignores the foundations of instructional science (Merrill, Drake, Lacy, Pratt, & the ID2 Research Group, 1996). There is obviously much confusion surrounding the nature and applications of constructivism (Tobias & Duffy, 2009). Much of this confusion appears to come from the fact that the term "constructivism" is used to describe an instructional theory, a learning theory, and an epistemology. For example, Jonassen, Cernusca, and Ionas (2007) argued that constructivism is not an instructional or learning theory, but simply an epistemology. However, in this same chapter, they describe constructivist-based pedagogies in instructional design but fail to name this category of educational practices other than claiming that they not be called "constructivism."

While there is great danger in reducing all learning to two categories, I believe that to understand how to introduce innovative constructivist pedagogies in educational development, it is helpful to consider instructivism and constructivism as two poles on the continuum of

educational practice. In this way, comparing two "metaphors" of learning (Sfard, 1998) on a macro level can assist us in understanding how contextual factors lead to the adoption of innovative practice (Palincsar, 1998). Others have called these poles "acquisition" and "participation" (Sfard, 1998), or the "banking model" and the "problem-posing model" (Freire, 2000). For the purposes of my distinction, instructivism refers to what some theorists and researchers (Merrill, 2008; Sweller, Kirschner, & Clark, 2007; Mayer, 2004) view as well-formulated, teacher-directed, didactic learning, which stands in contrast to constructivism's student-centered forms of instruction, including social (Bandura, 1977), situated (Lave & Wenger, 1991), knowledge-creating (Bereiter, 2002), and intersubjective (Suthers, 2006) pedagogies. Thus, in order to understand constructivism in practice, it is important to examine how it is applied institutionally as well as individually (Arnseth & Ludvigsen, 2006). Thus, schools operate on various points along the continuum between instructivism and constructivism, and are made up of individual teachers and students who function on their own points of the continuum. Furthermore, many of these schools exist in national cultures that likewise represent a larger culture of learning which is situated somewhere on the continuum. Depending on the distance between current practice and innovation, some cultures, systems, and personalities may align better with constructivism, where in others there may be conflict between the ideals of the learning environment and the student (Catterick, 2007).

A Comparison of Instructivism and Constructivism

Although there is some variety within the philosophy and practices of constructivism and instructivism, there is a clear distinction between the two (see Table 2.1). Most fundamentally is the difference between their pedagogical methods as well as the roles of the teacher and learners.

Underlying this, however, is a differing philosophy of learning, based on differing ontologies and epistemologies.

For instance, instructivists, whether behaviorist or cognitivist, are ontologically objectivist and realist, and epistemologically empiricist. That is, they see learning as simply mapping the real, external world onto the minds or behaviors of the student (Jonassen, 1991). Constructivists, on the other hand, display a variety of ontological and epistemological perspectives. For example, cognitive constructivists, based Piaget's (1932) work, see that students construct their own meaning of reality. Piagetian constructivism is closely related to cognitivism and appears externally quite similar to forms of cognitivism. From this perspective, the learner still processes objective reality in the mind, but creates his or her own understanding based on individual apperceptions, which may or may not correspond with reality. As a more "radical" version of constructivism, von Glasersfeld (1987) suggests that all reality is individualistic, creating an ontology that borders on solipsistic—that is, all reality exists only in the first person. Nevertheless, many constructivists would suggest that this epistemology does not preclude the existence of an external reality, only that it is epistemologically interpreted (Kivinen & Ristela, 2003). Thus, constructivism represents the epistemological intersection of empiricism and rationalism—learners come to know not only through empirical observation, but through rational mental construction (Ertmer & Newby, 1993).

Furthermore, social-cultural constructivism builds on Vygotsky's (1978) idea that learners construct knowledge through interacts with more knowledgeable peers in the Zone of Proximal Development. Social-cultural constructivism may include three ontologies. In addition to the internal, subjective reality of cognitive constructivism, and the external, objective reality of instructivism, there is also a third ontological reality, or the contextual intersubjective.

Table 2.1: Elements of instructivism and constructivism

		Instructivism		**Constructivism**	
		Behaviorism	**Cognitivism**	**Cognitive Constructivism**	**Socio-cultural Constructivism**
Philosophy	**History**	Skinner, Thorndike	information processing theorists	Piaget, constructionism	Vygotsky, social practice theories
	Ontology	realism, objectivism	realism, objectivism	ranges from objectivism to radical constructivism	reality can be objective *and* individually *and* socially created
	Epistemology	empiricism	ranges from rationalism to empiricism	Rationalism	empiricism, rationalism, *and* knowledge-building
	Learning Theory	stimuli, response, feedback; changes in behavior	Prior knowledge, sensory, short-term (working) and long-term memory; changes in knowledge states (long-term memory); use of schema in novel situations	engagement with others, through conflict to construct personal meaning	constructing intersubjective meaning in the Zone of Proximal Development with more knowledgeable-peers
Pedagogy	**Learning Goals**	mapping the structure of the world onto the learner; effective and efficient knowledge transfer	mapping the structure of the world onto the learner; effective and efficient knowledge transfer	creating elaborations and interpreting knowledge	flexible thinking skills and the domain practices for lifelong learning
	Pedagogies	computer-assisted instruction, programmed instruction, instruction sequencing, behavioral objectives, feedback	intelligent tutors, advanced organizers, learning hierarchies, concept maps, instructional design	discovery learning; Lego-LOGO, negotiated objectives, multiple resources	authentic tasks; cognitive apprenticeships; multiple perspectives/argumentation; CSCL; anchored instruction; problem-based/inquiry-based learning
	Learner's Role	recipient of teacher's instruction	recipient of teacher's instruction	active constructor of knowledge and center of learning environment	center of learning and participant in community of practice
	Teacher's Role	center of instruction; controls instruction process and content	center of instruction; controls instruction process and content	ranges from minimally guided to facilitator	facilitator; tutor; mentor
	Assessment	individual; criterion-referenced	individual; criterion-referenced	multiple goals; contextual; authentic assessment	multiple goals; contextual; authentic assessment

Bereiter (2002, based on Popper, 1972) calls these "world 1," "world 2," and "world 3," respectively. Thus, learners make meaning of new situations (epistemology) in three corresponding ways, empirically (by what they sense), rationally (by what they think), and collaboratively (by what they build with others, or what Scardamalia & Bereiter, 1993, call "knowledge-building"). When students are learning collaboratively, they empirically sense the objective world before them (world 1), construct a personal cognitive meaning of their environment based on previous experiences (world 2), and then negotiate the meaning they created intersubjectively with others (world 3) to contribute to a culturally and contextually bound understanding of the new situation (Suthers, 2006). This intersubjective meaning is then internalized or "appropriated" (Rogoff, 1991), as the student shapes his or her own personal (world 2) understanding.

These varying epistemologies lead to a variety of pedagogical methods, with differing learning goals, teacher and student rolls, and assessments. For example, instructivists hope to communicate and transfer knowledge to students as efficiently and effectively as possible (Bednar, Cunningham, Duffy, & Perry, 1991). This is the foundation of instructional design, and various instructional design methods are employed to guide cognition, like advanced organizers, concept maps, etc. (Ertmer & Newby, 1993). However, the goal of learning from a constructivist perspective is not for students to process discrete facts but to create elaborations and interpretations of information (Ertmer & Newby, 1993). Therefore socio-cultural constructivist methods of pedagogy emphasize student creation of individual and group meaning, rather than teacher-led instruction. Activities focus on learning through artifact creation (Papert, 1993), authentic tasks (Herrington & Oliver, 2000), cognitive apprenticeships (Collins, Brown, & Newman, 1987), demonstration of multiple perspectives (for example, through cases; see Choi

& Lee, 2009) and social negotiation through argumentation (Andriessen, Baker, & Suthers, 2003), as well as anchoring learning in meaningful contexts (Cognition and Technology Group at Vanderbilt, 1992) and problem-solving (Cindy E. Hmelo-Silver, Duncan, & Chinn, 2007; Jonassen, 2000; Schmidt, Loyens, Van Gog, & Paas, 2007). In these activities, the goals of the learner are central as the learner takes an active and reflexive (Bednar et al., 1991) role, moving from the periphery of a community of practice to its center (Lave & Wenger, 1991). To assess constructivist learning, some educators advocate the use of contextually-rich settings such as authentic assessment, performance assessment, and portfolio assessment (Palm, 2008; Reeves & Okey, 1996).

Naturally, each methodology has its strengths and weaknesses. Instructivist methods based on behaviorism, for instance, are well-suited to skills such as recalling facts and repetitive performance, while those based on cognitivism are well-suited to rule or procedural execution (Ertmer & Newby, 1993). Adversely, many fear that instructivist methods are ill-suited for complex processes, like language development, problem solving, inference generating, and critical thinking (Koschmann, 2002). Others claim that granting all control of learning to the teacher robs students of active engagement in learning (Jonassen, 1991, 2000; Koschmann, 1996) and may essentially oppress students (Freire, 2000). Additionally, some criticize instructivism based solely on its objectivist ontology. As Jonassen (1991) noted, instructivism assumes that everyone shares a similar ontology and epistemology, which is especially problematic when students are not allowed room to interpret transferred knowledge.

Constructivism's strengths, on the other hand, lie in its holistic and contextual nature. This makes it well-suited for teaching the epistemic practices and collaborative problem-solving skills necessary in a knowledge-society (Hmelo-Silver et al., 2007; see also Bereiter, 2002) while

empowering learners through democratic participation in learning and dialogue (Freire, 2000). Notwithstanding these benefits, many educators question the effectiveness and efficiency of constructivism's pedagogies and philosophies. For instance, instructors fear the loss of control in their classroom (Hung et al., 2003), while others fear that students will not assume control of their own learning (Jonassen, 1991). Some criticize constructivism for its inability to produce meaningful results in education (Fox, 2006) and its disconnect to research in cognitive science (Kirschner, Sweller, & Clark, 2006; Sweller et al., 2007), while others fear that constructivism may, in fact, disadvantage non-Western students who are unfamiliar with constructivist education (Catterick, 2007).

While the theories of instructivism and constructivism appear incommensurable, they are often, in fact, quite compatible. Sfard (1998), for instance, suggested that there was ample room in educational research for both perspectives on learning, and that declaring either as "correct" was a form of ideological dictatorship. Jonassen (1991) similarly takes a middle-ground position between objectivism and constructivism, highlighting the importance for teachers and designers to know when and how to appropriately apply constructivist methods. Likewise, Ertmer and Newby (1993) suggest that behaviorist, cognitivist, and constructivist methods each play an important learning role depending on the goals of the instruction. Indeed, even Vygostky (1978) saw value in both objectivist- and constructivist- based learning (1978). Perhaps, then, neither theory adequately describes the totality of learning, but rather each focuses on specific parts of the learning process, awaiting a more comprehensive third way.

Many have found ways to integrate instructivist and constructivist methods. Silverman (1995), for instance, found it beneficial to include minimally instructivist segments into a Computer-Supported Collaborative Learning (CSCL) environment. Hmelo-Silver et al. (2007)

and Schmidt et al. (2007) both highlighted the importance of including traditional instructivist methods, such as lectures, teacher-led discussions, readings, etc. in problem-based learning units. Even proponents of instructivism, such as Mayer (2004), suggest that "a variety of instructivist methods can lead to constructivist learning" (p. 15). Thus, even though their underlying philosophies may seem conflicting, both theories allow for creative linking of methodologies, or what Vavrus (2009) calls "contingent constructivism." For example, during her experiences working with pre-service teachers in Tanzania, she found these teachers employing a wide range of instructivist and constructivist practices to meet the cultural, political and economic needs of their specific classrooms.

A Model for Introducing Constructivism to Instructivist-oriented Learning Cultures

In explaining the differences between instructivism and constructivism, I have attempted to lay the groundwork for a conceptual model to explain the dynamics involved when innovative pedagogical practices are introduced into fundamentally different learning cultures. While the discussion of whether such an introduction is necessary is not the goal of this article, let it suffice to say that these introductions are happening around the world, sometimes at the urging of international organizations (see above), and other times as the result of deliberate choices by individual teachers, students, institutions and nations. Thus as educators, it is worthwhile to seek to understand the areas of conflict between what might be viewed as innovative pedagogies and traditional learning cultures and why these conflicts occur, as well as how students, teachers and institutions respond to these innovations.

Potential Conflicts

While constructivism has been introduced before in instructivist learning cultures, few researchers have focused their attention on what processes occur during this change to

educational practice and how students, teachers, and institutions reacted to the change. Thus, few have documented what potential conflicts may arise from this process. For instance, Hung et al. (2003) suggested that many teachers resist ceding control of their classrooms and feel uncomfortable shifting to a facilitator role. This loss of control in terms of content, instruction, and assessment has also been a concern at the institutional and national levels, as teachers are increasingly pressured to cover standardized content in preparation for high-stakes assessments. Furthermore, many students familiar with well-established methods of learning find that constructivist learning, such as solving ill-structured problems, requires entirely different skills than those they developed through prior schooling (Choi & Lee, 2009). For example, Ku, Pan, Tsai, Tao, and Cornell (2004) found that Chinese students studying abroad noted great differences between their foreign and home school systems in terms of teacher's role, type of communication promoted in the classroom, and forms of assessment. Students from instructivist traditions have been accused of lacking self-directedness and working only to "make the grade" (Hung et al., 2003). In the competitive structure of schooling, students accustomed to instructivist methods may find it hard to work collaboratively, especially for goals that are not aligned with well-structured academic rewards (Schank, 2006). Furthermore, many students become overburdened by the excessive demands of constructivist activities and fail to engage in meaningful ways (Kirschner et al., 2006).

Why These Conflicts Occur

To understand the root of these problems, I propose a conceptual model (see Figure 2.1) that takes into account the innovations or pedagogical methods and learning environments that are at the intersection of teachers' and students' educational philosophies, institutional systems, and national context. By educational philosophy, I mean the epistemology, culture, individual

differences, knowledge and skills, and academic habits and expectations of students or teachers. These exist within an institutional system with its own resources (including financial, curriculum, technology and teacher support), policy (including goals, structure and assessment) and institutional culture, or what Fishman, Marx, Blumenfeld, and Krajcik (2004) call, respectively, "capability," "policy and management," and "culture." These institutional factors influence the innovative actions of teachers and students such as administrative or technological constraints influencing pedagogical methods, as well as their beliefs such as when institutional policies contribute to students having a "making the grade" habit/expectation. Furthermore, the national context influences indirectly the innovation by affecting institutional or individual factors, such as policy or culture. Each of these influences is bidirectional since students, teachers, institutions and nations influence, and are influenced by each other.

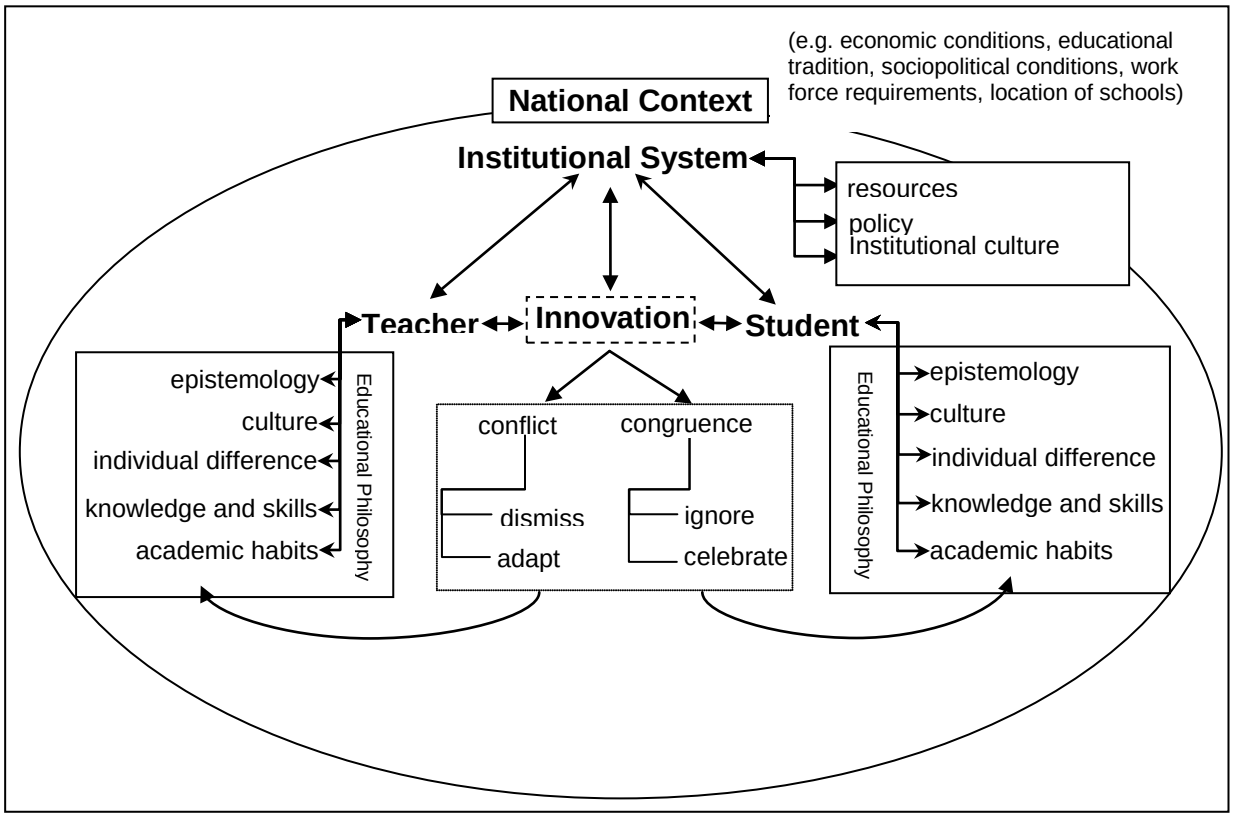

Figure 2.1: Framework for introducing innovative pedagogies.

In understanding the national context of instructional innovation, I turn to Reeves, Harmon, and Jones (1993), who developed a helpful model for diagnosing national contexts when adopting computer-based instruction, which I believe applies well to other pedagogical innovations. Within this model it is vital to consider economic conditions, educational tradition, sociopolitical conditions, cultural sensitivity, work force requirements, teacher status and skills, available technology, support structure, and location of schools. Several of these factors (i.e., teacher skills, culture, technology, and support structure), may be better explained within their individual and institutional structures, and are thus included elsewhere in the model.

In order for an innovative pedagogy to be successfully introduced there has to be minimal distance between students, teachers, and institutions. This is similar to Hannafin, Hannafin, Land, and Oliver's (1997) "foundations and assumptions for designing learning environments," which suggests that it is necessary to align design with psychological (or what in this model I refer to as epistemology, individual difference, knowledge and skills, and academic habit/expectations), pedagogical, pragmatic and technological (within institutional system) and cultural constraints. Thus students and teachers both bring with them potentially conflicting educational philosophies, while trying to function in potentially conflicting institutions.

To understand how this framework applies when introducing constructivism to instructivist learning cultures, it is necessary to diagnose the alignment (or misalignment) of student, teacher, and institutional systems through pedagogical innovation. For instance Song, Hannafin, and Hill (2007), building on conceptual change theory, suggested that several factors, including epistemology, knowledge and skills, pedagogy, and individual difference, such as awareness, motivation and adaptation, influence both students' and teachers' ability to engage after misalignment. They suggest that at several points along the learning process, students and

teachers have the ability to reconcile with each other, either unilaterally, or mutually. However, teachers and students may also fail to reconcile their beliefs, at which point the learning experience may prove frustrating for either party or both. Furthermore, Hannafin et al. (1997) noted that disconnect between stated objectives of institutions, such as "student-centered learning," and actual practices leads to theoretically ungrounded learning environments. Let us look at each element of the framework in detail.

Epistemology. As suggested by Song et al., (2007), epistemic alignment is important to the successful implementation of constructivist learning environments. However, epistemologies are not static, and can be altered through learning (Choi & Lee, 2009). The conflict arises when the epistemic change trajectories of a culture or a student do not align with those of a teacher or institution. Gottlieb (2007) and Zhang (1999) have suggested that far from following a single trajectory from naïve to sophisticated as commonly portrayed in the literature (Kitchener & King, 1981; Schommer, 1994), epistemologies may follow culturally-defined trajectories, whose endpoints may be valued in one culture, but dismissed as immature in another (or what Ladson-Billings, 2000, calls "epistemological racism"). For instance, Gottlieb (2007) found that differences in general and religious schools in Israel may have shaped students' epistemological reasoning, since different epistemologies were valued in the different communities. This is similar to the findings of Karabenick and Moosa (2005) who conclude that Omani men's involvement in authoritative political and religious settings contributed to differences in their epistemological development on issues of scientific authority, as compared with Omani women and American male and female students. In both of these cases, students developed their epistemologies according to a culturally-determined trajectory, and in both cases, there was

potential for conflict between the epistemologies of the local culture and that of the academic culture.

Culture. Culture may influence the ways students interact with others in constructivist learning environments. Wright and Lander (2003) noted in their study of South East Asian students at an Australian university that the international students engaged less frequently than did Australian students in collaborative discussion. Furthermore, Catterick (2007) suggested that constructivist pedagogy works poorly in Chinese culture, where many students struggle to reconcile their long held pedagogical beliefs and habits with collaborative learning, the diminished authority of teacher, and autonomous learning.

Individual difference. Individual difference, which may be shaped to some extent by culture and habit, also plays a role in a student's ability to accept various epistemologies, or succeed in classrooms shaped by those epistemologies. Nussbaum and Bendixen (2003) suggested that epistemology, extroversion, and cognitive need influenced students' engagement in argument, a constructivist learning method. They found that of the 238 undergraduate pre-service teachers questioned, personality played a major role in how students engaged in classroom discussion through argumentation, with students who ranked high on assertiveness tending to approach argumentation while those with high "warmth" tending to avoid argumentation. Poole, et al. (2004) found that medical practitioners who tended to be assertive, positive about others, and open to new experiences, were more likely to exhibit high amounts of trust, which in turn led to them being more likely to participate in virtual collaboration. Thus personality and individual difference may affect students' willingness not only to collaborate with others, but to adopt new technologies.

Knowledge and skills. Students' prior knowledge and skills aid in the adoption of constructivist methods. Al-Issa (2005) noted that any educational innovation is highly dependent on the teacher's skills and adequate training for implementation. Additionally, Choi and Lee (2009) noted how students' epistemological beliefs, along with metacogitive ability, justification/argumentation skills, and domain knowledge, are important for successful completion of ill-structured problem solving. Jonassen (1991) has suggested that as students progress from novice to advanced and then to expert learners instruction should move from behaviorist to cognitivist to constructivist methods. In this way, students' prior knowledge and skills may align better or worse with different types of learning. Saleh, Lazonder, and Jong (2007) found that Kuwaiti fourth-grade boys displayed different types of collaborative interactions in the classroom as well as motivation to engage in collaborative work based on their science ability. Their study confirmed that students of high ability, as determined by a science achievement test and a subject pretest, usually took on an "explainer" role in group discussions, often simply answering the questions of the low ability students. This often left the average ability students with little room for interaction in group discussions. However, when the researchers structured the discussions to limit the high ability students' involvement in the discussion and provide supportive cues for collaborative discussion, the interactions of the average ability students increased as did their motivation to engage in collaborative learning and their post-test achievement results. For these students, their limited previous knowledge and scientific ability could be mediated through structuring interactions to scaffolding their collaborative interactions.

Academic habits and expectations. Students' academic habits and expectations for learning, formed over years of enculturation in a school system, may also be a source of conflict

with innovative forms of pedagogy. For instance, when students become accustomed to taking multiple-choice tests throughout their schooling, they develop habits in studying and taking tests, as well as expectations of what future tests should contain (see, for example, Hübscher-Younger & Narayanan, 2003). Students may thus be ill-prepared for novel classroom routines with more open forms of assessment.

Reactions to Innovation

During innovation, students' educational philosophy can be either in conflict or congruence with teachers' educational philosophies, as well as the institution's structure, and vice versa. When there is congruence, the aligned elements may be ignored. For example, culture is rarely noticed unless it is in misalignment. Additionally, the congruence may be celebrated, as when students are excited that the teacher's style matches their own. When there is conflict, however, misaligned elements may be dismissed as irrelevant. For example, the student may simply say "I don't get this method" or "I just don't learn this way" and make no attempt at aligning his or her educational philosophy with the teacher or the institution. Otherwise, adaptation may take place where students take on new epistemologies, habits, skills, etc. While this adaptation is often the goal of innovation, it may cause conflict where there was previously congruence. For example if a student adopts a new epistemology, that student may find greater misalignment with institutional structure in terms of policy or institutional culture.

Song et al., (2007) describe two students who had difficulty reconciling their epistemology, previous knowledge, academic habits and individual differences with the instructor and course activities in a constructionist-based class. Since both students came from mainly instructivist backgrounds, they both experienced conflict with the beliefs, expectations, and knowledge of the teacher during the innovative course assignments and activities. One

student, Mindy, decided to dismiss the conflict and concluded that she was unable to learn on her own. The other student, Randy, took steps to adapt his beliefs to those of the teacher, and changed his educational philosophy, thus succeeding and finding pleasure in the course. As this example shows, while the reaction to the innovation may be the same for various students, the outcomes of that reaction can differ as the student or teacher either adapt their own educational philosophy, as Randy did, or reject the innovation as Mindy did.

Turning Conflict into Congruence

Key to the successful implementation of constructivist learning environments in instructivist learning cultures is aligning many of the abovementioned factors. Since multiple individuals are involved, perfect alignment is never possible. However, diagnosing the differences between teachers, students and institutions will help in predicting how likely sustainable adoption will be, and in determining which elements to adapt for greater alignment (see, for example, Fishman, Marx, Blumenfeld, & Krajcik, 2004).

Some misalignment may be mitigated simply through exposure to the new pedagogy. For instance, Hung et al. (2003) noted that some students, whose academic habits were in misalignment with problem-based learning, overcame their initial discomfort and gained an appreciation for problem-based learning over the course of the study, thus adapting their own educational philosophy as a result of the innovation. However, for other elements such as epistemology, knowledge and skill, and habit/expectation, a strong system of scaffolding may be needed (for an example, see Choi & Lee, 2009). For this to be successful, teachers must be explicit about their own educational philosophies (Hannafin et al., 1997; Song et al., 2007). The teacher must be actively involved in aiding students through the complexities of constructivist learning environments (Hung et al., 2003; see also above for role of teacher in constructivism) as

well as recognizing and flexibly adapting to misalignment (Song et al., 2007). This may include mixing instructivist and constructivist methods, training students in strategies for successful collaboration and problem solving, and creating tools for scaffolding students' abilities in task completing, such as through problem-solving aids (Hmelo-Silver et al., 2007) or discussion cues (Saleh et al., 2007).

Conclusion

While instructivism and constructivism stem from seemingly incommensurable paradigms, based on contrasting philosophies and pedagogies, each is beneficial to understanding and improving learning. While traditional instructivist pedagogies dominate many learning cultures in both industrialized and developing countries, knowledge societies are built on collaborative problem-solving and knowledge-creation skills that may be best taught and learned in constructivist-based learning environments. Thus, it is increasingly important to understand how to introduce constructivist elements to instructivist learning cultures. In order for such an innovation to be sustainable, designers need to work collaboratively with local practitioners to diminish the misalignment between educational philosophies of teachers, students and national or institutional systems.

For practitioners, this means diagnosing, first and foremost, their own educational philosophy and how it shapes their own innovative actions in the classroom or learning environment. In this way the teachers or instructional designers can see how their own habits/expectations, epistemology, etc. affect the structure and assessment of classroom activities. Next, educators can attempt to gauge the educational philosophy of their students, both individually and collectively. This can be done directly, by questioning the students, or by indirectly analyzing their reactions to the educator's innovations. For example, if students are

resistant to authentic assessments because they are used to normative-referenced testing, the teacher can attempt to understand how students' academic habits and epistemology have led to conflict and the students' subsequent dismissal of the innovative practice. The teacher can then work to either adapt his or her own innovations or help students adapt their own educational philosophy.

The analysis can then extend to the institution and further to the national context. While the teacher may be fully committed to constructivist education, the constraints, resources or politics of the institution or national system may shape the activities of the classroom, as has been so well illustrated by Vavrus (2009). Understanding how policy, resources, infrastructure, and culture influence classroom expectations is vital to introducing innovative activities or scaling them up to other classrooms and schools.

For researchers, the implications of this model are still being explored. This conceptual model is being applied and refined through a current study that introduces a CSCL environment into an undergraduate course at Sultan Qaboos University in Muscat, Oman. This study is employing an educational design research methodology to create a learning environment to minimizes the conflict between teachers, students, institutions and national context, while at the same time seeking to understand how this model's variables (along with other yet unforeseen variables) shape students' acceptance of the CSCL activities. This research is expected to shed greater light on how students adopt or reject innovative pedagogies based on constructivism. Ideally, practitioners and researchers will be able to apply the refined framework that results from this study as they work to create knowledge societies that foster international educational development.

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CHAPTER 3

LITERATURE REVIEW: THE POTENTIAL OF COMPUTER-SUPPORTED COLLABORATIVE LEARNING (CSCL) USE IN OMANI EDUCATIONAL DEVELOPMENT[2]

[2] Porcaro, D. Submitted to *The International Journal of Computer Supported Collaborative Learning*, 01/24/2011

Abstract

Researchers have suggested collaborative problem solving and knowledge building as important methods for linking students' classroom learning with workforce skills need in the globalized knowledge economy. However, research has done little to help researchers and practitioners understand the reaction of students from traditionally instructivist cultures—where lecture, memorization and high-stakes assessment are the norm—to such innovative curriculum. This review is focused on how CSCL and knowledge-building contribute to global knowledge economies, and more specifically how this applies to Omani education. The role CSCL plays in knowledge building and the limited applications of CSCL in the Arab Middle East and specifically Oman are reviewed. This article concludes with a brief overview of an effort to introduce CSCL into a pre-service education technology course at Sultan Qaboos University (SQU) in Muscat, Oman. **Keywords**: Culture, Knowledge building, Knowledge societies, Developing Countries, Oman

Connecting Education with Work

A major goal in educational research and practice is to bridge the gap between classroom instruction and real-world capabilities in order to develop the global workforce and aid in social and economic development. To meet this goal, international agencies such as UNESCO and the World Bank as well as educational researchers have called for constructivist-based teaching methods as a way of developing globally-connected knowledge societies (see, for example, Bereiter, 2002; UNESCO, 2005; World Bank, 2008). They argue that educators worldwide can no longer stress passive reception of sanctioned information through memorization and recall, but need rather to foster skills in information gathering, evaluating source quality, collaborating, problem-solving, and ultimately knowledge creation.

While some question the role these goals have in promoting the agendas of the established education "magistry" (Donn & Al Manthri, 2010), the shift to constructivist-based pedagogies has great potential to improve the quality of education worldwide. Many of the nations that could, as knowledge societies, benefit most from constructivist methods continue to promote education practices that are largely instructivist in nature; that is, they rely on verbal transmission of information through lectures and textbook readings and a heavy emphasis on memorization of discrete facts that can be assessed through high stakes exams. Thus these practices limit dialogue by organizing teaching and assessment according to a banking model, with teachers making information deposits that can be withdrawn from students during exams (Freire, 2000). This pedagogical orientation is ubiquitous throughout the Middle East/North Africa region, where traditional instructivist methods arguably contribute to the gulf between education and the labor force, creating challenges as graduates are unable to find work due to lack of relevant and practical skills (World Bank, 2008).

While several high profile policy makers advocate a shift to constructivist-based social learning methods to aid in educational development (see, for instance UNESCO, 2005), such a shift has both proponents and opponents within the educational research community. For instance, Kirschner, Sweller, and Clark (2006) suggest that constructivist methods are disconnected from cognitive science and fail to account for theories related to cognitive load and expert-novice differences. But others, such as Dakers (2005) and Amory (2010) suggest that behaviorist instruction, especially in technology education, promotes the economic priorities and values of the hegemony and that educators need to shift to more dialogic and inter-subjective methods of learning to prepare their students to more fully realize their potential in the 21st Century world of global competition. Despite the arguments for or against constructivism, the

actual process of change from instructivist to constructivist methods remains as poorly investigated (Catterick, 2007; Porcaro, in press).

As a form of constructivist-based education, several education experts recommend Computer-Supported Collaborative Learning (CSCL) as a way to bridge the distances amongst learners (physically, temporally and interpersonally) as well as between learners and relevant performance (Collis, 2008) with the goal of fostering collaborative knowledge creation (Scardamalia & Bereiter, 1993). But there remains little evidence of widespread adoption of CSCL tools by practicing teachers. Over the last two years, I have been collaborating with international colleagues to address this research gap in Oman, a country where a traditionally instructivist learning culture is predominant. My research has sought to reveal how personal and institutional factors affected the adoption of CSCL as an innovative learning tool. Lin and Hatano (2002) note the lack in cross-cultural studies of CSCL that address questions such as "How do students who are used to quietly receiving information respond to the discussion and argumentation that are central to CSCL?" In the development of knowledge *societies* (plural), the question of what locally-relevant values constitute a sustainable CSCL program is central, but too often ignored in education research.

This article reviews the related literature of CSCL implementation in developing countries, especially within the Arab Middle East and Oman to better understand the potential for its use in a teacher training course at Sultan Qaboos University (SQU) in Oman. To begin, I examine how CSCL fits into the background of Omani education as well as explore some of the theoretical roots and current practices of CSCL. I focus on efforts within the Arab Middle East, and specifically Oman, to implement CSCL and other collaborative methods and examine how

well the theories of CSCL may adapt to the Omani context. I then conclude by briefly sketching a CSCL project developed in Oman that applies the lessons learned from this review.

Omani Education

Oman's government has been highly committed to developing education, and has made many resources available for use at SQU and in public schools. The government invests significant financial resources in education, spending an estimated 31.1% of government funds on education (UNESCO Institute for Statistics, 2008). Oman's spending on education as a percentage of GDP is higher than most Arab countries and on par with most OECD countries (Gonzalez et al., 2008). The national government also provides much of the curricular resources for primary and secondary schools, including a standardized curriculum and textbooks. Since 1998, reforms have emphasized the teacher's role in providing additional resources for the classroom, including online resources (Oman Ministry of Education, 2008).

Additionally, the Omani educational system has undergone massive reform over the past four decades. For instance, in 1998, Oman restructured the public primary and secondary system, introducing what they term the "Basic Education" system. These reforms affect SQU graduates who work in the public schools, as well as future SQU students who will be graduates of the basic education system, so it is worth briefly noting how the goals, structure, and assessment requirements of these reforms may affect the adoption of CSCL in Omani classrooms.

Omani leaders, especially Sultan Qaboos, have realized the importance of developing human resources in order to make the country globally competitive, and have done more than leaders of many other developing countries in improving education and aligning education with workforce needs (see, for example, Gonzalez et al., 2008; and Rassekh, 2004). It is a goal of the

nation to prepare university graduates who can meet the needs of the global workforce, especially outside of Oman (Al-Barwani, Chapman, & Ameen, 2009). In order to reach these goals, the Ministry of Education collaborated with international experts to create a system that would "foster critical thinking skills and problem solving capacity among students and provide opportunities for practical experience and application to real life situations" (Rassekh, 2004, p. 15). Students are expected to construct meaning for themselves through involvement in authentic tasks (Alsarimi, 2001) and contribute to knowledge generation rather than consumption (Oman Ministry of Education, 2001). These expectations require a commitment to student-centered and experiential learning (Rassekh, 2004).

Furthermore, the Basic Education system seeks to improve assessment, aligning it better with the goals of education (Rassekh, 2004). Traditionally, assessment in Oman has been summative, occurring at the end of the educational cycle, as is common throughout the Arab Middle East, and designed to measure lower-order cognitive skills, such as fact recall. The Basic Education system proposes more authentic assessment that is formative and made up of many and frequent forms of assessment—including performance assessment, portfolios of assignments, and self-assessment by students (Alsarimi, 2001). Murphy, Ambusaidi, and Beggs (2006) suggest that this shift from a single high-stakes assessment may be a leading factor in Omani students' comparatively positive attitudes toward science, since students spent more time in classes experiencing science rather than preparing for tests.

Unfortunately, these changes are not often reflected in the higher education system, where instruction and assessment often remain quite traditional. However, as students come into higher education institutions from these Basic Education systems, their experiences, expectations and abilities will place them in a better position for adopting innovative pedagogy,

such as CSCL. Furthermore, since many of the graduates of SQU's teacher training programs will be working within these Basic Education schools, there has been an increased effort on the part of SQU faculty and staff to prepare students for the methods and expectations of these classes. All told, the effect of the Basic Education reform has begun to reshape the way all Omani educators, in primary and secondary as well as higher education, view learning and teaching.

In terms of technology, Oman has traditionally had limited access to advanced resources, but that is changing. In the 1990s the Omani government began investing heavily in educational technology for schools and universities (Al-Musawi, 2002). At Sultan Qaboos University (SQU; established in 1986), which is the only public comprehensive university in Oman, for instance, the administration has increased access to technology labs, made Internet access available in every classroom, and created a center for educational technology (Abdelraheem & Al-Musawi, 2003). Despite these advances, studies of technology usage in Oman have demonstrated poor network performance and a limited number of computers on campus (Osman, 2005), limited number of "fixed/portable equipment" and a reliance by instructors on "obsolete equipment," such as conventional film cameras, VCRs and slide projectors (Al-Musawi, 2007). In addition, Oman has limited Internet access, which is among the poorest in the Gulf Region (see Elnaggar, 2007), as well as having one of the region's lowest ICT use (Shirazi, Gholami, & Añón Higón, 2009). Al-Musawi (2007) suggested that "Oman needs a vision by which its higher education can adapt ET [educational technology]" (p. 396). The relatively weak technological situation is hopefully improving with the recent establishment of the national-level Information Technology Authority (Elnaggar, 2007) and advances in the technological infrastructure in recent years (see for instance, Al-Musawi, 2010).

Despite these advances, many classes remain instructivist in nature, and little collaboration or technology use is actually seen in the classroom (Al-Issa, 2005b; Sherif & Khan, 2005). With this in mind, CSCL has great potential as a tool for enhancing deeper cognitive processing in Omani students, improving their social learning skills, and preparing them for their future as 21st Century knowledge workers. Let us now look in a little more detail at how the theoretical foundations of CSCL prepare learners to be knowledge builders rather than knowledge consumers.

Using CSCL to Build Knowledge

As a theoretical foundation for CSCL research and practice, many researchers turn to Vygotsky (1978) to understand the socially-situated nature of collaborative learning. Learning, according to Vygotsky, includes a goal-directed learning environment, the use of mediational tools, and opportunities to interact with more knowledgeable persons in a "Zone of Proximal Development" (ZPD). According to Stahl, Koschmann and Suthers, (2006), Vygotsky's ZPD is, simply stated, the measurement of the differences between individual ability and collaborative outcomes.

This focus on the socially-constructed and situated nature of learning has fostered many closely-related social practice theories of learning, all of which are foundational to CSCL. Among these are reciprocal teaching (Brown & Palincsar, 1986), situated learning (Lave & Wenger, 1991), situated cognition (Brown, Collins, & Duguid, 1989), cognitive apprenticeships (Collins et al., 1987), distributed cognition (Salomon, 1997), and knowledge-building (Scardamalia & Bereiter, 1993). While each of these differ in their emphases (see Suthers, 2006, for a distinction of epistemologies underlying these theories), they all point to a collaborative learning that is separate from individual learning—one that is contextually, socio-culturally, and

dialogically bound. Each of these learning theories enable different instructional models or learning approaches (e.g. CSCL) for reaching some sort of intersubjective learning. In this context learners create meaning together, in what Roschelle and Teasley (1995), call a "joint problem space," and then interpret or appropriate that learning (Rogoff, 1995). This is what Vygotsky (1978) calls the "general genetic law of cultural development" where inter-personal meanings become intra-personal.

It is in this process of intersubjectivity and interpretation that CSCL finds its *raison d'etre* and its strength (Stahl, 2003). CSCL environments seek to provide students the opportunities to discuss and argue, and negotiate meaning together. More than simply learning alongside each other, as happens in cooperative learning, collaborative learning is a process of co-constructing meaning (Newman, Griffin, & Cole, 1989). The collaborators create artifacts, such as meaning, theory, or knowledge, which have ontologically-independent existence in what Bereiter (2002; based on Popper, 1972) calls "world 3", an ontology that transcends objectivity or subjectivity (or worlds 1 and 2, respectively). Thus, learners make meaning of new situations in three corresponding ways, empirically (by what they sense), rationally (by what they think), and collaboratively (by what they build with others). When students are learning collaboratively, they empirically sense the objective world before them (world 1), construct a personal cognitive meaning of their environment based on previous experiences (world 2), and then negotiate the meaning they created intersubjectively with others (world 3) to contribute to a culturally and contextually bound understanding of the new situation (Suthers, 2006). For Stahl et al. (2006), the individual/group learning tension is the heart of CSCL. As Stahl (2008) later clarified, "while some established disciplines privilege the individual and others the social, theories of collaborative learning must center on the dialectical relationship between them" (p. 99).

A theory of CSCL is communally being constructed and as Dillenbourg (1999) has proposed, this theory includes the situations, interactions, process of cognition, and effects of CSCL, suggesting that proper situations would lead to collaborative interactions that would then impact cognitive processes and result in various learning effects, though not necessarily in that order. According to Dillenbourg's model, a situation conducive to collaboration is central to effective collaborative learning. Simply placing students next to each other is not enough for collaborative learning (Newman et al., 1989). As Arnseth and Ludvigsen (2006) as well as Crook (1998) have noted, too often CSCL studies have suffered from shallow learning, ineffective collaboration, and lack of dialogue and intersubjective knowledge building. For instance, the real and potential CSCL problems that Roberts and McInnerney (2007) recognized include student antipathy toward group work, problems in group selection, a lack of essential group-work skills, free-riders, possible inequalities of student abilities, withdrawal of group members, and improper assessment of individuals within the groups.

The success of any CSCL project, then, is dependent on creating situations that will foster collaborative interactions (Martens, Bastiaens, & Kirschner, 2007). Crook (1994) has suggested that effective settings require an awareness of communal purpose among participants, a rich supply of external resources, and pre-existing interpersonal relations. Central to the creation of this environment is the teacher, both as an integral part of the collaboration and a party to the group meaning-making, from whence he or she can interpret intersubjective meaning into his or her own practice (Stahl, 2003). Whether the teacher remains distant (such as noted in Roschelle & Teasley, 1995) or as the source of meaningful anchors for discussion through direct student involvement (Dennen & Wieland, 2007), the role of the teacher is an important one in creating stimulating collaborative situations (Ku, Lohr, & Cheng, 2004).

Furthermore, as both a learning resource and an artifact of mediation (Van Drie, Van Boxtel, Erkens, & Kanselaar, 2005), computers play a central role in enabling collaborative situations. Regardless of the designer's underlying paradigm, Kolodner and Guzdial (1996) suggested that computers can assist collaboration by promoting conversation, facilitating knowledge building, providing record-keeping, enabling communication at a distance, promoting reflection, and supporting teacher planning and implementation of collaborative activities. These features and abilities of computers are especially important in light of current and evolving Web 2.0 and social media (for a meta-analysis of technology used in CSCL studies, see Jeong & Hmelo-Silver, 2010).

Central to the use of computers in CSCL is the design and study of what Stahl et al. (2006) call, "fundamentally social technologies." As they further explain, "to be fundamentally social means that the technology is designed specifically to mediate and encourage social acts that constitute group learning and lead to individual learning" (p. 419). This means focusing on the affordances of technology (Kirschner & Kreijns, 2005) and understanding how to build scripts within that technology that will lead the students to collaborative learning (Dillenbourg, 2002). These scripts can guide learning as well as social negotiation and can focus, among other things, on the nature of the problem (Kapur & Kinzer, 2007) or the task-orientation for the students (Schellens & Valcke, 2006). An example of "fundamentally social technology" is Future Learning Environments (FLE), which is an open-source web-based collaborative knowledge-building tool developed by a group of Finnish researchers that enables students to create knowledge representations (Muukkonen, Hakkarainen, & Lakkala, 1999) and is based on the ideas of CSILE or Knowledge Forum (Scardamalia & Bereiter, 1993, 1996).

FLE is now in its fourth version (or FLE4, http://fle4.uiah.fi/) and is currently an open-source plug-in for WordPress blogs. FLE4 guides students' comments on the blog according to "knowledge types" which are categories of scripts. For instance, students can respond to a problem posed by the teacher by writing comments to the post utilizing the "progressive inquiry" knowledge type (Muukkonen et al., 1999), which directs them to post a problem, a scientific answer, a personal answer, an evaluation of the process, or summary of the problem and answers. Using a familiar and widely used tool such as WordPress blogs allows the students to focus their time on learning to use something useful outside of the structure of the course, and not spend time learning how to use a tool only available in their class, as is the case with earlier versions of FLE, or other similar tools, such as Knowledge Forum.

CSCL in Practice

CSCL has been used in many international settings, but most especially in North America, the UK, Finland, the Netherlands, and Germany (Kienle & Wessner, 2006). It has been used cross-nationally in Europe (Lau-Chong Law & Nguyen-Ngoc, 2009; Ligorio & van Veen, 2006) as well as with foreign students (Lea, Rogers, & Postmes, 2002) and among Diaspora communities (Bekerman & Horenczyk, 2002). Recently it was used to improve cross-cultural understanding of Latin American learners in Japan (Isotani, Inaba, Ikeda, & Mizoguchi, 2009). CSCL has been used frequently in other Asian nations, especially China (van Aalst & Chan, 2007) and related countries, such as in Singapore (W. Chen, Looi, & Sini Tan, 2010; D. Hung, K. Lim, D. Chen, & Koh, 2008; Seng Chee Tan, Yeo, & W. Y. Lim, 2005), Malaysia (Gabarre & Gabarre, 2010) and Taiwan (Chiu & Hsiao, 2010). Outside the Far East, CSCL use has been documented in India (Kapur & Kinzer, 2007) and Knowledge Forum was used with limited results in Turkey (Erkunt, 2010). For instance, among the students of two classes, their

epistemic agency—or cognitive responsibility of the learner—based on quality of knowledge sharing, mediation of interaction, number of dialogue partners and knowledge advancement goals, was most often in the lowest level (out of four), while two to three students in each class reached the highest level. Additionally, one study of pre-service teachers in Rawanda shows implementation of CSCL for knowledge building in Sub-Saharan Africa (Mukama, 2010). While the study did not look at the success of the project as much as the actions students took in their collaborative learning, the project did lead students to seek assistance from other students, negotiate meaning through interaction, and reflect on their progress. Many of the students began the assignments through group discussion, negotiating with their group the meaning of the assignment and the role they would play.

Within the Arab Middle East, the documented use of CSCL is quite limited. In fact, of the few studies available, none specifically claimed to be CSCL. Many relied instead on the foundations of cooperative work. Others simply reported collaborative work with minimal or no computer support (see, as described below, Faris, 2009; Ghaith, 2004; Jabr, 2009; Smaili & Chehade, 2005; Soliman & Ismail, 2010). Some of the earliest documented work in the Arab World came in Israel and Palestine. For instance Hertz-Lazarowitz and Bar-Natan (2002) used computer-mediated communication (CMC) and collaborative learning (though not specifically CSCL) to teach writing skills to Israeli and Arab children in Israel. Interestingly, they found no significant difference between Arab and Israeli populations (n=599) when using collaborative CMC for writing, though there had historically been a large difference between populations in documented writing skills assessments. More recently Hoter, Shonfeld, and Ganayim (2009) used online tools to engage pre-service teachers from three different Israeli colleges—one Orthodox Jewish, one secular Jewish, and one Arab—to engage students in building

understanding between the groups. Using an approach called online inter-group contact hypothesis (OICH), the students collaborated to develop technology resources for teaching. In this approach, the students' interactions began entirely online and moved eventually to face-to-face collaboration as the students became more comfortable with each other. Though there were some limitations (such as Orthodox Jewish men refusing to work face-to-face with women they deemed as acting or dressing inappropriately), many students found the experience engaging and expressed that it helped to create inter-group connections between the traditionally separate groups. This is similar to the project undertaken by Bekerman and Horenczyk (2009) in which they joined Jewish and Arab schools in Israel in what they termed Computer-supported Collaborative Intercultural Education (CSCIE). In their online environment, they hoped to create a multilingual and multicultural space for students to connect and dismantle negative stereotypes of each other, building bridges of peace through computer-mediated contact. Other work in Palestine among Arabs included a collaborative problem-based learning activity in a public secondary science class in Ramallah that helped students collaboratively make meaning, rather than simply collect information, as they explored the causes and results of the shrinking Dead Sea and presented their findings in an authentic context to the community (Jabr, 2009). Additionally, the project was deemed a success due to the fact that students worked through the problem-solving process cooperatively, as well as expressed their own opinions creatively.

Lebanon was home to some of the Arab Middle East's earliest documented collaborative projects. In one of these, Ghaith (2004) documented the use of a collaborative technique called student teams achievement division (STAD) among 55 English as a Foreign Language (EFL) teachers in Lebanese public schools. They found through administering a questionnaire among the teachers that the most important factors to teacher adoption of STAD was their

epistemological stance (belief of knowledge as interpreted versus acquired), their attitudes toward STAD as well as beliefs of the institutional culture (what they term subjective norms) toward adoption and available resources in the learning environment(what they term behavioural control), while teachers' experience had no significant effect on adoption of STAD. Additionally, at the American University of Beirut, a Middle East institution with an American curriculum, Smaili and Chehade (2005) reported on the use of collaborative and authentic project-based learning in a mechanical engineering course focusing on the results of one group project, and the generally positive reaction by students to an end-of-course questionnaire.

In Egypt, El-Deghaidy and Nouby (2008) conducted a pretest/posttest quasi-experimental study of pre-service science teachers (n=14 and n=12 control) using a "Blended e-learning collaborative approach (BeLCA)." In this course, students worked in diads in front of a computer to accomplish given online tasks. The control group was also paired in diads to work on collaborative assignments, but with no computer support. Despite the low sample size, it is interesting to note that they found no difference in attitudes of students toward *cooperation* versus traditional methods, though there is no evidence in the study of actual *collaborative* learning.

Within the Arab Gulf, collaborative learning is also a fairly recent advancement. For instance, Alqurashi and Stahlke (2005) reported on an effort to introduce Saudi Arabian composition students to collaboration, both face-to-face and online. Finding no significant difference between the groups in terms of attitudes toward collaboration, social self-efficacy, and perceived peer academic support as measured on a questionnaire, the authors suggested this may be due partially to the fact that collaborative learning was a new method of learning in Saudi Arabia and that students were not familiar with this technique. More recently, Soliman and

Ismail (2010) developed a multi-level design studio for single-gender architecture and urban planning students at a university in Saudi Arabia. Within the studio, students of different academic levels collaborated in various design projects. While the results of the report are unclear, mostly based on ill-defined variables and unclear reporting of results, it appears that the multi-level ("vertical") design studio helped the students develop more design skills than the traditional arrangement. Within the United Arab Emirates (UAE), as was common elsewhere, efforts to introduce collaborative learning often included merely adding online discussion threads to traditionally face-to-face classes (see for example, Shana, 2009). Tubaishat, Bhatti, and El-Qawasmeh (2006) reported on the reaction of students to online learning management systems (LMS) in the UAE and Jordan, claiming that students used the LMSs to communicate and collaborate, allowing them to become more comfortable in mixed-gender settings. In Qatar, Faris (2009) studied the effect of nationality in heterogeneous grouping in a private international high school there, finding that heterogeneity in both students' nationality and ability produced the most desired outcomes of all collaborative groupings.

In Oman, Khan (2006a) surveyed 36 women in post-graduate teaching-certificate programs to gauge their perceptions of CMC use in collaborative education. While the term "collaborative" was used in the study, most of the examples demonstrated cooperative learning events. Despite the small sample size, the study showed that many women preferred CMC because of the social freedom they had as compared to face-to-face interaction (evidenced from the large number of respondents who claimed to take neutral or male pseudonyms during conversations). Alkharusi, Kazem, and Al-Musawi, (2010) used discussions in computer mediated communication in their educational measurement class in an attempt to foster collaboration and knowledge creation. The computer-mediated course (n=24) showed a positive

statistically significant difference over the traditional course (n=27) in terms of knowledge, perceived skillfulness and attitude as determined by various instruments. Hall (2009) conducted a design-based research study for her doctoral thesis to develop a culturally-appropriate online professional development program for teachers at SQU based on Vygotskyian constructivism. Within the structure of the course, computer-supported collaboration was an important element as a culturally mediating tool for knowledge building, though she did not necessarily build on a CSCL foundation. Additionally, several studies have been undertaken to understand the use and perceptions of students and teachers of e-learning tools in Oman (Al-Busaidi, 2009; Al-Musawi, 2007; Bentley, Shegunshi, & Scannell, 2010; T. Cobb, 1999; Naqvi, 2006, 2008; Osman, 2005; Smego, Herning, L. Davis, Hossain, & bin Mohammed Al-Khusaiby, 2009).

While these studies present tools that could be termed CSCL, such as LMSs, online discussion forums, etc., these studies do not provide evidence of intersubjective meaning-making. Even when they do cite collaboration or CSCL as their inspiration, many of these studies exhibit the problems outlined by Najafi and Slotta (2009) in that they "tend to focus on knowledge transmission, sustain fixed curriculum, include predetermined learning activities, emphasize individual achievement, use ineffective CSCL tools and employ rigid assessment procedures" (p. 233). Thus, in many ways, CSCL represents an entirely new paradigm (Koschmann, 1996) for learning in Oman as well as much of the Arab Middle East. While many of the studies demonstrate both qualitative and quantitative benefits for using collaborative learning in the Arab world, these studies do not demonstrate any overwhelming evidence of a positive effect of collaboration on learning, nor do the number of studies show a major trend toward the use of collaborative knowledge building in Oman.

However, as these studies seem to show, when properly prepared, the educational context in Oman does not appear to present any major obstacles to the adoption of knowledge building CSCl. In fact they may demonstrate that in many instances collaborative learning and CSCL especially can be applied successfully in Oman, and can even provide a socially safe space for mixed-gender collaboration (Khan, 2006; Tubaishat et al., 2006). With adequate support for students and faculty, CSCL tools can help transition Omani education away from instructivism and toward collaborative knowledge-building.

Conclusion

The potential for CSCL in Oman and related countries is quite great. However, it will require changes in the way education is conceptualized and practiced. As Stahl (2009) outlined in his introduction to a recent issue of the *International Journal of Computer-supported Collaborative Learning,*

> Although most CSCL systems are still experimental prototypes, once fully developed with all the supports needed for deployment, they could provide effective learning environments to broad audiences of students. In doing so, they would even make it possible for students to collaborate across national borders, preparing them for an ever more global world….The catch is that students, teachers, parents, schools, and politicians all have to transform how they think about education so that they can appreciate and support the profound kinds of learning that can take place in CSCL experiences. Some countries have begun to commit to constructivist and collaborative learning as appropriate to our global knowledge-building economy. It is up to CSCL researchers to continue to provide persuasive evidence for transforming our educational institutions in this direction (p. 2).

Within Oman, as well as throughout the Arab Middle East, there is a need to rethink how education is viewed if education systems are to meet the needs of the "global knowledge-building economy." While efforts have been made to introduce collaboration generally and CSCL specifically, the progress in this direction needs to continue, gaining momentum and developing in new, creative, and culturally-specific ways. The calls for a shift in Omani

education from instructivist methods and rote memorization to collaborative knowledge building have been voiced by not only Western educators, but Arab educators as well (see, for example, Al-Issa, 2005; Alkharusi et al., 2010; El Tell & Al-Maaitah, 2000). They see in collaborative knowledge building an opportunity to develop Oman's future work force (Al-Barwani et al., 2009) and to contribute in creative ways to solving Oman's problems and designing its future.

However, the "persuasive evidence" that Stahl calls for seems to be lacking in the current research. While the studies included show that collaborative learning and even CSCL is being done, the goals and methods of the research are mostly to document, not to develop. The efforts appear quite weak and often seem like catching-up, rather than creatively pushing the envelope of pedagogic possibility. The studies often consist of simple media comparison studies, which have consistently been shown to do little for educational research (Reeves, Herrington, & Oliver, 2005). What is needed to progress the field of CSCL research and application is a concerted effort to couple research into learning theory with research meant to design meaningful learning environments. As Roschelle, Rafanan, Estrella, Nussbaum, and Claro (2010) have demonstrated, CSCL research can move beyond simply determining efficacy through randomized trials or describing context through qualitative research, but it can combine the two to create effective and contextually rich environments. In this way, the effectiveness can extend beyond the confines of the study, and can have sustainable impact on education. As Hall (2009) demonstrated, this kind of work is not only possible in Oman, but can creating tangible benefits to the local learning context, including stainable and culturally-relevant learning environments and usable design principles. As researchers and practitioners work together in long-term iterative studies, the seeds of education reform will be planted and grow. From these seeds, as

well as others planted through many other collaborative education design projects, the Omani knowledge society will continue to grow and develop.

With this goal in mind, I have been working with Omani educators to develop a CSCL course at Sultan Qaboos University in Oman that fosters collaborative knowledge-building among pre-service teachers in an educational technology course. The study employed an educational design research methodology (van den Akker et al., 2006). Through my study, I sought to find a sustainable solution for the improvement of Omani education that could provide a model for educational practice in an Omani knowledge society while also contributing to an understanding of learning and educational change in general.

Utilizing FLE4 and other CSCL tools for knowledge-building, the course was based on the Fostering Communities of Learners (FCL) methodology (Brown & Campione, 1996). While many variations of FCL exist (Schoenfeld, 2004), Brown and Campione (1996) noted that the important thing was fundamental principles, not surface procedures. As Sherin, Mendez, and Louis (2004) note, these fundamental principles are activity, reflection, collaboration and community. To promote these principles, pre-service students worked in single-gender groups to create various educational technology tools for use in Omani schools. The students each chose roles based on those found in a multimedia design team (such as project manager, graphic designer, instructional designer, audio/video specialist and web specialist) and formed online jigsaw groups using FLE4 and wikis where they could discuss with others who shared their roles. Students also engaged in face-to-face “cross talk” sessions with other groups of the same gender, and then worked within their groups to produce the multimedia tools. The details of the design of the course and subsequent refinements, as well as the reaction of the Omani students to this innovation will be documented in future articles.

Through this course design, Omani students can begin to collaborate and build knowledge, and carry with them into their classrooms collaborative knowledge building practices. Additionally, educators throughout Oman and the Middle East may see in this project a way to apply the theories and principles of CSCL into their own practice. In this way, knowledge societies can develop that are locally contextual, but globally connected as Omanis work collaboratively to create knowledge and solutions for the future. Through education design research, I hope to plant the seeds of change in Omani education that will grow beyond the one classroom, or even the one institution, and will continue to have a positive impact on building an Omani knowledge society.

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CHAPTER 4

RESEARCH METHODS

Purpose of the Study

The purpose of this study was to understand how students, teachers and institutions adapt to collaborative knowledge-building technologies and practices, as well as to understand what design principles lead to a CSCL environment that is contextually appropriate for an undergraduate course at Sultan Qaboos University (SQU) in Oman. For this multi-semester design research study, I sought an answer to the following questions, based on a theoretical understanding of learning.

1. a) What changes (attitudinal, cognitive, epistemological, habitual, etc.) occur in teachers and students when a knowledge-building CSCL environment is introduced in an Omani undergraduate course? b) how do the students and teachers manage those changes?
2. What are the characteristics of a sustainable knowledge-building CSCL environment in an Omani undergraduate instructional design course?

Research Design

Educational technology has been noted as "first and foremost a design field," and as such, "the paramount research goal of education technology should be solving teaching, learning, and performance problems, and deriving design principles that can inform future development and implementation decision" (Reeves, 2006, p. 61). It is this general goal of understanding teaching and learning to solve existing problems and inform future design that guides my own

efforts to introduce a knowledge-building CSCL environment in Oman. Thus, in undertaking this research, my goal has been not only to understand how students, teachers and institutions adapt to CSCL technologies and practices, but also how to design a CSCL environment that is contextually appropriate for an undergraduate instructional design course at Sultan Qaboos University (SQU) in Muscat, Oman.

Aligning Methods to Goals

When designing a research study, it is important to first clarify the study's goals, and then align the methods to that goal. Reeves (2000) suggested that there are six types of research goals, namely theoretical, empirical (or predictive), interpretivist, postmodern, development and action. The developmental goals of design research are especially useful when "existing knowledge falls short, as is often the case with highly innovative curriculum improvement initiatives" (McKenney, Nieveen, & van den Akker, 2006, p. 74), or when researchers want to create new learning environments, develop contextually-based theories of learning, understand design processes or increase education innovation (DBRC, 2003). While CSCL studies have historically included laboratory, ethnographic or design research methods to reach their goals (Stahl et al., 2006), I feel that the predictive (e.g. laboratory) and descriptive (e.g. ethnographic) methods of research are limited in several important ways.

For example, while quasi-experimental laboratory studies or randomized clinical trials may be considered the "gold standard" of research because of their ability to isolate variables and determine causal relationships (National Research Council, 2002), this focus on only hypothesis testing limits the scientific process to merely evaluation (Phillips, 2006) and may hinder innovation by prematurely proclaiming evaluative judgments (DBRC, 2003). A focus on variable control leads to answers that are "too narrow to be meaningful, too superficial to be

instrumental, too artificial to be relevant, and, on top of that, they usually come too late to be of any use" (van den Akker, 1999, p. 2). In this way, these methods often de-contextualize to the point of insufficiency.

Likewise descriptive methods also fail too often in producing positive educational change. For instance, surveys, while allowing for large-scale evaluation of situations, take only a nomothetic (or general) view and neglect the idiographic (or specific) view, and thus sacrifice depth for breadth. Surveys, along with other descriptive research (such as ethnomethodology, phenomenology, ethnography and case studies) can constrain educational change within the observation stage, and may limit the transformative agendas of educational researchers due to fears of the Hawthorne effect on the observed phenomena (Barab & Squire, 2004).

Design research, however, has as a goal the application of both prediction and description in an attempt to create sustainable educational change while seeking to understand learning *in situ*. It describes learning situations using a variety of methods, fosters the creation of innovative learning environments, *and* evaluates them through predictive testing methods over several iterations (Stahl et al., 2006). Thus it is best situated to produce practical and socially-responsible research (Reeves, Herrington, & Oliver, 2005).

Furthermore, design research addresses many of the shortcomings of theoretical and postmodern research in that it creates solutions as a goal, rather than assuming that others will convert theory and critique into change. Design research also transcends the goals of formative (or action) research in that it constantly connects design with existing theory and generates new contextually-grounded theories (Barab & Squire, 2004). In this way, design research occupies Pasteur's quadrant in Stokes' (1997) matrix, assuming the dual goals of consideration of use and fundamental understanding (Reeves, 2000). It is for these reasons that I believe that the

developmental goals of design research best allowed me to understand the nature of collaborative knowledge building as well as work with local Omani educators to create solutions that will improve education in their country and lead to greater social and economic development.

Design Research Defined

Educational design research has been called by a variety of names, including *design research* (van den Akker et al., 2006), *design experiments* (Brown, 1992; Collins, 1992), *design-based research* (Design-Based Research Collective [DBRC], 2003), *development research* (van den Akker, 1999; closely related is Richey & Nelson, 1996) and *formative research* (Reigeluth & Frick, 1999; though it only represents one of their categories). It has also been associated with the closely-related *action research* (van den Akker, 1999), though focusing much more on the design-related aspects of education (such as curriculum and instruction, the learning sciences, and instructional design). Furthermore, its applications have been varied and diverse. Rather than being a single research method, Phillips (2006) noted that design research is like a file marked "miscellaneous" into which researchers cram many things. He suggests that design experiments are difficult to define, since "there *is no one thing that they are like* [emphasis original]" (p. 94). Barab & Squire (2004) suggest that design research is "not so much *an* approach as it is a series of approaches" (p. 2, emphasis original) and that since it is still in its infancy, its definition and methods have not fully been agreed upon. Bell (2004) seeks to bring order to this confusion by categorizing design research into four modes or families, based on varying theoretical traditions and research perspectives, including 1) developmental psychology, 2) cognitive science, 3) cultural psychology, and 4) linguistic or cognitive anthropology, of which this study best exemplifies the last (see more below).

Despite this seemingly chaotic scene, there are central goals and elements that unite all these approaches (no matter their name) and distinguish them from other forms of research. Design research has been defined as "an emerging paradigm for the study of learning in context through the systematic design and study of instructional strategies and tools" (DBRC, 2003, p. 5). Bell (2004) suggests that design research, no matter the mode, is "focused on the development of sustained innovation in education" (p. 251). Design research allows the researcher to "inquire more broadly into the nature of learning in a complex system and to refine generative or predictive theories of learning" while producing "models of successful innovation" (DBRC, 2003, p. 7), all the while combining research, design and pedagogical practice (Joseph, 2004).

Design research is focused on solving complex problems based on known and hypothetical design principles through long-term engagement and intensive collaboration with practitioners. This is done through rigorous and reflective inquiry that refines solutions and generates learning and design theory (Reeves, Herrington, & Oliver, 2005). It is extended, iterative, interventionist, theory-oriented and practical, as well as prospective and reflective (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003). It eliminates the boundary between design and research (Edelson, 2002) and creates sustainable learning artifacts *as well as* new theoretical categories, or ontological innovations (diSessa & Cobb, 2004). These theories expand our knowledge of domain theories, design frameworks and design methodologies (Edelson, 2002)—or what van den Akker (1999) calls substantive and methodological design principles. Based in authentic settings, design research is highly contextual and leads to sharable knowledge for practitioners and designers (DBRC, 2003); that is, knowledge that is usable, actionable and

adoptable (Bannan-Ritland, 2003). Furthermore, it uses mixed methods, and is neither qualitative nor quantitative, but rather "quisitive" (Stahl et al., 2006).

Just as with research questions, the emergent and iterative nature of design research makes it impossible to outline all the research steps from the beginning (Phillips, 2006). This does not, however, give researchers permission to take an "anything goes" approach. Good design requires careful planning to ensure that it is research-driven, well documented, formatively evaluated and generalized (Edelson, 2006). In order to ensure this, I utilized a research design that roughly followed Bannan-Ritland's (2003) Integrative Learning Design (ILD; see Figure 4.1).

This research design began with an informed exploration, or what van den Akker (1999) calls "preliminary investigating," involving reviewing the literature, developing theory, and understanding the users' needs. Based on this initial investigation, I designed a preliminary (see Joseph, 2004) CSCL environment based on theories of knowledge-building communities, understanding of the Omani context, and "thought experiments" (Gravemeijer & Cobb, 2006) or what Sandoval (2004) calls "embedded conjectures about learning." Once I arrived in Oman, I began to collect data through observation and collaboration with Omani educators and students that led to further refining of the initial learning environment.

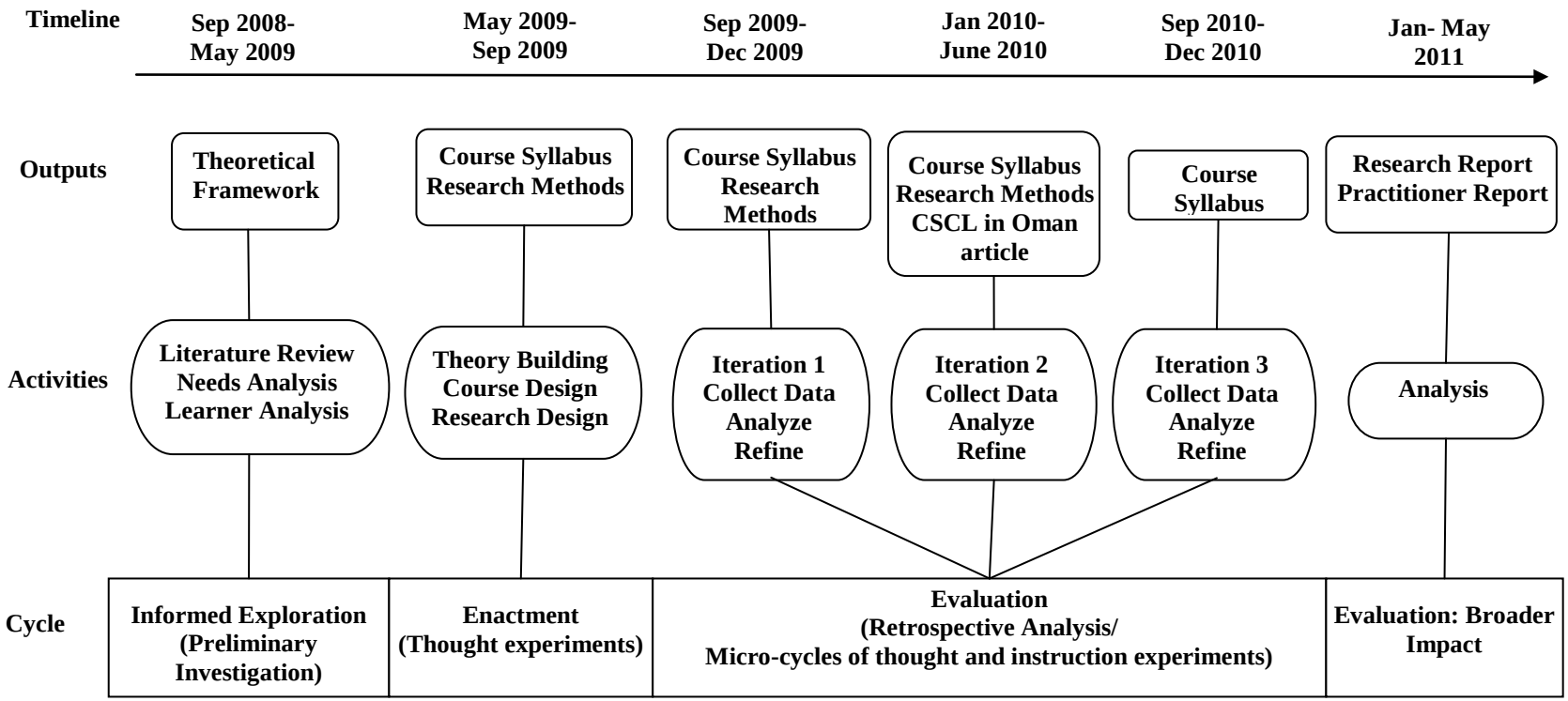

Figure 4.1: Research design, based on Bannan-Ritland's ILD (2003).

Implementation occurred simultaneous with evaluation, as data collection led to refinement in designs of the study and the learning environment. Through micro-cycles of "thought experiments" and "instruction experiments," the environment developed and a local instructional theory emerged (Gravemeijer & Cobb, 2006). I reviewed the results of the first implementation through what Edelson (2002) calls "retrospective analysis," and refined the design in preparation for a second, and a third implementation. After the third and final implementation, a "semi-final" (reflecting the long-term and on-going nature of the research) report was generated focusing on what Bannan-Ritland (2003) calls broader impact, in an attempt to generalize the results to other contexts. This is available in two versions, a technical report (see chapter 5), which goes into greater depth in one area of focus, and a practitioner's guide (see chapter 6) which broadly details the lessons learned from the study. While this is the limits of the dissertation, I hope to continue to broaden the study in future research, focusing on sustainability and scalability in other contexts.

Throughout the study, my work was guided by the beliefs and methods of what Bell (2004) calls "linguistic or cognitive anthropology design-based research," which places significant emphasis on the localized nature of the practices and norms of the social groups investigated (Omani students) as they actually occur in their specific settings. Bell claims that such a focus allows for detailed study of how new designs are appropriated, resisted, or even repurposed by groups that are assumed to already have significant cultural momentum before any intervention begins. He suggests that this form of work involves careful observation and documentation of the everyday practices of participants in the setting before, during, and after the introduction of new designs. Analysis often documents unanticipated consequences or

emergent practices that derive from the cultural worlds of participants never anticipated by the educational designers (p. 249).

Context of the Study

My goal through this study has been to incorporate a knowledge-building CSCL environment into an English as a Foreign Language (EFL) teacher training course for undergraduate students at Sultan Qaboos University, namely TECH 3008: Introduction to Educational Technology (see Appendix A for a copy the Spring 2010 syllabus, with research consent form). The research was originally cleared through the University of Georgia's Human Subjects Office's Institutional Review Board (see Appendix B), and subsequently by Sultan Qaboos University (see Appendix C) It was felt that introducing such a CSCL environment would help to move the students to gaining collaborative problem-solving skills they would need after graduation and allow them to move their learning from passive knowledge acquisition to knowledge building. I taught the course for the Fall 2009 and Spring 2010 semesters, and in Fall 2010 the course was taught by Ali Al-Musawi, an Omani professor in the Instructional and Learning Technologies department. The Fall 2009 course had 27 students, the Spring 2010 had 22, and the Fall 2010 had 39. In this course we introduced exercises based on Brown and Campione's (1996) Fostering a Community of Learners (FCL). The structure of the course allowed for one session a week devoted to traditional lectures, and the second session that involved a more interactive "lab" setting, usually held in a computer lab in the College of Education.

During the first two semesters, the students were assigned various projects designing posters, videos, websites, presentations and other instructional media. They selected their own groups for each assignment and worked individually or in small groups (3-5), which were all

single-gender groups. During the second half of the semester the students divided into project groups of 3-5 students (also single-gender) to collaboratively build multimedia kits relevant to the local Omani context. The multimedia kits were to supplement the national curriculum for English language in Omani public schools, and students picked a specific grade to work in. The students selected a unit from the textbook, and created media to accompany or supplement the lessons. They were asked to select a sample school in Oman where they would apply these lessons to ensure that the technical limitations of Omani schools were adequately planned for. For instance, if the classrooms in their sample school were not linked to the Internet or did not have a computer or projector, the media designed by the students had to reflect that fact. In the third semester, the initial group projects were removed and students worked on three group projects from the beginning of the semester in their design groups.

The students chose roles and were divided into "jigsaw groups" to learn about various aspects of educational technology. The roles were based on different elements of a multimedia team, namely project manager, web specialist, graphic designer, instructional designer, and audio/video specialist. Each student was responsible to independently learn more about some aspect of their role and collaborate with others who shared their roles online. They then rejoined their project groups and provided some level of expertise in their role to the project. During one lab session, the students were rotated around the room in either male or female "cross-talk" groups to allow them to share their knowledge and experiences with students from other groups. Taking on specific roles and creating authentic artifacts not only allowed the students to learn the skills of the EFL community of practice (Lave & Wenger, 1991), but immersed them in a form of cognitive apprenticeship (Collins, Brown, & Newman, 1987).

During the task, students formed knowledge-building communities of their own using Moodle (including discussion forums) and Wikis, as well as Future Learning Environments 4 (FLE4), an open source plugin for WordPress blogs (see Muukkonen, Hakkarainen, & Lakkala, 1999) which is based on the framework of Knowledge Forum (Scardamalia & Bereiter, 1993, 1996). FLE4 provided scripts for students in an attempt to guide their discussions and artifact creation toward knowledge building, helping the students to "rise-above" other students' comments as they built theory, questioned other students' assumptions, and linked ideas to relevant literature. Students' collaborative work was conducted online, so that mixed-gender groups could collaborate. Collaboration was conducted both synchronously (during class time) and asynchronously, face-to-face (in single gender groups) and online. During the third semester FLE4 was discontinued due to complexity of its use in the Omani setting, and Moodle's discussion forums were relied on for collaborative discussion.

Additionally, it is worth noting that, for both theoretical and practical reasons, the study's context extends beyond the single classroom (Barab & Squire, 2004) to also include the entire institution (Fishman et al., 2004). For example, in addition to seeing how feasible this design was in the context of the course, I also sought as a goal to investigate how institutional and national factors help or hinder the scalability of this idea to other courses within the college, and eventually to other colleges in the university. For this reason, I included available key stakeholders in the evaluation of the project (Walker, 2006), including teachers in other departments as well as available support staff and external expert reviewers.

Data Collection Methods

Data collection methods, like many other aspects of design research, were not formalized but rather depended on the theoretical basis of the study (Gravemeijer & Cobb, 2006). They

often include mixed methods (DBRC, 2003) and rely heavily on formative evaluation methods (van den Akker, 1999). While data collection in design-research is quite extensive and sometimes overwhelming (Brown, 1992; Dede, 2004), I tried to focus my collection efforts on information richness and process efficiency (van den Akker, 1999; see Appendix D for a complete data inventory). Most importantly, my research methods tied directly to my research questions, employing methods I believe answered those questions (see Table 4.1).

For the first question, I sought to understand the ways institutional structures and students' educational philosophies affected the introduction of innovative curricula, such as CSCL. To do this, I asked students to complete pre-, mid- and post-term questionnaires to assess their educational philosophy and attitudes toward collaborative knowledge-building (see Appendix E). The questions concerning epistemology were based on an English and Arab language questionnaire developed by Karabenick and Moosa (2005) for use by Omani university students. Students in the first group selected identification numbers for the questionnaires, and the master sheet of identification numbers was kept with a third-party to ensure confidentiality. During the second and third iterations, the questionnaire was administered on Moodle, utilizing the anonymity feature of the questionnaires. After the course was complete, the students' identities were revealed on Moodle, allowing the three surveys (pre-term, mid-term, and post-term) to be linked to each other so the students' educational philosophies could be traced over time. This anonymity was granted to the students until after the course was completed and grades were submitted, to provide students the assurance that their answers would not affect their standing in the course, in an attempt to improve the reliability of their responses.

Table 4.1: Methods matrix for research question 1

RESEARCH Methods MATRIX

What changes (attitudinal, cognitive, epistemological, habitual, etc.) occur in teachers and students when a knowledge-building CSCL environment is introduced in an Omani undergraduate course? How do the students and teachers manage those changes?

	Research Methods Sub-questions	Observations/Course Debriefs	Case student interviews (3)	Student focus group	Student Questionnaire (pre, mid, post)	On-Line Data	Assignments	Teacher / staff interviews	Available Documents
Institutional System	a. How do available resources affect adoption?	✓						✓	✓
	b. How does current policy affect adoption?	✓						✓	✓
	c. How does institutional culture affect adoption?	✓						✓	
Student Educational Philosophy	a. How does student epistemology affect adoption?		✓	✓	✓				
	b. How does a student's culture affect adoption?	✓	✓	✓	✓				
	c. How do students' individual differences affect adoption?	✓	✓	✓	✓	✓			
	d. How do students' knowledge and skills affect adoption?		✓	✓	✓		✓		
	e. How do students' academic habits and expectations affect adoption?	✓	✓	✓	✓	✓	✓		

In order to understand more deeply the reaction of students to the innovative pedagogy (Brown, 1992), I selected, based on their initial reactions to the course and variety in beliefs, three students during the first iteration as cases for further study. They were given pseudonyms, namely Fatima, Lailah and Amin, to limit the ability to track them to individual students in the course. The three students were purposefully selected to provide maximum variation (Glaser & Strauss, 1967; Patton, 1990). They varied in their reaction to constructivist education, ranging from congruence to conflict. For instance, Fatima was the most accepting of constructivist education and collaboration, and Amin was least accepting, with Lailah in the middle. Each of the students was in their 4th or 5th year of the English language teaching program at SQU and came from different regions of Oman. These case students were each involved in three semi-structured interviews, at the beginning of the course, mid-term and at the end of the course. The interviews each lasted nearly one hour, and were audio recorded and transcribed (see Appendix F). Following Seidman's (2006) recommendations for conducting three-session phenomenological interviews, the first interview focused on the students' history and context, the second focused on their experiences in learning an innovative curriculum, and the third focused on the meaning the student made of the experience. In some cases (for instance with Lailah), the students requested that the interview protocol be emailed to them before the interview. Additionally, Lailah was not able to attend the third interview, so she emailed her answers to the protocol questions to me.

During the second iteration, I sought greater breadth in understanding the student experience. Therefore, instead of selecting case students, I chose to employ student focus groups at the end of the semester. I conducted one male focus group (n=3 students) and one female focus group (n=4 students) in my office at SQU, and because of student scheduling difficulties I

also had additional individual interviews with two male students and two female students using the same protocol. The questions for this interview focused on the students' reactions to the course and their experiences with collaboration (see Appendix G). These interviews were all audio-recorded and transcribed.

Since during the first two iterations I was both the teacher and researcher, I also played the role of participant observer (Brown, 1992; Gravemeijer & Cobb, 2006; Joseph, 2004). My observations of the collaborative sessions were discussed with other educators at SQU and I kept a regular blog of my observations. Furthermore, since many of the students' collaborations and discussions were online, I recorded the discussions on Moodle, course Wikis and through FLE4, as well as kept copies of artifacts made in the courses.

In order to answer the second research question, I sought to assess the legitimacy, efficacy, and viability (McKenney et al., 2006) of the learning environment through formative evaluation methods (see Table 4.2). As part of classroom observations, I tried to monitor the students' use of the learning environment. The post-term survey also included questions about students' experiences with the environment and any refinements they might suggest. Case student and focus group interviews also included questions evaluating the students' experience with the course and course tools. I also asked seven external reviewers from various countries to review the course. These reviewers were selected based on their understanding of Omani higher education, collaborative knowledge building or teacher training. Five of them looked at the course, and four completed the expert review form (see appendix H).

Table 4.2: Methods matrix for research question 2

EVALUATION MATRIX

Research Question Two: What are the characteristics of a sustainable knowledge-building CSCL environment in an Omani undergraduate instructional design course?

	Evaluation Sub-questions	Observations/Course Debriefs	Expert Review	Case student interviews (3)	Student Questionnaire (pre, mid, post)	On-Line Data	Assignments	Student Focus groups	Teacher / staff interviews
Legitimacy	a. Is the course design harmonious, consistent and coherent?		✓	✓	✓				✓
	b. Does the course reflect current scientific insights or best practice?		✓						✓
Efficacy	a. Did the course help students build knowledge collaboratively?	✓		✓	✓	✓	✓	✓	
	b. What knowledge was learned by students?	✓		✓		✓	✓	✓	
	c. What skills were developed by students?	✓		✓	✓		✓	✓	
	d. How did the course appeal to students?	✓		✓	✓			✓	
Viability	a. Is the course practical for SQU?	✓			✓				✓
	b. Is the course relevant to the needs of SQU students?		✓	✓	✓			✓	✓
	c. Is the course sustainable and/ or scalable within Omani higher education?		✓		✓				✓

During the last semester of implementation, I conducted the data collection from a distance in Georgia, USA. This meant collecting data through emails, online surveys, as well as archived online discussion logs and course artifacts. I also asked the teacher in Oman to briefly write up his observations and thoughts on the course during the implementation (Collins, 1992) using the online debrief log (see Appendix I).

It is worth noting that, as van den Akker (1999) suggests, data collection in design research often moves from idiographic methods (e.g. interviews) to nomothetic methods (e.g. surveys) as the development matures. This is why I moved from case study students in the first iteration (idiographic and more deep) to focus groups in the second, and finally questionnaires only in the third (nomothetic and more broad). I also turned during the second iteration to the broader context of the course and included transcribed interviews (Reigeluth & Frick, 1999) with three teachers in the Instructional and Learning Technology department and one in the English Teaching section of the Curriculum and Instruction Department (see Appendix J), as well as a single interview with the two technical staff for the Instructional and Learning Technology Department who supported the course (see Appendix K). These interviews focused on how the course design could generalize to other courses and the institutional reaction to the course.

Since the data collection methods changed as the theoretical and practical needs of the study changed, this study did not follow exactly the plan outlined in the prospectus. However, this is quite natural for design research studies (van den Akker, 1999). Indeed, some successful design research studies were based on spontaneous and unplanned data collection (diSessa & Cobb, 2004). All of the data collection changes remained true to the original data collection intention and were quite minor.

Instrumentation

Unlike other forms of research, design research accommodates evolving research instruments as the theory and findings emerge (Joseph, 2004). For example, the frequent adaptation of surveys and interview protocols led to the creation of 108 instruments in one design research study (McKenney et al., 2006). While this study did not require such a large number of instruments, I did utilize 11 instruments, and have included in the Appendices all the instruments used in the study: pre-, mid-, and post-course student questionnaires (Appendix E), interview protocols for case students (before implementation, during implementation, and after implementation; Appendix F), focus group interview protocol (Appendix G), a template for expert review of the course (Appendix H), the debrief log for class observations (Appendix I), faculty interview protocol (Appendix J), support staff interview protocol (Appendix K).

Data Analysis Methods

Since design research is usually confined to implementation in a bounded setting, in many design research studies (see, for example Hall, 2009), case study methodology has proven an appropriate tool for analysis (Stake, 2000). I performed a retrospective analysis (Gravemeijer & Cobb, 2006) of the data by coding each document or transcript in Atlas.ti, a qualitative data analysis software package, according to the framework developed in chapter two, and created new codes where appropriate, using what Stake (2000) calls "correspondence and patterns" in case study. For the first research question, I outlined the major themes of the data, using each research sub-question as a code, as well as additional codes that came forward (such as motivation) in the data analysis. I thus tried to see where the data supported or rejected the theory I had developed in a deductive manner. I then wrote memos on each of the codes (see Appendix L for a list of codes and appendix M for sample code memos), working inductively

from the data and using many of the tools of grounded theorists, including constant comparison (Glaser & Strauss, 1967) to develop a better theoretical understanding of the various elements of the framework. In this way the meaning of each of the codes in the Omani context became more clear through "thick description" (Geertz, 1973) in the write-up. Each one of these memos could easily be the subject of its own research article; for this study, I limited my reporting to the code of Culture. This subject was chosen due to its richness within the Omani education context, and the transferability of the findings to similar contexts. I then looked at places where conflicting culture lead to adaptations, in the students, myself and the courses and reported on these in chapter five.

Additionally, design research requires a formative assessment of the sustainability of the project, so I coded the data using Atlas.ti for the second research question in a similar manner to the first research question. I took as codes each of the elements of the sub-questions, assessing the learning environment according to its viability (practicality, relevance and sustainability), legitimacy (contemporary scientific insights, consistency, harmony and coherence), and efficacy (yields desired results, cost/benefit; McKenney et al., 2006). Instead of individual memos being written on each, the findings of the second question are summarized in whole in chapter six. Additionally, this report was co-authored by Ali Al-Musawi, the course collaborator, to verify the findings of the research and include his analytical input. The results of all the analysis were reviewed by collaborators at SQU, providing a member check of findings.

Reliability and Validity Issues

Design research does not align closely with all of the validity and reliability tests of traditional experimental research. For instance, design research has been criticized for changing implementation protocols (Hoadley, 2004), poor measurement and lack of control groups

(Shavelson, Phillips, Towne, & Feuer, 2003), and impossibility for replication (DBRC, 2003; Barab & Squire, 2004; Hoadley, 2004). However, that is not to say that validity and reliability are not important to design researchers. Rather as a separate commissive space (Kelly, 2006) design research expresses these commitments differently than controlled experimentation, borrowing the methods of other research paradigms (DBRC, 2003). While issues of construct validity are important (Cobb et al., 2003), the strength of design research is in its systemic (Hoadley, 2004), consequential (Barab & Squire, 2004) or ecological (Gravemeijer & Cobb, 2006) validity; or in other words, its practicality and effectiveness (van den Akker, 1999). Thus findings are judged valid through collaboration with others, as well as through sustainability over several iterations (DBRC, 2003).

In order to improve validity and reliability, or what Lincoln & Guba (1985) call trustworthiness and credibility, I attempted to triangulate the most theoretically important data (Stake, 2000) through multiple data types and sources (DBRC, 2003), as well as working collaboratively with Omanis and other experts in joint evaluation (van den Akker, 1999) and member checking of findings (McKenney et al., 2006). I have attempted in my description of the case to be "thick" enough to allow you as the reader to determine the generalizability of the study and usefulness of the findings (Stake, 2000).

Researcher's Perspective

The researcher's perspective in design research is extremely important. Unlike predictive or descriptive research, the design researcher plays the role of change agent as well as evaluator, something that would prove problematic in traditional research paradigms (Barab & Squire, 2004). Thus, I have had to understand my own agenda, making it clear to participants, as well as documenting how my presence influenced the situation (Hoadley, 2004). From there, I have

sought to be realistic about how my findings can translate into contexts in which I am not directly involved in driving change (Barab & Squire, 2004).

Furthermore, as a Western academic, I have had to be aware of the role academia plays in furthering neo-colonial aims and subjugating non-Western knowledge (Altbach, 1971), especially in relation to the Arab World (Donn & Al Manthri, 2010). As a "cultural stranger," I tried to work collaboratively in a way that is mutually beneficial for all parties in an attempt to earn trust and fully understand the context (McKenney et al., 2006), thus trying to work "in communion" with the locals to unite praxis and theory (Freire, 2000). However, even anthropologically-based design researchers must resolve conflicting interests between themselves and their collaborators, and I actively viewed my design from the perspective of the participants (Bell, 2004). While I have sought the improvement of Omani education and subsequent economic development throughout the project, I believed that the only way for this project to truly address the needs of Omanis was through humility and in the spirit of true collaboration.

I thus entered this research knowing the pains of cognitive dissonance based on cultural background and teaching philosophies. As an international student once myself, and as a student of international teachers, I have seen in my own life how the various factors of educational philosophy have affected multi-cultural classroom interaction and success in learning. I thus tried in my research to improve the situation for students in Oman, who may be facing Western theories and educational philosophies for the first time. Admittedly, while I do not believe the American/European theories and practices based on constructivism provide all the answers to educational development, I realize the importance of these theories in fostering a new way of thinking, one which aligns more closely with globally-relevant practice. It is for this reason I

have sought to improve Omani education, and by extension, education throughout the developing world—thus strengthening collaborative problem-solving skills in students.

Limitations

One of the greatest limitations of this study was my own ability to manage the complexity of it. While some design research studies have been undertaken by a single researcher/teacher (Joseph, 2004) they often require the collaboration of many individuals to work successfully (Collins, Joseph, & Bielaczyc, 2004). I intended to include other Omani teachers, administrators and staff in the implementation, data collection, and analysis where feasible, but this did not happen to the extent I hoped. Thus I did not realize how much I would have to do on my own. Collecting rich data while actively participating as a course instructor and trying to navigate and live in a new culture often left me unable to do what I hoped I could. For instance, planned weekly course debriefs turned into less frequent observation reports through blog posting and interviews with technical staff and administrators included fewer participants than hoped for. As has been noted by other design researchers before, the large number of resources and personnel required (Collins et al., 2004) as well as the tendency for novice scholars to conduct studies that are "under-conceptualized and over methodologized" (Dede, 2004) made it a challenge to undertake this project as part of a PhD dissertation.

Additionally, technical constraints limited the usefulness of some of the data. For instance, the pre-, mid- and post-term questionnaires were originally administered on paper. After administering the pre-term course, my course was determined to have too many students, and several of the students were moved to a new section. Comparing the results of the questionnaires became quite problematic. This problem was exacerbated when many of the students either forgot their identification number, did not choose one, or did not use it. So for the

37 students who took the pre-term questionnaire in the first iteration, only 4 students could be tracked through all three surveys. This problem was improved through the use of Moodle's questionnaires and its capability to hide and later reveal student identities. However, during the second iteration, only 13 people chose to complete the final questionnaire, and of those, only 6 students could be tracked in all three questionnaires. Thus results from the questionnaire were limited to descriptive data only.

The third main limitation of this project was the limited collaboration it fostered between me as a research and the Omani educators. While everyone in Oman was extremely supportive of my research, and many went to great lengths to ensure this project would be successful, there was clearly a sense that this was my project and few others were as interested in the theory or long-term support of the course design. In other words, the lack of true collaboration meant there was little local ownership of the project (van den Akker, 1999). This is common in design-research collaborations (DBRC, 2003) and may have been exacerbated in this project by the realities of a Ph.D. dissertation research. For this project, the goals and objectives as well as the rewards of the study were too often designed for the PhD student first and foremost, which limited the potential of design-based research in this situation.

Further limitations stem from the nature of working in Oman. I did not have the ability to spend the entire study in its setting. Preliminary analysis and design had to be conducted from a distance, and the final implementation was monitored from a distance. Furthermore, institutional and national bureaucracy as well as distrust in the Middle East for researchers and qualitative interviews (Cook, 1998) had some influence on data collection efforts. Furthermore, since I began the study as a teacher and a researcher, the ethics surrounding voluntary participation were compromised, as some students may have felt compelled to participate and give only positive

responses, fearing the study would affect their course grade, despite efforts to protect against this.

In spite of these limitations, I feel that the research produced a wealth of data that provided sound and useful answers to the research questions and produced an effective and well-received course. I hope that my description of the study and its results have provided sufficient clarity and that you as a reader will gain insights useful in your own educational research and work.

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CHAPTER 5

EDUCATIONAL CHANGE IN OMAN: A DESIGN RESEARCH STUDY OF PERSONAL, INSTITUTIONAL, AND SOCIETAL REACTIONS TO COLLABORATIVE KNOWLEDGE BUILDING[3]

[3] Porcaro, D. S. To be submitted to *Educational Technology Research & Development*

Abstract

While collaborative problem-solving has been suggested as a solution for linking classroom learning with workforce skills, it is still not entirely clear how personal, institutional and national factors work together to influence student and teacher acceptance of this pedagogical strategy. Oman provides an appropriate case for exploring this intersection, as previously limited technology and an instructivist education tradition bump up against the demand for rapid educational improvement and economic development. This study focused on the cultural aspects that affect adoption of a Computer-Supported Collaborative Learning (CSCL) environment, and how adaptations appeared in the students, the teacher, and the course. An education design research methodology was used to examine how students react to the CSCL framework and tools.

Background and Goals of the Research

Although constructivism has gained popularity in many Western academic circles and is widely promoted in teacher-training courses (for example, see Jonassen, Cernusca, & Ionas, 2007), in many cases students' educational philosophies conflict with those of their teachers or of the educational milieu (Song et al., 2007). For students who learned primarily in instructivist educational systems and who subsequently find themselves enrolled in constructivist-based courses there may be a gap between their own educational philosophies and those upon which these courses were built. As I described in an earlier paper (Porcaro, in press), the lack of research on this subject has left instructional designers wondering how this gap can be bridged, or even whether it should be (Catterick, 2007).

As the number of multi-culturally diverse classrooms increases worldwide, and as people become increasingly connected globally, understanding the process of change that occurs when

introducing non-Western students to constructivist pedagogies generally and Computer-Supported Collaborative Learning (CSCL) specifically may improve many international learning contexts (Lin & Hatano, 2002; Oshima et al., 2006; Tan et al., 2005). Furthermore, as education provides economic opportunities for developing countries, it is important for educational development that a clearer understanding of students' educational philosophies be obtained in order to design programs and products that are locally relevant, but globally valued (Bereiter, 2002). This includes linking higher education to workforce capabilities by fostering collaborative knowledge building (Scardamalia & Bereiter, 1993) in undergraduate courses. In this way students can move beyond simple memorization and fact recall to collaborative problem-solving, authentic task completion and knowledge creation—skills which may contribute to the development of knowledge societies (UNESCO, 2005).

The specific purpose of this study was to understand how students, teachers and institutions react to collaborative knowledge-building technologies and practices, as well as to understand what design principles lead to a CSCL environment that is contextually appropriate for an undergraduate course at Sultan Qaboos University (SQU) in Oman. Within this multi-semester design research study, I sought answers to the following questions:

1) What changes (attitudinal, cognitive, epistemological, habitual, etc.) occur in teachers and students when a knowledge-building CSCL environment is introduced in an Omani undergraduate course?
2) How do the students and teachers manage those changes?

The more general purpose of my research is to examine how personal, institutional and national factors work together to influence student and teacher acceptance of a collaborative problem-solving pedagogical strategy. This is a long-term research agenda that is still on going.

Literature Review

As noted above, international agencies (UNESCO, 2005; World Bank, 2008), as well as educational researchers (e.g., Bereiter, 2002; Duffy & Cunningham, 1996; Jonassen et al., 2007; Palincsar, 1998) have called for constructivist-based teaching methods as a way of developing globally-connected knowledge societies and giving students increased voice in the classroom (Freire, 2000). This is especially relevant in the Middle East/North Africa region, where traditional instructivist methods contribute to the gap between education and the labor force, creating challenges as graduates are unable to find work due to lack of relevant and practical skills (World Bank, 2008). Many Western educators see in constructivism, and more specifically Computer-Supported Collaborative Learning (CSCL), as a way to engage in authentic and contextual learning (Hmelo-Silver et al., 2007; see also Bereiter, 2002) while bridging the distances amongst learners (physically, temporally and interpersonally) as well as between learners and relevant performance (Collis, 2008). In this way students are not simply consumers of knowledge, but collaborative knowledge creators (Scardamalia & Bereiter, 1993).

Nevertheless, constructivism does have its detractors (cf. Tobias & Duffy, 2009). Some critics say it lacks meaningful results (Fox, 2006; Meyer, 2009), ignores advances in cognitive science (Kirschner et al., 2006; Sweller et al., 2007), and even undermines the foundation of instructional science (Merrill et al., 1996). However, proponents argue that constructivism appears to provide many opportunities for countries seeking to develop their education systems as well as improve the capabilities of their workforce (cf. Jonassen et al., 2007).

Setting aside questions of its legitimacy, it is clearly a problem that constructivist and CSCL environments have often been introduced in non-Western contexts with insufficient regard for local culture or context. For example, Lin and Hatano (2002) note the lack of cross-cultural

CSCL studies that address questions such as how students accustomed to quietly receiving information respond to the discussion and argumentation that are central to CSCL. When applying CSCL projects to non-Western settings, a variety of institutional and individual reactions must be considered (Arnseth & Ludvigsen, 2006). For instance, researchers have documented teachers struggling to cede control of their classrooms to their students, as well as students lacking self-directedness and appearing to be motivated only to "make the grade" (Hung et al., 2003). Additionally, there were differences between Western and non-Western collaborative classrooms in terms of teachers' role, communication forms promoted in the classroom, and assessment strategies (Ku et al., 2004). For example, less frequent participation by non-Western students in collaborative discussions has been observed (Wright & Lander, 2003). In many highly competitive school systems, students accustomed to instructivist methods found it hard to work collaboratively, especially for goals that were not aligned with well-structured academic rewards (Schank, 2006). In introducing constructivist-based innovations, Western researchers often found themselves adapting to local needs, practicing what Vavrus (2009) calls "contingent constructivism." For example, during her experiences working with pre-service teachers in Tanzania, she found these teachers employing a wide range of instructivist and constructivist practices to meet the cultural, political and economic needs of their specific classrooms.

While studies of CSCL applications are common in Western countries, documented cases are rarer in developing countries, especially the Arab Middle East. However, there have been reports of cooperative work in Egypt (EL-Deghaidy & Nouby, 2008) and Oman (H. U. Khan, 2006b), as well as collaboration through computer-mediated communication (CMC) in Israel/Palestine (Hertz-Lazarowitz & Bar-Natan, 2002) and the introduction of e-learning tools

and Learning Management Systems (LMSs) in Oman (Al-Musawi, 2007; T. Cobb, 1999; Naqvi, 2006; Osman, 2005). Most recently, Hall (2009) conducted a design-based research study to discover design principles for developing a socially constructivist e-learning course in Oman, utilizing many collaborative tools in her design. While there is some movement toward understanding how CSCL and collaborative technologies could be used in Oman and the Arab world, there is a shortage of studies demonstrating student reaction to their introduction.

Overview of the Omani Context

Oman presents an interesting place to study the reaction to constructivist education several reasons. Oman is a small Sultanate in the South-East corner of the Arabian Peninsula. Despite its membership in the Gulf Cooperative Council (GCC) and access to oil resources, Oman has not experienced the unparalleled wealth of its neighbors. Oman's oil resources are low and running out quickly. It has a relatively small population (around 3 million), with a large proportion (43%) of those under 15 (CIA, 2011). Because of the large mountain range that has historically separated Oman from its Arab neighbors, much of Omani culture is tied to Iran, India, and Zanzibar (Tanzania) where it once had colonies.

For much of the 20th century Oman was an isolated and under-developed nation. For example, at the time of Sultan Qaboos' ascension to the Sultanate in 1970, Oman had three primary schools with a total of 909 male students, and no secondary schools or schools for female students (Arden-Close, 1999). By 2008, 38 years later, Oman had 1052 schools and 553,236 students, of which 48.7% were female (Oman Ministry of Education [MOE], 2008). Sultan Qaboos University, the country's first university, began admitting students only in 1986. However, Oman has a rich history of scholars and learning dating back at least to the

introduction of Islam in the 7th century. Its ancient cities, such as Nizwa, Bahla, and Sumail have been home to scholars and intellectuals for centuries (Eickelman, 2002).

Omani leaders, especially Sultan Qaboos have realized the importance of developing human resources in order to make the country globally competitive and diversify its economy (Rassekh, 2004). To obtain these goals, Sultan Qaboos University and the Ministry of Education have collaborated with international experts to introduce constructivist and student-centered methodologies into the public schools and teacher-training classes at SQU (Sales, 2010). Students are expected to construct meaning for themselves through involvement in authentic tasks (Alsarimi, 2001) and contribute to knowledge generation rather than consumption (MOE, 2001).

Methodology

This study employed an educational design research methodology (van den Akker et al., 2006), in which the research has the dual goals of understanding local learning theories as well as developing a learning environment through iterative evaluation and refinement that informs future instructional design. This requires the use of mixed research methods in an attempt to describe learning scenarios and prescribe design principles for enhancing these learning scenarios.

Throughout the study, my work was guided by the beliefs and methods of what Bell (2004) calls "linguistic or cognitive anthropology design-based research," examining the localized nature of innovation among Omani students. In order to accomplish this, I worked with researchers and teachers in Oman to build a collaborative knowledge-building learning environment for students (around 25 per class) enrolled in TECH 3008 (Introduction to Educational Technology) at Sultan Qaboos University. I taught the course for the first two

semesters, and transferred the course to an Omani teacher for the third semester. The course was based on Brown and Campione's (1996) Fostering a Community of Learners (FCL). During the semester, the students divided into "jigsaw groups" to learn about various aspects of educational technology. Each jigsaw piece represented a role within a professional multimedia development team (i.e. project manager, instructional designer, web specialist, audio/video specialist, and graphic designer). Students were responsible to gain expertise in some aspect of their role through independent research and share that expertise with their group to collaboratively build multimedia kits relevant to the local Omani context. During the task, students formed knowledge-building communities of their own using Moodle as well as FLE4, an open source plugin for Wordpress blogs (see Muukkonen, Hakkarainen, & Lakkala, 1999) which is based on the framework of Knowledge Forum (Scardamalia & Bereiter, 1993, 1996). Students' collaborative work was conducted online, so that mixed-gender groups could collaborate.

To address my research questions, I employed a variety of research methods to understand the ways institutional structures and students' educational philosophies affected the introduction of innovative curricula (see Table 5.1). Since I served as both the teacher and researcher during the first two semesters, I assumed the role of participant observer (Joseph, 2004). My observations, as well as those of the Omani teacher were recorded in a debriefing log after the collaborative class (Gravemeijer & Cobb, 2006). Additionally, I recorded the discussion logs and artifacts from assignments created on Moodle and FLE4 and asked students to complete pre-, mid-, and post-term questionnaires to assess their educational philosophy and attitudes toward collaborative knowledge-building. The questions concerning epistemology were based on an English and Arabic language questionnaire developed by Karabenick and Moosa (2005) for use by Omani university students.

Table 5.1: Matrix of research methods by sub-question

Research Methods Matrix

What changes (attitudinal, cognitive, epistemological, habitual, etc.) occur in teachers and students when a knowledge-building CSCL environment is introduced in an Omani undergraduate course? How do the students and teachers manage those changes?

	Research Methods Sub-questions	Observations/Weekly Course Debriefs	Case student interviews (3)	Student focus group	Student Questionnaire (pre, mid, post)	On-Line Data	Assignments	Teacher / staff interviews	Available Documents
Institutional System	a. How do available resources affect adoption?	✓						✓	✓
	b. How does current policy affect adoption?	✓						✓	✓
	c. How does institutional culture affect adoption?	✓						✓	
Student Educational Philosophy	a. How does student epistemology affect adoption?		✓	✓	✓				
	b. How does a student's culture affect adoption?	✓	✓	✓	✓				
	c. How do students' individual differences affect adoption?	✓	✓	✓	✓	✓			
	d. How do students' knowledge and skills affect adoption?		✓	✓	✓		✓		
	e. How do students' academic habits and expectations affect adoption?	✓	✓	✓	✓	✓	✓		

In order to understand more deeply the reaction of students to the innovative pedagogy, I selected three students as cases for further study, based on maximum variation (Glaser & Strauss, 1967) in their initial reactions to the course and beliefs about constructivism. The three participants were involved in three semi-structured interviews, which were audio recorded and transcribed (at the beginning, middle and end of the term).

Van den Akker (1999) suggests that data collection in design research often moves from idiographic or focused methods (e.g., interviews) to nomothetic or broad methods (e.g., surveys) as the development matures. Therefore, during the second semester I recorded and transcribed focus groups of students (one group of three males, one group of four females, and four 30-minute interviews with individual students who were unable to attend the focus groups) to get a broader picture of student reactions than was possible in the student case interviews. I also expanded my research within the institution, and recorded and transcribed interviews with relevant faculty and staff.

Following initial retrospective analysis (Edelson, 2002), I refined the learning environment and research instrumentation in order to better understand student reactions and create a locally-relevant learning environment that fostered collaborative knowledge-building. The course was implemented and refined three times (Fall 2009, Spring 2010 and Fall 2010), and this report represents a summative analysis (see Figure 5.1).

Since educational design research is usually confined to implementation in a bounded setting, case study methodology has proven an appropriate tool for analysis (Stake, 2000). I coded each document or transcript according to the framework developed earlier (Porcaro, in press) and created new codes where appropriate, using what Stake (2000) calls “correspondence and patterns” in case study analysis. I then wrote memos on each of the 9 codes or themes, using

many of the tools of grounded theorists, including constant comparison (Glaser & Strauss, 1967) to develop a better theoretical understanding of the various elements of the framework, as well as looked at whether the episodes exhibited conflict or congruence, and the resulting adaptation, dismissal, celebration or ignoring. Due to size limitations, I am reporting on only one of these themes to discuss it in detail. I have chosen the theme of culture, due to its richness within the Omani context, and the transferability of the findings to similar contexts. All findings were member checked by collaborators at SQU.

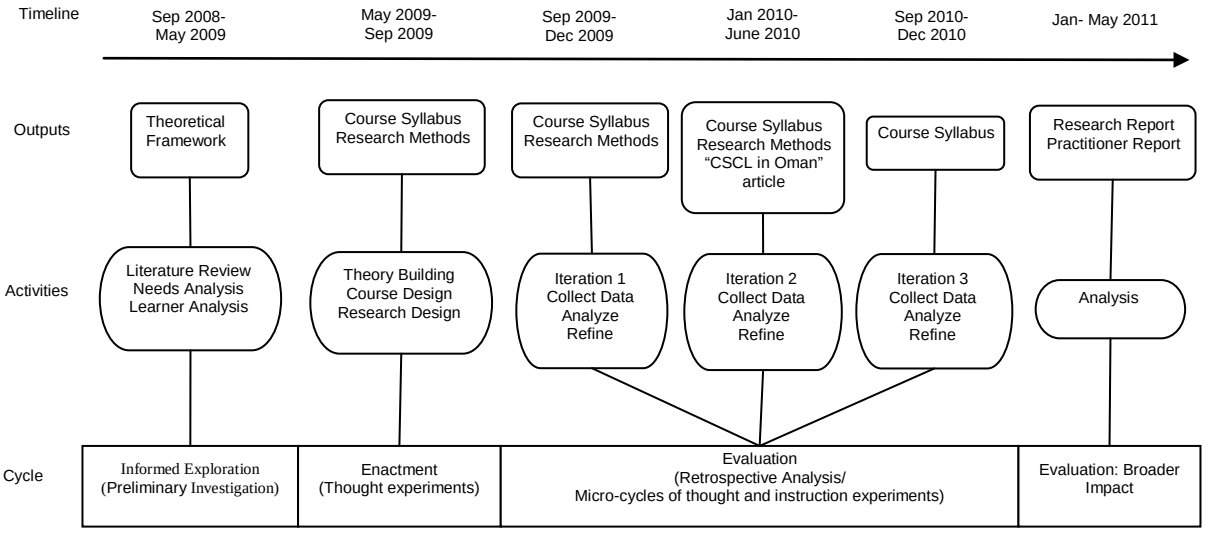

Figure 5.1. Timeline for educational design research study.

Limitations

The limitations inherent in a study whose goals and methods are constantly shifting, place more burden on the reader to interpret and apply the findings. This is also, however, a limitation of traditional case studies (Stake, 2000). Conclusions and generalizations for this study are only as meaningful as the reader interprets them. Since I acted as the researcher, and as participant observer (the teacher of the course), my own subjectivities come to play. My own limitations of viewing the Omani classroom as an American are numerous. Furthermore, my ability to

properly observe and record while teaching and guiding my students limited my data collection. My Arabic language ability and cultural sensitivity is not fluent, and my position within Western academe, with its lenses and paradigms also influences my findings. All work was done in English, with Arabic occasionally mixed in. This put the interviewees in the position of translating from their own language. Language misunderstandings inevitably played a part in the data collection and analysis, and have to be considered.

However, I hope the worth of this study, and the trustworthiness of its findings will be realized through the sustainability of the course design and the rigor of the design research effort. Through triangulation of data types (for instance, interviews, questionnaires, online data, etc.), sources (students, faculty, support staff, and myself) as well as investigators (via collaboration with Omanis in the design and teaching of the course, the study was strengthened.

Findings: Omani Culture's Effects on Collaboration

There are many factors that influence the adoption of collaborative pedagogy in the Omani classroom in complex ways (see Figure 5.2), as outlined previously (Porcaro, in press). This article focuses entirely on one of these factors, culture, and the many ways the culture of the teacher and student affected the adoption of CSCL. These included the foundation of oral-based interaction and learning in Oman, and the culturally-defined space in the classroom, which among other things, places the teacher in front as the source of authority in the class. As with all parts of Omani society, gender has played a major role in shaping collaboration in the classroom, as has acceptance of technology, and the ever-present influence of religion. Furthermore, the role of collaboration in Omani society helped to shape how it was received in the classroom. Let us examine each of these ideas further, turning to the data to further illustrate each issue.

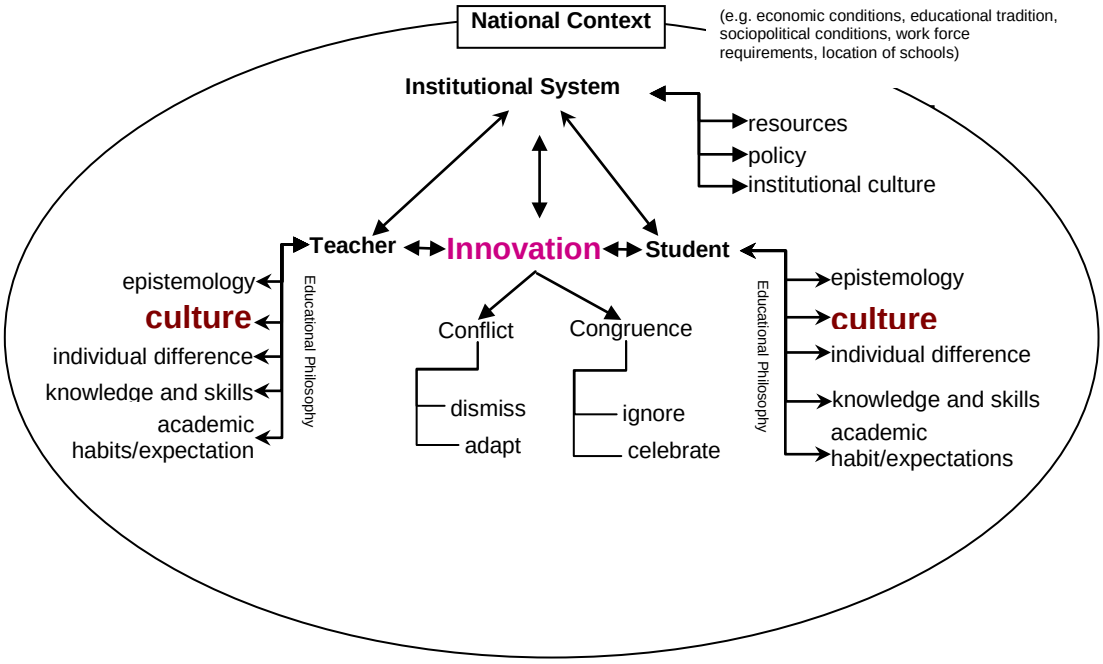

Figure 5.2. Individual and institutional reaction to innovative pedagogy.

Oral Culture in Oman

One area where culture was most present in learning was in students' preference for oral traditions of learning. An Omani faculty member suggested that students in Oman preferred discussing rather than reading, learning by speaking rather than writing. This is demonstrated in the societal preference for discussion and socialization among Arabs, and a limited presence of libraries, authors, or novelists, especially in Oman, in preference for oral based literature, such as poets and singers. For instance, in one primary school I visited, the school's library consisted of a small corner of the learning resource center (see Figure 5.3), with very few books considering the size of the school. This is consistent with Bouazza and Al-Mufaraji's (2005) review of school libraries that found Omani school libraries to be in a poor state of affairs with less than one book per student in the school library (compared to 12 per student in Britain), and the teachers rarely using libraries. However, they were hopeful that things would change with the

introduction of new library science and library media specialist programs at SQU, as well as online resources available through increased Internet connectivity in schools. Hall (2010) suggested that the lack of public libraries in Oman, as well as the limited reading done by Omanis demonstrates this oral-based culture. She also pointed to the fact that Arabic was traditionally considered an oral language that was preferred to be heard instead of read.

Figure 5.3: Library section of learning resource center in Omani public school.

Physical Setting of the Class

While the structure of the Omani classroom appears quite similar to other classrooms around the world, there are unique aspects associated with Omani culture that shape students' reactions to collaborative learning. To a Westerner, the most noticeable aspect of many SQU classrooms is the separate entrances for males and females. Male students come from inside the building and enter the first two or three rows of seats, and female students enter from the outside (women only) corridor and sit on the back two or three rows of seats. There are often two or three rows of empty seats between them. Arden-Close (1999) noticed that this often placed the female students outside the conversation, as often the males participated more actively in classroom discussions. It also limited in-class grouping to single gender groups, which will be

discussed below. In the computer lab, however, the students all entered through one door and males sat on one side of the room with women on the other (see Figure 5.4).

Figure 5.4: Omani computer lab showing separation by gender.

Teacher/ Student Relationship

Culture profoundly shaped the relationship between teachers and students in Oman. Traditionally, in the Qur'anic schools the teacher represented the absolute authority in the classroom. During an interview, Fatima (all names are pseudonyms), one of the Fall Semester case students mentioned this idea:

> In Qur'anic classes, I think, we have the content and we have to stick on that content. We can't go away from what is said in there. If we don't know, we can't guess the meaning from our own mind, from our experience. The teacher has to provide us with the information if we don't know them. But in other classes, we can guess, we can make assumptions, and so discussion I think it's more in other classes.

Additionally, the teacher was considered the source of authority for content in the classroom. For instance, when asked if he felt the course material was culturally appropriate, one student mentioned it was since the teacher had screened the textbook before selecting it for use in class.

The changing role of the teacher and student in Omani society has produced a range of reactions in faculty and students. For instance, Amin (a pseudonym), one of the Fall case students, stated that since the recent reforms in public education, the Omani teacher has lost his authority and students "don't care actually." While some students and faculty have welcomed this new-found student freedom, others feared the lack of control in the classroom. One Omani faculty member suggested that this reliance on authority has produced a society where everything is done for children and thus they lack self-motivation. Another faculty member noted in a teacher-training conference that it was "weird culturally" to think of the teacher learning from the student. This distance between student and teacher is highlighted well in Eickelman's (2002) review of traditional religious education in Oman. He noticed that there was much quiet memorization, while questioning was rare and corporal punishment was common.

Additionally, Hall (2009) suggests that due to the strong role of the teacher and the hierarchical role of the class, constructivist learning in Oman should begin teacher-centered and progress to more learner-centered. However, I approached the class with a lessened sense of authority than the students were used to from the first day, creating in my classroom a space where the students were treated like autonomous adults and agents of their own learning. As I explain more below, many students adapted to this positively.

Gender

One of the most visible aspects of Omani culture that affected collaboration in the classroom was gender. Omani society has clearly defined views on women in society and the

interactions between men and women. For instance, several of the female students expressed interest in other professions besides teaching, but were limited by society or family pressures. One student said,

> To be honest, teaching is not my preferred job, but there are some strict social codes that create limitations, to some extent, across my desire (as a female) to practice professionally something else. Fortunately, I am used to leave future for future, so I am not worried about this matter right now.

While this is consistent with other research on Omani women in the workforce (Donn & Issan, 2007; Issan, 2010; Limbert, 2006), this viewpoint does not represent the official government stance. For instance, the dean of the college as well as many prominent politicians within Oman's government are women (Issan, 2010), and Oman has taken great strides to promote the rights of women in the workplace. The interpretation of the role of women, then, is often dependent on the family or region in which the family lives. For instance, one woman surveyed suggested that culture has "nothing to do with my success" because "my family and my culture are encouraging (me) to be a creative woman."

The views of the role of women also reflect the ways women interact and collaborate in the classroom. For the students, there were varied and conflicting expectations for the voice of women in the classroom. As one male student noted during an interview,

> I don't say "I," but some people feel that, for example, when a lady come in front of the class, and she will do a presentation, or something like that… some people here find it unacceptable that a lady come and laugh and shout in front of the class, and explain or something like that.

This idea was not held only by male students. For instance, one female student noted that, "sometimes we don't accept to work with a girl who follows Western culture, like wearing makeup and fashion clothes even if she is an excellent girl in her study." Another female student confided with me that she was afraid to ask questions in class if a male answered. While this was not true of all female students, in fact several female students were quite vocal in class, for

many students, the cultural norms for women in society placed restrictions on their ability to discuss, collaborate, or present ideas in the class. This is similar to what Khan (2006b) found in Omani schools a few years ago, when all 36 females students he surveyed reported that they found it difficult to interact in class because they feared being misunderstood or laughed at, they felt shy, or felt they would not be paid attention to.

Other students were more hopeful for the progress made for women in the classroom. As women experienced society outside Oman, they became more comfortable in mixed gender interactions. Lailah (a pseudonym), one of the Fall semester case students, told of how her confidence in collaborating in class improved after a university sponsored trip to Australia:

> And especially when I went to Australia…last summer, my personality has changed a lot and also my friends tell me that "you become more confident and outgoing and you don't feel shy to ask about something and deal with males." And I think that's one of the positive things I gained from my travelling to Australia.

The physical separation between males and females also affected the way students were able to participate outside of class. Most of the female students (those who did not live at home) lived on campus, while many of the male students lived in off-campus housing in Al-Khod, between 4 and 6 kilometers from the campus. Both male and female students noted that because the female students lived close to each other they were able to collaborate more often outside of class, which often led to better-quality collaborative projects.

But this is only one factor leading to a disparity between the quality of male and female students' work, which has been a documented throughout the Gulf region (Ridge, 2009). For instance, males reported getting lower grades than females and that they studied less and socialized more (Issan, 2010). Because of the University's desire to reach an equal number of male and female students (Donn & Al Manthri, 2010), there has been a resultant lowering standard of admission for male students compared with female students. In the course under

study, the differences between male and female students often manifest themselves through higher technical interest and ability of the male students, while the female students generally demonstrated more focused collaboration and problem-solving, creativity in applying theories to their projects, attention to detail in design, and quality in presentation of materials. As Limbert (2006) noted, since societal factors, often drive females to teach and males (even male students enrolled in education programs) to seek employment in the private sector, this gap between male and female student performance widens since often the best female students become teachers at all-girl schools whereas the average male students become teachers at all-boy schools.

It was for this reason that I hoped as a teacher to create opportunities for the male and female students to share their ideas with each other, and let the best ideas from the class be experienced by all the students. In a collaboration-based classroom, however, the societal limitations of male-female collaboration were a strong concern to the students. When asked if the students felt that culture affected their ability to succeed in the class, this male/female interaction was mentioned 42 times—37 of those times the students stated they could not work with students of the opposite gender. Many students recognized that this limited their creativity. One anonymous student noted that "segregation between girls and boys may limit the exchange of ideas which may be more creative with their help." However, some students felt that this segregation did not pose a problem. As one female student noted, "girls don't usually work with boys. However, we all still able to sort this out and hasn't affected anything. Each gender is comfortable working alone and everyone is happy with this."

Many faculty and students pointed to various reasons for the separation between male and female students, including cultural, governmental, religious, and social. This is similar to the declaration of al-Lamki (1999) that gender differences in Oman were social and not religious.

One faculty member interviewed noted that this was not the policy of the university and interactions may differ from one college to another. Several students suggested that they are unaccustomed to working with males, having spent most of their education (since year 4 of elementary school) in single-gender classrooms. Others suggest that these restrictions were regional, with many rural students being less tolerant of collaboration.

However, many students felt that they either were comfortable with male-female interactions, or that Omani society welcomed and encouraged these interactions. One female student stated that "some people find it not good, because of their traditions, the lady must not talk to guys…But from my point of view, I find it is normal, actually." Other students expressed that especially in the university setting male-female interactions were allowed. Thus for these students, the restrictions may limit students from certain regions, families or customs, but not them. As one female student noted, "I feel free to work with male or female without obstacles, as long as we respect each other."

All the students in my study, however, agreed that online collaboration provided a place for them to share ideas in a socially-safe space. Similarly, Khan (2006b) found that computer-mediated communication lessened the male dominant role of face-to-face communication and empowered women in the class discussions. This idea was confirmed by students who used the CSCL environment in this study. One male faculty member suggested that "the online kind of tools will even break, to a great extent, this separation between genders." Students mentioned that they were interacting outside of class with other students in university forums on various topics, including English language and Omani history. One faculty member noted they often used online tools to invite male-female discussions on academic topics, something he felt was not possible in the classroom. This confirms the feelings of Jordanian and Emirati educators and

students who felt that the "barriers" between the genders were lowered online (Tubaishat et al., 2006).

While online collaboration tools allowed the students to mix in a safe environment, some felt that controls were still needed to ensure that the collaboration conformed to cultural norms. One faculty member suggested that careful monitoring of discussions and chats by faculty helped, while another pointed to the safety of anonymity in online postings. In fact, many students felt this anonymity was important, and in the Fall Semester 6 students used pseudonyms in the FLE4 discussions while in Spring Semester 11 students chose pseudonyms. This relates, to a much smaller degree, to what Khan (2006b) found among Omani female students in his study, where 82% took on gender-neutral pseudonyms during computer-mediated communication and 6% took on male pseudonyms.

Cultural Beliefs toward Technology

Most students felt that their culture aligned with the use of technology and the ideas of educational technology. On a questionnaire ranking the students' belief that "The principles of educational technology fit well with my cultural beliefs," most students agreed or strongly agreed (76% in Fall 2009, 85% in Spring 2010, and 80% in Fall 2010).

Students noted that there was a positive association between their culture and technology. Fatima, commented that

> recently technology is really appreciated in my culture. And maybe since it's appreciated here, so it pushed me to work hard in this course to gain as much knowledge on technology as I can. Since the one who can deal with technology is very respected here; people respect her a lot.

Some students were less optimistic, and realized that some aspects of technology did not conform to Omani culture. For the students, the idea of "misusing" technology was a concern in the schools as well as within the home and needed to be controlled by parent and teacher, just as

the Internet was controlled by the government. For most Omani students and faculty, the most important aspect of technology was that it be used within the cultural traditions of Omani society. As one student summarized, "in the past 40 years, our country has started developing in many sectors with accordance to our ingrained norms. This technology should be a tool to protect our culture …not a distraction." This idea of accepting technology, as long as it upholds the long-standing traditions of Arabic society was also found in a study of educational technology use among high school teachers in Syria, who embraced the technology but suggested that concerns with technology needed to be addressed (Albirini, 2006).

Religion

In addition to indirectly affecting the separation of genders noted above, religion had an impact on the way students accepted collaborative learning. For example, one student noted that the idea of collaboration was a religious value. As he noted, "(collaboration) is highly recommended by the prophet Mohammed (PBUH)."

While students realized that religion played an important part of their education, they felt that religion would not stand in the way of their learning. One student felt no reason for the course to interfere with his success, because "it does not include anything which is against Islam." Another felt that their religion would benefit them, since "The Islamic beliefs encourage anything that is creative as long as it is for the interest of the human himself." Furthermore, religion did not preclude the use of technology or learning more about it, as noted above, as long as it conformed to Islamic values. As one student noted "everything we learn doesn't harm our religion because technology is a two edged weapon, you can use it according your needs [*sic*].**"**

Additionally, religion played a role in how students connected their collaborative work in the course with future skills they would need in the workforce. In Islamic culture, the idea of

"Inshallah" or "if God wills it" is engrained into the mindset of the students. It is not only a part of every conversation, but shapes how the students foresee the future. When asked what the students planned to do after graduation, most could not articulate a clear plan or direction. For example, one student noted that "if we don't find a job that doesn't mean the end of the world since we don't know what the future hides for us." For the students, the direct application of course activities to post-graduation life were not as apparent or as urgent as I, as teacher, hoped or imagined them to be.

Issan, (2010) noted that "Islam, the state religion, exerts profound influence over most of Omani society in that the Quran prescribes politics, economics, law and justice, and social behavior, as well as theology" (p. 121). Though foundational to Omani society, the results did not necessarily show religion playing a major overt role in students' adoption of collaborative learning, per se. However, it did have indirect influence on other aspects, such as gender, adoption of technology, and classroom layout, as noted above, as well as how Omanis viewed collaboration in general.

Collaboration in Omani Society

The idea of collaborating is not new to Omani society. Many of the students and faculty mentioned that cooperation and collaboration were hallmarks of Omani society.

Another Omani faculty member asked me,

> Why do we need cooperative learning in the first place? Even the philosophy that stands behind the cooperative learning and collaboration: Do we need it in Oman? Are we in short [supply] of the cooperative skills and…behavior among the Omani society?...I mean maybe people are also *filled* with cooperative skills. They don't need (it). I mean, because they are good in communication with others, they have good social skills; they know how to lead and how to be led… because Omanis maybe, maybe Arabs also, they are sick of social links and behavior. Too much! We have too much of it.

However, this faculty member noted that within the academic setting, collaboration has not been fostered or embraced. Students mentioned that they usually studied on their own, and

only rarely did they work on group assignments together at another student's home. Instead, many pointed to the strong tradition of competition in Arab and Omani schools that discourages cooperation between students.

However, in many ways Omani culture is communal and collaborative, as Hall(2010) highlighted. It was on this idea that she built her design principles for social constructivist learning in Oman. But in other ways Oman society is competitive and individualistic, as noted above. For instance, Aycan, Al-Hamadi, Davis, and Budhwar (2007) noted in their analysis of Omani human resource development practices, that "the stereotypical perception of the Middle Eastern countries placing high value on collectivism, status hierarchy and quality of life is challenged by the findings of the study" (p. 29). This idea of partially individualistic and competitive, and partially collectivist society is best expressed in the Arabic saying, انا على أخي وأنا وأخي على ابن عمي وأنا وابن عمي على الغريب or "me against my brother; me and my brother against my cousin; me and my cousin against a stranger." The individual becomes collaborative and communal when required.

This idea also highlights the role of the family in Omani society and how the family, not the individual is the basic unit of society. Students often talked about families, rather than individuals, making decisions about culture in their lives, such as technology use. One student, when asked if culture affected his success in the classroom stated that "the answer may depends [*sic*] on the parents and the community that the person live in." For these students, collaborating with others, especially family members, was a natural part of their life, even if unnatural in the classroom.

Extending further, the tribal and regional affiliations of students affected their ability to collaborate in the classroom. Students often associated with their tribe or region and found

varying degrees of difference between students of different regions. Groups often were composed of students from the same tribe or region. While these tribal differences were very muted and imperceptible to the outsider, they showed the way in which tribal connections continue to play an important role in contemporary Omani society, as Al-Hamadi, Budhwar, and Shipton (2007) noted in their study on human resource development in Oman.

Furthermore, Omani society is fashioned on building relationships and appearing kind and agreeable. When students were in situations where their ideas disagreed, they often found that building the relationship was more important than refining an idea. One female student, when asked during an interview what she did when there were disagreements in her group work said,

> I can't say anything. I don't want to destroy my relationship with them, so, some students don't accept any other opinions. They want their opinions, so I have to accept theirs. That's it.

This was further manifest in students not feeling comfortable providing critical feedback, especially to the teacher. One female student began a suggestion for improving the class during an interview by apologizing for the suggestion. When asked about how I, as the teacher, supported or hindered her learning, she would refer to me in the third person while speaking to me.

Hall (2009) also noted the reluctance of Omanis to provide direct feedback in her study. In some ways this is similar to an Omani law dictating that a person can be jailed if someone feels they have been "personally defamed." This could range from an offensive sign made in traffic to an overheated discussion at the market. While I wondered if students would be limited in the argumentation and discussion due to fears of defamation, I found, rather, that within the classroom some students were open and willing to make suggestions, disagreeing with other students or the teacher or even the textbook. Within Omani society, the oral tradition of

discussion, negotiation, and debate that exists in the markets, in the halls of the university, even in the professor's office, was supportive of collaborative knowledge building, with its emphasis on argumentation and negotiated meaning.

Reaction to Cultural Elements

Through the previous discussion, we have seen that many variables played into the cultural acceptance or rejection of innovation through collaborative knowledge building in Oman. For different students, various aspects of culture played differing roles, interacting in complex ways with other students' culture, the teacher's (my own) culture, the institution's culture, and the national context (see Figure 5.3 above). As an outcome of the innovative practice, students experienced either conflict or congruence with my own culture and the institutional system. If there was congruence, that congruence was often ignored, such as when one student said "I never faced an activity that conflicted with my cultural belief." For this student she could not see the way culture affected her course because it presented no noticeable dissonance.

Occasionally, the students celebrated the congruence, since the cultural similarities—or indeed differences—worked well with the student's own educational philosophy. For example, one student noted that

> We do not feel that cultural differences with our teacher interfere with learning in this course. It is the opposite; we benefit from him. It is a chance to know about others' cultures. We respect our differences.

Often, as noted above, students highlighted the congruence between their culture and technology or collaboration, celebrating the way they fit nicely with those aspects of the course.

If there was conflict between teacher, student or institution, the conflict may have been dismissed and the student or teacher continued to hold onto their cultural beliefs, often complaining about their instructor, or the institution in the process. For instance, when Fatima

realized that her cultural pressure to build relationships with students conflicted with the necessity of arguing her point in collaborative knowledge building, she said, "When I am right, I try to convince them, but if they didn't convince, what shall I say, what shall I do? I can't do anything. That's why I prefer individual work rather than (collaborative work)." She realized there was a conflict between her culture of kindness and community-building and the requirements of the assignment, but decided to simply reject collaboration in this instance.

The most visible and interesting reaction to the CSCL innovation was when the student, teacher or institution adapted their beliefs and practices to the new situation. As one student stated, "if it (culture) is conflicted, we can shift to unconflicted--change it to acceptable." Let us look in more detail at the adaptations made by students, the teacher (me) and the innovation itself (the course).

Student adaptation. One area where students had to make the largest change for themselves was their cultural understanding of the teacher/student relationship. Students who were used to a distant "doctor" giving them information as the authority in the classroom, found instead more of a peer relationship between me and them, as noted above. As a teacher, I gave them autonomy to work on their projects and freedom to choose when, where, with whom, or on what they should work. Several of the students adjusted to this slowly, asking for permission from me to be able to work outside the classroom, for instance. However, as the semester progressed, most groups found a working arrangement that was comfortable for them, some working during class time, and others choosing to meet outside of class time instead. Even in my interactions with the students, they found great cultural differences from what they expected as a teacher. One male student noted:

> When you come to the classroom …you try to speak with students, and most importantly that you integrate yourself with students. Sometimes, I mean, except for your uniform

> (Western dress), when I watch you, for example, speaking with the students, I do not recognize you, that you are an instructor.

The students slowly changed their understanding of the teacher's role in the classroom, eventually limiting their use of honorific titles that were common in Arabic culture, for more peer-based ones. However, for me, the role of the teacher as a facilitator and guide was not only a cultural expectation I had as an American, but was fundamental to the kind of learning environment I was trying to create. Therefore, it was important for me that my students adapted their understanding of the teacher/student relationship in order to be successful in a collaboration knowledge-building classroom.

In the end, as students adapted to my own cultural expectations of the role of the teacher and student in the classroom, they found themselves more comfortable with the new learning environment. As Amin, who lamented the lack of student respect for authority in his practicum classroom (see above), told me at the end of the term, "even our relationship was good as students and teacher. And you didn't actually treat us as students and you were treating us as your brothers or even your sons, and it was good actually." The students suggested that this relationship motivated them to try in the class and to make the new pedagogy work, despite conflicts in educational philosophy.

Teacher adaptation. As a foreigner teaching within an Omani system, I had to make adaptations to my own educational philosophy and my expectations in the course. In a cultural sense, the adaptations were not necessarily changes in my culture, per se, but changes in my expectations of the students. For instance, my own educational philosophy conflicted with my students' educational philosophy in regard to the role of text in learning. In presenting the students with an opportunity to write a short paper based on their individual jigsaw research, I had expectations of the importance of text (both in reading and writing) for university learning.

The students, on the other hand, had a different understanding of not only the importance of text to the assignment, but of the role of proper citation of other's work, the need for originality of ideas in authorship, and the function of a paper for presenting ideas learned. The students' limited information literacy was a function of many factors, not least were language ability and experience and skill in researching and writing.

However, underlying all these issues was the cultural preference for oral over textual learning. Try as I could to introduce the Western concept of "term paper" to my students, the necessary alignment between educational philosophies was not there. This is consistent with Al-Issa and al-Belushi (2010), who found that 42% of EFL pre-service teachers at SQU interviewed were not asked to produce written research in their courses. Institutionally, the resources may have been available and many other SQU faculty members may have stressed the importance of writing in their courses. However, the requisite "culture of the book" was missing in the students' educational philosophy. Thus I was forced to adapt my expectations for these students in terms of reading and writing for class.

Course adaptation. While many of the adaptations to the course are documented in another article (see chapter 6), it is worth mentioning one way in which cultural conflict lead to course adaptations. Before arriving in Oman, I had envisioned students working in small groups scattered around the classroom. The reality of the separate entrances for male and female students was more shocking on the first day than I was prepared for. I started wondering how I could get students to collaborate in jigsaw groups when a physical and cultural gulf separated the students.

However, as the semester progressed, I had to adapt my own idea of what was culturally acceptable, and what jigsaw discussion should look like. Through this, I abandoned the idea of

face-to-face discussions with students who shared jigsaw roles, and replaced them by online discussions. Further cross-talk discussions, where students shared ideas with their peers from other groups, were restructured. Now instead of students moving around the room as originally planned, there were in essence two cross-talks going on: the males on one side moving around their half of the room, and the females on the other moving around their half of the room.

Conclusion: Cultural Adaptations

In the examples highlighted above, the role of culture created conflict between the students' educational philosophies, the teachers' educational philosophy, or the institutional setting, and thus had an impact on adoption of the innovation. While the goal of good instructional design and cross-cultural teaching is to maximize congruence, it is rather in the areas of conflict that that the greatest lessons are learned. It is through conflict that students, teachers, institutions and innovations adapt and refine themselves. Through diagnosing the differences between teachers, students, and institutions we might begin to predict how likely sustainable adoption can be, and determine which elements to adapt for greater alignment (see, for example, Fishman, Marx, Blumenfeld, & Krajcik, 2004). Future research can then begin to explore which factors are most flexible and most rigid? When should the teacher adjust, and when should the student? What is lost in adaptation and refinement?

During the introduction of a CSCL environment into Oman, culture affected the way students adopted collaboration and technology. The oral nature of learning shaped students' online discussion and research assignments in the course. The physical setting of the class limited the male-female interactions, and placed the focus on the teacher. Additionally, the traditional role of the teacher as authority limited students' ability to build knowledge on their own and take initiative in collaboration. One of the most obvious cultural influences on CSCL

adoption was gender, since many felt male-female collaboration was not appropriate. However, the use of online communication platforms showed that the computer-support element of CSCL could play an important role in fostering collaboration in Oman. In terms of cultural acceptance of technology, students accepted the role of technology, including online communication, as long as it benefits Omani society. Religion was one area that on the surface separated the students from me as the teacher, but had the least impact on the adoption of CSCL. As long as the values of Islam were recognized and accommodated for, the congruence between students and me were ignored. Lastly, the role of collaboration in society meant that students were well prepared to discuss, argue and work together in learning as they do in society. From these ideas several design principles has been developed, that may help inform future design (see Figure 5.5).

The importance of this study lies in its examination of the factors at work during educational innovation when designed in one culture and introduced in an entirely different learning culture. Understanding the personal, institutional, and societal reactions to educational change in Oman contributes to a greater understanding of educational change generally and informs similar projects in other Arab nations. By analyzing the reactions of students and faculty from a cultural perspective this study furthers our understanding of culture's role in innovation adoption. Future research can apply this analysis in other contexts, within the Arab Middle East, or other nations, refining our understanding of adaptation due to cultural conflict, and helping us to know how to bring more cultural congruence into innovative instructional design.

Oral Learning

- Online discussion may not be preferred due to large amounts of writing and reading. Where possible, allow face-to-face collaboration options.
- Students are often not skilled in writing traditional research projects. Use alternative ways for students to report, especially orally, such as presentations, etc., or provide strong scaffolding.

Physical Setting

- While male and female entrances may determine where students are comfortable sitting, where possible arrange seating in small groups, rather than in rows. In order to make the students feel comfortable, this may mean dividing the class into two halves.

Teacher as Authority

- Provide opportunities for the students to take initiative and control their learning. This may include the teacher helping the students choose topics for jigsaw specialization, or allowing students to choose between a selection of project options. Students may not be used to this, so the teacher must provide extra support and scaffolding.
- Where possible, let students teach each other, and the class, formally or informally. Teachers may feel it difficult to learn from their students, so moving from a teacher-centered classroom to a student-centered classroom may take time.

Gender

- Male and female face-to-face interactions will make many students uncomfortable. Where possible, provide opportunities for students to discuss online, or share their ideas with the whole class.
- Realize that many females may feel uncomfortable presenting in front of male students. Build their confidence by allowing them to pesent either in small groups with other female students first, or online.
- Since many students feel comfortable with the anonymity of online discussion, allow students to post things anonymously or using pseudonyms of their choosing.

Acceptance of Technology

- While many students may welcome technology, others may need the teacher to demonstrate how technology supports local values
- Be aware that many students come with very limited technological exposure. So allow alternative assignments based on different levels of technology, or allow them to work with other students.

Religion

- When designing the course, be sensitive to the values of Islam. While varying interpretations of Islam exist, if the teacher shows respect for religion, the students will be comfortable with any differences between them and the teacher.

Collaboration in Society

- Arab society is built on collaboration and helping others. Where possible build upon students' experiences in collaboration within the course activities.
- While students may not be comfortable disagreeing with teachers or other students, they often have real-world experience arguing points and negotiating solutions. Build students' collaboration skills from this base.
- Some students may work only with students from similar tribes or regions. Allow students to form their own groups, but provide opportunities for students to work with others in the class.

Figure 5.5. Principles for designing for culture in Omani higher education.

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CHAPTER 6

BREAKING BARRIERS: LESSONS LEARNED FROM ADOPTING COMPUTER SUPPORTED COLLABORATIVE LEARNING IN OMAN[4]

[4] Porcaro, D. S. and A. S. Al-Musawi. To be submitted to *EDUCAUSE Quarterly*.

Before I started taking this course I hated to work in groups because I thought that everybody will depend on the other to work and complete the project and there will be always disagreement between the members. However, working in different groups in this course all my ideas about collaborative learning have changed. I like it.—Omani undergraduate student

The Middle East has been home to many major education investments recently. Much of this has been spurred on by a mix of available resources and a need to diversify the workforce to prepare for a post-oil world. Previous accounts of the rapid modernization of university campuses in Kuwait[5] and Saudi Arabia[6] have been reported in this journal. In these and similar projects, technology has been seen as key to increasing access and improving quality while preparing students to build knowledge societies, or societies built around knowledge-based (rather than industrial or agricultural) economies.

However, higher education in the Middle East still faces many obstacles. One of the greatest of these has been a fundamental disconnect between education and employment, a possible factor contributing to many of the recent riots in the Arab World. In 2008, the World Bank published a report[7] that highlighted the massive unemployment among college graduates across the Middle East and suggested that the traditional instructivist teaching methods long dominant in the Middle East—which emphasize lecture, rote memorization, and high stakes testing—have done little to prepare graduates for work in the 21st century. They suggested that in conjunction with other possible solutions, greater emphasis should be placed on constructivist

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[5] Sean Dollman, "A Model of American Higher Education in the Middle East," *EDUCAUSE Quarterly* 30, no. 3 (2007), http://www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolum/AModelofAmericanHigherEducatio/161836.

[6] Eltayeb Salih Abuelyaman, "Making a Smart Campus in Saudi Arabia," *EDUCAUSE Quarterly* 31, no. 2 (June 2008), http://www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolum/MakingaSmartCampusinSaudiArabi/162872.

[7] World Bank, *The Road Not Traveled*, MENA Development Report (Washington, D.C.: The International Bank for Reconstruction and Development / The World Bank, 2008), http://siteresources.worldbank.org/INTMENA/Resources/EDU_Flagship_Full_ENG.pdf.

methods, including student-centered learning and collaborative problem solving, coupled with a greater use of information and communications technology (ICT).

Others agree that in order to build knowledge societies, we need to improve students' abilities to think for themselves, weigh competing claims, argue their position with others and work together to solve problems.[8] One powerful way of increasing the opportunities for students to develop these skills and habits of mind in formal courses is Computer-Supported Collaborative Learning (CSCL). Well-constructed CSCL environments provide opportunities for students to develop the critical thinking skills they need after graduation, and to learn to create, rather than simply consume, knowledge.[9] This article examines the effects of introducing CSCL into a Middle Eastern undergraduate course, and what cultural, institutional, and societal factors need to be considered for sustainable design.

What Is Knowledge Building CSCL?

Computer-Supported Collaborative Learning can best be understood by analyzing the constituent elements of the term. Computer-supported means that computers are at the center of the learning environment, though this does not necessarily mean this must be done with a traditional PC per se. Mobile phones, GPS-enabled handheld devices, or computers have all been used to support CSCL.[10] This support can either be through students working together in front of a computer with the computer acting as a tool to support face-to-face collaboration, or else the students can work from a distance and use computers or other devices as mediation tools for communication, as places to organize their learning, or as authoring tools for building

[8] UNESCO, *Towards Knowledge Societies* (Paris: United Nations Educational Scientific and Cultural Organisation, 2005).
[9] Carl Bereiter, *Education and Mind in the Knowledge Age* (Mahwah, NJ: Lawrence Erlbaum Associates., 2002).
[10] For instance, see some of the mobile CSCL projects of the Computer-Supported Collaboration and Learning Lab at Pennsylvania State University.
https://cscllab.ist.psu.edu/projects/mobile_applications_research_group

knowledge representations together (such as concept maps or essays). Collaborative learning means more than just dividing up an assignment and piecing it together at a later time, or what students often call "divide and conquer." This is better termed "cooperative learning" and does have its place in higher education.[11] However, for learning to be collaborative, students need to work with each other to solve problems. This means they need to recognize conflicting claims, weigh evidence, and argue their position with each other in order to negotiate meaning. In doing so, they co-labor, or work together, to solve problems, build products, or create knowledge.

A central point of CSCL is that students are doing more than simply acquiring knowledge. Facts are not being transmitted via a computer from one student to another, or from the teacher to the students. Rather students build knowledge, both within their own mind and as part of the collective human knowledge base, perhaps by sharing their newly-created knowledge with others on the Internet.[12] While this seems like a grand goal for an educational setting, it is no less than what is expected of members of knowledge societies. Thus students need to learn how to create solutions to local and global problems, discover and invent new products and processes, and contribute to the global conversation if they are to compete after graduation. While this may be a lot for a student to handle individually, through collaboration with others, knowledge building is possible.[13] Additionally, when collaboration via computers is "scripted,"[14] or designed in creative and thoughtful ways that support collaboration, knowledge building becomes a natural part of learning. For instance, procedures that students should follow

[11] Robert E. Slavin, "Cooperative Learning," *Review of Educational Research* 50, no. 2 (Summer 1980): 315-342.
[12] Marlene Scardamalia and Carl Bereiter, "Computer Support for Knowledge-building Communities," *Journal of the Learning Sciences* 3, no. 3 (July 1993): 265.
[13] Tammy Schellens and Martin Valcke, "Fostering Knowledge Construction in University Students through Asynchronous Discussion Groups," *Computers & Education* 46, no. 4 (May 2006): 349-370.
[14] Pierre Dillenbourg and Fabrice Hong, "The Mechanics of CSCL Macro Scripts," *International Journal of Computer-Supported Collaborative Learning* 3, no. 1 (March 10, 2008): 5-23.

in negotiating meaning could be built into the computer-mediated communication tool the students are using, thus prompting them on how best to formulate their responses in online discussions.

Many online tools can be used to support collaboration. For instance, in many higher education courses today, educators use Web 2.0 tools such as blogs, wikis, and social networking to support collaborative learning. Additionally, many popular Learning Management Systems (LMSs) used on campuses contain discussion forums and chat rooms that can provide collaboration opportunities. However, as many educators have witnessed, simply placing two students together or creating an asynchronous discussion thread does not automatically lead to collaborative knowledge building. Rather the learning environment—activities, tools, resources, and assessments—need to be structured or scripted to provide the best possible support, especially for those not familiar with collaborative knowledge building, either by the teacher, through course activities, or via CSCL tools.

Several unique CSCL tools have been developed to facilitate student knowledge building, including Knowledge Forum (http://www.knowledgeforum.com) and FLE4 (http://fle4.uiah.fi). For example, FLE4, which is a free plugin for WordPress blogs (http://wordpress.org/), guides students in their responses to blog posts. When students respond to other posts, they must select a knowledge type for their response (such as “problem”, “my explanation”, “scientific explanation”, “evaluation of the process”, “summary,” etc.). When they select a knowledge type, they are then given suggestions for how to begin forming their response (see Figure 6.1). This helps the students reflect before simply responding “I agree” to another student’s post. Because FLE4 utilizes a popular blog format, this allows students to learn how to use a tool they can continue to use outside their course activities.

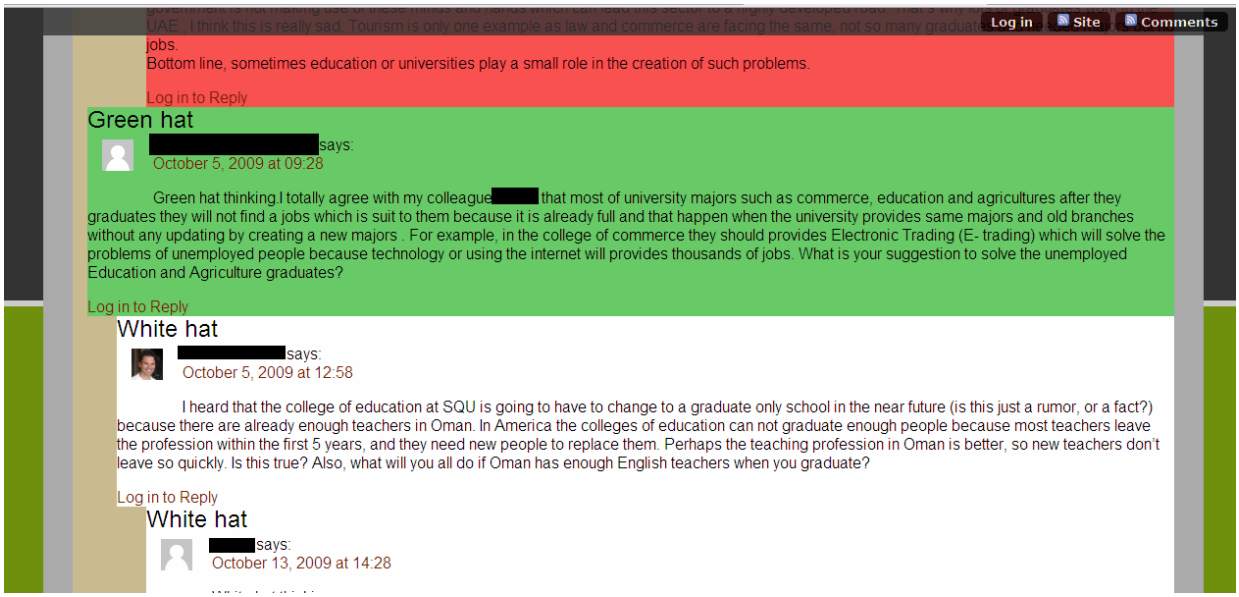

Figure 6.1. Example of FLE4 use in an Omani undergraduate course. In this case, DeBono's Six Hat Thinking is used to script the discussion.

Fostering Communities of Learners (FCL): A Template for Collaboration

Designing a collaborative course is difficult and time consuming. However, teachers and instructional designers can turn to well-researched methods and learning frameworks that can be used as templates for designing their own collaborative learning environments. One possible design template is called "Fostering Communities of Learners" (FCL). Developed by Brown and Campione[15] for use in science classrooms, it has been applied in a variety of class types, including math, science, social studies, and English language arts.[16] While its implementation varies from one classroom to the next, the basic principles are the same. These include: activity,

[15] Ann L. Brown and J. C. Campione, "Psychological Theory and the Design of Innovative Learning Environments: On Procedures, Principles, and Systems," in *Innovations in Learning: New Environments for Education*, ed. Leona Schauble and Glaser (Mahwah, NJ: Lawrence Erlbaum Associates., 1996), 289-325.

[16] An entire issue (March 2004, Vol 36, no 2) of the *Journal of Curriculum Studies* was dedicated to Fostering a Community of Learners. It featured reports on its application in 4 different classrooms, as well as commentary and responses to these studies.

reflection, collaboration, and community.[17] Brown and Campione found that these principles were developed when students worked together on something they called a "consequential task." This was a project that required students to solve problems and create solutions through product or idea. In order for every student to do their part, and to limit one student from doing all the work while the rest hung on as "free loaders," students were given "jigsaw" responsibilities, or pieces of the larger project that could be broken off and analyzed in more detail before returning to their place in the complete project. These jigsaws were roles or chunks of content the students had to research more deeply in order to become the expert on for their group. Jigsaw groups could be formed wherein students who shared the same role or subject could discuss their specialty and share their research. Then students returned to their original group to work on their consequential task, each jigsaw piece adding its expertise to the whole.

Often, groups shared their learning with other groups in sessions Brown and Campione called "cross-talk." This gave students a chance to spread their ideas outside their group, and learn more fully from each other. Cross-talk sessions were usually with students in other groups, so that ideas could spread across the class. Although this design has primarily been used in K-12 education, it can also be applied in higher education, for example, by enabling students to work with experts or clients outside the classroom to accomplish authentic activities.[18]

Why CSCL in Oman?

As noted above, Oman, along with many of its neighbors, has done much lately to improve education and build its own knowledge society. Realizing oil resources are dwindling,

[17] Miriam Gamoran Sherin, Edith Prentice Mendez, and David A. Louis, "A Discipline Apart: The Challenges of 'Fostering a Community of Learners' in a Mathematics Classroom," *Journal of Curriculum Studies* 36, no. 2 (March 2004): 207-232.
[18] Y. Woo et al., "Implementing Authentic Tasks in Web-Based Learning Environments," *Educause Quarterly* 30, no. 3 (2007), http://www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolum/ImplementingAuthenticTasksinWe/161831.

Oman's leaders look to building human capacity for diversifying its economy. Oman has come far considering its limited education foundation. Before the ascension of Sultan Qaboos in 1970, there were only three male-only primary schools in the country. Since then, Oman's educational structure has flourished. The first national university, Sultan Qaboos University (SQU) (www.squ.edu.om), opened its doors in 1986. Since then, Oman has continued to invest in education and most recently has begun to shift teaching practices toward constructivist methods, such as child-centered and problem-based learning.

While many teachers have attempted to introduce cooperative projects, or social technologies (such as discussion boards on LMSs), documented cases of CSCL applications in Oman are rare. Most higher education courses utilize traditional instructivist methods with relatively limited use of collaboration and discussion. Students are most often expected to acquire, rather than construct knowledge, and demonstrate acquired knowledge through high-stakes exams. Although courses at SQU have mixed-gender classrooms, social barriers between male and female students prevent them from talking or working with each other, or even sitting near one another. Thus discussion and idea sharing between genders in the classroom is often limited. It seems, then, that utilizing CSCL tools and FCL methods would present a great opportunity for expanding the learning experiences of Omani university students.

Educational Design Research as a Tool for Design and Theory-building

In order to develop a CSCL-based course and investigate the students' reaction to this innovation, we conducted an educational design research study at Sultan Qaboos University in Muscat, Oman. The course in which this study was conducted was an introduction to educational technology for English-as-a-Foreign-Language (EFL) pre-service teachers.

Educational design research,[19] also known as design-based research, has two goals: 1) to build theory about learning and teaching, and 2) to create a sustainable learning environment for a local context. In order to do this, design research requires close collaboration between researchers and practitioners to understand the nature of the educational problem at the local level. Additionally, collaborators co-develop a prototype course to address the problem, followed by refinement of the course over multiple iterations. In this case, we worked together over three semesters, Fall 2009, Spring 2010, and Fall 2010, to implement the course, collect data, and make refinements. The first two courses were taught by the American author, and the third by the Omani author, providing an opportunity for the course to be refined based on different teachers from different cultures. During the course, multiple methods were used to collect data about the implementation of the innovative course, as well as to understand how students in Oman adapt to educational innovation. The methods included conducting interviews of students and faculty, recording teachers' observations, collecting online data and assignments, and having students complete questionnaires.

A Course Designed: Iteration 1

The course followed the customary twice-per-week format of similar SQU courses, with the first day devoted to lecture and discussion on educational technology theory and the second day devoted to practical application. During the first half of the semester, students worked in small groups of their own choosing (around 4-5 in a group) to develop various educational technology media, such as videos, presentations, and posters. During the second half of the semester, students formed groups of 4 to 5 students to build a multimedia kit, consisting of digital and non-digital multimedia items that could be used in a unit of instruction in the schools.

[19] Jan van den Akker et al., eds., *Educational Design Research* (New York and London: Routledge, 2006).

Since the curriculum in Oman is standardized nationally, the students only needed to choose a unit of lessons from the textbook for any grade, and build or collect videos, websites, real objects, posters, transparencies, etc. for their unit. They had to choose a school in Oman where they would teach the unit, and limit their media to only things accessible in that type of classroom. For instance, if their classroom did not have a computer, projector, or internet connectivity, then streaming videos could not be incorporated in class, unless the school had a computer lab or learning resource center to which the teacher could take their students.

Within their consequential task groups, students chose one of five jigsaw roles to play in their project, each representing a member of a multimedia development team: project manager, instructional designer, audio-video specialist, graphic designer, or web specialist. As a way to build expertise in their role, each student was required to research some aspect of their role that they could apply in their project, and then write a small research paper on that subject. They were encouraged to discuss their developing expertise with others who shared their roles in jigsaw groups. They then re-combined with their project groups to design their multimedia kits. One day in the semester was set aside for "cross-talk," and due to limitations on male-female interaction in class, students rotated in either all-male or all-female groups to share their progress and ideas with students in the other groups. This allowed the students to share their progress and expertise with the students who did not share their role in their jigsaw groups or did not work with them in their project groups.

In order to facilitate knowledge building, the course used a wiki for all course-wide communication. Wiki pages as well as FLE4 discussion pages were created for each project group and jigsaw group. During the semester students participated in online discussions on course topics using FLE4 to familiarize them with the tools, and then were given discussion

pages for their own group use. Students presented their projects in person to the entire class at the end of the semester.

As the semester concluded, many students found the collaborative interactions worthwhile, both in terms of enjoyment and knowledge and skill development. While there were instances of collaborative knowledge building among the most motivated students in the class, many technical problems limited all of the students from fully participating. For instance, seven students (26 percent) did not leave a post on the blog during the course of semester, and ten students (37 percent) responded less than once per post (see Figure 6.2). Most students reported collaborating either face-to-face or via SMS text messaging, and since many students were not accustomed to using the Internet, many found discussing online cumbersome. Very few students collaborated online in their jigsaw roles. Students reported limited off-campus access to the course websites, slow Internet connection speeds, and not being comfortable doing class work on the Internet as reasons for low participation. This was partially due to limited bandwidth at the university and the fact that, due to the project's limit to on-campus access from the SQU servers, the server used for hosting FLE4 was located in Georgia, USA, thus slowing down the blog's response time considerably.

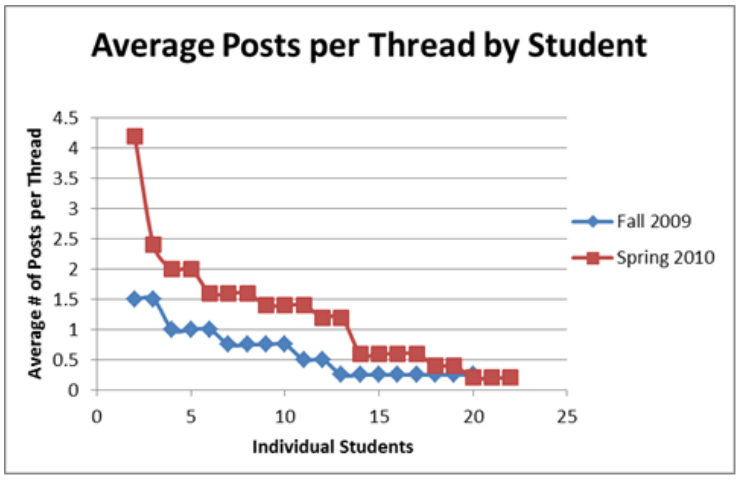

Figure 6.2. Number of posts on the FLE4 blog per person for Fall 2009 and Spring 2010.

Due to the extremely limited computer skills of some of the students, many had difficulty keeping track of separate logins for the wiki and the FLE4 blogs, and found the wiki to be too difficult to use. Students complained that they were unable to edit the wikis, or create new pages, or they posted their responses on the wrong pages, or accidentally deleted other students' entries or they used the wiki comments section rather than co-writing wiki pages. When students did use the course FLE4 blog, most students did not use the correct knowledge type for their discussion posts.

Often, the students and the teacher did not share expectations for the course projects, especially the written paper about their choice of jigsaw subject. Many students simply submitted verbatim copies of Wikipedia entries without proper citation, or segments of other websites that simply defined their roles. Because Oman, like other Arab nations, is mainly an oral culture, students were unfamiliar with many aspects of information literacy, especially the concept of writing original reports. Additionally, language proficiency (all courses were in English) limited the students' confidence in writing. All these factors were taken into consideration in refining the course for the next iteration.

A Course Refined: Iteration 2

During the second semester, the course followed much of the design of the first iteration, including forming consequential task groups to design a multimedia kit for a unit of instruction in their textbook. Jigsaw groups were formed, and students selected a jigsaw role for increased study. Students worked for the first half of the semester designing and developing instructional media, as before, and then formed their consequential task group in the second half of the semester. One session was devoted to cross-talk, just as was done in the first semester.

After reviewing the barriers to collaboration from the first semester, many technical refinements were made to the course and the CSCL tools. Because of the problems students were having working with the course wiki during the second iteration, all course content and general discussion were enabled via a Moodle LMS. Students were more familiar with this tool, having used it in many other classes. Also, because of students' difficulties in writing a research paper, during the second semester the students were asked to contribute to a wiki page for their jigsaw role. This was a less formal medium than submitting a research paper, and would allow students more opportunities to properly use wikis.

Because many students neglected to use the discussion forums or contribute to discussions during the first semester, online discussion, wiki pages, and chat rooms were available and encouraged, but not required during the second semester. Students were still asked to contribute to discussions on course topics throughout the semester, but were allowed more flexibility in how CSCL tools were used in their jigsaw and project groups.

Also during the second semester, greater in-class support was given by the instructor. This included providing more examples of successful past projects, talking with students individually to clarify their roles and help them determine appropriate topics of research, and working with groups to make sure they understood expectations and were working well together.

In the end, many more students participated in the course discussions during the second semester, and more collaborative knowledge building episodes were observed online. For instance, all 22 students participated in online discussions, many responding more often per thread (see Figure 6.2) and in a timelier manner than in the first semester (for instance, two to three weeks after a post for the second semester compared with as much as nine weeks after for the first semester). This frequently led to greater depth of discussion and better use of the CSCL

tools by the students, since students were returning frequently and responding to other students' posts. However, this online collaborative knowledge building was observed among only a few of the most motivated students, and many of the other students were overwhelmed by the difficulty of the course tools. As the first instructor prepared the course to transfer to a new instructor, he realized that most of the details of the course were too difficult to maintain. The least sustainable of the tools was the FLE4 blog, and the blog maintenance. Additionally, both instructors realized the course load was too excessive for undergraduate students at SQU. As we prepared for the third iteration we focused on which aspects of the course were essential to the theory of FCL and collaborative knowledge building, deciding that the scripting provided by FLE4 was too advanced for students with such limited technical experience.

A Course Transferred: Iteration 3

During the third semester, the course was entirely taught by an Omani instructor, who was not present in the course during the first two semesters. This allowed us to see how the course would be modified when taught by another instructor from the local culture. Much of the maintenance and use of the site became too difficult to learn and adopt, especially given its limited use by students in previous courses. Thus the wikis and FLE4 blogs were dropped from the course and all online collaborative discussion was conducted using Moodle discussion boards. The refinements of this semester mainly focused on making the course as easy for another teacher to implement as possible to provide for future scalability.

Overall, the course structure followed the same instructional design principles as the first two iterations. Student groups were formed to design and produce three collaborative projects using units from Ministry of Education school textbooks. Members in each group researched their assigned roles and used their expertise to work with their group and solve learning

problems. They also shared ideas with others in their role using the Moodle online forums. At the end of each project, each group had to present their projects to other groups. During this semester, students wrote reflections on their experiences and roles. The iteration placed greater emphasis on collaborative and student-centered methods, often focusing course instruction on these themes.

Students reported their satisfaction and motivation towards the application of CSCL, citing "creative thinking, time management, and social interaction are the main skills we have developed throughout the projects." Additionally, the Omani instructor felt that collaboration among students made students enthusiastic about their learning, especially when combined with online interaction and web-based resources. The simplification of online tools appeared to benefit the students, and many of the student project groups engaged in increased online discussions. There were, however, still a few students who did not engage in online discussion of collaborative knowledge building. At the end of the third iteration, the principles from the course, including FCL methodology and online collaborative knowledge building, appeared scalable to other classes. However, a greater emphasis on teacher-facilitated discussion (both online and face-to-face) was needed, as FLE4 was not a viable option for SQU courses in the short-term.

Impact of CSCL on Omani Higher Education

In order to understand the impact this course had in this Omani educational context, including students' growth in knowledge building and the scalability of the course, we analyzed the data to determine 1) how well the course was designed, or its legitimacy; 2) how well the course helped students build knowledge, or its efficiency; and 3) how well the course would

continue in the future, or its viability[20]. We focused on those themes that are most applicable in other higher education institutions in Oman or other similar nations.

Legitimacy

An important contributor to CSCL success is building the course upon sound theoretical principles, as outlined above. Through this course, we tried to maintain the key principles of FCL (i.e., activity, reflection, collaboration, and community). This was evident to the external panel of experts chosen to review the course who all agreed the course was scientifically founded and coherent. Students reported that many of the key elements of FCL worked very well in the class, such as jigsaw, cross talk, and online discussions. For instance, at the end of a cross-talk session many students were full of excitement and new ideas for their projects. One student who did not normally contribute to his group discussions came up to the instructor afterward and said "this was good, let's do it again."

Design was only part of the success of implementation, and a great deal of how these principles were applied was dependent on the instructor. Instructor scaffolding played an important role in the course and would be hard to replicate in other courses taught by other instructors. For example, students commented about how one instructor related to the students as a peer and motivated them through enthusiastic encouragement, noting that this was not common in many of their courses at SQU. They commented that they felt free to express themselves in the class, and the instructor helped to lessen their fears. As one student noted, the teacher was "very helpful with the students, and [he dealt] with them in a nice way, so I don't have any fears." Additionally, the way the teacher monitored group work, frequently talking with groups and discussing concerns with them, helped the students in their collaboration. This also included the

[20] These criteria are based on Susan McKenney, Nienke Nieveen, and Jan van den Akker, "Design Research from a Curriculum Perspective," in *Educational Design Research*, ed. Jan van den Akker et al. (New York and London: Routledge, 2006), 67-90.

instructor responding frequently to online discussions by asking questions and providing feedback throughout the learning process. One student summed this idea up by stating that,

> the teacher most of the time, work as a facilitator of learning or a guide, maybe, of learning. And the way we used to, for example, get knowledge in the past, and the way we were learning in the past at schools was…different from how we learn today, because in the past we were…taking the information from the teacher himself and we were depending on the books but now we are…able to search for the information we need, and as a teacher, you...give us specific task to do, and we search for the information by ourselves.

It is important in implementing a course like this that the teacher spend a significant amount of time explaining the process of collaboration and purpose of CSCL scripts, and helping the students practice the collaborative and technological skills that for most students will be new. This was lacking in the first two implementations, and may have been one of the contributing factors to why the CSCL tools were not used more in the class. For most of the students, tools like blogs and wikis were entirely new, and students needed to understand more clearly how to use them, or even why. FLE4 scripts were used correctly by some students, but many would select the wrong knowledge type for their response or would continue to make inconsequential posts, such as "I agree with all of you." More time spent early on explaining the ideas and processes central to CSCL and more student practice with the tools would have been beneficial.

Furthermore, group relationship building was hard to design into the course. For instance, while jigsaw groups were meant to limit the "free loader" effect, there were still several students in this course who did not contribute to their groups at all. However, even with this unequal participation, the groups that fared the best had a strong leader who helped the group complete tasks on time and motivated others. In some groups this was the project manager, while in other groups this person had a different jigsaw role. For the instructor, this meant doing whatever was possible to support the group's leader or help a leader come to the front of the

group to contribute to greater collaboration. Additionally, encouraging students to form groups from pre-existing relationships or building groups early in the course and developing them over the entire semester may have contributed to better collaboration. The groups with the best discussions and project outcomes were composed of students who had worked together before and were comfortable with each other. While it is often the case in post-graduation collaboration experiences that people are called upon to work with people with whom they are unfamiliar or with whom they may have poor relationships, in a course where so much of the course is new and unfamiliar to the student, it may be worthwhile to support effective group relationships as much as possible, to allow students to be successful as they learn to collaborate.

Efficiency

To judge the efficiency of the course, we looked at whether the course yielded the results we desired in our design.[21] For us, that meant examining how the course appealed to students, what knowledge and skills they gained, and how they collaboratively built knowledge in the course.

As for appeal, most students enjoyed the course and many noted that it was one of the best they had taken at SQU. Of the students surveyed, 84 percent of Fall 2009, 79 percent of Spring 2010, and 92 percent of Fall 2010 students agreed or strongly agreed that they enjoyed the course assignments. Students commented that this was a change from their other courses, and they especially enjoyed the practical rather than theoretical nature of the course. This was a common theme for the students: that they felt the course was not only practical, but very relevant to their future careers. Some students suggested that the collaborative work made the course enjoyable and others mentioned that they felt comfortable in the class and with the instructor. Not all students, however, felt this way. Some felt the course workload was excessive,

[21] Ibid., p. 80.

especially compared with other courses at the university and a few preferred working individually rather than collaboratively. However, even though this course entailed more work than other courses, many students felt that it was useful and prepared them for their careers.

As for knowledge gained from the course, many students recalled specific technologies, ideas, or processes they learned in the course that they felt would be useful in their careers, such as specific graphic design principles, or ability to use movie editing software, among other skills. For many of the students their confidence in using and applying technology grew throughout the semester. Several students also pointed to skills that resulted from group collaboration and focusing on their jigsaw roles, such as leadership skills, instructional design concepts, time management, and presenting opinions and ideas. For instance, one student when asked what she learned said,

> I think I've learned how to present your personality. I mean, how to give others solution, how to solve the problems…and come up with the new ideas or… to be active in your group, not just to be passive and doing nothing. It helps you to improve your personality and your self-confidence.

With these many positive results, we were left wondering if the course met its main goal: did the students build knowledge? While we were disappointed at many of the students' inability to use the online tools correctly, or even at all, upon further analysis we realized that many students did reach a point in their online discussions that demonstrated their ability to negotiate meaning through argument, present evidence from a variety of sources, make decisions and offer innovative solutions to problems. For a very few of the students this was done online and with the CSCL tools, such as the wiki and FLE4. For most of the students, however, this was done in face-to-face collaboration, often as students learned or built together in front of a computer. Other times, students reported collaborating "under the radar," that is by using emails, SMS texts, and instant messaging or other means not seen by the teacher. Quite often,

collaboration was informal and initiated by the students, using means not intended by the instructor, such as questions posed by students on personal wiki pages, or in the wiki's comments section.

Whatever the means, many students felt they benefited from their collaborative knowledge building. Several students suggested that having others in their group who could provide added input allowed them to be successful in collaboratively designing their multimedia kits. One student told of how her group helped her fulfill her role as instructional designer to create an instructional game:

> Firstly I was stuck how to begin…to create these games and which way should I put these games in papers or on online. But because of useful friends, they help me to start. They said for me, now, [student in the group] you can write it, do it in online and [other group member] will scan for me pictures.

Others pointed to the online tools as a welcome way to share ideas across gender, especially since the male and female students rarely if ever interacted in the classroom. In this way, the best ideas and projects could provide benefit to all students in the classroom, regardless of gender. In interviews at the end of the course, several of the students displayed an accurate understanding of what knowledge building meant and looked forward to applying it in their classes. Some students even appeared to alter their understanding of teaching and learning, from instructivist to constructivist pedagogies. As one student noted,

> Before this course for me, I thought that teaching was only talking or writing on the board. Just like this. But when we came to this course, we have noticed that it's more beneficial for us. And teaching is not talking or not writing. But is group working and using technology, makes this teaching or education more interactive and interesting.

Lastly, through the course of the semester, some students began to display a shifting epistemology, from objectivist knowledge acquisition to constructivist knowledge creation, as noted in classroom behavior and their evolving perspectives shown in different interviews over

the semester. This epistemological shift is an important step in students adopting constructivist methods in their own teaching and learning, though this course could only provide a small change in their epistemological development.

Viability

In judging the viability of the course, we wanted to know if the course was practical, relevant, and sustainable for use in courses at SQU. In terms of practicality, several obstacles stood in the way of collaborative discussion. For instance, the institutional preference for course assessment based mainly on mid-term and final exams limited the acceptance of performance or project assessment. Though the university does provide for flexibility in assessment, if other courses adopt this structure, teachers, students, and administrators would need to clearly understand and be comfortable with the alternative assessments required for this type of course.

Additionally, the separation of male and female students greatly limited the kinds of in-class discussions that were possible. As noted above, online tools lessened this problem to some extent. However, since many students chose not to participate in online discussions, their ideas were rarely, if ever, heard by students from the opposite gender. Additionally, students found it difficult to arrange proper meeting times and places for out-of-class collaboration. Since many of the female students lived on campus, they were able to meet together in the evenings. However, some male and female students lived at home (as far as an hour by school bus, which left the campus only one time daily) and most male students lived 4 to 6 kilometers away in off-campus housing. Additionally, students were not used to meeting at other students' houses to study or work on projects, and many students complained of not being able to find an appropriate place or time to collaborate on their projects.

While online collaboration may provide an answer to some of these problems, there were several further technical constraints. Often there were problems with Internet speeds or connections. Usually, as mentioned above, the bandwidth was much too low to provide a user-friendly online experience for students, so many did not participate in the online collaboration. The few students who did have off-campus access to the Internet were often unable to access the course site for various reasons. For those who relied on the campus computers, the few labs on campus were often being used for other classes. Other problems included labs with malfunctioning or virus-laden computers, limited software, restricted hours of operation (often only until 6:30 or 7pm), and inadequate number of support staff (who left around 4pm). Some students had extremely limited technical ability, since many had never really used a computer before entering college. Tasks like logging in to a website and making comments on a blog were extremely difficult for them. If these technical considerations were realized before the course design, perhaps the course would have focused more on face-to-face collaboration, and relied on one CSCL tool for online collaboration, such as Moodle discussion threads. In this way students could become proficient in its operation, and then other tools, such as wikis, or FLE4 blogs could be added afterward.

Although practical constraints posed many problems, several students expressed the desire to work through these difficulties, due to the relevancy the course held in their own careers and lives. Since the project involved creating media for current Ministry of Education textbooks, students who were concurrently in their teaching practice found many opportunities to try out their ideas in the classroom. Several students immediately applied ideas from the course to their student-teaching. Others brought ideas from their practicum classrooms to their group projects. Many of the students who enjoyed the course the most and did the best were those who

directly applied new knowledge in the practice teaching, suggesting that courses like this should be aligned with other internship or practical experience courses. However, even though all the students were education majors, many did not plan on working in education but rather hoped to find jobs in the private sector or the military, for instance. Finding relevancy for these students was less apparent, since much of the course revolved around designing and implementing instructional media. Nevertheless, many of these students recognized the application of skills learned in the class, such as working with others, managing projects, and using technology, to their own careers.

The real test of this course is its sustainability over time. Much of the success of the course, as highlighted above, depends upon the teacher. If other teachers are to apply CSCL tools, such as FLE4, and collaborative knowledge-building methods such as FCL, they must have sufficient buy-in, available preparation time, technical skill, and knowledge about collaborative knowledge building. However, if this type of course were to be adopted in other classrooms, many teachers would not have the time to adequately prepare and maintain the tools, or the incentive to change their well-established teaching methods—which are much easier to implement, much less time-intensive, and provide the same rewards to the teacher. Additionally, if a course like this was to scale to multiple classes, there would be serious pressure on the limited hardware and network resources of the department computer labs and their staff. Additionally, in a university where the language of instruction for most courses is English but many students have limited proficiency, relying heavily on online discussion and writing may decrease the students' success in the classroom, especially for those not studying to be English teachers.

All these problems aside, there is hope that these CSCL ideas are viable in Omani higher education. As we have noted, several students were successful, despite technical or pedagogical limitations. There were several who were applying, or planning to apply knowledge building into their own classes, where these ideas will continue to spread. Several teachers at SQU are committed to collaborative knowledge building and have utilized elements of CSCL and FCL in their classes already. The course continued to be viable as it was transferred to a new instructor, showing that the course design holds potential for scalability. Thus it appears that the principles of collaborative knowledge building and CSCL can be applied and adapted in similar universities in the region.

Conclusion: Lessons Learned

While this case study focused on a single course in a single university in Oman, there are several lessons that can be shared across the region. In an attempt to link higher education to workforce skills through CSCL, we can begin to understand what steps should be taken in similar projects at other universities in the Middle East. The main points are summarized in Figure 6.3.

As these types of courses are utilized at other institutions in the Middle East, these design principles will continue to be refined. As demonstrated through this case study, the outcomes of applying CSCL environments in the university context outweigh the barriers to adoption. These outcomes include enhanced course content knowledge, increased confidence in applying course knowledge and skills, stronger collaboration skills (arguing ideas, making decisions, providing solutions), more ability to create instead of simply consume knowledge, as well as the added benefits of leadership and presentation skills. In this way, students in the Middle East can be

better prepared for the careers of the future, and for collaboratively creating solutions to many of the region's most pressing problems.

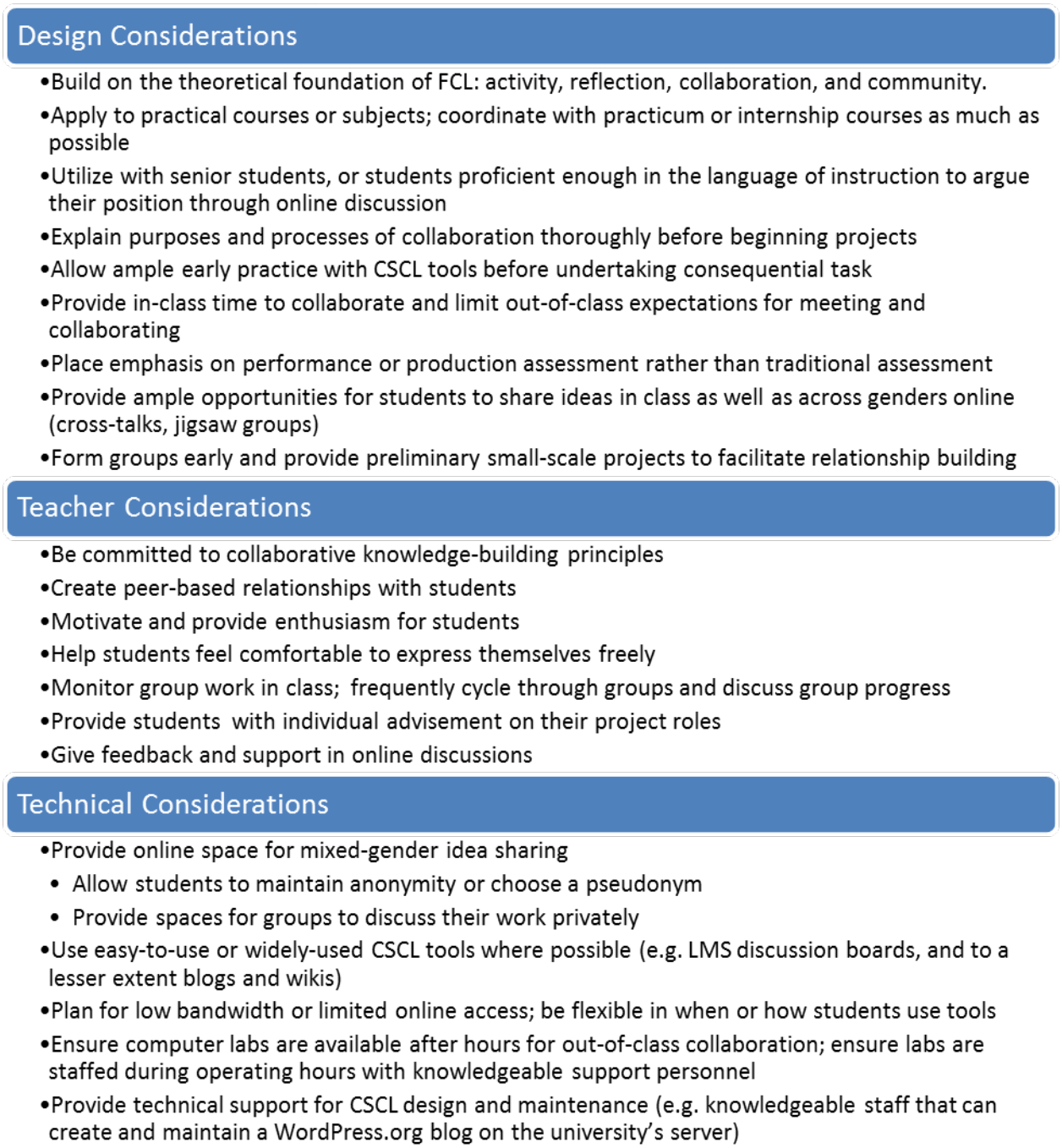

Figure 6.3. Considerations for applying collaborative knowledge building in Oman.

CHAPTER 7

CONCLUSION

Challenges of International Education Design Research

The pieces of this dissertation work together to describe one educational change project. As with any change project, this one did not proceed exactly as expected. As soon as I arrived in Oman, I realized my own understanding of the Middle East and my expectations of how I would implement this research had to evolve. For instance, the level of technical infrastructure and technological ability were nowhere near what I had planned for. While I realized I could not rely on the technology of Europe and North America, where many CSCL tools were developed, I was not prepared for how inappropriate much of what I had planned was going to be. If I had known better the technical challenges I was facing, I would have built up from what the students knew (discussion boards on Moodle, for instance), rather than try to trim down something too advanced for the Omani context (FLE4). This was what my Omani collaborator and I finally ended up with, in the third iteration. But if we had begun from what we knew and built up, I believe we would have created a much better learning environment for Oman.

Helping others to buy in to the importance of what I was doing was also a major challenge throughout this dissertation. Doing educational design research as a graduate student is particularly difficult. Often the goals of a dissertation do not always align well with the intense collaboration, expertise, and large data collection efforts of successful education design research projects. This was intensified by the fact that I designed my course while still in the United States, and then later travelled to Oman to implement it. This meant that the

collaboration necessary from the beginning—people sitting around a table and drawing up a vision for the project—was not there. While everyone in Oman was extremely supportive, I got the sense throughout my study that this was my study, and they would accommodate anything I felt was necessary, rather than this being *our* study where I accommodated whatever *they* thought was necessary. This left me feeling that this study was more like the typical international research project, where the Western researcher flies in, tries out his or her theory, collects data, and flies away, leaving little lasting impact on the local context.

In the end, the constraints of working in Oman left me wondering if my students ever did build knowledge collaboratively, or whether I had fostered a community of learners. Had this study failed to meet its most fundamental goal? Additionally, did I make any lasting impact on education in Oman? Would these ideas die as soon as I stopped fanning the flames?

While I was feeling overwhelmed by this disappointment, I read Schoenfeld's (2004) commentary on four FCL projects reported in the *Journal of Curriculum Studies*. Realizing that all four studies faced major difficulties, and the researchers exhibited this same lack of confidence in their results, he noted the following:

> Put these four sets of difficulties—finding big ideas, finding a plausible decomposition for purposes of jigsawing, designing non-standard instruction based on the jigsaw, and teaching in ways that foster the development of intellectual communities—together and you have a monumental challenge. This would be a major challenge for a seasoned design team and teachers who are well accustomed to 'reform'. To ask teachers without much design experience and relatively unseasoned facilitators to take on this challenge is to ask a great deal. The efforts of the four teams discussed here were little short of heroic, and their limited accomplishments should be judged accordingly. It should be understood that pioneering attempts demand heroic efforts, and that prototypes (both of process and of product) necessarily have lots of rough edges. What has been presented in this set of papers is a collective design experiment, where the goal was to create something important in order to examine and improve it. As has been seen, the outcomes fell short of expectations (for all of the reasons identified above). However, they can be considered improvements in both process and product over much traditional instruction, and catalysts for professional growth as well. On their own terms, those are non-trivial achievements. (p. 247)

Reading this, I began to look at this project in a new light. Instead of seeing what went wrong in this study, I began to see what went right. That was when I saw the heroics of this project, and the value of my time.

Results: What Went Right

As outlined in chapters 5 and 6, while not all students collaborated in the way I had envisioned, some did. Some students were prepared to take on this course and move forward their epistemology, knowledge, skills and perspective. I saw students arguing with other students and defending ideas. I saw students questioning the value of textbooks as the sole source of information. I saw students realizing their teachers were more their peers than their judges. I saw students creating, solving, producing, working together, and discovering new ways of teaching and learning. While not all students reached this level, some did. And several of those students told me they wanted to apply these ideas in the future in their own teaching.

Additionally, students began to see a crumbling of the barriers that prevent information-sharing across gender. Male and female students collaborated online and shared ideas. I found instances of students offering feedback, support, or inspiration to each other, from one gender to the other. For many students this was new, and for many, this was exciting.

While the change I saw was slow, I did see change. I spoke with several faculty members about my ideas, and I saw many think about ways they could adopt them in their own classes. The fact that one faculty member tried them out in his own course, with a high degree of success, was enough for me to feel like I was making a difference. In fact, I had heard recently that one female faculty member at SQU even introduced in-class, face-to-face discussions between males and females, with some success. Change is slow. But good ideas spread eventually, and as my students become teachers, their students will experience change in their

learning, and eventually Omani education will include more of the kinds of learning experiences that will prepare Omani knowledge workers for the future. This is the same thing we are seeing across the public squares of many Arabic nations as I write. Ideas spread until there is a critical mass willing to make the change reality.

Next Steps

This dissertation is only the beginning of a research agenda concerning educational change and development. I have accepted a position with a learning design company that has been working on several international education development projects, especially in the field of teacher training and development. As I begin this assignment, the skills, attitudes, and experiences I gained during this dissertation study will be invaluable. I will be able to design, develop, implement and evaluate many similar projects, though their scope may be different. I have learned how to be creative in dealing with locally-available resources, and how to collaborate with others who may see life in much different ways than I do. And I will be able to research change, and report on that change, in a variety of ways, and to a variety of audiences, just as I did in this dissertation.

I hope also to further develop the theories that grew from this research. I have a lot of data that is ripe for further analysis and publication. I can continue to pick the fruits of this one project for a while to come. But I also want to see how these ideas work in other contexts. Do the design principles I developed here work in other Arab nations outside Oman, such as the United Arab Emirates? Is the framework I developed here applicable in non-Arab countries? How can these design principles be refined over additional projects to best facilitate innovation adoption? These are all research ideas I hope to pursue within this research agenda, as I continue my career as a life-long scholar.

As I look forward beyond this research, I feel that the tools I have developed—in research, collaboration, change management, instructional design, evaluation, and project management—will all serve me well in the future. Furthermore, the specific findings of this research—how students reacted to the introduction of educational innovation and how to design a sustainable collaborative knowledge building environment—will guide me as I work to design similar environments in the future. My end goal is that I can help find more ways to provide greater education opportunities for those throughout the world who would suffer the most without quality education.

Reference

Schoenfeld, A. H. (2004). Multiple learning communities: students, teachers, instructional designers, and researchers. *Journal of Curriculum Studies, 36*(2), 237-255.

APPENDICES

APPENDIX A. SAMPLE SYLLABUS AND CONSENT FORM

Sultan Qaboos University
College of Education
Instructional and Learning Technologies Dept.
Feb 6, 2010

General Info.:
Course name: TECH 3008: Introduction to Educational Technology
Credits: 3; 4 contact hours/week
Time: Saturday and Monday, 16:15-18:05
Course Instructor: Mr. David Porcaro
E-mail: dporcaro@squ.edu.om
Office Ext.: (2414) 3939
Office Location: COE- 1st floor (Room# 1077)
Office Hours: Sat/Mon 10:00-11:00 and by appointment

Course Description:
This course covers the concepts of instructional media, educational technology and their role in teaching and learning processes. In addition, it demonstrates the historical developments of this field; it also covers the models of communication, their elements, forms and relations to education. The course explains media classification, selection, with reference to systematic approach and instructional design. It covers their design principles, preparation, production, development, use, and evaluation. Some instructional equipment operations are applied. The course also introduces new technologies used in instruction (instructional TV, programmed learning, computer, interactive video, language lab, personal tutoring system).

Objectives:
At the end of this course, the student will be able to:
1. Recognize concepts related to instructional media and educational technology.
2. Classify instructional media to different methods.
3. Know instructional communication process, and its models, applications, and impediments.
4. Select suitable instructional method for a particular instructional situation.
5. Apply principles of visual media designing.
6. Design and produce a set of audiovisual media (transparencies, slides, audiotapes, videotapes, models, solids, computerized presentations)
7. Use different instructional media.
8. Evaluate some instructional media.

Collaborative Knowledge Building:

This course should be unlike any other course you have ever taken. It is part of an experimental effort to increase student autonomy in learning, and to help you develop collaborative problem solving skills, the kinds of things you will need after graduation. For this course to be a success, we all need to be honest with ourselves and your fellow classmates. We all have to do our part because everyone is counting on us. We all have to accept a little ambiguity as we all learn from each other throughout the semester. And we all have to be willing to have fun learning about technology in the classroom. We must all come prepared and willing to make this course a success. Please know that I am always here to help you if you have any questions or concerns with this course.

Course Schedule: (Fall '09)

Week	Date	Theory course	Practicum	Readings	Assignments
1	6 Feb	Intro to course			
2	13 Feb	Instructional Technology	Transparencies	1, 10	create individual page/first discussion
3	20 Feb	visual principles	poster	4	
4	27 Feb	communications	audio/video	11,12	
5	6 Mar	computers	PPT/smartboard	5	
6	13 Mar	e-learning	web (webquest)/social media	7,8	
7	20 Mar	LRCs/displays	Finish portfolios		4 best items, **Due 22 Mar**
8	27 Mar	TBA	Group Work (ideas)	9	
9	3 Apr	**Midterm**	Jigsaw (research)		
10	10 Apr	multimedia/research	Jigsaw (research)	6	
11	17 Apr	ASSURE Model	group (cross-talk)	3	Jigsaw Wiki, **Due 19 Apr**
12	24 Apr	student-centered learning	group (production)	2	individual paper (2 pages), **Due 26 Apr**
13	1 May	evaluation	group (production)		
14	8 May	current and future trends	group (production)	13	
15	15 May	Review	**Group Presentations**		Final project, **Due 22 May**
16	30 May	**Final exam (3-6pm)**			

Course Website

We will be organizing our course and group interactions on the course website on Moodle. Log into Moodle and go look up Please visit this site often for the latest updates to the schedule, announcements, additional resources, etc. Some discussions will take place on the course blog: http://projects.coe.uga.edu/tech3008/s2010.

Textbook:

Smaldino, S., Heinich, R., Molenda, M., & Russell, J. (2006). *Instructional Technology And Media For Learning*, 8th Edition. Macmillan Publishing Comp.

Additional Resources:

Additional resources will be available on the course wiki as they become available.

Evaluation (All the assignment details and grading rubrics are on the Moodle site):

Midterm (**20%**)
Activities (**16%**) (Choose 4 of your best works, worth 4% each)
- Manual/thermal transparencies
- Displays/pocket displays production
- Audio/video production
- PPT program production
- Webquest/social media

Final project (**20%**)
- Individual research (including wiki) **5%**
- Project **10%**
- Presentation **5%**

Participation (**4%**)
Final (**40%**)

- **Late Work will receive 5% points off for every day late.**
- **All work is expected to be yours. If I find that you copied directly from any other source without proper citation, you will receive a ZERO for the assignment.**
- **You are expected to participate in all course activities, including discussions and in-class assignments.**

Informational Letter

6 Feb 2010

Dear Students of TECH 3008:

I am a graduate student under the direction of Dr. Thomas Reeves in the Department of Educational Psychology and Instructional Technology, Dr. Janette Hill in the Department of Lifelong Education, Administration and Policy, at The University of Georgia (USA) and Dr. Mohamed Eltahir Osman in the Department of Instructional and Teaching Technology at Sultan Qaboos University. I invite you to participate in a research study entitled "Collaborative Knowledge Building in an Omani Undergraduate Course: A Design Research Study" The purpose of this study is to understand how Omani students react to the introduction of collaborative knowledge-building pedagogies in an attempt to design a sustainable computer supported collaborative learning environment for Sultan Qaboos University.

Your participation will involve taking part in normal educational activities for the course, including collaborative knowledge-building exercises, online discussions, and exams. Furthermore, you will be asked to complete three brief questionnaires (at the beginning of the year, at mid-term, and during the course final, each of which should take about 15 minutes to complete). Based on your interactions in the course, you may be selected for further study, in which you will be interviewed during three separate meetings, for 1 hour each. Your involvement in the study is voluntary, and you may choose not to participate or to stop at any time without penalty or loss of benefits to which you are otherwise entitled. You may opt out of the study, with no consequence to you, your grade, or your standing in the department, by informing me in writing at any time during the semester. If you participate, you will be assigned a pseudonym, and any identifying features of your questionnaires, interviews, assignments, and online discussions will be removed. The results of the research study may be published, but your name will not be used. In fact, the published results will be presented in summary form only. Your identity will not be associated with your responses in any published format.

The findings from this project may provide information that will improve learning and ease the transition to innovative pedagogies. Furthermore, these pedagogies may help you develop the kinds of skills valued after graduation, such as collaboration, problem solving and knowledge building. There are no known risks or discomforts associated with this research.

If you have any questions about this research project, please feel free to call me David Porcaro at 24143939 or send an e-mail to dporcaro@uga.edu. Questions or concerns about your rights as a research participant should be directed to The Chairperson, University of Georgia Institutional Review Board, 612 Boyd GSRC, Athens, Georgia 30602-7411; telephone (706) 542-3199; email address irb@uga.edu.

Thank you for your consideration! Please keep this letter for your records.

Sincerely,

David Porcaro

APPENDIX B. INSTITUTIONAL REVIEW BOARD APPROVAL

The University of Georgia

Office of The Vice President for Research
DHHS Assurance ID No. : FWA00003901

Institutional Review Board
Human Subjects Office
612 Boyd GSRC
Athens, Georgia 30602-7411
(706) 542-3199
Fax: (706) 542-3360
www.ovpr.uga.edu/hso

APPROVAL FORM

Date Proposal Received: 2009-07-02 **Project Number:** 2010-10009-0

Name	Title	Dept/Phone	Address	Email
Dr. Thomas C. Reeves	PI	Educational Technology and Instructional Technology 604 Aderhold Hall 1060 706-542-3849		treeves@uga.edu
Mr. David Porcaro	CO	Educational Psychology Aderhold 1060 706-461-0952		dporcaro@uga.edu
Dr. Janette R. Hill	CO	LEAP Rivers Crossing 542-4035		janette@uga.edu

Title of Study: Collaborative Knowledge Building in an Omani Undergraduate Course: A Design Research Study

45 CFR 46 Category: Administrative 1
Parameters:
Approved for Institutions with Authorization Letters on File;

Change(s) Required for Approval:
Receipt of Consent Document(s); Receipt of signed cover page for co-researcher, Dr. Hill;

Revised Application;

Approved : 2009-07-22 Begin date : 2009-07-22 Expiration date : 2014-07-21

NOTE: Any research conducted before the approval date or after the end data collection date shown above is not covered by IRB approval, and cannot be retroactively approved.

Number Assigned by Sponsored Programs:

Funding Agency:

Your human subjects study has been approved.

Please be aware that it is your responsibility to inform the IRB:
. . . of any adverse events or unanticipated risks to the subjects or others within 24 to 72 hours;
. . . of any significant changes or additions to your study and obtain approval of them before they are put into effect;
. . . that you need to extend the approval period beyond the expiration date shown above;
. . . that you have completed your data collection as approved, within the approval period shown above, so that your file may be closed.

For additional information regarding your responsibilities as an investigtor refer to the IRB Guidelines.
Use the attached Researcher Request Form for requesting renewals, changes, or closures.
Keep this original approval form for your records.

Chairperson or Designee,
Institutional Review Board

APPENDIX C. SQU NO OBJECTION LETTER

بسم الله الرحمن الرحيم

Sultan Qaboos University

OFFICE OF THE ADVISOR
FOR ACADEMIC AFFAIRS

جامعة السلطان قابوس

مكتب المستشار
للشؤون الاكاديمية

3rd October, 2009

TO WHOM IT MAY CONCERN

This is to certify that the University has no objection of Mr. David Porcaro distributing the attached questionnaire for his research: "Collaborative Knowledge Building in an Omani Undergraduate Course: A Design Research Study", as long the instructors and students have no objections.

Dr. Taher Ba-Omar
VC's Advisor, Academic Affairs

Data inventory

Interviews (transcripts available on http://sites.google.com/site/porcarophd; notes available in hard copy, audio on flash drive)

- Focus students (fall 2009)
  - Amin 1
  - Amin 2
  - Amin 3
  - Fatima 1
  - Fatima 2
  - Fatima 3
  - Lailah 1
  - Lailah 2
  - Lailah 3 (sent by email, she moved home before she could meet in person)
- Staff (Spring 2010)
  - Support Staff
  - Ahmed
  - Ali M
  - Alaa
  - Ali B (English dept.)
- Focus groups (Spring 2010)
  - Focus 1 (1 male student)
  - Focus 3 (3 Male students)
  - Focus 4 (1 female student)
  - Focus 5 (4 female students)
  - Focus 6 (1 male student)
  - Focus 7 (1 female student)

(total people =20, total time=c.17 hrs)

Questionnaires (data in Excel available on http://sites.google.com/site/porcarophd, hard copy in file)

- Fall 2009
  - Preterm (n=37, 19 identifyable, 4 not needed)
  - Midterm (n=27, 11 identifyable)
  - Final (n=27, 10 identifyable, 4 same in all three, 5 same on two)
- Spring 2010
  - Preterm (n=21)
  - Midterm (n=14)
  - Final (n=13, 7 identifyable, 6 same in all three, 1 same on two)
- Fall 2010
  - Preterm (n=33)
  - Midterm (n=27)
  - Final (n=5; none identifyable)

(total number of people responded at least one time =91)

Expert Reviews (Responses available at http://bit.ly/9jFL4G)

Requested from

Michael Hannafin (no response)
Teemu Leinonen (no response)
Ali al Musawi (completed survey)
Gretchen Thomas (completed survey)
Tarmo Toikkanen (did not complete, but looked at it)
Greg Sales (completed survey)
Susan McKenney (completed survey)

Blog entries (observations) (available at http://porcarophd.blogspot.com)

Aug=3, Sep=8, Oct=1, Nov=3, Dec=3, Jan=0, Feb=2, March=4, Apr=1, May=2
Total=27

Test Results (Hard copies only for Spring)

Fall 2009

Preterm (n=36)
Midterm (n=27)
Final (n=27)

Spring 2010

Midterm (n=18 hard copy, the rest on moodle)
Final (n=22 hard copy)

Artifacts

Fall 2009

Activities—

Posters (photos)=8; Transp.=0, Videos (digital)=4, presentations(digital)=19 Websites (urls)=3

Final Projects—

Photos=27, digital= Presentations (4); movies (1); audio (1); websites (2)

Website Evaluations (extra work) (11)
Role papers (40-some are revisions)
Feedback and grades (presentation, portfolio, final project, total grades)

Spring 2010

Activities—

Posters (photos)=5; Transp.=0, Videos (digital)=2, presentations(digital)=2

Websites (urls)=6

Final Projects—

Photos=11, record of one group meeting

Role papers (20)

Fall 2010

Websites (urls)=4
Reflection paper (1)

Online data

Fall 2009

FLE4 Blog record

PBWIKI page

Syllabus

Spring 2010

FLE4 Blog record

Moodle Page

Syllabus

Fall 2010

Was only able to view the course while it was in progress. It has subsequently been closed by the university and is no longer available.

Other

Notes from conferences (In filing cabinet)

ICET (Muscat, Dec 2009)

ELEX Forum (Dubai, Feb 2010)

MEPI (Muscat, March 2010)

Fulbright (Rabat, May 2010)

Photos from School visits

School 1, LRC (8 pictures)

School 1, computer lab (4)

School 2, LRC (3)

School 2, courtyard (1)

Ppts from lessons (lesson 1-11; lesson 1 spring; lrcs (2); death by PowerPoint links; cross-talk; Ahmed's original PowerPoint slides (11))

IRB data (informational letter, application, SQU clearance, Osman CV)

Original Syllabus (from Ali)

Ideas for Oman class (from comps)

Methods matrix (from prospectus)

Data remaining to collect (from April)

Changes made to first term course (from Jan)

Notes from meetings with Tom and Janette (one digital, the rest hardcopy)

Pictures of me teaching (5)

APPENDIX E. QUESTIONNAIRES (PRE-, MID- AND POST-TERM)

PRE-COURSE QUESTIONNAIRE

Date: _____

Age _____ Gender: ___Male __Female Year (circle one): 1/ 2/ 3/ 4/ Other

Major area of study _____

Beliefs about Knowledge
Please indicate your beliefs about the following statements by circling your response to each item. If you need additional room for comments, please use the back of the sheet.

NA=Not applicable 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5=Strongly agree

1. What is known in academics is complex rather than a set of simple facts.	N/A	1	2	3	4	5
2. Most questions in academics have only one right answer.	N/A	1	2	3	4	5
3. What is considered scientific truth is likely to change.	N/A	1	2	3	4	5
4. Academic knowledge is based on whether researchers consistently arrive at the same conclusions.	N/A	1	2	3	4	5
5. A person can just accept answers from the experts in a subject without question.	N/A	1	2	3	4	5
6. If people read something in an academic textbook, they can be confident it is true.	N/A	1	2	3	4	5

Culture

7. There are aspects of my culture that may limit my success in collaboratively working with other students.	N/A	1	2	3	4	5

Please explain:

8. The principles of educational technology fit well with my cultural beliefs.	N/A	1	2	3	4	5

Please explain:

9. I expect my cultural beliefs to conflict with course activities.	N/A	1	2	3	4	5

Please explain:

10. Cultural differences between me and the teacher may limit my success in this course. N/A 1 2 3 4 5

Please explain:

Preferences

11. I prefer working in groups. N/A 1 2 3 4 5

12. I feel uncomfortable making comments in class. N/A 1 2 3 4 5

13. I enjoy memorizing and taking tests. N/A 1 2 3 4 5

14. I enjoy discussing ideas with others, even when we don't agree. N/A 1 2 3 4 5

15. I can not tolerate ambiguity. N/A 1 2 3 4 5

16. I feel like I can make a contribution to the world. N/A 1 2 3 4 5

17. I enjoy working on "real-world" problems in class. N/A 1 2 3 4 5

Knowledge and skills

18. Please rate your technology skills for an online course on a scale ranging from 1 (novice) to 5 (expert). None 1 2 3 4 5 Expert

19. If you have previous experience with online or blended courses, what were the most positive aspects of that learning experience?

20. If you have previous experience with online or blended courses, what were the most challenging aspects of that learning experience?

21. Have you had any group work or projects in your courses at SQU? Yes or No

22. If you had group work or projects in your courses, what kinds of activities did you do?

23. Please rate your groupwork experience, from 1 (negative/unsuccessful) to 5 (positive/successful). Negative/unsuccessful Positive/successful

1 2 3 4 5

Habits and expectations

24. What is your motivation to take this course?

25. What are your expectations for this course?

26. Please rate your confidence in doing well in this course from 1 (very low) to 5 (very high). Very low Very high

1 2 3 4 5

27. What needs, concerns or considerations do you have that your instructor should be made aware of?

This information will be very useful. Thank you for your input!

MID-TERM QUESTIONNAIRE

Date: _____ Research Number:_____

Beliefs about Knowledge

Please indicate your beliefs about the following statements by circling your response to each item. If you need additional room for comments, please use the back of the sheet.

NA=Not applicable 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5=Strongly agree

1. What is known in academics is complex rather than a set of simple facts. N/A 1 2 3 4 5

2. Most questions in academics have only one right answer. N/A 1 2 3 4 5

3. What is considered scientific truth is likely to change. N/A 1 2 3 4 5

4. Academic knowledge is based on whether researchers consistently arrive at the same conclusions. N/A 1 2 3 4 5

5. A person can just accept answers from the experts in a subject without question. N/A 1 2 3 4 5

6. If people read something in an academic textbook, they can be confident it is true. N/A 1 2 3 4 5

Culture

7. There are aspects of my culture that may limit my success in collaboratively working with other students. N/A 1 2 3 4 5

Please explain:

8. The principles of educational technology fit well with my cultural beliefs. N/A 1 2 3 4 5

Please explain:

9. My cultural beliefs have conflicted with course activities. N/A 1 2 3 4 5

Please explain:

10. Cultural differences between me and the teacher may limit

my success in this course. N/A 1 2 3 4 5

Please explain:

Individual differences

11. I prefer working in groups. N/A 1 2 3 4 5

12. I feel uncomfortable making comments in class. N/A 1 2 3 4 5

13. I enjoy memorizing facts and taking tests. N/A 1 2 3 4 5

14. I enjoy discussing ideas with others, even when we don't agree. N/A 1 2 3 4 5

15. I can not tolerate ambiguity. N/A 1 2 3 4 5

16. I feel like I can make a contribution to the world. N/A 1 2 3 4 5

17. I enjoy working on "real-world" problems in class. N/A 1 2 3 4 5

Knowledge and skills

18. Please rate your technology skills for an online course on a scale ranging from 0 (none) to 5 (expert), None Expert 0 1 2 3 4 5

19. What have been the most positive aspects of this course so far?

20. What have been the most challenging aspects of this course so far?

21. Please rate your collaboration experiences in this course so far, ranging from 1 (negative/ unsuccessful) to 5 (positive/successful). Negative/unsuccessful Positive/successful 1 2 3 4 5

22. Please describe one thing you have learned from this course so far that stands out in your mind.

Habits and expectations

23. Has this course met your expectations so far?
If not, explain why not:

24. Please rate your confidence in doing well in this course, from

0 (very low) to 5 (very high). Very low Very high

1 2 3 4 5

25. What needs, concerns or considerations do you have that your instructor should be made aware of?

Course Design

NA=Not applicable 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5=Strongly agree

26. I have enjoyed the course assignments so far. N/A 1 2 3 4 5
Suggestions:

27. I can easily use the online tools. N/A 1 2 3 4 5
Suggestions:

28. I feel like the elements of the course tie together well. N/A 1 2 3 4 5
Suggestions:

29. I am comfortable with how the teacher presents information. N/A 1 2 3 4 5
Suggestions:

This information will be very useful. Thank you for your input!

FINAL QUESTIONNAIRE

Date: _____ Research Number:_____

Beliefs about Knowledge

Please indicate your beliefs about the following statements by circling your response to each item. If you need additional room for comments, please use the back of the sheet.

NA=Not applicable 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5=Strongly agree

1. What is known in academics is complex rather than a set of simple facts. N/A 1 2 3 4 5

2. Most questions in academics have only one right answer. N/A 1 2 3 4 5

3. What is considered scientific truth is likely to change. N/A 1 2 3 4 5

4. Academic knowledge is based on whether researchers consistently arrive at the same conclusions. N/A 1 2 3 4 5

5. A person can just accept answers from the experts in a subject without question. N/A 1 2 3 4 5

6. If people read something in an academic textbook, they can be confident it is true. N/A 1 2 3 4 5

Culture

7. There are aspects of my culture that may limit my success in collaboratively working with other students. N/A 1 2 3 4 5

Please explain:

8. The principles of educational technology fit well with my cultural beliefs. N/A 1 2 3 4 5

Please explain:

9. My cultural beliefs have conflicted with course activities. N/A 1 2 3 4 5

Please explain:

10. Cultural differences between me and the teacher limited

my success in this course. N/A 1 2 3 4 5

Please explain:

Individual differences

11. I prefer working in groups. N/A 1 2 3 4 5

12. I feel uncomfortable making comments in class. N/A 1 2 3 4 5

13. I enjoy memorizing facts and taking tests. N/A 1 2 3 4 5

14. I enjoy discussing ideas with others, even when we don't agree. N/A 1 2 3 4 5

15. I can not tolerate ambiguity. N/A 1 2 3 4 5

16. I feel like I can make a contribution to the world. N/A 1 2 3 4 5

17. I enjoy working on "real-world" problems in class. N/A 1 2 3 4 5

Knowledge and skills

18. Please rate your technology skills for an online course on a scale None Expert

ranging from 0 (none) to 5 (expert), 0 1 2 3 4 5

19. What have been the most positive aspects of this course?

20. What have been the most challenging aspects of this course?

21. Please rate your collaboration experiences in this course, ranging from 1 (negative/ unsuccessful) to 5 (positive/successful). Negative/unsuccessful Positive/successful

1 2 3 4 5

22. Please describe one thing you have learned from this course that stands out in your mind.

23. Please rate your confidence in utilizing technology in your class, ranging from

0 (None) to 5(very high) None Very High

1 2 3 4 5

Habits and expectations

24. Did this course met your expectations?
    If not, explain why not:

25. Please rate your confidence that you did well in this course, from
    0 (very low) to 5 (very high). Very low Very high
    1 2 3 4 5

Course Design

NA=Not applicable 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5=Strongly agree

26. I enjoyed the course assignments. N/A 1 2 3 4 5
    Suggestions:

27. I could easily use the online tools. N/A 1 2 3 4 5
    Suggestions:

28. I felt like the elements of the course tied together well. N/A 1 2 3 4 5
    Suggestions:

29. I am comfortable with how the teacher presented information. N/A 1 2 3 4 5
    Suggestions:

30. The tests in this course were accurate and fair. N/A 1 2 3 4 5
    Suggestions:

31. I built knowledge through collaborating with classmates. N/A 1 2 3 4 5
    Suggestions:

29. This course has prepared me for successful employment. N/A 1 2 3 4 5
    Suggestions:

This information will be very useful. Thank you for your input!

APPENDIX F. CASE STUDENT INTERVIEW PROTOCOLS (PRE, MID, AND FINAL)

Interview 1 Context/History

How did you get interested in instructional and teaching technology?

What do you plan on doing after you graduate?

Describe for me the typical classroom in the primary or secondary school you attended.

How do the teachers teach?

How do the students learn?

How was learning assessed?

Describe for me the typical classroom at Sultan Qaboos University.

How do the teachers teach?

How do the students learn?

How is learning assessed?

What is your experience with collaborative learning in primary and secondary school?

What did you liked about it the most and what did you like the least?

Why?

In general, do you prefer group learning or individual learning?

Why?

How comfortable are you with online technology?

What kinds of computer games have you played?

Describe your experiences with using the World Wide Web (WWW).

Do you use the internet to chat/text with friends?

What do you think you will learn in this class?

What are your fears about this class?

Interview 2- Educational philosophy and mid-term evaluation

Tell me about a previous group project

How did the computer tools help or hinder your collaboration?

How did the teacher support or hinder your collaboration?

Educational Philosophy
What do you enjoy most about learning in school?

What did you struggle with the most?

When there is a disagreement about competing theories, where do you turn for guidance?

How do feel your own personality or beliefs affect how you learn?

How do you think culture affects how you learn?

What changes have you seen in your beliefs about learning and teaching since you began college?

How do you think you will apply what you learned to future teaching and learning?

How do you think your classes have prepared you for "real-world" work?

Design
Please describe your first reactions to the instructional technology course.

How do you feel about the course now?

What is going well?

What is going poorly?

How do you feel about your collaboration experiences so far?

How well does your team work together?

How does your team make decisions?

How do you deal with conflicting ideas or disagreements?

What are your opinions about the online technology used in this course?

How is your group using the online tools?

What technical or administrative problems have you had?

How does your experience in this course compare with your earlier technology experiences?

How does it compare with computer games?

How does it compare with other blended or online courses?

How does it compare with your use of the World Wide Web?

What changes would you make in this course?

Interview 3- Review and Meaning-making

Collaborative knowledge Building

What does collaborative knowledge building mean to you?

How does that affect how you will design instruction in the future?

Have you had any experiences in this course where you feel you built knowledge collaboratively?

What happened?

How did the computer support knowledge building?
What elements were essential to collaborative knowledge building?

How did the instructor support knowledge building?
What elements were essential to collaborative knowledge building?

How has collaborative work influenced your learning about instructional design?

Based on your experience, what do you think the critical factors of a successful online learning environment for collaboration?

Course Design

What did you think about this instructional design course?

How did it meet expectation?

What do you wish was different?

What would you tell other students, not in the course, about this class?

What would you say to the teachers or administrators about this course?

What areas of education would be suitable for this teaching approach?

Should this type of course be used more widely within this school? Why or why not?

What other feedback can you provide concerning this course?

How do you think this course has prepared you for your employment?

Educational Philosophy

How did your beliefs about knowledge help or hinder you in this course?

How have your beliefs about knowledge changed during this course, if at all?

How has your teacher's belief about knowledge helped or hindered you in this course?

How did your own cultural beliefs help or hinder you in this course?

How has your teacher's culture affected how you learned?

How did your learning preferences and personality help or hinder you in this course?

What changes have you seen in your learning preferences?

Have you become more willing to discuss your ideas with others?

Explain how.

How has your teachers personality and teaching preferences helped or hindered your learning?

What have you learned in this course?

How did you learn this information?

What do you wish you had known before starting the course?

How has this course changed your expectations of future courses, if at all?

How have your beliefs or attitudes changed during this course?

Have these changes been positive or negative?

What kinds of resistance have you experienced during this change?

How have you managed these changes?

APPENDIX G. FOCUS GROUP INTERVIEW PROTOCOL

Student Focus Group

What have you thought of the course so far?

What have you learned?

What skills have you gained?

How has this course differed from what you expected?

How has this course affected your beliefs about teaching and learning?

What things would you do differently if you were the teacher?

What have you learned from collaborating with other students?

What was the most difficult?

What was the most enjoyable thing?

How did technology help you to be successful in collaborating?

APPENDIX H. EXPERT REVIEW LETTER AND FORM

Dear_____,

I am currently researching ways to introduce computer-supported collaborative learning (CSCL) environments into the classrooms of Sultan Qaboos University (SQU) in Muscat, Oman. I am looking specifically at one course (TECH 3008: Introduction to Educational Technology) which is specifically designed for pre-service English-language teachers who are in their 3rd to 5th year at the University. My colleagues here at SQU and I are undertaking an educational design research study that seeks greater understanding on how students and teachers react to innovative pedagogy, while also iteratively designing a course that is sustainable within the Omani context.

We are at the point of our study now where the course has been running for a whole semester, we have gathered data on its use, and we have begun to make refinements through its second iteration. At this point, I feel the course could benefit greatly from your expertise. The course would greatly benefit if you would please take a few minutes to review the course, and then access the review form at **http://www.surveymonkey.com/s/WJ7LF6V**.

Your insights into things we can improve will be greatly appreciated. You are welcome to make any recommendations about the course design, technological tools, assessment techniques, or any other considerations. When making your recommendations, please keep in mind that this type of course is new for many of the students in Oman, and things that may be taken for granted in other educational contexts are either developing or non-existent here.

If you choose to review the course, I hope you will take into consideration the following artifacts of the course

1) The course syllabus
2) The course website (Moodle). You can access the Moodle site at **http://moodle.squ.edu.om/course/view.php?id=3741** with **tmp001**as the username, and **Bulldog123** as the password. Then click "**Introduction to Educational Technology (Spring 2010)"** on the left side of the page.
3) The course blog (CSCL tool) utilizing FLE4 on a Wordpress blog. Each course discussion will lead you to the blog. Sign in using the same username and password as above.
4) Course assignments and assessment rubrics (found throughout the Moodle site)
5) Examples of student projects, available electronically at http://moodle.squ.edu.om/mod/resource/view.php?id=66524. You may need to paste in the URL after you are logged in to Moodle, in order to access it.

Thank you very much in advance for your time and sharing your expertise. Working together, I'm certain we can make improvements in education world-wide.

Sincerely,

David Porcaro,
PhD Candidate
Learning, Design, and Technology
University of Georgia (USA)
Visiting Researcher (Fulbright Fellow)
Instructional and Learning Technologies
Sultan Qaboos University (Oman)

EXPERT REVIEW CHECK LIST FOR CSCL ENVIRONMENT

REVIEWER: **DUE DATE**:

Please circle your rating and write comments on each aspect of the CSCL environment. 1 represents the lowest and most negative impression on the scale, 3 represents an adequate impression, and 5 represents the highest and most positive impression. Choose N/A if the item is not appropriate or not applicable to this course. Use additional paper for comments.

NA=Not applicable 1=Strongly disagree 2=Disagree 3=Neither agree/nor disagree 4=Agree 5=Strongly agree

AREA 1 - INSTRUCTIONAL DESIGN REVIEW

1. This CSCL environment provides learners with a clear knowledge of the program objectives.	N/A	1	2	3	4	5
2. The instructional interactions in this CSCL environment are appropriate for the objectives.	N/A	1	2	3	4	5
3. The instructional design of this CSCL environment is based on sound learning theory and principles.	N/A	1	2	3	4	5
4. The feedback in this CSCL environment is clear.	N/A	1	2	3	4	5
5. The pace of assignments is appropriate.	N/A	1	2	3	4	5
6. The difficulty level of assignments is appropriate.	N/A	1	2	3	4	5
7. The course design is harmonious, consistent and coherent.	N/A	1	2	3	4	5

AREA 2 – VIABILITY REVIEW

7. This CSCL environment has “real-world” relevancy.	N/A	1	2	3	4	5
8. This CSCL environment is contextually sustainable.	N/A	1	2	3	4	5
9. The CSCL environment is culturally appropriate.	N/A	1	2	3	4	5

AREA 3 - PROGRAM FUNCTIONALITY REVIEW

10. This CSCL environment operated flawlessly.	N/A	1	2	3	4	5

Please add any specific comments you wish to make about the CSCL or the overall course design below:

APPENDIX I. OBSERVATION DEBRIEF LOG

Collaborative knowledge building instructor log
This is a place for the teacher of TECH 3008 to share their observations on collaborative knowledge building

---

* Required

Today's Date *

What did the students do this week that demonstrated collaborative knowledge building? *

How did the students react to this week's collaborative or knowledge building activities? *

How did the technology tools help or hinder collaborative knowledge building? *

How did you as the instructor help or hinder collaborative knowledge building? *

APPENDIX J. FACULTY INTERVIEW PROTOCOL

Faculty interview (45-60 min)

What skills do you feel students in Oman need to learn while at SQU?

How important do you feel collaboration is to these skills?

How do you use collaboration in your classes?

What has been your most successful project that involved student collaboration?

What do you see as the greatest barriers to collaboration?

What technology did you use to support collaboration?

How did the technology help or hinder collaboration?

To what extent is it important for students to know how to build or construct their own knowledge versus accepting knowledge provided by other sources such as the teacher or a textbook? Why?

To what extent do you think students need to move beyond memorizing facts toward building their own knowledge?

How do university policies help or hinder collaborative knowledge building here at SQU?

How does the institutional culture here at SQU help or hinder collaborative knowledge building?

How does the more general Omani culture help or hinder collaborative knowledge building here at SQU?

(After explaining the structure of the course) What do you think about this course structure?

To what extent should more courses be designed like this one at SQU? Why or why not?

What do you think would be the most difficult about implementing a course like this?

What do you think would be the most beneficial thing about using a course structure like this to enhance collaborative knowledge building?

APPENDIX K. SUPPORT STAFF INTERVIEW

Support staff—technicians from ILT department

Explain the course.

What are the biggest technical barriers to success in this course?

What additional resources would SQU need to be successful?

How does SQU policy help or hinder this course?

Do you think other courses could be designed like this?

What would you change about the way this course is taught?

What could faculty or staff do differently?

What would you do differently?

APPENDIX L. LIST OF CODES USED

National	National	National level policies, laws, and resources (such as available from the Ministry of Education) that affect how students collaborate or apply CSCL in public schools after graduation.
Institutional	Institutional Policy	Policies at SQU that affect the use of CSCL, such as policies toward assessment, etc.
	Institutional Resources	Resources available at SQU for CSCL, such as computer resources, support staff, etc.
	Institutional Culture	The culture of SQU professors towards collaboration, technology use, and innovative pedagogies, etc.
Personal	Culture	Cultural elements (that may distinguish Oman from other non-Arab nations) that affect students' adoption of CSCL
	Epistemology	Demonstrations of student or faculty epistemology, such as source of knowledge, role of authorities, etc.
	Habits and Expectations	Elements that may show academic habits of expectations developed from past schooling, such as expectations for multiple choice tests, sitting quietly in class, etc.
	Individual Differences	Individual preferences that may affect collaboration, such as dislike of online discussion, preference for arguing a point, etc.
	Knowledge and Skills	Knowledge or skills brought to the class, or learned in the course, which affect the students' ability to collaborate. This includes skills in writing papers, working in groups, etc. or knowledge of learning theories, etc.
	Technology Use	As part of knowledge and skills, students' knowledge and skills in computer and Internet use.
Reaction	Conflict, Adaptation	Episodes where students or teacher adapted to innovation when there was conflict. Coded with one of the previous codes, such as Conflict, adaptation and epistemology.
	Conflict, Reject	Episodes where students or teacher rejected innovation when there was conflict. Coded with one of the previous codes, such as Conflict, reject and institutional culture.
	Congruence, Celebrate	Episodes where students or teacher celebrated the congruence of an element of innovation. Coded with one of the previous codes, such as Congruence, celebrate and habits and expectations.
	Congruence, Ignore	Episodes where students or teacher ignored the congruence of an element of innovation. Coded with one of the previous codes, such as Conflict, ignore and individual differences.

Methods	Methods	Issues related to research methods and research processes
Legitimacy	Course Design	Issues related to the design on the course, such as assignments or assessments, and their relationship to underlying CSCL theory
	Group Relationships	As a sub-issue of course design , issues related to group relationships, such as size of the group, leadership within the group, etc.
	Scaffolding	As a sub-issue of course design, elements of the course in which the teacher scaffolded the student collaboration
	Scientific Insights	Elements of the course design that relate to a clearer understanding of FCL or CSCL principles
Efficacy	Student Knowledge Building	Episodes where students exhibited collaborative knowledge building.
	Appeal to students	Elements that exhibited the interest or disinterest of students in the course design
Viability	Practical	Elements that showed that the course could practically be applied at SQU
	Technical	How the technical elements at SQU supported the practical application of the course at SQU, such as working computer labs, etc.
	Relevant	How the course related to the student's lives, other courses at the university, or post-graduation career
	Sustainable	Support or hindrances to the sustainability of the course over time, such as technical or institutional capacity, etc.
	Teacher Commitment	How the amount of commitment on the part of the teacher may be replicated by other teachers, leading to the sustainability of the course, such as teacher maintenance of course technology, etc.

APPENDIX M. EXAMPLES OF CODE MEMOS

Because of the large amount of data in this study, I focused my reporting on only the theme of Culture in chapter 5. This also included reviewing the episodes that were coded both "culture" and one of the four reactions (e.g., conflict, adaptation). In chapter 6, the results were compiled from the results of the themes and subthemes associated with "legitimacy," "efficacy," and "viability." The theme "methods" helped to shape the study as it was refined between iterations. This has left 8 themes (nation, institutional policy, institutional resources, institutional culture, epistemology, habits and expectations, individual differences, and knowledge and skills) not fully reported in this dissertation. Each one could be the subject of a manuscript in its own right. While the analysis of these themes shaped my thinking in the written work that makes up this dissertation, they did not receive in-depth treatment. Therefore, I have included two memos as samples to show the type of work done on them. The first (habits and expectations) represents a rough memo, where coded quotes were organized into subthemes inductively from the data. An example quote from each theme is listed here for space considerations. The second memo (institutional culture) is an advanced memo, which extends the work of the rough memo into a narrative form that could be the basis of a findings section of a future manuscript. It was in this manner that chapter 5 was created.

Habits and Expectations (Rough Memo)

Workload expectations

> Expert Review: The volume of readings and assignments. Again, this comment is based on my familiarity with Oman, SQU, and the undergraduates there. Students have not historically been required to do a lot of work outside of class, especially intellectually challenging work. The level of assignments may have been too great for the culture of the students.

> **"easy class"**

> > Faculty interview: "that was so hard", he says, "teacher, this class is supposed to be an easy class." ([laughs)]. He says, "all the students say this is the easy class." (no,[laughing]) And I said, "ohh".

Students make tech staff do parts of assignment for them

Technical support interview: Often students are not prepared when they come to the technical support for help (things like printing off transparencies, and making posters). They are often told to just go to the technical support, and they will do it for you (things like taking a picture, and breaking it up into a multi-layer transparency).

Expectations of how to behave in class

Amin: Actually, when I entered the class I sit, actually I chose places in front of the class mostly. And it depends on the teacher, actually. If the teacher is very strict, you don't actually even talk, or move your head (um) to other direction, you just pay attention. And react with him in a way that, that makes him not actually made at you. But if the teacher is not that strict the teacher is dealing with you as…not only a student, as…there are teachers who deal with us, who are dealing with us as their sons. Yeah. Those teachers will respect them very much, and we'll try our best to actually pay attention to them and to our exercises. So it depends on the teacher actually. The way were react in the class depends on the teacher themselves.

Teacher dismiss students

Observation blog: They were very quiet, and when I suggested that they could stay and work on the assignment or leave if they had it done, those that were finished appeared reluctant to leave. Perhaps they were waiting for a formal dismissal when all could leave.

Preparation for class

Focus group 1: I witness that most students come to classroom, they don't, I mean, they didn't prepare, I mean by, I mean just you come and you have your little bit laptop and you just teach me kind of presentation why a student does not know and students start to ask, which chapter is this teacher? You witness that kind of thing. And if you can little bit manage to do it I mean second time via a Moodle, I think it will be a great idea. It will be a great idea.

Work through book

Focus Group 6: Some students who took this course before, they took it with a doctor. And they said we have nothing to do to work, just go through this book. Maybe they have one project. And they say it was boring.

Experiences with computers in class

Fatima: Uh, I mean that, for example, they use the overhead projector, they use it only to write the materials that is in the book. The same material. And put it in the transparency and present it in the class. I don't think this is the way to use. Maybe they can use diagrams rather than written work. (mmm) they can eh….they can summarize what is in, in the book and put it there in the transparency. But they use the whole material most of the time in the transparency, and present it-read it (mmm). It's the same. We can open our books in the class and read it (um huh). That's it. We don't have to look at the, they, um…they provide us with the atmosphere of sleeping ([laughs]), they switch the lights off--

Experience with constructionism

Fatima: For example, the project we did in this course were enjoyable because we were not familiar with this kind of project (um huh). most of the time in all our courses, the projects we did were written (uh huh). And even at school.

Students give presentations

Amin: No, no, no, no. After one year, actually, it became normal for us. Like now, and actually, presentations, if you do a lot of presentations, you'll find it something normal, actually you can come in front of the class and talk, whatever you want, and you have the skill after studying reading, speaking, and writing. And you will have the skills to express your ideas, actually. So, it's not that, it's not a problem right now.
David: What do you think has changed?
Amin: Actually, I think it's the experience, because you do a lot of work, presentations, and discussions, and that has the effect, yeah.

Work with experts

FLE4: And when it comes to "experts", we need to be more serious and realistic. Are the Omani people willing to hold a discussion with school students leaving his job to be done at some later time? (This question by no means is criticizing any citizen, but it just shows the reality).

Exposure to schools outside Oman

Lailah: I attended five classes in Queensland's Academy (uh huh) School. This school is for the Genius students (uh huh) who are very smart (uh huh) and they, the-I attend for example, I attend mathematics class (mm huh), they only use their laptops, they didn't use any paper (uh huh), any pen. And also-even the books, they didn't use any books (mmm). All the content and the assignments are in their laptops (um huh), and they had also the Smart screen (um huh) to write their formulas and explanations from the large screen that the teacher use (um huh)

Teacher

Teachers are boring

Fatima: Because, as you know, here in Oman, teachers almost give up easily. So, that's because the career is boring. Why it's boring, because teachers are boring themselves.

Teacher talk

Amin: But in our times, in the past, we just come and actually most of the classes are from the teacher, I mean, the teacher will explain and will give you the lesson, and you will, at the end of the class he'll ask you for the homework. That routine, actually (um huh) was there, actually. And as a students we have just to listen to the teachers. Sometimes we discuss and most of the times we just received the information (mmm). And it's not really good that we have to listen and not to work, but it seems like a kind of-you feel for example, comfortable (uh huh),

IRE

Fatima: For example, at school, it's controlled most of the time. We have the lesson, and we are ready before, so go there and the teacher asked questions, then we answered. The same material, all the students. But here, the material is different. Even if we have a textbook or papers, or anything, we can go far from the area we are focusing on (uh huh). So we can extend our knowledge in our discussion in the area we are discussing.

Use of powerpoints

Focus Group 1: He speak about you, I mean, how, I mean little bit, how interesting your way of teaching this kind of subject. And I expect some course of PowerPoint slides, as usual. We have this kind of stereotypes in our minds. Teachers come to the classroom, they I mean make the slides and these kind of thing, and there's no kind of innovations

Give copies of slides to students

From Fall 2010 course Wiki: yes, the visual principles presentation is not there. We Need It PLEASE.

Role of teacher giving students information is changing due to Internet

Lailah: Maybe the technology (mm), change everything, and student can get the information from the internet, and the importance of teachers nowadays is decreased because of technology

Meeting after class with teacher

Faculty member: In [country of origin], we give student more chance to learn. We provide the very little, very minimum guidance (um). And students spend much time at the library. (mmm). You know. Seeking information by themselves. (mmm). The amount of information given to them inside the classroom, is very minimum and general. Minimum and general. And in order to get those information, they should go to the library, in order to widen and widen their understanding and get more elaboration on the topics being taught inside the classroom. So our students they work much better than students here. University students here, they need everything, just like spoon feeding. They need the PowerPoint presentations, they need you to do everything for them. And they need exams, which is not difficult. And we do not have this much, we have very tough exams in our country, and our students, believe me, no student comes to your office as a professor, inside the classroom, and the library. Two places. Classroom and library. No complaints about degree about grades. You know, marks. Complaining, I have a B+, I don't like it, and I want you to revise my [laughs], my answer, my answer sheet. We do not have such behavior at our faculty. And students in our country, we stop them at this line, do not cross this line.

Group work

Group work in schools

Fatima: At school? Um….group work when I was at school, I was in the general education, not the basic one (mmm). As group work was not that much, at school, eh….most of the work was done individually, but sometimes the teacher tries to engage the students in group work (mm) at class. Sometimes when we have big projects, maybe they distribute us into groups. But now basic education depends on group work (mmm).

Group projects in other SQU classes

Interview with Lailah: D: and how many people were in the group?
L: Four.
D: Four? (yeah). And would you meet mostly in class, or outside of class.
L: No, outside of class, we gathered at the campus, and do things together (mm), and we also divided the questionnaires for all of us, and get and then gathered them and, and get analyze the data to get the final data collections.

Cooperative learning

Lailah: First, we divide the works (um huh). Some…we told each other to write instructional objectives and then gather them together and select the best ones (um huh), and for the test, we gather all sort of, to make the test, and divide the parts of the test,

Negative experiences with group work

Lailah: But I don't like the-the thing that I don't like (mm) about collaborative learning is they depend on each other (mm) and they, they didn't do their works on time. They

delayed after the last moment (mmm). Until the last moment.

Individual Study

Fatima: Since we go to class unprepared, when we come to tests, it becomes more difficult than the way of schools. Because the material is heavy so we have to study the textbook. Not what-we depend on what we discuss at class, but most of the time we depend on the book. So, as I said, it's more of self-study, because most of the time, some students don't pay attention at class, so they don't even know what the teacher is talking about at class. So just they depend on the book, what's said there, for the tests. And the tests most of the time comes from the book, not from what is said in the class.

Discussion

Class discussion (in schools)

Fatima: The class when I was at school? (uh huh). They class had 35 students. Maybe the teacher distributes most of the time, distributes the class into five or six rooms. So from 6-7 students in each group. The most work we do at groups-we did at groups when I was at school, is discussion. The teacher gives us, gave us a topic, related to the subject we are taking, and asked us to discuss the topic together. Then we will share our opinions in each group, and present it in front of the class. Sometimes we-sometimes for the projects, when I told you about the projects, maybe the group of three students only. We have to distribute the work ourselves.

Class discussion (SQU)

Interview with faculty: And I found some of them, yaani, very interactive. But really, very few (mmm). *Very* few. Yeah, In thirty students, you'll find two or one (mmm). The student who is ready, you know, to think and to…cooperate with you (um huh). Most of them, I find them sitting…you know, without thinking or interacting with you. And I ask them randomly, sometimes I ask them randomly…randomly. For example, mentioning them by name. "Mohamed, could you tell me…." "Abdullah, could you tell me…" "Zouainah, could you tell me", "Muazer, could you tell me…" something like that. Yeah. So as to making them with m, not the, outside the classroom. This is what I use to teach them, in order to think, not to get my ideas only.

Online discussion

Response to Questionnaire: Because we are not accustomed to work on online courses, we sometimes tend to ignore it.

Assessment

Students learn to pass exam

Fatima: Let's see. Here at S-not at SQU, at university, I think students learn not for the sake of learning, most of the time. Just for to pass the exam. So I think if you ask one student about something that he or she learned last semester (um huh), they don't even remember. Some courses depend on each other, but when we come to the, for example, we have taken one course. When we come to the second course, we don't remember what is taken in the course. Because we don't learn for the sake of learning. And it happens a lot here, because it's, what's this called, when it depends on each other?

Assessment types

Amin: Mostly on exams. (um huh). Yeah, we had a ….we have two exams actually for each course (hmmm). Most of the course have the exam, the middle exams (um huh) and the last exams at the end of the year, final exams. So that we were assessed by exams, not by our performance in the classrooms (hmmm) something like that. But now it's

changed. Yeah. Now they assess depends on exams for performance in the class, how you, the treatment with the teacher and other things, your projects, your homework. Now it has changed.

Memorization

Fatima: Since I started my studies here at SQU, all the courses are theoretical, even, um, from the language center to the college of arts and here in the college of education, they depend all the time on memorization

Expected this class to be "theory"

Focus Group 2: I expected that only we go through the books without practical work. So when we started this course, actually, I wonder, I wonder this course has a lot of things to do. And I was eager, till now I have been eager to make a lot of things to create. To be creative person in this world, by creating a lot of things, poster, and movie. Actually, I am audio/video. I like to create audio video [laughs].

Want changes in habits

Fatima: so if I become a teacher I will try to be one of the distinguished teacher, I don't want to be any…as other teachers, because I don't like their way of teaching (mmm). I was a student at school 12 years, but I didn't think that I got that benefit from teachers because their way was very traditional (mmmm) so I have to improve it.

Experienced change in their own expectations

Lailah: Yes. There is [laughs]. My learning depends on the way that I am used to learn (um). For example, at school, the way was different than here, we depend on the teacher, so most of the time, I depend on preparation before class, (um huh), I prepare for the class, and the teacher explanation, then I can do well in my studies (um huh), but here, I used to that way at school, but when I came to the university, I was shocked by the way that here at the university most of the time it depends on self-study (um huh). So here, at the beginning I found it difficult to change my way of learning, but then when I am used to this kind of learning, so it's familiar to me know, since I'm in my fifth year (um huh), but so I can manage the things I'm doing. But I think it's affecting me in my teaching practice now when I present the material to my students, I use the way of university, not (umm) the way of schools. So, when I'm used to one way of learning, I depend on it most. Most of the time.

Institutional Culture (Advanced Memo)

The institutional culture at SQU provides several examples of possible opportunities for CSCL integration, as well as potential barriers. When I talked with students and faculty, I got the sense that students were participating in group work in other classes at SQU, but that this usually involved cooperative dividing up of work. For instance, in other classes, students made group presentations, conducted and reported on surveys, and even co-wrote essays. One student complained that, "some teachers, even if the thing you work on is easy, they will chose group [work]." One student noted that this often simply meant dividing the content, and combining it for the presentation. Partly this was because, as he noted, "we were guided, not actually by our performance in this class, but we [were] evaluated at the end by the information we found about that topic." In other instances, the student group work approached collaborative knowledge building. One professor I interviewed noted that he often gives small group projects and discussions in class. He said, "Two or three times in the semester I divide the classroom into small groups and assign for each group an activity and ask them to deal with that activity and to solve it, and discuss it within the group and between the groups." Another professor gave weekly group writing assignments where they had to synthesize the

course readings and in class discussions to jointly produce group wiki pages on the topics. He said, "I gave them a lot of tasks, where they work together. My ultimate goal is there must be an outcome they should achieve at the end of that task, or project or whatever. And I think that would be the culmination of the cooperation."

But not all instructors had positive experiences with cooperative or collaborative learning methods. One professor said that often the instructors intend to use collaborative learning in their course, but "students come with too many claim that others don't cooperate with them, so teachers themselves feel that they're wasting a lot of time, just receiving claims and negative feedback from students that they work alone." He further noted that, "even as a course instructor, I found that it's very difficult to push students to work in groups and to benefit from their experience even in the class and to help each other and such a project to enhance their experience and their skills. So, even the concept of teamwork is not well-established here and students need to learn more and more about this topic."

Much more commonly, however, the faculty and students interview expressed that they experienced a culture of instructivism at SQU. One professor estimated that the number of professors at SQU practicing collaborative learning methods, "from my experience with my colleagues, it's not more than, maybe 25, 30%. Instructors have a lot of information and knowledge they think that they need to deliver to their students, they have a big curriculum, they have a lot of duties, they have work load, so maybe that's some barriers or problems, they face." He continued, "And it depends on, of course, the instructors background and experience and type of education he or she received." One student further noted that, "since I started my studies here at SQU, all the courses are theoretical, even, um, from the language center to the college of arts and here in the college of education, they depend all the time on memorization"

While one professor suggested that faculty outside the college of education engage more in instructivist methods because they have not been formally trained in various teaching methods, others claim that the college of education has some of the most frequent use of instructivist methods. One student told me that the college of education has a reputation among students at SQU for being boring. Another student, in describing the difference between the college of arts and the college of education said that in the college of education the grades often solely depend on a midterm and a final. One faculty member suggested that this creates a negative cycle of poor teaching and learning between the college of education and the schools. "We at the colleges of education educate--train teachers to do more rote learning, on verbatim. When they go there to educate the students, they bring them in the way they were trained. And then these students will come to us, so we will either be forced to go with their own study habits, so they again will become teachers who are not good [at]... educat[ing] students to become critical thinkers and self-motivated [learners]. So it's like a circle which needs to be broken somewhere." The idea of lecturing seems to be so deeply embedded in the institutional culture that I frequently heard use of the term "lecturer," rather than teacher, instructor, or professor. Another professor expressed frustration at an attempt to engage faculty in the college in a learning-centered initiative and found many who said they were not interested. As he said, "Now, it's open to discussion. Is it because they don't want to cooperate with others, or is it extra work, or is it they don't favor learner-centeredness and they think teacher-led is easier? Take your pick." Another faculty member suggested that the there is a culture also within the research teams and administrative committees of individual work that may lead to unwillingness to adopt collaborative methods in the classroom.

Furthermore, there are varying degrees of technology use by faculty with in the institution, which has an effect of CSCL adoption. One student noted that compared with pre-university schooling, "We use a lot of technology, like overhead projectors, and PowerPoints. We have to check our emails every day because the teachers send us handouts and assignments to do." But this often times just amplifies the instructivism. For example, as one student noted, "Most of the time they use technology here. But I don't think in a very effective way, because they also use lecturing. They don't engage students. At school we were participating. But here, only sitting in our chairs and listen[ing] to the teacher." She further added that, "I mean that, for example, they use the overhead projector. They use it only to write the materials that are in the book. The same material. And put it in the transparency and present it in the class. I don't think this is the way to use it. Maybe they can use diagrams rather than written work. They can can summarize what is in the book and put it there in the transparency. But they use the whole material most of the time in the transparency, and present it--read it. It's the same. We can open our books in the class and read it." One faculty member agreed, saying, "They taught the students as they were taught. Without any innovation in teaching, even that some of them are just, until now are using the pen and board, even the PowerPoint presentation, they do not use it. If they do not use technology, or, let us say, new approaches, not technology--teaching

approaches, if they do not use that, how can they lead their student to be, for example, collaborative students, or cooperative students?"

One of the issues affecting institutional culture is the diverse makeup of the faculty. Because the faculty is made up of a large percentage of expats, this provides a variety in training and culture. For instance, in the Department of Instructional and Learning Technologies, the full-time faculty was made up of 2 Omanis, 2 Sudanese, and 2 Egyptians, in addition to several adjunct faculty from, among other places, the United States, Iran, Egypt and Oman. This also creates a culture of minimal disturbance by the faculty. Several faculty suggested (Omani and expat alike) that, as one professor said, "they don't want to, in fact upset the students. So they go with the same way that they see them. They don't want to force them to be really good critical thinkers, and self-motivated people." In other words, many try to please the students in order to keep their job in Oman.

However, this does not mean the institution is content on maintaining a culture of instructivism. In fact, many opportunities for professional development and college level discussions of teaching innovation exist. One faculty member noted, "In terms of professional development, a lot of seminars, workshops, talks encouraging this kind of cooperation, even periodical program evaluations, whether done by external examiners or from within the quality assurance office inside the university. They encourage [collaboration] and they even ask us for evidence to tell us how we deal with our students, what's your role, what are the students' roles in the class, the facilities, everything is available in the class. And, but it's once again, it's up to the instructor." College-based initiatives, such as the Child-centered Curriculum Methods course done in conjunction with Seward, Inc. and Creative Associates show the institution's commitment to improving the culture of collaboration in the classroom. However, as one faculty noted, "it's like a wave. Ok, and you cannot defy. The challenge is I think the educational system failed to respond to it. With all kinds of modifications, reforms...there are some, maybe, efforts, which are by persons, by individuals, so it's not like a group or a collective kind of effort." However, some noted that changes in institutional culture can have a positive effect on the students. For instance, one professor noted that in English Language department, their institutional culture has produced students of a different caliber than others who come through the College of Education. As he said, "They are doing a good job in changing the student attitudes. Even you will find their presentation skills are better, you will find that their way of thinking is clearer and more critical." He added, "now this maybe, goes with your theory that the rote learning kind of attitude or approach they come with from the school--it can be changed. But by having the right qualified staff who can do the trick." As another faculty observed, if the students experienced more collaborative methods in their classes in the college of education, then it, "would encourage them [the future teachers] to a great extent to use it in their schools." For this reason, one of the senior faculty I interviewed confided that he is trying very hard to get the culture of his department to that point.