Online debating to encourage student participation in online learning environments: A qualitative case study at a South African university

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ABSTRACT

The use of computer-mediated communication in higher education presents opportunities for students to be part of an online learning community irrespective of their geographical location. However, students do not always avail themselves of this opportunity and pedagogic strategies for encouraging participation are therefore constantly being explored. One potential strategy to encourage participation is the use of the structured format of online debating. This paper proposes an underlying epistemological perspective on and an informing learning theory of online debating and its potential as a pedagogic strategy to encourage participation in online learning environments. The paper reports on student and staff perceptions of an online debate used during a BEd (Hons) course at a South African university. The findings underline the importance of providing explicit procedures to pave the way for student participation and highlight the potential value of an online debate as a pedagogic strategy to support the development of argumentation and to encourage reflexivity.

Keywords: *Computer-mediated communication, online learning environment, online learning community, online participation, online debating*

INTRODUCTION

Internationally there is a growing trend for universities to use computer-mediated communication to facilitate discussion between geographically dispersed students. Computer-mediated communication (CMC) is a "generic term now commonly used for a variety of systems that enable people to communicate with other people by means of computers and networks" (Romiszowski & Mason 1996, p. 438). It includes the use of e-mail, computer conferencing, discussion lists, bulletin boards, videoconferencing, internet relay chat as well as more specific educational applications such as computer-mediated seminars and case study discussions (Romiszowski, Jost & Chang 1990; Romiszowski & De Haas 1989); virtual classrooms (Hiltz 1994); virtual learning teams (Johnson, Suriya, Won Yoon, Berrett & La Fleur 2002) and learning circles (Riel 2002). While each of these strategies has the intention of encouraging participation, they differ in the way online discussion is managed and to what extent participation is specifically required.

Despite that fact that these online communication strategies are intended to replicate or augment face-to-face group communication, students do not always avail themselves of the opportunity. In attempting to account for the reasons why students are reluctant to participate as frequently or substantively as they could, some researchers have focussed on student-related issues, while others have focussed their attention on the role of the lecturer or on course-related concerns. Bures, Abrami and Amundsen (2000) found that students who are concerned about their performance relative to that of others send fewer messages when online activities are not assessed. Masters and Oberprieler (2004) note that students need incentives to participate in online discussion, while Pilkington and Walker (2003) recommend that students take on different dialogue roles in order to encourage participation. A study that focussed on the role that the online lecturer plays found that "frequent posting by instructors did not lead to more student postings, and the more the instructors posted, the shorter were the lengths of the discussions overall" (Mazzolini & Maddison 2003, p. 237). From a course-related perspective, Mason and

Bacsich (1998) emphasise the influence of integrating online collaborative learning within the structure of the course and Macdonald (2003, p. 377) underlines the importance of assessment in "ensuring online participation". While these factors possibly all play a role in encouraging online participation, an additional challenge is how to encourage students to provide thoughtful and considered responses rather than posting ill-considered, poorly articulated or hasty responses. This paper will argue that online debating is a possible pedagogic strategy to encourage student participation through encouraging students to provide well-argued and reflective responses in online discussions. In addition, we maintain that online debating may be particularly appropriate for facilitating the acquisition of academic discourse in an asynchronous environment among English additional-language speakers.

The epistemological perspective that informed our use of online debating to encourage student participation is based on the assumption that knowledge is constructed by learners in a socio-cultural context (Vygotsky 1978). The logical extension of this perspective is that knowledge is constructed, negotiated and perpetuated "via a process of argumentation within a community" (Cobb, Perlwitz & Underwood-Gregg 1998, p. 72). Online debating can be seen as one way of allowing geographically dispersed students to participate in the process of constructing and negotiating knowledge via a process of argumentation within a virtual community.

The interactive and collaborative nature of online debating is underpinned by social constructivist learning theory (Palincsar 1998). This view holds that learning does not happen in a void, but occurs within a social environment which not only brings with it the history, traditions and "wisdom" of the social environment or particular society, but also provides the learner with a resource of other learners, each with their own knowledge, experience and expertise, with whom to share ideas, negotiate meaning and work towards shared understandings. One of the key assumptions of social constructivist pedagogy is that the most valuable activity in a classroom is one that provides opportunities for learners to work and interact together to become part of a community of scholars and practitioners (Jonassen, Davidson, Collins, Campbell & Haag 1995). Whether the students meet face-to-face or online, the assumption is that by making their covert ideas overt, students support each other in the construction of their understanding of the topic and concepts under discussion.

Traditionally face-to-face class debates have been used to encourage students to engage interactively with each other to refine their understanding of particular issues. The formal structure of the debate provides a clearly defined framework for discussion by assigning particular roles and procedures to be followed. While these formal procedures may be interpreted by some as inhibiting, for students who are apprehensive about participating in discussions, they may provide a "scaffold" specifying when the students are required to participate and to what particular issue. For example, if assigned the role as the first speaker, the student would have the clearly defined task of introducing his or her team's stance on the particular motion being debated. As such, a class debate is a particular form of co-operative learning (Slavin 1995) which requires learners, each with an assigned role, to work in smaller groups towards a shared goal.

An online debate appropriates the structure of the face-to-face debate with its formal organisation and set procedures, but differs in one very important aspect – time. While face-to-face debates are usually conducted synchronously, online debates may be conducted asynchronously allowing students time to consider and plan before making a response, hopefully encouraging reflexivity (Archer 2003). Reflexivity is understood to be the practice of the internal dialogue through and in which we go about formulating a thought, "questioning ourselves, clarifying our beliefs and inclinations, diagnosing our situations, deliberating about our concerns and defining our own projects" (Archer 2003:103). Researchers in the field of CMC maintain that asynchronous online discussion offers participants the opportunity to think through, research and construct their responses that is not possible in a traditional face-to-face discussion (Harasim, Hiltz, Teles, &

Turoff 1995). Furthermore, Boughey (1997) claims that the act of writing (or typing) responses *per se,* as opposed to responding verbally, also enhances learning since the writer has to consider, clarify and revise thoughts more carefully than if they had not been written down.

A further possibility is that online debating could be used to develop the argumentation skills required by university students. As Marttunen and Laurinen (2001, p. 127) note: "Argumentation and debating skills are needed when engaging in academic discussion, where it is essential to be able to assess the strengths and weaknesses of other peoples' standpoints, and to formulate one's own positions supported with relevant and adequate grounds". Their study suggests that argumentation skills can be promoted by short-term e-mail and face-to-face teaching.

Lea and Street (cited in Macdonald 2003) maintain that familiarity with the language of a discipline and the academic genre is essential for students to communicate within an academic discipline. They claim that this familiarity with the discourse grows as students practice writing online messages. Likewise, Sullivan & Pratt (cited in Pilkington and Walker 2003, p. 41) report that "the quality and quantity of writing for second-language students improves in the computer-assisted classroom employing electronic discussion". As online debating specifically requires students to write online messages asynchronously, allowing time for drafting and redrafting of messages, we suggest that online debating could particularly helpful for English additional-language speakers.

ONLINE DEBATE CASE STUDY

Context of the study

The Education Department of Rhodes University offers a two-year part-time BEd (Hons) degree for in-service teachers. During their first year students enrol for Foundations of Education, a course integrating Educational Psychology, Philosophy and Sociology. In their second year students can select three from a total of approximately five elective courses one of which is "Educational Computing" (as it was in 2000, but renamed in 2001 as "Information Communication Technology for Education"). This module aims to support teachers in using information communication technology (ICT) to enhance teaching and learning in the classroom. Since basic computer literacy skills are not explicitly taught in this course, students selecting this elective are required to display a prerequisite level of computer literacy. As a means of establishing their computer literacy skills, prospective students were required to complete an electronic questionnaire and submit it as an e-mail attachment. Before the course, they were however not expected to have set up a personal distribution list of subscribed to a mailing list; both activities which were used extensively during the debate. In addition, students were required to have easy access to a computer and the Internet.

The online debate was the second of four activities in the first of five modules entitled: "An introduction to the use of ICT for Education". A study guide which was made available both in hard copy and on the Web, contained the intended course outcomes, the assessment criteria and deadlines, as well as references to both library and Web resources.

Research design

This study reports on a qualitative case study undertaken during May to June 2000. As only four in-service teachers completing the B. Ed. (Hons) degree met the selection criteria, four guests were invite d to participate to increase the range of experience and expertise within the group, to enrich the interaction in the debate and to offer alternative perspectives on the debate topic. Seven of the eight participants were English additional-language speakers. Before the start of the

debate, students were requested to compile a "Personal Profile" which assisted the lecturer in dividing the group into two fairly evenly matched teams according to the following criteria: prior computer experience, occupation, geographic location, and status (student or guest), as depicted in Table 1.

Table 1:   Participants in the study

Participant	Prior computer experience	Occupation	Geographic location	Status	Mother tongue & nationality	Debating group
1	Some	College lecturer	Swakopmund, Namibia	BEd (Hons) student	Ovambo Namibian	1
2	Some	College manager	Keetmanshoop, Namibia	BEd (Hons) student	Afrikaans Namibian	2
3	Adequate	Primary school teacher	Port Elizabeth, South Africa	BEd (Hons) student	Afrikaans South African	1
4	Some	Primary school teacher	Grahamstown, South Africa	BEd (Hons) student	English South African	2
5	Excellent	Computer Science lecturer	Grahamstown, South Africa	Guest	isiXhosa South African	1
6	Excellent	Information Systems (Hons) student	Grahamstown, South Africa	Guest	Shona Zimbabwian	1
7	Some	Prospective MEd ICT student	Grahamstown, South Africa	Guest	Kikuyu Kenyan	2
8	Adequate	Secondary school teacher	Grahamstown South Africa	Guest	Afrikaans/English South African	2

Data were collected in several ways: through participant observation by the lecturer; a questionnaire distributed to the participants; archived messages on the mailing list; and an evaluation report compiled by the course evaluator. The lecturer who took on the role of chairperson of the debate made field notes before, during and after the debate noting the issues that were of interest or concern. The open-ended questionnaire was e-mailed to the participants after the course and returned to the lecturer. The students' perceptions of the online debate were elicited with four open-ended questions:

1) Describe the two to three most valuable learning points about debating online.
2) What hindered the process of online debating for you?
3) What could be done differently in a future online debate?
4) Provide details of anything else that you would like to share with the lecturer and the evaluator.

While the archived messages provide a rich source of data, a detailed analysis of the postings is beyond the scope of this paper. For this paper, the archived messages were used to report on particular e-mails only from the lecturer. The course evaluator, who followed the debate on the mailing list as a non-participant (or "lurker") compiled an evaluation report by grouping all the comments of the students, anonymously, according to common themes and adding his own perceptions. This report was sent to the participants at the end of the debate.

Online debating process

Before the debate commenced, the lecturer sent an e-mail message to all the BEd (Hons) students and the guests inviting them to introduce themselves by compiling and posting a "Personal Profile" to the group. As only two of the four BEd (Hons) students had previously met, this was an ideal exercise to establish a shared understanding of each others' work environment, family and support structure, access to and experience of using ICTs and what they were able to contribute to the group. In addition, participants were asked to send a photograph of themselves as an attachment. The e-mail message also provided specific instructions to set up a distribution list and a link to the course URL which provided the course study guide, procedures to be followed in the debate and references to online resources that they could use in preparing for the debate.

The three modes of communication used during the online debate were electronic mail, distribution lists created within students' email clients and a mailing list (listserv). As we did not have access to an integrated learning management system at the time, we had to be creative with what software was available. The thinking behind this structure was to provide a one-to-one communication medium for personal comments between individual students or between individual students and the lecturer; a one-to-many communication medium for each of the teams to communicate, strategise and build their arguments in a "private forum" and a many-to-many communication medium to conduct the public online debate. To support the pedagogic process, the lecturer (acting as chairperson of the debate) was an obligatory member of each student's distribution list. The course evaluator, however, was excluded from the distribution lists and could therefore only follow the actual online debate on the public mailing list. Postings to the mailing list were automatically archived providing a useful feature for the participants to catch-up on the debate and for the lecturer to re-evaluate the process and content of the online debate at a later stage. None of the products used required high bandwidth provision, as Web-based technologies would have done. This was especially useful since some of the participants were connected to their Internet Service Providers (ISPs) through dial-up connections.

A second e-mail message from the lecturer introduced the motion of the debate: "Computers should be implemented in schools". This e-mail message also included a contentious extract from Naisbitt's (2000) book aimed at promoting the use of the Internet in the town of Celebration (http://www.abfla.com/1tocf/disney/celeb.html). The purpose of this extract was to encourage the participants to reflect critically on the implementation of computers in schools. The procedures to be followed in the debate and the specific rules to be observed were also provided. Each team was given between two and three days to discuss and negotiate their arguments and then to post the combined response by a specified target date. From time to time these target dates had to be adjusted due to unforeseen procedural, technical or personal problems.

REFLECTION ON THE ONLINE DEBATE

Despite the fact that there were only eight participants a great deal of data was generated by the debate itself, the students' evaluation questionnaire responses, the field notes by the lecturer and the evaluator's report. For the purposes of this paper we will report on four themes only, namely the students' perceptions of the value of the online debate in general, the value of online debating to encourage student participation (including students' perceptions on potential obstacles and suggestions for improvement), the potential of online debating in developing argumentation skills and the extent to which online debating can be a useful pedagogic strategy to support English additional-language speakers acquire academic discourse.

Value of online debating: Students' perceptions

With reference to the value of online debating in encouraging student participation, two students commented on the *value of the immediacy of responses:* (1) "The responses are up to date of how people feel about the topic." (2) "Online debating has the wonderful quality of enjoying written argument (sic) that has been posted to the reader recently – it is therefore "fresh" and it is possible to make an immediate response." One long reflective comment refers to the *value of understanding different perspectives*: "I think one of the most valuable learning experiences is to gain insights into what other people have to say. It is very interesting to see the different responses from the different areas as well as the different learning conditions. Let me expand on this. The response from a person teaching at a very affluent school is different from the person teaching at a township school. The response of one teaching in a metropolitan area is very different from one teaching out in the 'sticks'. It was interesting to see that often one 'side' did not really appreciate where the other side was coming from. This taught me really to take stock of myself and try to gain insight in to what the other party was saying." Another comment focussed specifically on the importance of *engaging with students who hold different opinions*: "You also learn about netiquette and how to respond without flaming the others, even it you don't agree with their opinions." One comment in particular reinforced the *collaborative nature of online debating*: "You have to work together in a group"*,* while another made a closely associated comment about the value of online debating as a *mechanism to overcome geographical distance*: "The barriers are broken down and because we are not in a class situation, the virtual community classroom is a great alternative." One student even expresses his missionary-like zeal for online debating: "Online debating celebrates the genius of human thinking – one once again realises the difference in human beings – that the same point of debate is open to all and each person reacts on it through the electronic medium. This point supports the importance of computers in education."

Value of online debating to encourage student participation

Both the lecturer and the evaluator mention their perceived value using the extract from Naisbitt's book to stimulate ideas prior to the debate. The evaluator notes: "This book addresses a rather contentious issue which somehow managed to get the learners involved emotionally (at least some of us, if you look at the many personal examples that were put forward as arguments) … In my view, such use of a controversial piece of writing is an extremely useful technique for engaging learners and increasing the level of participation."

When the debate actually commenced on 22 May 2000, the lecturer was delighted that the "Proposing Team" presented a fairly well thought through piece on why computers should be implemented in schools, despite it being over the word limit. When a second e-mail was sent from the same team the next day with a separate argument, the lecturer realised that her original instructions may not have been clear enough or that the students had not read them adequately. To accommodate this glitch, she posted the following e-mail:

> *From c.hodgkinson at ru.ac.za Wed May 24 11:47:35 2000*
>
> *Thanks to the proposers of the motion, "Computers should be implemented in schools", for their opening arguments. I trust that the team opposing the motion will have some time today to put forward their opposing arguments (at least before 8:00 tomorrow). Fortunately e-mail with its option to include and annotate the previous message makes it a very powerful medium for debate – you can argue sentence by sentence!*
>
> *Remember that this is a team effort. Consult with your team mates before posting a reply. In this way you can gather a great deal of evidence and/or questions to oppose the*

> *motion. I suggest that you appoint one person to be responsible for the final posting, but that you consult along the way.*
>
> *Usually the proposers are allowed to make their opening arguments and cannot add to their formal presentation until the team opposing the motion has a chance to air their views. This would mean that the additional e-mail "Debate-more food for thought" would be excluded for comment by the opposition team. But as this is our first debate I suggest that we accept the additional arguments, but respond to them in one consolidated e-mail (i.e. cut and paste). We'll get the hang of this way of communicating soon.*
>
> *The chairperson.*

This fortunately had the desired impact and the opposing team posted their contribution after consulting with each other. However, it did point to the need for *procedural clarity*. This point was picked up too by the evaluator who states in his report: "While the debate format intrinsically encourages participation, the online medium, in my view, requires more structure which should be provided by an even stricter adherence to the debating procedure." This procedural issue plagued the rest debate and resulted in an *unavoidable extension of the deadlines* originally imposed. Despite the initial difficulties, both lecturer and evaluator felt that the online debate did increase student participation. The lecturer noted: "What really made this valuable was the authenticity of debating with people who were not part of a usual class. What made this even more interesting was that most participants did not know each other, so the formal debate was quite an appropriate way to structure the online interaction.*"*

Potential obstacles of online debating in encouraging student participation

Students provided some very insightful comments about what hindered the process of participating in the online debate. Two comments refer specifically to the need for the *goals of the debate to be clear:* (1) "That the topic under discussion should be clear to all"; (2) "There should be no ambiguity." Another one refers to the need for *procedural clarity* in the online debate: "That all participants should know where to send his/her arguments." Another three specifically refer to the need for *clearly specified deadlines:* (1) "Dates given should be adhered to, if possible." (2) "Everyone didn't respond before the deadlines we have set." (3) "Time should be clear in the sense of different times, eg. Namibian and South African." Technical issues were raised about the *importance of reliable internet service provision* three times: (1) "That the service providers of the sender and the receiver must be able to communication with one another." (2) "The big problem that I had, was the fact that whenever I sent my messages, the messages have been returned in my box. The fault was with the service provider on my side which was rejected by terrapin.ru.ac.za. It forced me to cancel my service with them and subscribe to another one." (3) "In addition, the server only provides a node with a capacity of 33 lines in Keetmanshoop, resulting in a congestion of calls during business hours." A related problem of a *lack of convenient access* was raised twice: (1) "My biggest problem was the lack of a reliable link. The only reliable link I have is at school. Time is limited there as I teach full time and have little time at school to do anything else. The other big problem that I have is when (on the rare occasion) I connect at home all the emails I want to refer to are on my school computer! I do believe that there is a way of re-reading the mail. I want to investigate this possibility. The other way to do it is of course to forward the mail, but here the problem is that when one gets home and tried to connect and fails the messages remain unread. The next day at school all the mail is sent back to you!" (2) "This might sound like self-pitying, but I envy those who could use their work time and computer facility to post their messages. I can, unfortunately only check mail between 1–2 pm and work online after 5 o'clock or over weekends." One participant complained about *inadequate*

typing skills: "My typing skills are not so good either but have improved remarkably over the last few weeks!"

Suggestions to improve student participation in online debating

The question on how student participation could be improved for a future online debate yielded some interesting responses. Two comments indicated the need for *revolving leadership*: (1) "Give someone else a chance to be the group leader so that everyone have [sic] an opportunity to have that responsibility and keep the others on their toes." (2) "It might also be useful if either Prof. Hodgkinson or Markus could allocate specific areas/aspects for each team member. Similarly, a team leader (on a rotating basis) could be appointed from Rhodes. Each team member will have to respond to his/her team-leader within a given time span. In this way, the leader may contact each of his/her team-members individually before presenting the collective team effort." Another comment called for more specific task allocation: "Each person could be assigned a task." One participant made a plea for *additional time for the online debate*: "At least two to three weeks for debating." Two participants made a *call for a synchronous debate:* (1) "I know this will be very difficult to co-ordinate but it would be really super if all the debaters could be at their computers at a given time – much like attending a lecture. This would have to be arranged well in advance so that we all could make sure we are sitting at a reliable link. This would give the debate a really 'live' feel. I appreciate that this will be very difficult to do but there is no harm in dreaming of the 'ideal' situation." (2) "It might perhaps be useful if a daily time slot (differentiating between week days and weekends) could be suggested. I don't know how practical this will be for others." A request made by one participant that the lecturer should receive a copy of each student's contribution indicates that the person concerned *did not understand the role of the distribution list or the mailing list* as the lecturer received copies of every posting other than personal one-to-one e-mails: "A copy of each participant's contribution could be send (sic) to the lecturer so that the lecturer can keep up with those who are contributing and those who has problems. The lecturer do not need(sic) to read the content in detail." One participant asked "to keep the maximum length of [a] given essay". The advice given here indicates the need for the lecturer to encourage those who were not participating adequately. This is consonant with one student's comment on the obstacles facing students in an online debate: "The lack of full participation of all team members".

The potential of online debating in developing argumentation skills

On this issue the lecturer and the evaluator disagree. The lecturer maintained that: "The students certainly improve their argumentation skills between what they negotiate 'behind the scenes' on the distribution list and what they present on the mailing list." The evaluator had harsh words on this issue in his report: "In fact, my strongest critique of this debate is the lack of conciseness and economy of words by both sides. Yes, there are certainly many reasons why computers should or should not be implemented in all schools. However, what are the three to five most convincing arguments? The critics, in their initial posting, worked towards this aim by providing four very distinct (albeit lengthy) arguments and kind of grouped another four (obviously weaker) reasons into one point. Cheryl very explicitly said 'decide on the major points of discussion' (2000-05-17). In my view, the purpose of the behind-the-scenes distribution lists was to develop comprehensive lists of all the issues, then to negotiate the most compelling reasons and then develop these strongest ideas into arguments. Obviously, I did not have access to these discussions, but you might want to agree that the postings I received provided little evidence of such negotiations."

Three comments from question 1 of the participants' questionnaire refer directly to the role of online debating in the development of an argument: The first comment refers to the benefit of being required to *argue a point of view contrary to one's own view* on the motion: "Another valuable learning point was that I actually had [to] argue against something that I have felt a need

to introduce at my school. Obviously I would not have introduced computers at my school if I did not feel this was the way to go. I really had to play the devil's advocate here! Many of the things I was arguing against I actually believed in. This was very difficult because one still has to build credible 'anti-arguments'. It has probably taught me to look at the 'other' side more critically that I would have done before." The second comment notes the *importance of reflection* in developing an argument: "A second important aspect in this sort of debating requires careful reflection. Unlike in the real-life situation, one is afforded the opportunity to think out well-reflected arguments. It creates a learning situation in which one can avoid impulsive (and subjective) counter arguments and interjections which derail the line of thinking. This objectivity is an invaluable life-long academic learning tool that helps one to sort out thoughts and translate them into structured arguments." The third comment indicates that while asynchronous debating has a place, it is not the same as face-to-face debating: "In this way one can follow the gist of debating and the development of a statement [argument?] on a daily basis. As such it is second best to the real-life debate."

The potential of online debating for facilitating the acquisition of academic discourse among English additional-language speakers

This issue was raised in discussions between the lecturer and the evaluator after the debate when they were analysing the archived messages. They perceived that there was a noticeable difference between the "private" messages the students sent to each other or the lecturer and the formal messages sent to the mailing list, possibly due to the requirements of the formal debate or the time to reflect more carefully on their responses. A detailed exposition of this position is beyond the scope of this paper, but it does raise possible questions for further research.

The students' comments refer mainly to the issue of reflexivity raised above and can probably be best summarised by the one comment: "This objectivity is an invaluable life-long academic learning tool that helps one to sort out thoughts and translate them into structured arguments."

CONCLUSION

These findings underline the importance of procedural clarity in online debating to prepare the way for student participation. Students in this study valued online debating for its potential to provide immediate responses, as a medium for gaining insight into the perspectives of people whom they were unlikely to meet in person and for learning how to engage with those holding different opinions to their own. Suggestions made by students for revolving leadership and additional time were taken up towards the end of the debate and embedded within the structure of the subsequent use of an online debate in the following year.

While the constraints of this paper preclude a detailed analysis of the actual debate, both students and staff members perceive that online debating is a potentially useful pedagogical strategy to encourage participation through the development of argumentation skills and to promote reflexivity.

REFERENCES

Archer, M.S. (2003), *Structure, Agency and the Internal Conversation*, Cambridge University Press, Cambridge.

Boughey, C.M. (1997), Learning to write by writing to learn: A group-work approach, *ELT Journal*, vol. 51, no. 2, pp. 126–134.

Bures, E.M., Abrami, P.C., & Amundsen, C. (2000), Student motivation via computer conferencing, *Research in higher Education*, vol. 41, no. 5, pp. 593–621.

Cobb, P., Perlwitz, M., & Underwood-Gregg, D. (1998), Individual construction, mathematical acculturation and the classroom community. In M. Larochelle, N. Bednarz & J. Garrison (eds.), *Constructivism and education,* Cambridge University Press, Cambridge.

Harasim, L., Hiltz, S.R., Teles, L., & Turoff, M. (1995), *Learning networks*, MIT Press, Cambridge, MA.

Hiltz, S.R. (1994), *The virtual classroom: Learning without limits via computer networks,* Ablex Publishing Corporation, Norwood, N.J..

Johnson, S.D., Suriya, C., Won Yoon, S., Berrett, J.V., & La Fleur, J. (2002), Team development and group processes of virtual learning teams, *Computers & Education,* vol. 39, no. 4, pp. 379–393.

Jonasssen, D., Davidson, M., Collins, M., Campbell, J., & Haag, B. (1995), Constructivism and Computer-Mediated Communication in Distance Education, *The American Journal of Distance Education*, vol. 9, no. 2, pp. 7–26.

Macdonald, J. (2003), Assessing online collaborative learning: process and product, *Computers & Education*, vol. 40 (2003), pp. 377–391.

Mason, R. & Bacsich, P. (1998), Embedding computer conferencing into university teaching, *Computers & Education*, vol. 30, nos.3–4, pp. 249–258.

Masters, K. & Oberprieler, G. (2004), Encouraging online participation through curriculum articulation, *Computers & Education*, vol. 42 (2004), pp. 319–332.

Marttunen, M. & Laurinen, L. (2001), Learning of argumentation skills in networked and face-to-face environments, *Instructional Science*, vol. 29, no. 2, pp. 127–153.

Mazzolini, M. & Maddison, S. (2003), Sage, guide or ghost? The effect of instructor intervention on student participation in online discussion forums, *Computers & Education*, vol. 40, no. 3, pp. 237–253.

Naisbitt, J. (2000), *High Tech, High Touch: Technology and Our Search for Meaning*, Broadway Books, New York.

Palincsar, A.S. (1998), Social constructivist perspectives on teaching and learning, *Annual Review Psychology,* vol. 49, no. 1, pp. 345–375.

Pilkington, R.M. & Walker, A. (2003), Facilitating debate in networked learning: Reflecting on online synchronous discussion in higher education, *Instructional Science*, vol. 31, nos. 1–2, pp. 41–63.

Riel, M. (2002), *Learning circles teachers' guide*. [Online]. Available at: http://www.iearn.org/circles/lcguide/. Accessed 19 June 2004.

Romiszowski, A.J. & De Haas, J. (1989), Computer-mediated communication for instruction: Using email as a seminar, *Educational Technology,* vol. 29, no. 10, pp. 7–14.

Romiszowski, A.J., Jost, K. & Chang, E. (1990), Computer-mediated communication: a hypertext approach to structuring distance seminars. In *Proceedings of the 32nd Annual ADCIS International Conference*. Association for the Development of Computer-based Instructional Systems (ADCIS).

Romiszowski, A.J. & Mason, R. (1996), Computer-mediated communication. In D.H. Jonassen (ed.), *Handbook of Research for Educational Communications and Technology*, Prentice Hall International, London.

Slavin, R.E. (1995), *Cooperative learning: theory, research, and practice*, Allyn & Bacon, Boston, Mass..

Vygotsky, L.S. (1978), Mind in society: The development of higher psychological processes. In M. Cole, V. John-Steiner, S. Scribner & E. Souberman (eds.), *Mind in Society*. Harvard University Press, Cambridge, Mass.