

Reviewing the literature of computer-supported collaborative learning (CSCL) to determine its usefulness in Omani education development.

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ABSTRACT

As a way to develop twenty-first century skills and link education with work, researchers and international agencies have promoted collaborative problem solving for knowledge building. However, there has been little guidance about how students, teachers, and institutions from traditionally instructivist cultures—where lecture, memorization and high stakes assessment are the norm—will react to these innovations. This review is focused on how CSCL and knowledge-building pedagogies 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 educational design research study to introduce CSCL into a pre-service education technology course at Sultan Qaboos University (SQU) in Muscat, Oman, of which this literature review plays a part.

Keywords: Culture; Knowledge building; Knowledge societies; Developing Countries; Oman, Computer-supported Collaborative Learning (CSCL)

INTRODUCTION

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.

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). Furthermore, changes in instructional culture require significant shifts in thinking about how education should be undertaken and managed, and includes massive institutional reorganization, change in social relations between students, teachers, and administrators, and significant cultural change on the part of all stakeholders (Porcaro & A. S. Al-Musawi 2011).

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 paper represents a review of the relevant literature focused on the adoption of CSCL in Arab, and specifically Omani contexts.

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 et al. 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 (A. 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 & A. 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 et al. 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 Oman’s reforms, and available infrastructure, support, and policy 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.

CSCL’s Theoretical Roots

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’être* 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 (or “divide and conquer” 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).

CSCL as an Educational Theory in Its Own Right

A theory of CSCL is communally being constructed by researchers and practitioners, 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 McInerney (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 et al. 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 et al. 2004).

Technology’s Role in CSCL

Furthermore, as both a learning resource and an artifact of mediation (Van Drie et al. 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 et al. 1999) and is based on the ideas of CSILE or Knowledge Forum (Scardamalia & Bereiter 1993; Scardamalia & Bereiter 1996).

FLE is now in its fourth version (or FLE4, <http://fle4.uiah.fi/>) and is currently an open-source plugin 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.

While CSCL has developed over the foundations of other social learning theories, it has come of its own in recent years. Better understanding of the role of technology in mediating social learning interactions has helped educators to see the potential of CSCL in creating more work-force ready skills in students. As with every other educational theory, the trick is how it is applied in practical settings that shows its true value in improving educational cultures in areas like Oman.

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 et al. 2002) and among Diaspora communities (Bekerman & Horenczyk 2002). Recently it was used to improve cross-cultural understanding of Latin American learners in Japan (Isotani et al. 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 et al. 2010; Hung et al. 2008; S. C. Tan et al. 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.

CSCL in the Arab Middle East

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 (2006) 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; A. Al-Musawi 2007; Bentley et al. 2010; Cobb 1999; S. Naqvi 2006; S. J. Naqvi 2008; Osman 2005; Smego et al. 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. Efforts are underway to introduce more collaborative knowledge building practices in Oman, which will begin to reshape the learning culture for teachers and students (Porcaro and al-Musawi, 2011).

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 be creating tangible benefits to the local learning context, including sustainable 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.

Practical Applications

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. But I overview them here to show one possible way CSCL could be sustainably applied in an Omani context. To see more clearly how these ideas can be applied in practical settings, refer to Porcaro and al-Musawi (2011).

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. Other CSCL projects that build on these theoretical principles will doubtless add fuel to

the fire of educational change in the Arab Middle East, and begin to create more collaborative, relevant, and practical learning experiences

ACKNOWLEDGEMENTS

This research was possible thanks to a Fulbright Fellowship for 2009-2010. Furthermore, this study owes heavily to the faculty, staff and students at Sultan Qaboos University who allowed me to see education through another culture's lens. An earlier version of this study was presented as Porcaro, D. Feb. 2010. "Computer-Supported Collaborative Learning (CSCL) in an Omani Undergraduate Course: A Design-Based Study". Paper presented at the *E-learning Excellence in the Middle East Forum*, Dubai, United Arab Emirates. It has since undergone significant revision.

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