Hammering a Nail with a Saw: The Constraints of "One-Size-Fits-All" Technology in Supporting Online Communities of Science Teachers

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ABSTRACT

To eliminate the gap between university teacher preparation and the induction years of teaching elementary science, an Elementary Science Learning Community (ESLC) was established to support prospective teachers during teacher education, induction, and beyond. This pilot study explored science teachers' perceptions of belonging as member of an online learning community as well as their expectations and needs of a supportive online learning community. The results indicate teachers' desire to have more social interaction with classroom teachers through ESLC and provide insights for improving the ESLC.

INTRODUCTION

Science teaching in the U.S. has been characterized as presentation of a collection of facts and discussion of textbook readings or a barrage of disconnected activities (Anderson & Smith, 1987; Gee & Gabel, 1996; Moscovici, 1998; Prather, 1993). In 1996 the *National Science Education Standards* (NSES) put forth a vision of science education for K-12 that enables students to 1) experience the richness and excitement of knowing about and understanding the natural world; 2) use appropriate scientific processes and principles in making personal decisions; 3) engage intelligently in public discourse and debate about matters of scientific and technological concern; and 4)increase their economic productivity through the use of the knowledge, understanding, and skills of the scientifically literate person in their careers (NRC, 1996, p.13). Results from the 1993 and 2000 National Surveys of Science and Mathematics Education (Smith, Banilower, McMahon, & Weiss, 2002), however, suggest there has been little change in science instruction in the nation as a whole since the *Standards* were published. The *Standards* describe a continuous, career-long process of learning in which science teachers have regular, sustained opportunities to engage in inquiry, knowledge acquisition and integration, reflection, and collaboration (NRC, 1996). Yet, the current status of science teacher education does not effectively connect teachers' university preparation and continued education throughout their careers (Kahle and Kronebusch, 2003). In this paper, we explore the use of technology to support online communities of practice that facilitate teacher learning throughout the professional continuum. Specifically, we report the results of a pilot study of teacher learning in an online environment for preservice and beginning elementary teachers. The purpose of this community was to bridge the gap between university preparation and teacher induction in regard to elementary science teaching.

THEORETICAL FRAMEWORK

Teacher Professional Continuum

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Researchers recognize a professional continuum of learning that spans preservice teacher education, induction of beginning teachers, and continued professional development (e.g., Feiman-Nemser, 2001). However, as Goodlad (1990) describes, there is a general lack of collaboration and connectedness between schools of education and K-12 education. Universities typically regard preservice preparation as their task, with responsibility of new teacher induction resting with schools (Feinman-Nemser, 2001). In particular, the science teacher education continuum has been criticized as "a fractured system, lacking both continuity and accountability" (Kahle & Kronebusch, 2003 p.585).

The consequences of discrete and disconnected experiences are profound. During induction, for example, novice teachers are often overwhelmed with the number of duties and responsibilities that are part of the teaching job (Kagan, 1992; Fessler & Christensen, 1992; Huberman, 1993) and the feelings of isolation that characterize teaching alone for the first time (Holt-Reynolds, 1995). As such, novice teachers may rely on whatever practices enable them to survive, whether or not these are best practices. Rather than implementing reform-based practices learned in their teacher education program, they may "adopt ways of thinking and acting that [place] them in harmony with the existing occupational culture" (Schempp, Sparkes, & Templin, 1993, p.448). In this way, Fieman-Nemser argues, teacher education programs represent only a "weak intervention compared to the influence of teachers' own schooling and their on-the-job experience" (2001, p. 1014). In order to bridge the gap between university preparation and teacher induction, there must be a means for assisting teacher in implementing what they learned in their teacher education programs *and* continuing build upon this knowledge base. Technology which provides synchronous and asynchronous virtual space may enable innovative solutions to address this need. There is evidence that such virtual spaces may support teacher learning by bringing together communities of practice (Wenger, 1998).

Community of Practice

According to Preece (2000), an online community consists of people, shared purpose, policies, and computer systems. People achieve a shared purpose by participating in the practices of the social community (Wenger, 1998). Thus, online communities can be considered communities of practice (COP), which Wenger (1998) defines as groups of people who join together with a common purpose and share a common practice. Lave and Wenger (1991) argue "activities, tasks, functions, and understandings do not exist in isolation; they are part of broader system of relations in which they have meaning. These systems of relations arise out of and are reproduced and developed within social communities, which are in part systems of relations among persons" (p. 53).

The social organization of schooling and the culture of teaching make it difficult for mentors and novices to work together in productive ways (Feiman-Nemser, 2001). Teachers most often work alone in their classrooms, out of sight of other colleagues and protected by norms of autonomy and noninterference (Lortie, 1975). Additionally, the school day does not provide extended opportunities for teacher collaboration outside of student responsibilities. Web-based communities are one means for bringing teachers together across physical barriers of distance and time, as well as social barriers of isolation. Furthermore, such virtual environments may provide a "safe" venue for teachers to share problems and seek assistance without worrying that they will be assessed. Huling-Austin (1990) identifies assistance and assessment as incompatible tasks, arguing that teachers

may be less likely to share their struggles and concerns when they are being evaluated.

Online Communities of Practice in Teacher Professional Development

Teacher online learning communities have been established through courses in teacher education, such as LabNet (Roup et. al., 1993), Concord Consortium (Lu & Rose, 2003), English teacher online learning community (Steele, 2002). However, previous research indicates it is difficult to provide coherence with teachers' needs and practical teaching through a "course" structure in online learning communities (Desimone, Porter, Caret, Suk Yoon, & Birman, 2002). An online course may simply be a computer-based form of "one-shot workshops," which have been criticized as ineffective forms of professional development. Teacher development, instead, occurs over the long term and throughout a professional continuum of learning (Feiman-Nemser, 2001). A teacher online learning community, therefore, needs to be a continuous space where supports will always be available for teachers no matter where the teachers are.

One example of such an online space is the Inquiry Learning Forum (ILF, http://ilf.crlt.indiana.edu; Job-Sluder & Barab, 2004). The ILF is a CoP for teacher professional development, which was created in 1999 by researchers at the Indiana University School of Education. Barab, MaKinster, and Schekler (2004) utilized Lave and Wenger's (1996) CoP framework to create a "visit to the classroom" metaphor in which the interface is structured with various types of rooms, such as Lounge is a public discussion area for general topics, the Library is a place for members to share lesson plans and resources, and Inquiry Lab is to support members' professional development in inquiry-based pedagogy. Though initially developed in order to build a state-wide community of math and science teachers online, as Moore & Barab (2002) reported, a barrier to building this community was teachers' reluctance to participate without initial face-to-face interactions. Barab, Makinster, and Scheckler (2004) described how later the ILF began integrating pre-service teachers' courses of teacher education with in-service teachers' professional development training.

Another online teacher CoP is Tapped In (www.tappedin.org; Gray & Tatar, 2004), which is organized around the metaphor of a conference site with a multi-user virtual environment for supporting teachers' professional development (Gray & Tatar, 2004). CMC tools are used to support members' synchronous and asynchronous communication of the activities including course and workshop sessions, group meetings, and public discussion pertaining to K-12 teaching. Members login to Tapped In seeking ideas and colleagues outside of their local practice and exploring the affordance of the online learning communities. Schlager and Fusco (2003) found that "Tapped In has been quite successful in achieving its original goal of bringing together and forging new relationships among education practitioners, providers, and researchers from around the world on a daily basis" (p.204).

Elementary Science Learning (ESLC)

The ESLC is a web-based learning environment constructed around the central tasks of learning to teach (Feinman-Nemser, 2001). Utilizing a WebCT platform, the ESLC provides resources, tools, and learning tasks to assist members in enhancing their knowledge and skills for teaching elementary science. For example, the current site (see Appendix A) includes resources, discussion forums, internal email, chat rooms, and

member pages to facilitate getting to know other members.

Similar projects, such as the Inquiry Learning Forum have had *creating* online communities of science teachers as their goal (Moore & Barab, 2002). The ESLC differs in a critical way—it is an outgrowth of the community that is built during face-to-face interactions among prospective teachers within their teacher education program. The ESLC is thus a way to sustain an existing community to support teachers' continued learning throughout their induction and professional careers. The project is an outgrowth of the interest a science educator had in maintaining relationships with former students and enabling them to maintain relationships with each other.

Previous research indicates that while teachers need access to knowledgeable sources outside their immediate circle, effective professional development draws from "the collective wisdom that thoughtful teachers can generate by working together" (Feiman-Nemser, 2001, p. 1042). In a COP, legitimate peripheral participation is the process by which a new member becomes part of a community, while more knowledgeable members plays a central role of the community (Wenger, 1998). Thus, in designing the ESLC, the science educator believed it would benefit all members by building a space for teachers at different stages in the professional continuum (i.e., current students as well as graduates of the teacher education program). Ebenezer, Lugo, Beirnacka, and Puvirajah emphasize that collaboration and exchange with others in online communities can enhance teacher reflection by "generating and unfolding ideas in multiple perspectives and solutions that contribute to better and mutual understanding" (2003, p. 309).

PURPOSE OF THE STUDY

The purpose of this pilot study is to investigate elementary science teachers' needs and learning experiences in the ESLC, a web-based community hosted through WebCT. Specifically, we are interested in understanding how the tools and resources available in ESLC enable teachers to engage in the central tasks of learning to teach at each stage in the professional continuum. The research questions are as follows:

1. What are teachers' needs and expectations for participating in an online community of practice such as the ESLC?
2. How do teachers utilize WebCT tools to meet their needs and expectations for participation in ESLC?
3. What are teachers' perceptions of the value of membership in a professional online learning community in supporting their learning to teach?

The results of this pilot study provided will provide information about how to address elementary science teachers' specific needs across the professional continuum through online communities such as the ESLC. These results can be used to further develop the ESLC, which in turn can enhance teachers' learning through the social interaction of the community.

RESEARCH METHOD

We employed a mixed research method with both quantitative and qualitative data collection techniques to triangulate teachers' needs, expectation, and experience as members of the ESLC and to establish a model of elementary science teachers' learning in

an online community. In this manner, we adopted a phenomenological perspective (Taylor & Bogdan, 1984) to understand ways in which participants' experiences in the ESLC might differ from one another according to their stage in the professional continuum.

Participants

Members of the ESLC are currently or will become elementary teachers, and all have been or are currently enrolled in courses taught by the second author. These courses included both specialized physics courses for teachers and elementary science methods courses at two Midwestern universities (1999- present). Thus, the community is composed of preservice teachers, student teachers completing their internships, and practicing teachers. While most are located in the Midwest (Indiana and Missouri), there are also members who now reside in California, Texas, Georgia, and Nevada. The ESLC was established in the fall of 2005 and invitations were sent via email to potential members by the second author. 76 indicated interest in the site and were given usernames and passwords; however, only 45 of those actually logged into the site at least once. Table 2 provides a profile of the ESLC members.

Table 1. Status and Origin of ESLC Members

Phase in Continuum	Teacher Education Program	# of Accepting Invitations to Join ESLC	# of Utilizing the Site at Least Once
Prospective teachers	University 1	25	25
Student teachers	University 1	17	9
	University 2	15	7
Beginning/ early career teachers	University 1	5	3
	University 2	14	11

All 76 members, including those who did not utilize the site, were invited to participate in an online survey. The 23 members who responded to the survey were then invited to participate in a focus group or individual phone interview. A total of 4 phone interviews and 1 focus group with 3 participants were conducted. Individual interviews and focus group sessions were purposefully selected to solicit perspectives from members with varying levels of activity and participation in the ESLC. By this sampling, we were able to understand both frequent users and non-frequent-users' perspectives of needs and expectations of a collaborative online learning community. Table 3 presents the demographic information of participants who completed the online survey, focus group interviews, and individual interviews.

Table 2. Demographic Information for Survey, Interview, and Focus Group Participants

	Gender		Current Stages			Online Learning Experience		ESLC Experience			
Methods	Female	Male	Teacher Education Program	Student Teaching	Classroom Teaching	Blended learning	Online course	Never Login	Login 1-5 times	Login over 5 times	**Total**
Online Survey	22	1	8	10	5	13	3	3	5	15	23
Semi-structure	4	0	2	1	1	4	2	1	3	0	4

interview											
Focus group	2	1	3	0	0	3	0	0	0	3	3

Data Collection

The ESLC Online Learning Experience Survey, adapted from the Online Learning Experience Study Survey (OLESS) (Yang, Tsai, Cho, Kim, & Laffey, 2006) includes 7-point Likert scales response items. We modified the Technology Acceptance Model (TAM), motivation, learning satisfaction, and course evaluation items of this survey and added a section indicating what activities participants have been doing in ESLC to meet the purpose of present study. Thus, the adapted survey includes TAM items classified into WebCT tools' ease of use and usefulness aspects, motivation items categorized as intrinsic goal orientation, self-efficacy (of learning in ESLC), and task value aspects, learning satisfaction items, and site evaluation items. The Cronbach α reliability estimated from our data were 97.3% for TAM, 98.3% for motivation, 96.7% for learning satisfaction, and 91.2% for site evaluation.

A semi-structured interview protocol was developed to probe participants' background, previous and current experiences using online spaces, and their experiences in the ESLC. Follow-up questions were asked to understand both frequent users and non-frequent-users' perspectives of needs and expectations of a collaborative online learning community. Table 3 presented detail information of data collection.

Table 3. Methods of Data Collection

Methods	Tools	Data
Survey	ESLC Online Learning Experience Survey	Teachers' perspectives about social interaction, individual motivation, technology use, and satisfaction in the ESLC
Focus Group & Individual Interviews	Semi-structure Interview Protocol	Teachers' perspectives of utilizing and collaborating in the ESLC Teachers' perspectives of needs and expectation for improving collaborative learning in ESLC

Data Analysis

The researchers utilized SPSS© to analyze quantitative survey data. The analysis of the survey focused on several aspects of learning in online environments that can help the researchers better understand how the ESLC facilitates members' completion of the central tasks of learning to teach; these include 1) ease of use, 2) perceived usefulness, 3) intrinsic goal orientation, 4) self-efficacy, 5) task value, 6) learning satisfaction, and 7) site evaluation. Qualitative data were analyzed by using Nvivo©, a qualitative analysis software. The analysis of qualitative data focused on teachers' multiple perspectives of needs and expectation of a collaborative online learning community which assist their professional development. Particularly, teachers' suggestions of improving ESLC are helpful for further development of ESLC.

The first author examined interview transcripts and created a coding schema using line-by-line coding (Charmaz, 2000). This schema was independently reviewed by the second author, and upon reaching inter-rater consensus, the researchers organized the codes into categories related to (1) aspects of the ESLC teachers found valuable, (2)

aspects of the ESLC that served as barriers to their participation, and (3) teachers' suggestions for improvements to the site that would better meet their needs and expectations. A constant comparative method was used to (1) compare responses of different teachers, (2) compare transcripts and survey data with the categories generated, and (3) compare the categories to teach other. Through this process, three emerging themes were identified.

RESULTS

Based upon the Pearson correlation score and mean score of different aspects of the survey, the participants' learning satisfaction of ESLC appeared to have at least moderate significantly statistic correlation with their perception of ease of use (r=.64) and usefulness (r=.75) of WebCT tools and learning motivation, including task value (r=.40) , intrinsic goal orientation (r=.50), and self-efficacy (r=.45).

Table 4. Correlation Table

	Perceived ease of use	Perceived of usefulness	Intrinsic goal orientation	Self-efficacy	Task value	Learning satisfaction	Site evaluation
Perceived ease of use	1.00						
Perceived of usefulness	.86**	1.00					
Intrinsic goal orientation	.38	.56**	1.00				
Self-efficacy	.73**	.75**	.68**	1.00			
Task value	.71**	.69**	.70**	.91**	1.00		
Learning satisfaction	.64**	.75**	.40**	.50**	.45*	1.00	
Site evaluation	.67**	.79**	.54**	.67**	.61**	.78**	1.00

Note: n=23, α=.05

Table 5. Descriptive Statistic of Aspects

Aspects		Mean (M)	SD	Reliability
TAM	Perceived ease of use	3.45	1.89	97.8%
	Perceived usefulness	3.80	1.71	94.6%
Motivation	Intrinsic goal orientation	4.64	1.44	91.7%
	Self-efficacy	4.39	2.02	98.3%
	Task value	4.83	1.93	98.1%
Learning satisfaction		3.69	2.13	96.7%
Site evaluation		4.16	2.03	91.2%

Note: n=23

According to the quantitative and qualitative data analysis, three primary themes were identified. First of all, while members were highly motivated to participate in the community, they did not experience a high degree of learning satisfaction while using the WebCT tools in ESLC. Second, while prospective teachers did not experience a high level of satisfaction with the ESLC, they did perceive usefulness for the site in their future student teaching and classroom teaching experiences. Finally, social interaction within the site was limited to some degree by the functionality of available tools within WebCT, as such members expressed frustration and provided suggestions for improving the functionality of the space.

Motivation

To be more specific, participants appeared to have high motivation to participate in the community. Although the ESLC was introduced in an elementary science methods course, students who were taking this course participated in the ESLC voluntarily. Thus, only two students (9%) indicated their participation was due to a desire to complete learning tasks of this class. After participating in the ESLC, there was a higher percentage of members (48%) who responded that gaining insights and advice from other teachers including classmates, education majors further along in their program, and in-service teachers who are teaching in schools is the primary reason to motivate them to participate in ESLC. Additionally, getting science teaching resources *and* support from others (35%) is another important reason that influenced their decision to participate in the ESLC. Hoping to get help and ideas from someone who encountered same problems (13%), sharing information and personal insights (13%), establishing teaching network (9%), professors' recommendation (4%), and being engaged in using technology tool (4%) are the other reasons that attract members to join the community. To confirm the result of the survey, members who participated in phone interview and the focus group indicated that having the chance to establish a teaching network, to connect with previous classmates or other teachers in the field, and to have a support system and resources were the primary goals for them participating in the ESLC.

Learning Satisfaction

In comparison to motivation to participate in the ESLC, participants' learning satisfaction was not as high as what we expected. Teachers expressed a moderate learning satisfaction (M=3.69, SD=2.13) in ESLC. The reason for the moderate learning satisfaction might be due to participants' feelings about the technologies or tools applied in the community. The ESLC includes basic WebCT features such as an open discussion forum where members can share information or ask questions, WebCT mail function, private or public chat room, and file sharing space for members to easily share and access teaching resources. Participants felt the ease of use (M =3.45, SD=1.89) and the usefulness of the technologies (M=3.80, SD=1.71) in the ESLC was not as satisfactory as we anticipated. We recognize that because some members did not login and utilize these tools frequently, they may not have had sufficient opportunity to become familiar with the functions of the tools. Only three members who participated in survey, interview, or focus groups had previous online learning experiences in which their course was delivered through groupware system entirely. Most of the participants were not familiar with the functions of the discussion board of WebCT, such as changing the list order by author name in the discussion board. Based on this, we believe a more in-depth orientation for using the functions of the system would be very helpful.

It should be noted, however, that in addition to technological barriers, participants identified several other reasons for their lack of participation in the ESLC. These included internet accessibility and connection speed, lack of time. Additionally, pre-service teacher members expressed not having many questions related to their *practice* since they were not yet teaching lessons in their field experience.

Perceived Usefulness of the ESLC

Despite this, prospective teachers did perceive the benefits for the site (M=4.16, SD=2.03) in their future student teaching and classroom teaching experiences. They identified the member page feature of WebCT as a major channel to get to know other members. All ESLC members were encouraged to set up a member page which indicated their name, location, interests and so on. Thus, some members indicated that they got sense of other members' identity, which helped them interpret postings in the discussion forums. For example, one respondent said:

> "I read the member pages…it is interesting to read what other people have….Good to get to know *what* that person does and what that person's like. And then you see they post something. And so it like if that person's a teacher you can go to their member page and see that they're a teacher and then see oh this is a teacher that wrote this. So, it just helps a lot."

Additionally, members who were taking the elementary science methods course indicated that though they might not have many questions to ask right now, they know that they can go back to the discussion board to ask questions when they need to do so in the future. A member said:

> "I don't think I had that many questions right now, but I think that I would definitely go back. Maybe next year when I'm doing my student teaching. And I would look on there to see people who are current teachers. Or even ask people that are in the class right now, if I forgot something, or if they're doing something new. If I needed suggestions. So I think I would ask the people more questions than the teacher that I did."

Overall, participants appreciated that the advantages of ESLC, including information and resource sharing, establishing network, and diverse insights from other teachers, were helpful for their learning to *teach* science.

Constraints of WebCT and Suggested Improvements to the ESLC

Our data highlight how WebCT tools constrained the way members communicated with each other. Social interaction within the site was limited to a certain degree by the functionality of available tools within WebCT. For example, members had no social awareness in the site; that is, when they logged in, there was no way to identify other members who were also logged in at that same time to interact with them. Similarly, features they were used to using in other online spaces, such as clicking on a person's username to send an instant message, were not available in the WebCT environment, and thus limited their ease of communication.

Participants expressed several frustrations and suggestions for improving ESLC. They indicated that a notification, such as via email, listing authors, topics, and time of the postings, would be very important for them to be aware of current activities and information in the ESLC, particularly when they were off-line. As one respondent said:

> "I would say probably just maybe an email here and there, like, about what's going on in it or an update if there's any new things… just so that I don't forget that it's even there, you know, because when I start teaching, I might ….have a lot on my plate and I think if I had an email that had a link to it and there are some ….said, "Oh, check this out" and that I might – I'd be more likely to think, "Oh, yeah" and look at it and log in."

Private discussion spaces and notification of people's availability for chat would also enhance members' communication in the ESLC. Members indicated a desire for instant chat that could be accomplished by clicking on a users' name in discussion board *and* for notifying them of others' presence in the site. By knowing others who are present in the site, they would be able to send them an instant message to ask for a question or to ask them meet in the chat room. A member said:

> "Maybe even on the discussion board.. they'll have their name… it'll be bolded so you can click on it, and the it'll just pop up a little message. Then you can send a message to them or something. And ask questions about it. It's like, if you could click his name. And have him send, it send him a message. And then like when he opened it up it'd say you have one new message. And as often as you run through that page, if you the next time I refreshed a page, it had a java script that popped up and said, Ally's waiting for you in chat room one. Or if I just sent him a message. And then you could just reply to my message. Just a way to send, just send spontaneous messages through there so another person online could instantly be aware. Or even see who's online, cause then you could send them a message."

In addition to communicating with others, members expressed a need for a way to track and organize their own communication through a personal workspace for monitor self postings. For example, one respondent said:

> "I have something that I just don't like in general. I wish you could click, underneath discussions you could – like it would show all the discussions you've ever posted. Cause I forget. And especially on, for field. I don't remember what all I wrote. And it's hard – if I just want to go and see what somebody replied to me if I don't remember what heading I put it under. You have like five hundred or six hundred to go through. So I wish you could just click and see all the ones that you've posted."

Getting to know other members can be important for fostering a sense of community. This was especially critical to foster connections and interaction between graduates (former students) and current students. Although the information found on member pages facilitated this to some degree, members also suggested that having more specific information about each member's teaching or learning, such as current teaching situations, grade level they teach, and personal background would make them feel like they really know the people more. One respondent suggested the use of standardized "profile" information that members could enter and that would be listed on their page:

> "if you had a page, that they filled out their name where they're teaching now, what grades they've previously taught, what year they're teaching. That would be interesting. You know, talking to somebody who's taught three different years in all different grades. And leave an open spot where they could write what they want."

Finally, the shared resources need to be organized based upon clear title, course schedule, and graduated year. The participants really enjoyed having supportive resource that they can utilize; however, they expect to have more structured way to locate the resource for their easily use.

DISCUSSION

In order to bridge the gap between university teacher education and teacher professional practice, an online learning community, such as ESLC, can be a way to make

learning how to teaching elementary science fluent across teacher education, student teaching, induction years of teaching, and beyond. Confirming the results of Rovai (2003), which indicates learners believe they are members of a community of practice tends to have higher learning satisfaction, members of the ESLC indicated that having more social interaction and sharing of practice were reasons which attracted them back to the community. However, as Moore and Barab (2002) suggested, it is critical to overcome the barriers caused by not meeting fact-to-face. Members who were logged in at the same time in WebCT might nonetheless feel "alone" in the space without being aware of each other's presence. The WebCT tools' ease of use and usefulness were not be able to satisfy members' needs for social interaction and sense of community. In those cases, members failed to return to the site on a regular basis. Even those who did utilize the site relatively frequently, however, suggested that providing supports such as notification tools and a means to identify other members who were logged in would be useful in facilitating their social interaction online.

We feel that while some of the frustrations members experienced could be addressed through enhanced facilitation of the site (e.g., by organizing "events" and/or live chat sessions to invite members' interaction), that there are also some features of the WebCT environment that cannot provide the optimum social awareness to members to foster a sense of community in an online space. In this sense, despite its potential, WebCT may not be the right tool for the job—that is, we may be hammering a nail with a saw. Ebenezer, Lugo, Beirnacka, and Puvirajah (2003) also investigated community building for reflective practice in WebCT, specifically for student teachers:

> Although the students (pre-service teachers) who participated in this [web environment] were not asked directly if they experience community—the data, which is to say the dialogues conducted online, seem to indicate that they did….Did WebCT bulletin board help in building a community of pre-service teacher inquirers for carrying out reflective dialogues in this study? One the basis of the evidence indicated in the postings on the bulletin board, we answer the question: Yes, WebCT was helpful in community building to engage in reflective dialogues (p. 409).

We argue that "community" activity extends beyond asynchronous discussions in a bulletin board, and question whether it is valid to draw inferences from this data source alone to justify that "community" exists. In our study, for example, members posted within the discussion boards and replied to posts of others; however, they nonetheless in interviews expressed feeling disconnected from the larger membership of the ESLC. Our participants indicated they enjoyed the opportunity to talk with others in the ESLC about teaching, but they did not feel the information delivered through WebCT tools support their connectedness and relationships with others.

From our data, we assert that the optimum groupware system for the ESLC should extend beyond asynchronous discussions in discussion bulletin by supporting social awareness of knowing other members presence or current status (i.e. reading message, replying to others, chatting with others), knowing what is happing in the community with or without login to the site, and providing social cues to facilitate the interaction among members. In our study, participants expressed their desire for a social network with other teachers through a low-cost and efficient ways. However, the supports of WebCT do not

quite satisfy members' needs of social awareness and social interaction. There are two fold of modification need to be made for improving the social interaction of ESLC. First, better tools for establishing social awareness of members, activities, and community, members' personal information, communicating opportunities, and collaboration are needed. In further study, we will move ESLC to a better supportive online collaborative groupware and establish systematic central tasks for promoting their professional development and sense of community.

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