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LEARNING TO TEACH ONLINE: WHAT WORKS FOR PRE-SERVICE TEACHERS

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ABSTRACT

While opportunities for online learning are increasing in K-12 education, few teacher education programs include courses on online teaching and learning. Using Garrison and Anderson's (2003) *Community of Inquiry* framework, this qualitative study explored the educational experiences of pre-service teachers in an experiential online course designed to teach about online teaching. Students explored aspects of online education and created a multi-media teaching module. The study highlighted the need for pre-service teacher education programs to design learning experiences that equip the next generation of teachers with the skills required to teach 21st century students in a variety of media that accommodate a diversity of learning styles.

INTRODUCTION

According to 21st Century Schools (2008), education in the new millennium "addresses a rapidly changing world filled with fantastic new problems as well as exciting new possibilities" (n.p.). Online learning has established its value in the K–12 education system by offering flexible and creative alternatives for K-12 students. It provides options to fill voids that school districts may find difficult to

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address, such as: the lack of access to courses; advanced placement (AP) or college level courses; a scarcity of highly qualified teachers; growing student populations and limited space; course scheduling conflicts; the inability of students to work within the prescribed school schedule; and credit recovery programs with the aim of raising graduation rates (National Center for Education Statistics, 2005; Trotter, 2008; Watson, Gemin, & Ryan, 2008).

According to *Keeping pace with K-12 online learning: A review of state-level policy and practice* (Watson, et al., 2008), there has been an enormous growth in K-12 online course offerings over the past 5 years. Such expansion has created an increased demand for online teachers (US Department of Education, 2004). Rice and Dawley (2007) questioned "Who are these teachers, and how are they successfully learning to teach online?" (p. 8). Teachers are an integral part of learning online (Watson, 2007). However, the skills for effective online teaching extend beyond the competencies required for successful teaching in the traditional classroom, and include mastering the technology and tools of the online delivery platform, heightened communication skills, and good time management because students and teachers can be online at any time. Therefore, more forward planning is required than is usual for traditional classrooms (Watson, 2007).

While Ferdig, DiPietro, and Papanastasiou (2005) contended that online education can be successful provided it is designed with effective pedagogical strategies in mind and taught by instructors who are qualified in teaching online, according to Smith, Clark, and Blomeyer (2005), many K-12 teachers currently teaching in online environments lack both theoretical and practical understandings of teaching and learning online. In an analysis of the current status of professional development for K-12 online educators, Rice and Dawley (2007) found that prior to teaching online: 62% of teachers had no training in teaching in this medium; few had formal academic training in the online teaching; and most learned on the job and rarely were provided with release time, extra funding, or acknowledgment of their efforts. Hence, online teachers were frequently overwhelmed by the effort (Smith et al., 2005). Furthermore, Watson (2007) claimed that "many educators and policymakers remain unaware of the basics of how online education programs operate, what an online course looks like, and most fundamentally, how students can learn online" (p. 3).

The National Educational Technology Plan (U.S. Department of Education, 2004) placed high emphasis on e-learning, stating that federal, state, and local education agencies should provide every student access to e-learning and enable every teacher to participate in e-learning training. Similarly, the Partnership for 21st Century Skills (2007) advocated that teacher education institutes add 21st century skills competencies, in particular in information and communication technology (ICT), to the accreditation criteria for teacher education programs. Pre-service teachers need not only to understand how to use new technologies, but also how to use them effectively to design meaningful learning experiences (Brush, Glazewski, Rutowski, Berg, Stromfors, Van-Nest, et al., 2003; Dawson, Pringle,

& Adams, 2003; Ertmer, 2003; International Society of Technology in Education, 2002; Pope, Hare, & Howard, 2002; Selinger, 2001). However, currently most traditional and alternative teacher education programs do not prepare new teachers for teaching online (Jung, 2005; National Education Association, 2006).

PURPOSE OF STUDY

This empirical study followed a unique, experiential, online course for pre-service educators, the objective of which was to introduce them to online teaching. Using a social constructivist approach to teaching and learning with technology, the aim was to create a community of inquiry that focused on engagement of participants in the educational experience through interaction, collaboration, and reflection.

The purpose of this study was first to explore the educational experience of pre-service student teacher participants as they learned about teaching and learning online. The focus was in three areas using Garrison and Anderson's *Community of Inquiry* framework: these areas were the cognitive domain, the social domain, and the teaching domain (Garrison & Anderson, 2003; Garrison & Vaughan, 2008). The second objective was to dialogue and reflect with students on how to improve the online educational experience, and thus contribute to the ongoing conversation on effective online pedagogy.

The research questions guiding this study were:

1. What are the educational experiences of pre-service teachers in an online course on online teaching?
2. What can instructors do to enhance the online learning experience for students?

LITERATURE REVIEW

Traditional K-12 schools are turning to online opportunities to expand options for students and to provide professional development for teachers (Technology Counts 2007, 2006). Don Knezek, chief executive officer of the International Society for Technology in Education, declared:

> [I]t is difficult to imagine a young learner today that will not see virtual education play a role in her/his learning future. What we must realize is that for an effective 21st century teacher the same is true . . . for that teacher's own learning and for that teacher's teaching. (Technology Counts 2007, 2006, para 4).

However, currently, with the exception of Alabama and Kansas, while requiring that online teachers meet state standards of licensure and certification, most states have no further training requirements for online teachers (Watson et al., 2008).

It is difficult to estimate the actual numbers of K-12 students currently enrolled in online courses full-time or as a supplement to traditional classes in North America. While some U.S. states collect detailed information on K-12 online programs, many states have no data collection requirements to track the number of students taking online courses, the online programs that exist, and how those programs are operating (Watson, 2007). Picciano and Seaman (2009) estimated the overall number of K-12 students engaged in online courses in 2007-2008 at 1,030,000, representing a 47% increase since 2005-2006. As of September 2008, Watson et al. (2008) reported that 44 states had implemented some combination of supplemental online learning programs, full-time online programs, and blended learning opportunities, with considerable growth in the number of students enrolled in these options. Supplemental online programs offer online learning courses to students who are otherwise enrolled in physical schools, while blended learning opportunities comprise part online and part traditional face-to-face instruction (Watson, 2007). Of the remainder of states not currently using online alternatives, several are in the planning process for online learning development (Watson et al., 2008). In addition to developing and providing their own online courses, school districts typically depend on multiple online learning providers, including post-secondary institutions, state virtual schools, and independent providers (Picciano & Seaman, 2009).

According to Watson (2007), online education is proliferating because technology in education is not only appropriate, but also necessary to educate 21st century students for whom technology is their path to information, the way they communicate and form social networks, and a main source of entertainment. Further, it is a response to the need for reform in K-12 education to meet the needs of a society in which 90 percent of the fastest growing jobs require a college degree, and only 70 percent of students in public high schools graduate (Watson, 2007). According to Watson et al. (2008), online education can foster 21st century skills, such as self-direction in learning, time management, personal responsibility, and technology literacy in the context of problem solving and global awareness.

While innovative technologies have created new possibilities for teaching and learning, at the same time they have placed demands on teachers to learn how to use these new technologies in their teaching (Robinson & Latchem, 2003). The question is: Are today's teachers able to meet these new demands? (Watson, 2007). A common assumption by school and district administrators is that new teachers, fresh from college, and members of a generation that has been immersed in technology, will somehow be able to bridge the chasm between technology presence and use. However, according to Jacobsen, Clifford, and Friesen (2002), this is a misconception. Few pre-service teachers bring the skills and experiences that are needed to transform today's classrooms. Several reasons exist for this false assumption. In teacher education, information and communication technology courses are frequently optional, or are just an area of specialization for a few

pre-service teachers. In addition, when such courses are compulsory, their focus is more on software applications than on technology-infused curriculum design (Jacobsen et al., 2002). The NEA (2007) reported that most traditional and alternative teacher education programs do not prepare new teachers for teaching online. To overcome this deficit, NEA recommended that accreditation criteria for teacher education institutions and programs should include an analysis of their competency to equip new educators to instruct online, and that the ability to instruct online should become part of the licensure requirements for new teachers.

Combining new technologies with effective pedagogy is a daunting task for both initial teacher training and in-service training institutions (Jung, 2005). Jung suggested teachers are likely to benefit by actively experiencing technology skills as a learner. Similarly, Guy and Li (2002) claimed that infusing technology into methods courses provides a meaningful context to embed technology into subject matter. In addition, Mullen (2001) emphasized that teacher education programs should help student teachers to develop sound pedagogical rationales for teaching with technology along with opportunities to reflect on their experiences. The aim is not to view technology as a content area, but rather as a pedagogical tool that can improve learning or change how learning occurs, yet leave the content relatively unchanged (Downes, et al., 2001). Despite these suggestions, Angeli (2004) concluded that integrating technology into methods courses in teacher education is difficult and requires commitment to gaining expertise in practical settings. Effective online pedagogies for ICT teacher training have yet to be explored (Jung, 2005).

Given Picciano and Seaman's (2009) conclusion that online and blended learning environments will play a large role in K-12 education in the future, teacher education programs need to prepare future teachers with the skills to succeed in these environments. To fully understand the complexities of teaching online, online instructors should have firsthand experience as learners in an online environment (Duncan, 2005). The best way to understand the range of issues that surround teaching with technology is to actively work through them. Students are more engaged in learning when they actively construct knowledge by collaborating with peers to relate information to practice (Norton & Sprague, 2001).

THEORETICAL FRAMEWORK

The learning theory that grounds this study is social constructivism (Vygotsky, 1978). Social constructivists believe that individuals construct their own learning by building on previous knowledge and experience, and through interactions with others. Learning is active and student-centered, and is dependent on an interactive, mutually respectful relationship between the learner, other learners, and the teacher (Carlile & Jordan, 2005). Learners have autonomy, and consequently must take increased responsibility for their own learning (Lea, Stephenson, & Troy,

2003). The role of the teacher is to facilitate meaning making and understanding (Carlile & Jordan, 2005).

Community of Inquiry

To conceptualize the educational experience of pre-service teachers in this study, Garrison and Anderson's (2003) *Community of Inquiry* framework was used. Garrison and Anderson (2003) defined a community of inquiry as:

> A critical community of learners . . . composed of teachers and students transacting with the specific purposes of facilitating, constructing, and validating understanding, and of developing capabilities that will lead to further learning. Such a community encourages cognitive independence and social interdependence simultaneously. (2003, p. 23)

The centerpiece of the *Community of Inquiry* framework is the educational experience, which is embedded in three interdependent core domains, each of which supports the other. The three domains are social presence, cognitive presence, and teaching presence. To study the teaching and learning transaction, Garrison and Vaughan (2008) operationalized these domains into categories and indicators.

Social Presence

Social presence is a pre-requisite for building community and establishing cognitive presence. The aim is to create a climate of trust by promoting and supporting open communication and interaction. According to Garrison and Vaughan (2008), social presence online is less frequent and more intentional than in a face-to-face environment. Social presence comprises three categories that are progressive and help establish and grow a community of inquiry. The first, *open communication*, is indicated by enabling risk-free communication, which is important to meaningful interaction and trust-building. The second, *group cohesion,* is indicated by encouraging collaboration, acknowledging individuals' presence, encouraging, affirming, and thus creating purposeful relationships. Third, *affective/personal,* is indicated by expressing emotions: to engage in meaningful dialogue, students must feel emotionally secure (Garrison & Vaughan, 2008).

Cognitive Presence

Cognitive presence grounds an intellectual environment that supports sustained critical discourse and includes a cycle of interaction and reflection. Cognitive presence comprises four categories. The *triggering* phase, in which a problem is identified, may be indicated by a sense of puzzlement; for example, questions such as why, how, and what if ? *Exploration* is the second phase in which participants gather, refine and exchange information. In the third phase, *integration,* the process of sense-making is where ideas are connected. Finally, in the fourth phase,

resolution, solutions are debated and new ideas applied. This cycle is recursive and nonlinear (Garrison & Vaughan, 2008).

Teaching Presence

Teaching presence categories include *design and organization* of the course, *facilitation of dialogue*, and *direct instruction* (Garrison & Vaughan, 2008). Teaching presence is often necessary to encourage the collaboration required to create a community of inquiry. Students online expect a strong teaching presence (Duncan, 2005). According to Perry and Edwards (2005), the most effective online teachers meld the social, cognitive, and teaching presences to create a community of inquiry. Teaching presence is vital to moderate, steer, and channel cognitive and social presences. Its purpose is to realize personally meaningful and educationally worthwhile outcomes. Its indicators include setting the curriculum and methods, sharing personal meaning, and focusing discussion (Garrison & Vaughan, 2008).

CONTEXT OF STUDY

This study followed a unique, experiential, online course for pre-service educators in which the focus was collaborative online learning and teaching. The purpose of the course was to help pre-service teachers develop fluency in teaching and learning online. Students were required to critically examine a variety of issues in and around the online learning and experience, and investigate, develop, and reflect on appropriate uses of online learning and teaching in K-12 education.

The course delivery platform was WebCT. Students learned about teaching online in a blended online learning format, with two face-to-face meetings on the first and last days of the semester. They explored different aspects of e-learning in weekly discussion modules (teaching and learning online; online communication and networks; computer crimes; privacy online; online safety; access and equity online; ethics; and assessment online). The practical aspects of teaching online were explored in a course-long project in which students worked in collaborative groups of three or four to develop an online unit in their teaching area. Their tasks were to build content using a variety of media and interactive course tools; upload the content to a delivery platform; and finally develop and moderate activities or discussion topics. In addition, each student was required to participate in other groups' discussion topics or activities.

RESEARCH METHODOLOGY

This was a case study of an online, process-based course for pre-service teachers. Because case study is an ideal methodology to conduct a holistic, in-depth investigation (Feagin, Orum, & Sjoberg, 1991), it seemed the most

appropriate way in which to approach this inquiry. As advised by Stake (1995), choosing to study a particular case enables a researcher to bring out a rich description of the lived experience from the participants' viewpoint. The research followed the qualitative tradition and included the collection of data from multiple electronic sources as well as from semi-structured online interviews and a face-to-face focus group. Independent Research Board (IRB) approval for the study was obtained from the instructor's university.

Participants

The participants included 19 pre-service teachers (Table 1) and their instructor. All participants had completed an undergraduate degree in their teaching area and were enrolled in a post baccalaureate in education. To avoid students feeling pressurized to participate in the study, two separate sections of the course were offered, one of which was designated for research. Students had the choice of enrolling in either the "study" or "non-study" sections. All students in the "study section" consented in writing to participate and were aware that they could withdraw from the study at any time. The teaching areas of the participants were diverse, ranging from elementary and secondary programs, and in subject areas from science and technology to English and social studies.

Although the majority of the 19 pre-service teachers rated their technology skills as medium or high, only three had previous online learning experience. Seven students were traditional (defined as attending university within 2 years of completing high school) and 12 were non-traditional. The non-traditional students brought a wide range of prior experiences, from working on oil rigs, in restaurants, in marketing, insurance, and engineering. Eleven participants were male and 8 were female.

The instructor and researcher taught at different universities. Each was experienced in developing and teaching online courses and shared common interests in exploring and improving online pedagogy. Hence, the decision to conduct this research and use it not only to investigate pedagogy and process of online teaching, but also to reflect afterwards on the ways in which our own learning from

Table 1. Pre-service Teacher Demographics

Characteristic	*n*	Characteristic	*n*
Traditional	7	Non-traditional	12
Male	11	Female	8
Medium/high technical skills	15	Low technical skills	4
Online teaching/learning experience	3	No online teaching/learning experience	16
Science/technoogy majors	13	Arts/humanities	6

the study could impact our future teaching. The instructor developed and taught the course under study. The role of the researcher was to dialogue with instructor and participants during the course to gain a better understanding of instructor/learner perspectives of the online teaching and learning experience.

Data Collection

Qualitative data were collected throughout the 4-month period of the course from course discussions, e-mail, IM, and electronic survey transcripts. These data sources indicated: who was interacting; who was supporting; who was sharing knowledge; who was questioning; who was reflecting; and who was synthesizing. In the second week of the course, the researcher e-mailed a brief survey to participants that asked about: previous online course experience; reasons for choosing to learn online; comfort level with the technology; the clarity of the course expectations; and what they liked about and did not like about the course so far. Throughout the course the researcher corresponded with participants by e-mail to obtain student and instructor feedback about the learning experience. Data gathered by the researcher from students were not shared with the instructor until after the course was complete and grades assigned. The instructor conducted a final focus group with all student participants to explore ways to improve the content and process of the class.

Data Analysis

Data from all electronic sources were coded with ATLAS^{ti} using the elements, categories, and indicators from Garrison and Anderson's (2003) Community of Inquiry framework (Table 2) as themes and sub-themes. Data analysis was not a

Table 2. Community of Inquiry Categories and Indicators
(from Garrison & Vaughan, 2008, p. 19)

Elements	Categories	Indicators
Social presence	Open communication	Enabling risk-free expression
	Group cohesion	Encouraging collaboration
	Affective/personal	Expressing emotions
Cognitive presence	Triggering event	Having sense of puzzlement
	Exploration	Exchanging information
	Integration	Connecting ideas
	Resolution	Applying new ideas
Teaching presence	Design and organization	Setting Curriculum and methods
	Faciitation of discourse	Sharing personal meaning
	Direct instruction	Focusing discussion

separate self-contained phase but rather an ongoing and integral part of data collection and so provided a point of re-entry to discuss with participants any concerns or issues that arose and required clarification. To provide inter-rater reliability, all data were recoded separately by the researcher and the instructor after the course was complete, until agreement of greater than 95% was reached.

FINDINGS

Garrison and Vaughan's (2008) *Community of Inquiry* elements, categories, and indicators provided a framework to explore research question one, *What are the educational experiences of pre-service teachers in an online course on online teaching?*

Social Presence

The introductory module in the course was designed to provide the opportunity for students to share personal and professional information and to provide a foundation for developing a trusting community. The instructor modeled the way by responding to each participant's posting, providing encouragement and affirmation, and asking questions to promote further dialogue. While most students responded to instructor questions, only two of them responded to other students' biographies. Several students expressed emotions, such as excitement or looking forward to working with each other. Although during the discussion modules social presence was not strongly apparent, it was evident from as early as the first discussion that an environment that supported risk-free expression was present, as students readily challenged ideas and put forward their own opinions. Although a few supportive comments were made affirming other participants' viewpoints, there was little evidence of camaraderie; the focus was mainly on cognitive presence, discussing the content of the topics. The instructor commented:

> I am concerned that some of the students are still hooked on content delivery as the measure of a course rather than the process. It worries me that they have not understood that the purpose of this course is to look at all facets of the process of online learning.

However, students were eager to share experiences in the units on online safety and computer crime, areas in which most students had been victims. While a few students explored the issues in depth, many postings were simply descriptive and anecdotal in nature. In such circumstances it becomes a challenge for the instructor to support discourse by weaving such exchanges with cognitive exploration of underlying issues. To this end, the instructor shared personal meaning, as well as focused the discussion by asking questions, but was always mindful not to let his view points dominate.

It was not until the final stages of the group teaching projects that social presence became more apparent. Early conversations focused very much on content and process. In most groups, students agreed what their tasks would be and worked individually on bits and pieces. "We finally figured out that the best way to approach it was to work on our own and collaborate via postings." Collaboration was democratic but very much task-related. Students indicated they preferred this business-like approach. "I did find that it [group work online] was more efficient, as there was no 'chit chat' as there is when you meet with people face to face." Only when the project was complete did students progress from working as individuals to becoming a cohesive group, and begin to express emotions to each other, such as pride, fulfillment, and excitement.

> I just wanted to make a little comment, to 'toot our own horn' ☺ I've gone through quite a few of the modules, and I would like to say that I really like ours!! I think our module is easy to read and very enjoyable. I think it would hold student interest (hopefully), and was a great choice of topic. . . . Anyway, good job!

The teaching project involved students actively in their own learning. It required students not only to work with others to find appropriate content and to present it in a manner that would engage learners, but also to master the intricacies of uploading content, including text, graphics, and multi-media, to a course delivery platform. It was in this module that collaboration and finally cohesion were evident and the social, cognitive, and teaching presences became an entity.

> I think one of the main things that led to our success is that we were all motivated and have good time management skills. If one of us lacked these attributes, I don't think we would have had any success. In an online situation where you have no contact you have no idea of the work ethic of other group members, and you have to rely on them to make contact as well. If there is no contact, you could end up having to do the project on your own.

Importantly, students recognized motivation, time management skills, commitment, and reciprocity as qualities necessary to collaborate successfully in an online environment.

Cognitive Presence

Cognitive presence is the integration of reflection and interaction, the relating of prior experience to current learning, and finally constructing new ways of knowing. Establishing cognitive presence is intricately entwined with teaching presence. The course was taught using online lectures, which were mainly text-based and included links to different websites. Each lecture had accompanying threaded discussions that focused on relating the content to the process of online teaching. Students were provided clear instructions as to frequency of posting (two postings per topic), length of posting (no more than 200 words), time frame for posting, and

content expectations (one relevant thought per posting) for grading purposes. The main content of the first few postings simply summarized the lecture topic, with little input of student thinking. As confidence grew, postings showed evidence of triggering and contained questions. Subsequent postings demonstrated that students were reading outside the course material, sharing the ideas (exploration), connecting these to derive new ideas, providing reasoned responses, hypothesizing; challenging the ideas of others, defending their own ideas (integration), and forming new theories and conceptions (resolution). Toward the end of the course there was evidence that students had moved from a content focus to a more process oriented viewpoint, in that they had an appreciation of what they were doing and why they were doing it.

Teaching Presence

Learning online is an interactive process that focuses on a learner-centered approach in which the teacher and learner share the responsibility for the learning experience. The instructor's role falls into three categories: course design and organization; facilitating dialogue; and direct instruction.

Design and Organization

The instructor indicated he spent much time up-front designing the course to provide a flexible template around which to organize the course, so that student entry and access was as seamless and user friendly as possible. This time is vital, especially in a course such as this where most students had no experience of e-learning and little conception of the expectations and behaviors required of them. The instructor indicated that he endeavored to make expectations clear, but was careful to allow students some freedom in their interpretation. "I accept many different variations of assignments because I want each student to develop their own "take" on them and do something that will be of value in their careers." The instructor weighed students' needs for specificity with freedom to explore areas that crop up serendipitously. He commented that a stumbling block to exploration was that students were very grade-focused, and comfortable in a passive mode of doing exactly what the instructor wanted, with the aim of attaining a perfect score. He felt his challenge as an instructor was to move these future teachers beyond a focus on grades as the goal of learning, toward learning as the end product.

Assessment

Students were assessed on discussion participation, the teaching module they created, as well as with online multiple choice tests after each module. Students recognized that assessing discussion participation and their teaching module was authentic. Indeed most students were so engaged in the discussions that the process became the motivator rather than the fact that marks were assigned. "To

tell you the truth I never even thought of discussions as an assessment tool partly because I forgot that we were being marked on what we posted."

The discussion on online assessment focused around online testing, and was the liveliest of the threaded discussions, perhaps because assessment and grading are very important to students. Participants experienced online testing as learners in low stakes online multiple choice tests that counted only minimally toward the final grade. The intention was to expose students to online testing and to provide a review of concepts covered in the module. Much discussion focused around defining cheating. Animated debate ensued around whether allowing students to take a test several times was encouraging dishonesty and laziness or a more formative means of ensuring the student finally grasped the content. Students also discussed their role as educators to ensure that assessments measured more than simple recall and also enhanced the learning outcomes.

Participants identified benefits of testing online in several areas, such as: the ability to use animations and interactive items; the opportunity for instant feedback on quizzes; the availability of question banks not only for test preparation but also to vary test items to reduce the chance of cheating. On the other hand, some students in this course suffered from the drawbacks of online testing. Due to time sensitivity, some students found themselves "locked out" of the tests, which was a source of frustration. Participants concluded that as so many high stakes tests, such as state proficiency assessments to meet the requirements of the *No Child Left Behind Act* (2001), were now administered online, it was important that as teachers they were aware of any pitfalls in online testing and were able to teach their students the skills necessary to take tests online.

Course Structure

Students' reflections on online learning included comments about balancing flexibility and structure, in particular, the amount of time and self-discipline required to be a successful online learner . . . and teacher. It was evident from students' comments that true learning and the development of a community of inquiry was fostered when students were given active ownership of their learning in the collaborative project to create an online teaching module. Students indicated that although group-work at a distance was a challenge and the technology learning curve was high, they worked together diligently to create and upload their end product. Moreover, they expressed high levels of satisfaction in their achievements.

Facilitating Dialogue

Each student was expected to post twice on the weekly discussion topic. Students commented that with 19 participants at times, it became difficult to come up with a stance that had not already been covered. One student commented, "There is

no real way to 'cut a student off' and not allow them to present many thoughts at once or to give their complete view of the situation." The instructor replied:

> I agree that when students stake out all the various positions on a topic it is much harder for others to contribute to that particular topic. I have tried to allow discussions to go whatever way students take them to account for that problem but it results in a less focused discussion for sure. So . . . it IS a problem. . . . What does an instructor do when a student breaks the one thought per post rule? Delete the post? Freeze the post? Edit the post? Lower the grade?

In a face-to-face situation, a quiet word after class with over-vocal students can quickly resolve such a situation; online, a gentle e-mail may have the same effect. However, in a text-based medium, we must be careful that the message is received in the same tone that it is sent. The ensuing student discussion focused on tone and making meaning online; students used personal examples to demonstrate how frequently we read intent that is unintended.

Direct Instruction

The aim of instructor in this course was to build student ownership of dialogue, develop their teaching presence and leadership skills, and to foster intellectual growth. To this end, while he modeled probing questions, he gave students ownership of the discussions and intervened only when necessary to redirect or focus discourse. He treated challenges in a non-threatening constructive way as teachable moments, and intervened respectfully with individuals whose postings were inappropriate.

Data from the final focus group and from researcher e-mail conversations with the instructor and students throughout the course were used to explore the second research question: *What can instructors do to enhance the online experience for students?*

As the aim of this course was learning about online teaching, it was important that students had input into how it was structured. Several students entered actively into a dialogue regarding the course structure. Although most students valued threaded discussions, three indicated in response to questions from the researcher that the text-based focus did not match their learning styles.

Most student participants felt that the course could be improved by providing a greater balance between discussion of content and hands-on individual and group projects in which students applied the knowledge they had learned. For instance, suggestions included projects to create online assessments and to develop lessons about computer crimes and Internet safety rather than simply discussing these topics. As the course was a blended learning opportunity that included an initial meeting, students indicated that the chance to learn to use the course development technology in a face-to-face, hands-on setting would have greatly reduced the steepness of the learning curve, as well as their frustration in trying individually to master intricate new technology.

A final suggestion from students was that peer assessment should be included as part of the grade for their teaching modules. Students felt that in this assignment they had been actively involved as problem solvers in creating their modules, and had also acted as participants in other group's modules. Therefore, they should also be involved in the assessment process.

DISCUSSION

Garrison and Anderson's (2003) *Community of Inquiry* framework provided a pathway to analyze the educational experience of pre-service teachers as they developed online content in a variety of media and experienced the complexities of not only learning, but also teaching online. In agreement with several researchers (Conrad, 2002; Duncan, 2005; Garrison & Vaughan, 2008), this study indicates that establishing social presence online is a challenge. While an atmosphere of open communication existed in this study, threaded discussions focused on cognitive aspects, and on the individual "I" rather than the collective "we."

Facilitating effective group projects is a challenge in any environment, but even more so online (Duncan, 2005). However, students in this study indicated that they found the online environment provided a task-oriented focus that was more efficient and productive. Students in this course indicated their learning experience was enhanced as a result of its overtly experiential and socially constructive nature. Jung's (2005) observation that teachers benefit from active experience of technology as learners was borne out as students identified that the most useful and engaging part was when they were challenged to create their own online teaching module. The instructor noted the main challenges to establishing cognitive presence were in shifting student focus from content to process, from information accumulation to discovering meaning and understanding, and from grades as the end product to learning as a continuous journey.

One question that arose was how to balance specific requirements for posting in discussions while maintaining epistemological curiosity and relevance. Palloff and Pratt (1999) recognized that imposing rigid guidelines for number and type of contributions to the dialogue can be constraining, causing participants to worry about the nature of their posts rather than simply post. Freire (Freire & Macedo, 1999) advocated against the "facilitator who merely orchestrates students in pure verbalism" (p. 52), and creates a superficial democracy in which all students must take their turn to speak whether or not they have anything substantive to contribute. In addressing students' concerns about repetitive discussion postings, the instructor increased their awareness of the problem, and, by inviting students to participate in a solution, he gave them a sense of ownership of their learning. As Garrison and Vaughan (2008) noted, "true learning is exploratory and often unpredictable" (p. 23), and unintended outcomes are valuable. A structural solution to conversation domination online may be to divide students into groups so that there are several concurrent discussions on the same topic, thus reducing the

amount of reading required, decreasing duplication of ideas, and eliminating the need to stretch the focus to find something new to say. In addition, related to establishing social presence, smaller groups may become more cohesive as there are more opportunities for individuals to get to know and trust each other.

Through the collaborative process of developing their own online modules, pre-service teachers discovered the need to balance flexibility with setting clear timelines and expectations for "their" students. In agreement with Watson (2007), this study indicated learning online can promote 21st century skills by promoting self-directed learning, time management skills, and personal responsibility in the context of technology, literacy, and problem solving.

Online learning has been, up to this point, predominantly a textual environment, where reading and writing skills are to the fore (Schnitz, 2007; Zapalska & Dabb, 2002). Discussion of their own ways of learning led pre-service teachers in this study to an increased awareness of the need to consider the learning styles of their own students when teaching in any medium. As Denig (2004) noted, learning styles play a key role in students' educational performance. As course delivery platforms become increasingly sophisticated and support the inclusion of multimedia, it is becoming easier to accommodate a diversity of student learning styles in online course design and instruction (Rofel & Revenaugh, 2008).

Students' comments and suggestions have led us to increase the focus on problem-based learning (PBL), that is, to challenge students to "learn to learn," working cooperatively in groups to seek solutions to real world problems that engage curiosity and initiate learning the subject matter. PBL prepares students to think critically and analytically and to find and use appropriate learning resources (Boud & Feletti, 1991). In addition, we now include student input into assessment in all our courses. We challenge students to create and use self and peer assessment rubrics. Importantly, we use student feedback to analyze our own practices as instructors so that we can more actively model what effective online instruction entails. The emphasis in the literature is on the democratic nature of e-learning. Consequently, the role of the instructor in providing direction and leading the community toward achieving its goals may have been downplayed online (Garrison & Anderson, 2003). Teaching presence requires an experienced instructor to guide and focus discourse, confirm understanding, diagnose misconceptions, and intervene when required. We cannot expect students to absorb such techniques by osmosis. Instructors must overtly provide their students with clear expectations of a leadership role online, and provide them with opportunities to practice the skills that promote social, cognitive, and teaching presences.

CONCLUSION

While e-learning is growing rapidly in K-12 education, the National Education Association (2006) noted that teacher preparation programs rarely include courses on how to teach online. This course is a step forward, a building block that we can

use to refine the content and strategies in the next iterations to respond better to students' needs. As online instructors, we learned much from students' comments and from the research process itself. We, as teacher education faculty, do not often make time to actually talk about how we teach online. More frequently we develop and teach our online courses in isolation. Although at the university level we strive to design our courses toward constructivist practice that focuses on active experiential learning and collaborative practice, we frequently work in isolation, the very practice we condemn in elementary and secondary schools. We cannot overemphasize the value of reflective dialogue to guide practice around teaching in higher education.

This study reinforces the fact that students are engaged when they are active learners. It emphasizes the need to focus on authentic experiential learning that provides opportunity for reflection, interaction, collaboration, and critical thinking. Further, if our aim in courses such as these is to equip pre-service teachers to be online leaders, then not only must instructors model online leadership, but they must also provide opportunities for students to actively practice the skills required to develop social, cognitive, and teaching presence.

To meet the needs of 21st century learners, pre-service teacher education programs must equip the next generation of teachers with the skills to teach in a variety of media that their future students will be using. Teacher education programs should take the lead in practicing an effective online pedagogy that: is constructivist and democratic; accommodates different learning styles; fosters active engagement in and ownership of learning; promotes critical thinking skills; and supports reflective interaction with other learners, the instructor, technology, and content. Future teachers must have the skills and knowledge to teach effectively in online as well as in traditional environments. Quality teaching must form the foundation of innovative and flexible opportunities for learning in K-12 education in the twenty-first century.

REFERENCES

Angeli, C. (2004). Transforming a teacher education methods course through technology: Effects on pre-service teachers' technology competency. *Computers and Education, 45*(4), 383-398.

Boud, D., & Feletti, G. (1991). The challenge of problem-based learning. New York: St. Martin's Press.

Brush, T., Glazewski, K., Rutowski, K., Berg, K., Stromfors, C., Van-Nest, et al. (2003). Integrating technology in a field-based teacher training program: The PT3@ASU Project. *Educational Technology Research and Development*, *51*(21), 57-72.

Carlile, O., & Jordan, A. (2005). It works in practice, but will it work in theory? The theoretical underpinnings of pedagogy. In G. O'Neill, S. Moore, & B. McMullin (Eds.), *Emerging issues in the practice of university learning and teaching* (pp. 11-26). Dublin: AISHE. [Online]. Available: http://www.aishe.org/readings/2005-1/

Conrad, D. L. (2002). Engagement, excitement, anxiety, and fear: Learners' experiences of starting an online course. *The American Journal of Distance Education, 16*(4), 205-226.

Dawson, K., Pringle, R., & Adams, T. L. (2003). Providing links between technology integration, methods courses, and school-based field experiences: A curriculum based and technology-enhanced microteaching. *Journal of Computing in Teacher Education*, *20*(1), 41-47.

Denig, S. J. (2004). Multiple intelligences and learning styles: Two complementary dimensions. *Teachers College Record*, *106*(1), 96-111.

Downes, T., Fluck, A., Gibbons, P., Leonard, R., Matthews, C., Oliver, R., et al. (2001). *Making better connections: Models of teacher professional development for the integration of information and communication technology into classroom practice.* Canberra, AU: Commonwealth Department of Education, Science and Training. [Online]. Available: http://www.dest.gov.au/NR/rdonlyres/3A88BB29-9798-49A1-90DB0E46590E96BF/1593/MBC.pdf

Duncan, H. E. (2005). Online education for practicing professionals: A case study. *Canadian Journal of Education, 28*(4), 874-896.

Ertmer, P. (2003). Transforming teacher education: Visions and strategies, *Educational Technology Research and Development, 51*(1), 124-128.

Ferdig, R. E., DiPietro, M., & Papanastasiou, E. (2005). *Teaching and learning in collaborative virtual high schools.* Naperville, Illinois: Learning Point Associates.

Feagin, J., Orum, A., & Sjoberg, G. (1991). *A case for case study*. Chapel Hill, NC: University of North Carolina.

Freire, P., & Macedo, D. P. (1999). Pedagogy, culture, language, and race. A dialogue. In J. Leach, & B. Moon (Eds.), *Learners and pedagogy* (pp. 48-62). London: Paul Chapman.

Garrison, D. R., & Anderson, T. (2003). *E-learning in the 21st century: A framework for research and practice.* London: Routledge Falmer.

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Frame work, principles, and guidelines.* San Francisco: Jossey-Bass.

Guy, M. D., & Li, Q. (2002). *Integrating technology into an elementary mathematics methods course: Assessing the impact on pre- service teachers' perception to use and teach with technology.* Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

International Society for Technology in Education. (2002). *National educational technology standards for teachers: Preparing teachers to use technology*. Danvers, MA: Author.

Jacobsen, M., Clifford, P. & Friesen, S. (2002). Preparing teachers for technology integration: Creating a culture of inquiry in the context of use. *Contemporary Issues in Technology and Teacher Education, 2*(3), 363-388.

Jung, I. (2005). ICT-pedagogy integration in teacher training: Application cases worldwide. *Educational Technology & Society*, *8*(2), 94-101.

Lea, S. J., Stephenson, D., & Troy, J. (2003). Higher education students' attitudes to student centered learning: Beyond "educational bulimia." *Studies in Higher Education, 28*(3), 321-334.

Mullen, L. (2001). Beyond infusion: Pre-service students' understandings about educational technologies for teaching and learning. *Journal of Technology and Teacher Education*, *9*(3), 447-466.

National Center for Education Statistics (NCES). (2005). *Distance education courses for public elementary and secondary school students: 2002-2003.* Washington, DC: U.S. Department of Education. [Online]. Available: http://nces.ed.gov/surveys/frss/publications/2005010/index.asp?sectionid=2

National Education Association (NEA). (2006). *Guide to teaching online courses.* Washington, DC: Author.

No Child Left Behind Act, 20 U.S.C § 6301 (2001). Washington, DC: U.S. Government Printing Office.

Norton, P., & Sprague, D. (2001). *Technology for teaching*. Boston, MA: Allyn & Bacon.

Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace: Effective strategies for the online classroom*. San Francisco, CA: Jossey-Bass.

Partnership for 21st Century Skills. (2007). *21st century skills professional development.* [Online]. Available: http://www.21stcenturyskills.org/documents/21st_century_skills_professional_development.pdf

Perry, B., & Edwards, M**.** (2005). Exemplary educators: Creating a community of inquiry online. *Turkish Online Journal of Distance Education, 6*(2). [Online]. Available: http://tojde.anadolu.edu.tr/

Picciano, A. G., & Seaman, J. (2009). *K-12 online learning: A survey of U.S. school district administrators.* The Sloan Foundation. [Online]. Available: http://www.sloanconsortium.org/publications/survey/pdf/k-12_online_learning_2008.pdf

Pope, M., Hare, D., & Howard, E. (2002). Technology integration: Closing the gap between what pre-service teachers are taught to do and what they can do. *Journal of Technology and Teacher Education*, *10*(2), 191-203.

Rice, K., & Dawley, L. (2007). *Going virtual! The status of professional development for K–12 online teachers*. [Online]. Available: http://edtech.boisestate.edu/goingvirtual/goingvirtual1.pdf

Robinson, B., & Latchem, C. (2003). Teacher education: Challenges and change. In B. Robinson, & C. Latchem (Eds.), *Teacher education through open and distance learning* (pp. 1-27). London, UK: Routledge Falmer.

Rofel, M., & Revenaugh, M. (2008). Special education in online learning. In J. Watson, B. Gemin, & J. Ryan, *Keeping pace with K–12 online learning: A review of state-level policy and practice* (pp. 22-23). [Online]. Available: http://www.kpk12.com/downloads/KeepingPace_2008.pdf

Selinger, M. (2001). Learning information and communications technology skills and the subject context of the learning. *Journal of Information Technology for Teacher Education, 10*(1 & 2), 143-154.

Smith, R., Clark, T., & Blomeyer, R. L. (2005). *A synthesis of new research on K–12 online learning*. Naperville, IL: North Central Regional Educational Laboratories.

Schnitz, J. (2007). Succeeding online: 7 requirements. *Distance Learning Today, 1*(2), 9-10.

Stake, R. E. (1995). *The art of case research*. Newbury Park, CA: Sage.

Technology Counts 2007. (2006, November 7). Looking back, looking ahead. *Education Week.* [Online]. Available: http://www.edweek.org/chat/transcript_11_17_2006.html

Trotter, A. (2008). Online options for "credit recovery" widen. *Education Week, 27*(38), 1, 12-15.

Twenty-first Century Schools. (2008). *Possibilities for 21st century education.* [Online]. Available: http://www.21stcenturyschools.com/What_is_21st_Century_Education.htm

U.S. Department of Education. (2004). *Toward a new golden age in American education: How the internet, the law and today's students are revolutionizing expectations*. Washington, DC: National Educational Technology Plan 2004.

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

Watson, J. (2007). *A national primer on K–12 online learning.* Washington, DC: North American Council on Online Learning. [Online]. Available: http://www.connectionsacademy.com/pdfs/200704_NACOL_OnlineLearningPrimer.pdf

Watson, J., Gemin, B., & Ryan, J. (2008). *Keeping pace with K–12 online learning: A review of state-level policy and practice.* [Online]. Available: http://www.kpk12.com/-downloads/KeepingPace_2008.pdf

Zapalska, A. & Dabb, H. (2002). Learning styles. *International Business Teaching in Eastern and Central European Countries*, *13*(3/4), 77-97.

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