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Developing a Community of Learners: Potentials and Possibilities in Web Mediated Discourse

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For over 30 years, computer technology has been used in education in a variety of ways. Initially, typical web educational systems largely embraced static tutorial-style approaches, such as drill and practice or noninteractive delivery of educational materials (Jones, Kirkup, & Kirkwood, 1993; McIntyre & Wolff, 1998;). Much of the energies of early visionaries were devoted to highlighting the role of the computer as a tool to augment, rather than automate human intellect and interaction. Therefore, as it underwent development, computer technology was viewed mainly as an extension of distance education or as a variant of classroom activity (Harasim, 1990).

Modern computer technology has made possible a new and rich learning environment (Lee, 1999). Today as we perch, poised for the next millennium, there is evidence that the computer and the World Wide Web (WWW or Web), have become a more viable, interactive option for teaching and learning. The Internet has quickly become a ubiquitous open web of interconnected, global computer networks (McIntyre & Wolff, 1998), allowing for extensive interaction and collaboration among learning communities. The concept of building "communities of learners" is based on democratic ideals of learning processes and products (Schon, 1999). According to Roth (1998), such communities are built on principles of coparticipation while challenging traditional modes of teacher-student relationships. Here, coparticipation implies the presence of a shared language that becomes accessed by all as they engage in the activities of the community with a goal of facilitating meaningful learning. In effect, the teachers are no longer the bearers of information, but partners in conversations that seek to construct knowledge. This construction occurs through negotiation and consensus building, allowing the viability of such knowledge to be tested against what has been established and accepted as "truth."

Harasim (1990) and Linn (1998) noted that computer technology has introduced unprecedented options for teaching, learning, and knowledge building, while expanding the opportunities for building communities of learners. Many educators agree that the search to amplify intellectual processes has been an inspiring force in the development of computer technology (Harasim, 1990). This coupling of research in teaching and learning with technology has led to substantial alterations in the way electronic technology is used in education. Not only does the technology support learning, but it also has provided the stimulus for expansion of education within a global environment. This has led to challenges as instructors strive for more effective teaching strategies and instructional design in this new social context.

Today, asynchronous learning tools on the Web have opened up possibilities and potential for a new environment for teaching and learning. The central pedagogical idea in an asynchronous learning network is collaborative learning at the time and place of the individual learner's convenience which allows for multiple discussions to occur simultaneously, while slowing down the dynamic face-to-face interactions characteristic of the traditional classrooms (Nulden & Hardless, 1999). This article describes how an asynchronous learning network was integrated into a traditional science education course for preservice teachers and how it facilitated the achievement of the course goals and objectives.

One of the hallmarks of the asynchronous learning network is that it reduces competition for airtime among participants allowing for equal voice in communications. In part, this is accomplished as the time available for reading or rereading materials is increased, allowing for critical reflection, formulation of thoughts and use of the available tools to initiate or participate in existing dialogue (Nulden & Hardless, 1999). By allowing learners to operate at a pace convenient to them and appropriate to the learning process, such interaction supports the development of a rational discourse. Habermas (1973) described discourses as performances in which one seeks to show the grounds for cognitive utterances. This rationality of discourse is important in effective communication as participants become situated within a community that allows them to make statements, reflect, and ask questions with equal rights without temporal, factual, or social limitations. Guided by the notion of constructivism, meaningful learning will be enhanced when students can reflect on and are allowed to communicate what they know with others (Tobin & Tippins, 1993).

CONNECTING COMMUNITIES OF LEARNERS (CCL)

One program that employed the previously mentioned type of asynchronous learning tool was the Internet application known as *Connecting Communities of Learning* (CCL), which was developed by Kenneth Tobin and a team of educators and programmers at Florida State University (FSU) in the mid-1990s. Embracing social constructivism and giving consideration to the social context of learners and their individual needs, the developers assembled an environment that promoted coparticipation and maximized learning within a community. Incorporating functions that enabled the students to access these tools, the website was designed and implemented to facilitate learners' input at their convenience. This was beyond the traditional teacher-driven classroom with its controlled interactions and boundaries within time and space. Emphasis was placed on the active role of learners in knowledge construction, as well as the social aspects to the construction of this knowledge (Vygotsky, 1978).

Presenting the view of knowledge building as an analytical process, Tobin (1997) argued the need for technology to support the individual and social processes involved in learning. He stated, "If the applications of technology are to enhance learning it is important that they facilitate the creation of environments in which interactions can occur and the texts produced can serve as potential resources to support the learning of all participants" (Tobin, 1997).

This was the basis of the CCL: the development of an electronic learning community, involving appropriate activities, artifacts, materials, and tools that support the emergence of shared language games that were meaningful to all its participants, including the instructor (Roth, 1998). CCL embraced the notion that all the participants would have access to cultural tools, skills, language, beliefs and values, and would learn to act and interact in different yet authentic ways (Tobin, 1997). By allowing such access, CCL supported interaction and co-participation, while facilitating a rational discourse that reached beyond the boundary of the single learning community. In the new environment, learners became active, reflected on interesting issues raised during the development of a course of study, and then shared with their peers in the non-threatening environment of the learning community (Roth, 1998). Here learners had the potential to intentionally connect thoughts, feelings, and experiences related to the learning activity in which they were engaged (Andrusyszyn & Lynn, 1997). This article describes how these

principles of an asynchronous program were incorporated into a traditional college course for elementary teachers and the students' reactions to the new learning environment.

INCORPORATING CCL INTO A TRADITIONAL SYNCHRONOUS CLASSROOM

The course, Science Education for Elementary Teachers, was designed to facilitate development of the competence and confidence needed to teach science in elementary schools. This science education course was one of a series of methods courses offered in the semester just before the preservice teachers' internship. Students were expected to learn about teaching and learning science through intellectually challenging, rigorous academic experiences that would make them life-long, resourceful learners. This necessitated the development of a learning community in which members became collaboratively engaged in the practice of learning to teach science. The course was structured to include the asynchronous web-based technology while still maintaining features of the traditional classroom environment such as the weekly class meetings. CCL was integrated into the science education course because of its compatibility with the synchronous learning environment, which already sought as a goal, through objectives and assignments, the development of a learning community.

STRUCTURE OF THE CCL

The CCL consisted of a number of sites for posting class assignments and restricted sites that were accessed only by the instructor. Identified by named buttons, critical reviews, dialogue journals, research papers, proposals, portfolios, and a notice board were among the features available. These were enhanced as CCL allowed for further evolution of its platforms based on the needs of the instructor, thus working with a web-master, changes were allowed as the program developed. For example, one notice board that served for general notices was available at the start of the semester; however, as issues became hot topics for discussion, other notice boards were built into the program. A mailroom system was another added feature, which allowed for selective or mass dispatching of e-mails to the instructor and all members enrolled in the course. Students accessed the website through the

use of a login name and a private password. They also accessed their private pages where they posted their assignments, engaged in conversations in the dialogue journal group to which they were assigned, and entered and contributed to common areas such as the notice boards. Only the instructor had access to the administrative sites and all the student pages, which allowed for management of the program and oversight of the development of the community.

POTENTIALS AND POSSIBILITIES OF THE CCL

Extending the physical boundaries of the classroom and the traditional contact times beyond the allotted three hours per week, the development of CCL expanded the electronic capabilities typically employed in university classroom-based courses beyond an e-mail only communication to a highly interactive website based curriculum system (Muire, Tobin, & Davis, 1999). This occurred because of the ongoing access to and the time-independent nature of the CCL. Students were able to post their assignments, respond to their peers and enter into conversations at their own convenience outside of the established class time.

Following is a discussion of the features of the CCL that were used in the science education for preservice elementary teachers course; dialogue journals, critical reviews, notice boards, a research proposal, a grade book and e-mail. Others aspects of the CCL—conferencing, portfolio and autobiography—were not used in the course for elementary teachers. While these would possibly allow for more community building among the group of students, full use of all the tools in CCL would require more than the one semester allowed to the science course.

WEBSITE TEACHING AND LEARNING TOOLS

Dialogue Journal

The dialogue journal, a semi-private site, offered a safe, emancipatory learning environment where participants became involved in academic discourse and shared perspectives with their peers. Students were assigned dialogue partners and in groups of threes were instructed to share with each

other on course related issues. The instructor had full access to the ensuing conversations as well, rounding out the discourse community. The dialogue journal was central in the process of sharing the observations that were made in schools during students' weekly classroom visits, including exchanging notes and ideas on issues such as classroom management and behavior modification strategies or just simply how to cope with matters regarding their cooperative teachers and the school system. The dialogue journal also provided a platform in which group members could work collaboratively on projects. One project, The Moon Model, required group members to observe the moon over a period of time and create a model to explain their observations. Following is an excerpt from a dialogue journal in which members sought to clarify issues raised in the development of their moon model.

> The moon has been outshined by the sun. Only a small portion of its lit up side is visible to us, and it is close to the sun (from our vantage point). It's like trying to see a small flashlight next to a spotlight shining in your eyes. (Submitted Feb. 19, 1999)

Continuing the dialogue, the peer's response was as follows:

> I think I am onto something too. Tell me if you don't agree. Think of the moon as it looks like a sliver or finger nail. If you compare it at different times of the day, it will be tilted differently. For example, at sunset this week, it looked like a smile. In the morning, its tilt was somewhat opposite. This may be from the tilt of the earth. Because we are tilted, we see the moon at different angles. I know this is impossible to envision without the balls. (Submitted September 21, 1998)

Another member of the group responded two days later:

> I found out that the moon rises 55 minutes later every day, so eventually it will rise before the sun, thus leading the sun. Other times it will rise after the sun, thus following the sun. Does that help with anything? (Submitted September 23, 1998)

Further responses are as follows:

> When the moon is waning, it is always leading the sun. When it is waxing, it is always following. If you think of yourself rotating on a CCW earth, it makes perfect sense. (Submitted September 23, 1998)

> Looking at the moon model we have come up with so far, I think your explanation about the tilt of the earth being the reason we see the moon at different positions during the day is a logical explanation for this. (Submitted September 24, 1998).

The asynchronous learning environment served well to facilitate their interactions. Group members were able to work collaboratively on their science project even though they were separated by distance. While the technology worked well to facilitate the ensuing dialogue, the teacher had to pay attention to the science misconceptions that arose during their conversations, as seen in the previous discussion of the position of the moon and the earth. From the preceding dialogue it was clear that students were not only documenting their observations, but were involved in the process of negotiation toward consensus building. Then, as perturbations arose and as they discussed ideas, they were able to begin to question their own concepts and see alternatives (Brooks & Brooks, 1993). The CCL allowed them to share their observations, offer explanations, and reflect on their model as it was being constructed. Operating under the premise that learners actively construct their own meanings (Duit & Treagust, 1998; Tobin 1997; Wheatley, 1991) through a process of collaboration and reflection (Andrusyszyn & Lynn 1997), educators have agreed that meaningful learning takes place when students observe, reflect, make connections and become involved in the discourse of the community.

ASSESSMENT THROUGH CRITICAL REVIEW

Assessment through critical review was a key feature of the course. Participants were assigned readings from prescribed texts and from relevant literature in the library, (another feature of the website). Each student wrote formal critical reviews that were posted in the appropriate sections on the Web. As individual assignments were posted and accessed by other group members, the CCL allowed for peer review of each other's work. The goal of the peer review was to provide students a nonthreatening environment in which to read each other's work as they confronted their own ideas as well

as to challenge the ideas of their peers towards the goal of continuous improvement. This forum supplied useful feedback to the individuals whose work was being evaluated, while at the same time providing an avenue for further learning to the person engaged in the critique. According to Slavin (1987), group feedback assists members in cognitive restructuring, by requiring them to reshape their ideas and learn new information that they would not have constructed on their own. Eisner (1991), commenting on the importance of group critiques, described it as a form of cooperative learning, which fosters awareness, enhances knowledge construction, and facilitates the development of a learning community.

Developments in technology have enabled educators not only to explore ways of using the computer and related technologies to support learning, but also to rethink processes such as assessment. In the struggle to reform classroom practices toward effectiveness, the CCL allowed for the exploration of the potential of assessment for enhancing improvement rather than being of value judgment only. To such an end participants were involved in peer and self-assessment of the critical reviews. By students request, the peer reviews were conducted blindly. This meant that students were not able to recognize the writer of the reviews that they were assessing or the peer who critiqued theirs. The following excerpt taken from a dialogue journal typified the students' reasons for wanting anonymity in the review process:

> If we know who we are critiquing this will affect our assessment. I do not want to come down hard on my friend when I know that my comments might affect their grade in the course. And if I knew my friends wrote the review I am sure I will not be objective in giving the feedback because I do not want them to feel bad neither do I want to get into a quarrel with any of my classmates (Dialogue journal).

Instructor assessment of critical reviews was also a part of the overall format. A rating scale on a continuum from unsatisfactory to superb was used along with a comment window for feedback. User-friendly information relating to the quality of the review and how specifically the student might be able to improve on what was written was encouraged to be a part of the feedback from both the peer reviewers and the instructor. Each learner became obligated to consider these responses and to use them as the basis for self-assessment. Evident in the following comments, quality

feedback became an important and valuable issue within the community. Members not only maintained control of the assessment process, but were responsible for their own learning.

> I have learned so much from my peers' feedback and I now feel cheated when I am about to write another review without having my previous critique. The feedbacks forced me to think about not only my style of writing but also forced me to think about other issues raised in the reading. This has helped me to connect to some of my experiences in the elementary school. (Submitted Nov. 9, 1998).

> I did not know that I could ever come to rely on any help from my peers in this block…The feedbacks I am receiving in general have helped me to become conscious of the things I write and the conclusions I make from my own readings and observations in the school I am visiting. (Submitted Nov. 12, 1998).

At the same time, some students were uncomfortable with the process of posting their critical reviews for others to read, and at the same time articulated a mistrust of the process and the validity of peer assessment. They did not value the feedback from their peers, as indicated in the following dialogue journal entries:

> How can my peers give me feedback for improvement? They know just as much as I do and more so some of them are so spiteful.

> If we assess our peers how will we know what the teacher wants? I think that only the teacher can assess our work and give us feedback that will help us. I really do not like how we have to assess each other's reviews.

Overall, however, the critical review provided the opportunity to depart from the traditional objectivist metaphor of teacher as knowledge bearer. Instead, informed by a constructivist epistemology, it provided the opportunity for critical reflection of issues raised in the reading, while making

connections to personal experiences and to the work of peers within the learning community. The learners were involved in critical, self-reflective inquiry, generating new understanding, and testing its viability against the socio-cultural world of the web classroom. And as Wheatley (1991) wrote,

> If we are reflective and inquiring, it is likely that we will encounter events which will call into question our conceptualizations and we will be forced to reorganize our ideas. This may require throwing out much of what we have constructed and end up restructuring our own scheme of knowledge (Wheatley, 1991).

NOTICE BOARDS

The notice boards were sites intended as easily accessible central locations for brainstorming and speculative thinking, as well as the posting of instructor's general notices and other public communication. However, as the semester unfolded, special interest notice boards evolved out of the issues that arose in the course, which allowed learners to use personal motivating issues, interests, or experiences as scaffolds to foster new learning. Topics such as assessment, particularly peer and self-assessment, and the nature of the science and the teaching of science in public schools became the focus of discussion on these special interest notice boards. These individual notice boards provided the forum for participants to verbalize their positions on specific ideas generated through reading or from other experiences. Responses in the form of feedback, comments, and alternative ideas then provided the opportunities for elaboration or modification of views while interacting with the ideas of their peers. This enabled the creation of shared beliefs and in some cases provided the opportunities for students' ideas on issues crucial to teaching and learning science to be challenged.

GRADE BOOK

The grade book provided easy access to feedback and grades. It included distribution of ratings from each peer review, as well as all the related

feedbacks from peer, instructor, and self. These feedbacks occurred at two levels: providing private comments addressed to the individual and public comments that served to inform the work of the class as a whole.

ISSUES IN CCL

Even though many advances have been made in the use of electronic technologies and computers, in particular, these new developments often engender fear. This was evident while introducing the CCL to the preservice teachers. However, because the CCL was simple to use and allowed for such a large degree of maneuverability, the inhibitions were easily overcome in a tutorial. Double clicking on a button that opened directly to the corresponding page worked well for the students. After two hours in a computer lab they were able to easily access and manipulate the features involved.

The CCL, as a teaching and learning tool, offered potentials for changes in education. First, it had implications for the emerging role of the instructor. Larochelle and Bednarz (1998) discussing this issue, stated that the facilitating role of the teacher now includes the rethinking of how the students might render the knowledge visible to themselves and to other members within their learning community. The focus is now on interaction and coparticipation with the goal of facilitating the emergence and sharing of a type of socio-discursive cohesion within the given community. Such a radical change in approach may be problematic, as much of schooling has been primarily based on individuality and the ability of learners to reproduce the knowledge garnered from the teacher or texts. This reproduction usually requires the completion of standards or criteria established by some authority, such as a testing organization.

In the new social context that CCL affords, not only will instructors have to cultivate a sense of community among learners, but they will have to help them reconstruct the idea of what it means to know and to appreciate the process of knowledge building. Instructors will have to facilitate the notion of trust among learners and a respect for timeliness of posting, a sense of community among learners, and a move away from the traditional competitive nature of learning. This will require instructors to develop other strategies and skills not embraced in traditional teaching.

Students brought to the science education course experience with knowledge of electronic technology as a tool for word processing, recording data, exploring topics, e-mail communication, and drill and practice. They were unfamiliar with using the technology to facilitate the changes in the course that CCL made possible, which led to some initial discomfort with tasks and features, such as posting their assignments on the Web for peer reading and review, posting in a timely manner, accessing computers, and slowing down the pace from that of more familiar face-to-face interactions.

Early in the semester, some students were not willing to part with traditional writing implements. They expressed the desire to be able to use pen and paper, a technology with which they were quite comfortable. As the semester progressed, the complaints focused on the amount of time spent at the computer, in addition to the inconvenience of access for some. As one student wrote,

> I do not own a computer and find it difficult to always being at the lab. I think the computer work is causing me to be at the computer (lab), for too long and I have other assignments to do that do not require the computer lab. (Dialogue journal, October 1998).

> This course is much more than the four hours for which we registered. I feel that I am always doing stuff on the computer for science education and this takes time away from the other courses that I am taking.

Some students were not comfortable with their written work being identified on the Web, especially when the issue of peer assessment was involved. This led to discussions of trust among learners, anonymity within the learning community and the issue of control of assessment in teaching and learning. Dealing with assessment as a tool for continuous learning became a focus of discussion for the students and this continued throughout the semester. The students believed that assessment belonged in the instructor's domain, into which, they as learners were not allowed to venture. This belief, reinforced over time, was being confirmed during this semester by their experiences in other courses. Their reactions to peer and self-assessment within CCL was directly related to beliefs about the ownership of the assessment process and their roles as learners.

The university provided easy access to computers, but there were instances when, due to technological glitches, the system temporarily went out of operation. While this did not occur too often, there was always the looming possibility, and when it did happen, or when peers were late in posting, the effects were devastating within the community. While the CCL provided time and space independence, tardiness and late posting affected the development of some discourses. Timeliness of posting became an issue, as noted in one student's comment window: "I anxiously await the work of my peer so that I can go ahead and do my peer assessment" (September 1998).

Text-based communication led to information overload, resulting in a major complaint from the students that they had to follow the intensely active online discussions, which resulted in heavy amounts of reading for each participant, while at the same time keeping up with other course reading materials. For the instructor as well, effective coordination of the discussions and dialogues on the Web required a heavy time commitment.

Some students favored the hot topics discussions on the notice board and between their peers in the dialogue journal. For them, the Web provided a safe environment for their voices to be heard.

> I like the discussion on the notice boards because I do not have the personality to compete for airtime with those people in class who are always in charge of the discussion. The website allows me to reflect and share my thoughts in a meaningful way. (Private conversation, November 1998).

However, some students lamented the absence of spontaneity in response that face-to-face interaction afforded when discussing some topics. They noted that they would rather have the immediate face-to-face feedback with the accompanying body language than respond to the text-only medium. Attempts were made at times during the traditional class meetings to continue some of the ensuing dialogues that were being conducted on the notice board; however, observations revealed that some students willingly participated while others remained silent onlookers, unless deliberate attempts were made to solicit their ideas. The nature of the CCL was such that equity in participation was maintained during discussions either on the Web or in the traditional synchronous classroom. This created space for all learners to share their ideas and to interact in ways that were comfortable for them, which was in accordance with the hallmark of a learning community in which all learners are afforded the opportunity for participation.

Unfortunately, CCL lost administrative support and was discontinued soon after I had the opportunity to explore its usefulness in teaching and learning science education. The need for a continued web-master to support and maintain its development was cited as being too costly for the long-term. *Blackboard* and *WebCT*, other programs that bore similarities, eventually replaced CCL. However, one of the strengths of CCL was that it evolved in accordance with the philosophy of guiding teaching and learning and was not fixed in its offerings. Therefore its structure did not dictate the development of the course; rather the opposite occurred.

CONCLUSION

There is no doubt that the computer and the Web have revolutionized much of our day-to-day actions and interactions. As we enter into the next millennium, the CCL and similarly structured programs such as Blackboard and WebCT will play a role in transforming teaching and learning due to the potential of these programs to support and extend synchronous learning environments. Guided by the notions of coparticipation and emancipatory practices, such programs will not only extend on-campus courses, but will be able to unite learners from varied geographical locations into a community of learners. However, as these programs become widely used in university classrooms, the need exists for continuity in their use in college courses so that learners and instructors may adequately develop the skills and attitudes needed for harnessing all the possible advantages afforded by such a system. The benefits for students include a nurturing of self-learning ability as they acquire not just explicit, formal knowledge, but also the ability to behave as community members. Learning in this community-based setting draws attention away from the abstractness of ideas presented in the absence of context and negotiation and focuses on communities in which knowledge takes on authentic meaning for its members.

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