

Quality practice in computer supported collaborative learning

Identifying research gaps and opportunities

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Abstract: This paper is written to provide a framework of discussion for the stream with a view to identifying research gaps and research opportunities in the field of computer supported collaborative learning in education and training. The paper identifies a number of themes and provides a brief scan of some of the literature in the field.

Key words: computer supported collaborative learning, collaborative learning, computer mediated communication, e-learning, computer conferencing.

1. INTRODUCTION

Quality education relies, at least in part, on quality research that is based in theory and that informs practice. Quality education at a distance, delivered online, is no different in that need. Though our field is much more recent, researchers are just beginning to identify criteria for measuring quality in online practice. This paper maps the research into online teaching and learning and describes gaps in the field and opportunities for research that will monitor and define quality online teaching and learning.

In describing teaching and learning online we will use the term computer supported collaborative learning (CSCL). The field is recent and popular enough to be developing an everchanging nomenclature from computer mediated communication (CMC) to e-learning to computer supported collaborative learning. As each of these terms has its own defined boundaries we use computer supported collaborative learning to describe the process of learning and its supportive teaching strategies with attributes of a learning space for classes or small instructional groups mediated by

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computer supported communication. The studies identified in this paper focus on the process of groups of interacting learners.

Research in online distance learning has been pursued in academia with vigour, resulting in a quantity of research material available to inform good practice. Compared to classroom teaching, though, we are in a very early stage. Associated with that infancy, we are also in a field that changes and moves rapidly particularly with developments in technology in an era characterised also by rapid change. We are also in a time where existing educational structures are being questioned, when our educational institutions are being expected to increase productivity and to cater for new groups of learners. Those same educational institutions are being challenged by a marketisation of education that has seen new forms of education and training providers develop to directly challenge more established institutions, or to provide for markets not otherwise catered for. Consequently research needs change.

In this paper we are suggesting that the increasing engagement in computer mediated group learning across different education and training applications, and the increasing willingness of learners and instructors to use this medium, brings an opportunity to identify and develop several themes for research. In short, there is a growing diversity of applications, of users and contexts of use, and this diversity brings a commensurate need for strongly diversified research focuses. While there has been a major focus on research in higher education, (Bernard and Lundgren-Cayrol 2001; McFadzean and McKenzie 2001) there has also been work in the schools sector (Watson & Andersen, 2002; McNamara & Stacey, 2002).

This paper is not an attempt at a comprehensive literature review. What we have done is to scan the literature to undertake a meta-analysis of the typical areas of research focus in the field, and to use that meta-analysis to identify some research focuses, research gaps, and research opportunities. The *Quality Education @ a Distance* Conference has provided a platform for discussion and development of this topic. In our view, a gathering of people involved in researching quality education at a distance is an opportunity to discuss issues for research, and to identify the major issues that confront researchers in the field.

In this paper we have identified a number of focuses we observe to be important and fruitful fields for further research in CMC in education and training, and these helped to structure discussion within the stream, with an ultimate objective of identifying a further array of research questions fruitful to pursue, and currently in need of further research.

2. WILLINGNESS TO ENGAGE IN CSCL

One identifiable research focus has been on strategies to increase comfort and usage. Harasim, Hiltz, Teles & Turoff (1995) and Mason (1994) were early researchers in the field who defined the necessary strategies and requirements for effective online learning and teaching. Salmon (2000) has more recently developed a staged model that has been influential in training and online professional development. Other researchers have taken more specific elements of CMC engagement for example, Garrison, Anderson & Walter's (2000) Community of Inquiry research investigated a model of cognitive, social and teaching presence as key attributes in analysing online interaction and learning. There is also Stacey's (2002) work analysing collaborative learning online and particularly the importance of the establishment of social presence; and the role of learning contracts in developing community building (Murphy, Mahoney & Harvell, 2000).

Though articles about online practice abound, only gradually are quality professional development models being developed and researched. A recent paper by Johnston et al (2003) reports research and experience at a US university in the development of student and faculty participation in online courses. The authors identify the need for online learning skills among students, and an institutional willingness to invest in staff and student skill development as being important initiatives in overcoming obstacles to use.

Nevertheless, our view in this paper is that there are considerable research opportunities in the area of professional development for teachers and trainers; and for skill development among learners. We also suggest that the majority of research reported so far in the literature is based on quite small numbers of students, typically around fifteen to thirty in computer mediated learning groups. There have been fewer studies based on large numbers of students being managed in CSCL environments. This issue of larger groups has a clear impact on willingness of students and staff to engage. For instructors there are issues here of time management, of the stress of relentless online engagement on a 24 hours a day 7 days a week basis, and issues of occupational health and safety. There are also industrial issues of workload that provide useful areas for research. As large computer mediated learning groups become more common one of the major issues we will face is maintaining the same quality of interaction that is possible with the small online class.

What we are suggesting here is that, while there has been much useful research reported on the development of willingness to become involved with CSCL among students, there is also emerging a set of research issues

that result from the success of strategies designed to increase that willingness.

3. COMMUNITIES OF LEARNING AND PRACTICE

Within institutional settings, most particularly higher education institutions, there has been a great deal of research focussing on communities of learning. In a context of distance education, CSCL has provided the capacity to develop a community of learning among groups of learners who are geographically distributed, and who would not otherwise have opportunity for the collaborative experience that is afforded online. Most typically, that research has focussed on students who are enrolled in the same unit of study.

Postgraduate students in particular have been captive groups for research and have been found to respond positively to this type of learning especially as learning online provides them with flexibility of access to a community of learning without their having to travel from their workplaces or homes. The advantages and disadvantage of CSCL are documented extensively including the sharing of the diverse perspectives of the group members and their clarification of ideas via group communication through the feedback provided by other group members and through the sharing of resources (Stacey, 1999). Through the process of seeking group solutions for problems, CSCL provides the possibility of mutual support among students. Undergraduate students are more frequently researched using CSCL as a complementary component of their learning with face to face classes still a necessary component.

The development of such communities is explored mainly through researching teaching strategies in online environments and the notion of community of learning and practice is not well defined or researched particularly from the student perspective. Bernard et al (2000) in summarising collaborative online learning developments identify the need for the learner to feel part of a learning community and where social interaction fosters community spirit, and suggest that the effectiveness of such learning has yet to be demonstrated. This model of online collaborative learning has been used as a means of measuring quality through online course evaluation and through judging quality in terms of consumer satisfaction (Trindade et al, 2000). A framework of criteria for measuring best practice for quality online programs (Inglis, Ling & Joosten, 2002) provides indicators for supporting learners needs that attempt to answer the research identified disadvantages of access problems, skills training and learner support

The current authors have to agree with the observations of Newton, Hase and Ellis (2002) that the literature regarding online learning in workplaces has been long on rhetoric and promise, but short on research into how to implement it. The views expressed by Newton et al are echoed for vocational education by Harper, Hedberg, Bennett and Lockyer (2000) in their observation that, although anecdotal reports of online learning experiences are generally positive, there is only vague information about learner needs and experiences. The recent publication by Rudestam & Schoenholtz-Read (2002) of a set of case study based experiences together with useful implementation advice has assisted in addressing this area, but the papers in that edited collection are based more in well-grounded observation and literature than in direct research.

The role of CSCL in assisting and guiding work identified by Smith (2001) is also central to the observations resulting from recent work by McKavanagh et al (2002) who in an extensive piece of research focussing on vocational education providers of online learning in both institutional and workplace settings, concluded that 'conversations' are central to effective online learning, and can form a basis for evaluation of effectiveness. They observe CSCL to play an important role in the delivery of effective online learning to vocationally oriented learners.

That collection of research has indicated a clear place for CSCL to support workplace training, but there has been little attention paid to how CSCL can impact upon, either negatively or positively, the communities of learning and practice that are already established in workplaces (Wenger, 2000). We perceive a potential tension between CSCL and the communities of practice that exist in workplace settings, and we suggest CSCL could disturb these communities. A further issue here are the changes to this informal learning in communities of practice that may result from more structured approaches to learning that may be taken in the design of online learning.

4. ACCESS TO CSCL

The issue of accessibility to online learning has been discussed largely in terms of social and economic equity, with concerns on whether or not students from different economic circumstances can afford to purchase the necessary hardware and software. Additionally, there has been discussion on the telecommunications infrastructure required to support online learning, and the availability of that infrastructure in different nations, or in the different regions of the same nation.

Kirkwood (2000) has explored in some detail the issues surrounding the potential engagement with online learning on a global basis, in the light of enormous differences between countries in their technological infrastructure. He provides statistics on television set and telephone line availability for advanced and for developing nations. Those statistics show enormous disparity between the rich and the poor nations. Acknowledging work by such writers as McLoughlin (2000), who has shown that some marginalised groups have been empowered through the use of ICT to learn, Kirkwood (2000) nevertheless draws the conclusion that 'the benefits that can be derived from the use of ICT will be greatest for those at present well-served, and least for those already disadvantaged' (p.11).

Among the issues of access that appear to have had less attention paid to them are those that relate to matters of individual circumstance among learners for whom the technological infrastructure is indeed already available. We know little of the nature of competition within households for the technology required to engage in online learning. Where a household possesses a number of computers less than the number of users in that household, the equipment is clearly in contention for other purposes besides online learning engagement. There may be business uses, children's homework uses, game playing, chat room engagement and so on. That competition may be heightened for households where there is only one telephone connection, such that computer communication needs will also compete with voice communication requirements, and possibly fax as well. How these issues of within-household competition are played out in these environments, and how well online learning engagement fares in this competition framework, are matters on which there appears to be a paucity of research. Brennan (2002) has started to draw attention to the issues of access that are associated with these within-household competitive pressures.

Other related issues of access are those to do with the competition between different online learning tasks for the time that a learner has to devote to them, or for the time for which they have access. Additionally, we know rather little about the policies and attitudes of enterprises in providing access for employees to learn online in employer time, or using employer equipment.

5. LEARNERS AND THEIR NEEDS

There has been an amount of research focussing on learners 'types', in terms of styles, preferences and personality characteristics. For example, Miller (1997), working with degree level agricultural students in the US

found that field-dependent students were more satisfied with computer-based interactive communication in a distance education setting while their field-independent colleagues were more positive in their expectation prior to enrolment. Other work by Wang and Newlin (2000) with undergraduate students in a course on psychological statistics showed that success among their students in a virtual classroom was predicted by 'intellectual inquisitiveness, and an internal locus of control' (p.142). Although the theoretical paradigms are different, such that precise comparison is not easy to achieve, the Wang and Newlin finding on internal locus of control does seem somewhat at odds with Miller's finding of field-dependence.

Other work, among vocational training students (Warner, Christie & Choy, 1998) indicates that a capacity for self-directed learning, and an ability to work with textually presented materials are important characteristics among learners who engage successfully with online learning, including CSCL. More recent work by Smith, Murphy and Mahony (2002) has identified the importance of ability to self-manage learning, and comfort with e-learning as being important predictors of online learning ability, and capacity to engage successfully in CSCL. Research by Valenta, Therriault, Dieter and Mrtek (2002) also identified a strong independent learning factor as a possible predictor of success with technology-mediated distance education. The development of further research on learner characteristics that are associated with successful engagement with CSCL would appear to be useful in terms of developing predictive tools. With such development, research into the identification of strategies to assist learners to become more prepared for CSCL would also be useful. Theory based research linking learning and cognitive style to CSCL engagement would also be a fruitful area of research currently not plentiful in the literature we have scanned.

Research in the area of culture (eg. Baron, 1998 ; Smith & Smith, 1999, 2000) has been wide ranging investigating a number of cultural groups, and associating with cultural characteristics such dependent variables as collaborative behaviour, learning strategies, language and structure and the various interactions between these. We suggest there is opportunity for more research and theory building in this area, particularly to integrate the findings from previous research into a larger theoretical framework.

6. STRUCTURING STUDENT CSCL EXPERIENCES

Smith and Stacey (2003) have explored CSCL structure through a number of variables. Their research compared two discrete units of study.

As would be expected, compulsory participation in one unit generated a higher amount of interaction. More interestingly, though, the unit where students could identify their own topics for discussion showed a more sustained involvement throughout the semester. There was evidence that the problem solving approach in the unit which provided definite scenarios for discussion and resolution was characterised by students bypassing discussion of the problems and going straight to suggesting solutions. Smith and Stacey suggested that ownership of the problem is an important variable (Jonassen, Previs, Christy & Stavroulaki, 1999), and that the scenarios provided for convergent participation rather than divergent. They suggested that convergent problem solving in CSCL environments seems more problematic than where the approach to an issue is rather more divergent.

Work by Coomey and Stephenson (2001) in the development of a 'paradigm grid for online learning' (p.41) has potential here. They have developed four paradigms resulting from the intersection of two orthogonal dimensions. The first dimension is one of 'specified tasks' to 'unspecified tasks'; the second dimension is one of 'teacher-controlled' to 'learner-managed'. They then develop a set of characteristics for instruction within each of the resultant quadrants, and advice to instructors on how to develop, manage and structure learning within each of the four paradigms. That work has potential to be generative of further research into differently structured learning environments, and student behaviour within each. There is also potential to develop research on which of the paradigms best suits different learner groups.

7. CONCLUSION

This paper has attempted to map some of the research into online teaching and learning and describe gaps in the field and opportunities for research that will monitor and define quality online teaching and learning.

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