Evidence Based Library and Information Practice

Article

Using Evidence Based Practice in LIS Education: Results of a Test of a Communities of Practice Model

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Abstract

Objective - This study investigated the use of a communities of practice (CoP) model for blended learning in library and information science (LIS) graduate courses. The purposes were to: (1) test the model's efficacy in supporting student growth related to core LIS concepts, practices, professional identity, and leadership skills, and (2) develop methods for formative and summative assessment using the model.

Methods - Using design-based research principles to guide the formative and summative assessments, pre-, mid-, and post-course questionnaires were constructed to test the model and administered to students in three LIS courses taught by the author. Participation was voluntary and anonymous. A total of 34 students completed the three courses; response rate for the questionnaires ranged from 47% to 95%. The pre-course questionnaire addressed attitudes toward technology and the use of technology for learning. The mid-course questionnaire addressed strengths and weaknesses of the course and suggestions for improvement. The post-course questionnaire addressed what students valued about their learning and any changes in attitude toward technology for learning. Data were analyzed on three levels. Micro-level analysis addressed technological factors related to usability and participant skills and attitudes. Meso-level analysis addressed social and pedagogical factors influencing community learning. Macro-level analysis addressed CoP learning outcomes, namely, knowledge of core concepts and practices, and the development of professional identity and leadership skills.

Results - The students can be characterized as adult learners who were neither early nor late adopters of technology. At the micro-level, responses indicate that the online tools met high standards of usability and effectively supported online communication and learning. Moreover, the increase in positive attitudes toward the use of technology for learning at the end of the course may indicate that an effective balance between face-to-face and online media was achieved. At the meso-level, students valued learning in community for developing mutual respect, confidence building, risk taking, deeper and more varied learning, learning with and from their peers, and greater enjoyment in the classes. Students found that the online environments were useful for organizing the class objectives and subject matter, "staying connected" between classes, sharing ideas, keeping track of their work, and preparing them for future work in blended environments. At the macro-level, the findings of the effects on student growth related to core LIS concepts, practices, professional identity and leadership skills were inconclusive. However, students' expressed a high regard for the value of collaboration, and there were indications that the model supported differentiated learning of professional knowledge and skills.

Conclusion - The findings strongly suggest that the use of the CoP model had positive effects on the learning process. Students' high regard for the value of collaboration appears to be a clear effect of using the CoP model. The assessment methods were sufficient for testing the efficacy of most aspects of the model under the limited conditions of this study. Student responses led to refinements in both the model and methods. This study contributes to social constructivist learning approaches and LIS curricular development by presenting an innovative model for supporting professional growth among adult learners, as well as a conceptual framework to guide evidence based practice. Further testing and refinement of the model in other contexts and by other educators are needed to ensure that the model is robust and broadly applicable.

Introduction

Contemporary learning approaches emphasize the importance of learner agency (constructivism) and social learning (social constructivism), building on Dewey's (1933) influential work on learning through communication and inquiry in a social context. Dewey's ideas have continued to inform work on experiential learning (Kolb, 1984) and learning through dialogue (Edwards, 1991; Mercer, 1995; Wells, 1999). Vygotsky's theory connecting learning to the sociocultural context (1978) and Bruner's (1990) work on cultural psychology and education also form part of the foundation of principles for active, collaborative learning (Larreamendy-Joerns & Leinhardt, 2006; Salomon & Perkins, 1998).

Moreover, many library and information science (LIS) students are adult learners, returning to school to pursue second careers. Adult learning is problem-based, dialogic, and focused on critical reflection for more effective action (Mezirow, 2000). New knowledge is created from a base of prior knowledge and experiences (Gagne, 1985) and enacted through an instructional design that requires the integration of various types of knowledge, intellectual skills, and cognitive strategies to achieve the goals of a purposeful enterprise (Gagne & Merrill, 1990). Dialogue and social interaction are "essential aspects of knowing a domain" (Larreamendy-Joerns & Leinhardt, 2006), and professional discourse and patterns of practice emerge through mutual participation (Wenger, 1998). Social learning approaches such as communities of practice stress that learning is not only knowledge acquisition, but also a process of identity

formation and empowerment (Lave & Wenger, 1991).

With the increasing demand for online learning, professional education is challenged to provide virtual learning experiences appropriate for adult learners. While online environments provide tools for intellectual and social discourse that support cognitive development, social networking, and community building (Palloff & Pratt, 1999; Preece, 2000), the primary means of online communication today is typed text. This mode of communication lacks the expressive features of nonverbal communication and voice tone, as well as a shared awareness of context. Thus, some studies stress the importance of early face-to-face encounters among students to promote bonding as a basis for continued interaction and participation online (Haythornthwaite et al., 2000). Although text-based online communication may be superior to face-to-face for supporting reflection (e.g., Yukawa, 2006; Garrison, Anderson & Archer, 2000; Larreamendy-Joerns & Leinhardt, 2006), writing cannot be viewed in isolation from other factors in the learning environment (Mimirinis & Bhattacharya, 2007; Tolmie & Boyle, 2000; Ziegler, Paulus, & Woodside, 2006), nor is the ability to review online communication sufficient encouragement in and of itself to ensure that critical reflection takes place (Seale & Cann, 2000).

A potentially valuable approach for effective professional education is blended learning in a classroom community of practice (CoP). This paper describes an investigation of the use of a CoP model for blended learning in three LIS courses. The purposes were to: (1) test the model's efficacy in supporting student growth related to core LIS concepts, practices, professional identity, and leadership skills; and (2) develop methods for formative and summative assessment using the model. The paper begins with a description of the design and implementation of the CoP blended learning model, then describes assessment methods, and concludes with a discussion of the findings and their implications.

Communities of Practice Model for Blended Learning

The origins of many contemporary studies of communities of practice are Lave and Wenger's examinations of apprenticeship learning (1991). To support blended learning based on social learning principles, I developed a model based on Wenger's (1998) elaboration of the CoP framework. While the process of model building is beyond the scope of this article and has been described elsewhere (Yukawa, 2010), this section summarizes the essential characteristics of Wenger's framework as I view them through the lens of social constructivist and adult learning theories.

Communities of practice have three dimensions – a community, a domain, and a practice. *Community* refers to the relationships and interactions among members of a professional group, *domain* refers to the community's focal issues, and *practice* consists of the discourse, tools, methods, and skills used and transformed by the community over time (Snyder, Wenger, & de Sousa Briggs, 2004). Grounding learning in these dimensions serves to ensure that it is social, has a clear disciplinary focus, and is focused on actual practice.

CoP learning incorporates three "modes of belonging": engagement, imagination, and alignment (Wenger, 1998, p. 237-239). I consider these as stages of learning, although actual learning is more complex and iterative: (1) *engage*: connect to one's own prior knowledge and experiences, and share experiences, ideas, and competence over time; (2) *imagine*: extend knowledge and experience through critical reflection and creative exploration; and (3) *align*: converge around vision, goals, practices, and accountability to each other. Each of these stages is complex and multidimensional. Engagement addresses the adult learner's need to connect learning to prior experience and established frames of reference, as well as interact socially and emotionally with others. Imagination encompasses the critical, creative, and

reflective thinking processes that lead to questioning assumptions, imagining alternatives, and transforming one's knowledge in response to new information and ideas from others. Alignment focuses the learning process on a common vision, solutions to shared problems, clear decision-making, and socially responsible action.

Wenger's framework also incorporates the concept of dualities, perhaps the most influential aspect of his work. He defines a duality as a pair of elements that are reciprocal and inseparable rather than oppositional (Wenger, 1998, p. 66-69). One of his major contributions was to reexamine ideas of dichotomy through the use of four dualities that address "the fundamental issues of meaning, time, space, and power" in community learning (Wenger, 1998, p. 231): (1) participation and reification, (2) the designed and the emergent, (3) the local and the global, and (4) identification and negotiability. My analysis of the essence of these dualities can be summarized as four creative tensions that shape the learning experience: (1) *negotiating meaning*: learning key concepts by connecting to prior knowledge and experience, by questioning assumptions and expanding one's knowledge, and by developing shared meanings with others; (2) *negotiating practice*: learning new practices by connecting them to one's own, expanding these practices through exposure to the practices of others, and

aligning to best practices; (3) *negotiating expertise*: sharing and building on one another's expertise and learning from real world expertise; and (4) *negotiating identity and leadership*: developing an identity in relationship to the community, influencing others, and taking leadership.

Barab, MaKinster, and Scheckler (2004) propose a fifth duality or creative tension important for online and blended learning: *face-to-face and online communication*. Herbert Clark's (Clark & Brennan, 1991) theory of common ground provides a basis for understanding this creative tension through the inhibiting and enabling factors characteristic of different types of media. Eight "constraints," or enabling factors, affect communication efficiency (Table 1). Face-to-face communication allows the greatest efficiency because it provides the richest array of enablers. Wikis are subject to more constraints than face-to-face but provide the advantages of reviewability and revisability, i.e., messages are recorded permanently for review and reflection, but can also be revised.

Effectively negotiating this creative tension is fundamental to learning, as usability issues, lack of technical skills, or negative attitudes toward technology can inhibit communication and potentially derail the blended learning process at the outset.

Table 1
Clark's Communication Constraints (Enablers)
(Yukawa, 2007; based on Clark & Brennan, 1991)

Enabler	Description
Copresence	Communicators share the same physical environment.
Visibility	Communicators are visible to each other.
Audibility	Communicators can hear each other.
Cotemporality	Communicators receive messages at roughly the same time they are produced.
Simultaneity	Communicators can send and receive at once and simultaneously.
Sequentiality	Communicators' conversation turn taking cannot get out of sequence.
Reviewability	Communicators can review each other's messages (i.e., messages are permanently recorded).
Revisability	Communicators can revise messages for each other (e.g., letters, email).

I developed a model for blended learning based on Wenger's CoP design framework (Wenger, 1998, p. 240) to address the limitations to meaningful learning imposed by online communication. The model (Figure 1) focuses on the four creative tensions that shape community learning. These creative tensions are articulated through the three stages of learning (engagement, imagination, alignment) and enacted through face-to-face and online communication (the fifth creative tension), requiring a negotiation of the benefits and costs of each medium to meet learning needs. The desired result of negotiating all five creative tensions is the personal realization of professional identity, principles, practices, and leadership skills that help students become respected and contributing members of the profession.
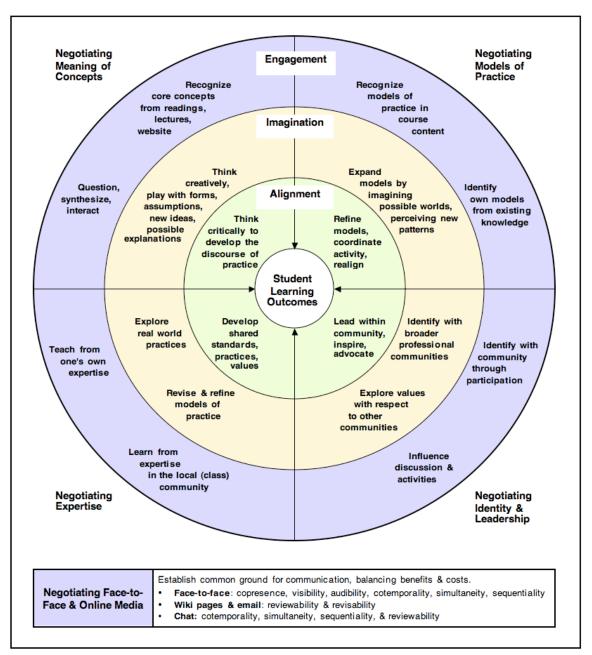

Fig. 1. CoP learning processes in the blended classroom.

Implementation of the Model

Guided by the model, I redesigned three blended LIS courses taught for the Master of Library and Information Science (MLIS) Program at St. Catherine University during the 15-week Winter 2009 semester: "Reference & Online Services," a core course that met for 3 hours weekly, and the elective courses, "Library User Instruction" and "Information Seeking Behavior," which met on alternate weekends for 5 hour sessions. The model was iteratively tested and refined during implementation. In this section, I first address the design of the online environment, followed by brief descriptions of the face-to-face and online strategies used to enact the creative tensions for learning. (For a fuller discussion of the design and implementation process, see Yukawa, 2010.)

Design of the Online Learning Environment

My goals in designing the learning environment were to ensure that the online tools: (1) met usability guidelines – ease of navigation, clear information design, and dialogue support (Preece, 2000), (2) were integral to meeting learning objectives, and (3) provided support for the CoP learning processes (Figure 1). The online tools used in the three courses included a wiki as the main course website (PBworks, formerly PBwiki, http://pbworks.com), a lightweight chat application for synchronous communication (Yaplet, http://www.yaplet.com), blogs for individual reflections on learning, and a course management system, Moodle, for grading (http://moodle.org). Online dialogue was supported through the use of the comment feature on wiki pages, the chat application, and the blogs.

The wiki provided a combination of structure, functionality, and flexibility needed to create course websites that support CoP blended learning. I designed the wiki to communicate the core concepts, models of practice, and course expectations in an easily navigable format. The folders of wiki pages visually presented the main course activities, e.g.,

About the Course (syllabus and course calendar), Assignments and Assessment, Class Sessions (with lecture notes provided on wiki pages in lieu of slide presentations or handouts), Class Workshops, Course Readings, Feedback, and Personal Pages.

The two pages with the most essential information at the beginning of the course were the syllabus and the course calendar. Creating a wiki page syllabus easily supported embedding images (such as a course concept map) and hyperlinks to other wiki pages and external web pages. The ability to create a customized course calendar also enhanced usability. Through a table that linked to pages with weekly information about topics to be covered, reading lists, and instructions for assignments due, the calendar provided on a single page a week-by-week visual index to the most essential instructor-created pages (Figure 2).

The ability to hyperlink allowed me to create multiple pathways for finding pages depending on context, increasing ease of access. For example, readings could be organized by topic in the Course Readings folder, but were also accessible by date from the calendar page and by session from the class session pages. Within this basic organization, content was added to wiki pages by the students and myself as one of the means for negotiating learning.

Negotiating Identity and Leadership

Of the four substantive creative tensions, negotiating identity and leadership is the most encompassing and challenging. I believed that engaging students to find personal meaning in the focus of the course and to commit to collaborative learning were the most critical early tasks. My strategies included building an atmosphere of trust and a climate of collaboration in order to encourage confidence building, risk taking, and relationship building. I encouraged students to create personal wiki pages and post many of their assignments (such a learning reflections) on the wiki. I also required them to conduct

Session & Date	Topics	Readings Due	Assignments Due
Session 1 Jan 6	• Introduction: "Humans and technology hand-in-hand" • Meeting the information needs of diverse users and communities • Dimensions of information work: humans, systems, resources • Class projects	Readings 1	Get a head start: begin informal Field Report due 1/20. Visit several libraries and observe reference behavior. Begin thinking about the type(s) of library/libraries you'd like to do your Reference Observations in. Prepare a list of questions that pique your curiosity about reference work, and do informational interviews with two reference librarians.
Session 2 Jan 13	Systems Dimensions • Search Systems • Traditional and Online Views of Reference Sources	Readings 2	• Pathfinder Outline • Questionnaire
Session 3 Jan 20	Systems Dimensions • Searching the Web	Readings 3	• Field Report
Session 4 Jan 27	Systems Dimensions • Bibliographic Control • Controlled Vocabulary & Natural Language	Readings 4	• SE1 – Searching the Web
Session 5 Feb 3	Systems Dimensions • Databases • Indexes and abstracts	Readings 5	• Pathfinder
Session 6 Feb 10	Resources Dimensions • Selecting and Evaluating Sources • Bibliographies • Bibliography Plan Project	Readings 6	• SE2 – Print & Online Indexes
Session 7 Feb 17	Human Dimensions • The Reference Interview as a Tool for Information Problem-Solving • Reference Observations	Readings 7	• Bibliography Plan Outline • SE3 – Bibliographies • Temperature Check
Session 8 Feb 24	Human Dimensions • Digital Reference Resources Dimensions • Encyclopedias	Readings 8	• Discussion Lists Forum entry • Identify library for Reference Observations

Fig. 2. Example of a course calendar.

group work and aspects of team projects on the wiki (not graded). These uses of the wiki were intended in part to foster identification with the class community and provide opportunities to share expertise, collaborate, inspire each other, and take leadership.

Negotiating the Meaning of Core Concepts

The core concepts of a subject are the basic building blocks of knowledge. Students initially engaged with core concepts through the wiki content – syllabus, readings and resources, class session notes, assignment instructions, and assessment rubrics. Throughout the semester, negotiations of meaning were supported face-to-face through lectures, dialogue, collaborative questioning and synthesis, group work, team projects, and student presentations with class discussion. During the process of negotiating core concepts, the wiki evolved as the students and I added new content. For example, in Reference & Online Services, in two large groups, students debated the advantages and

disadvantages of *Encyclopaedia Britannica* versus *Wikipedia*, considering uses, knowledge creation processes, and criteria for accuracy and authority. The groups used wiki pages to brainstorm ideas, develop convincing arguments, and present their cases.

Negotiating Models of Practice

Negotiating models of practice involves an iterative process of identifying one's own models from existing knowledge and practical experience, exposure to expert models, reflection on practice, and model building and refinement. One example from Reference & Online Services is how the views that students held of information seeking behavior in their own lives changed with exposure to Kuhlthau's model of information seeking (2004). While a number of models of information seeking behavior exist (Wilson, 1999), I chose to introduce Kuhlthau's model to students new to the LIS discipline, as a framework for reflecting on their own information seeking processes. Other

examples are simulations and problem- and project-based learning, such as the teaching demonstrations developed and conducted by students in Library User Instruction. These strategies were used to help students build and refine their own models, coordinate group activity, self-assess, and align to standards of good practice as articulated by experts and practicing professionals.

Negotiating Expertise

Strategies for negotiating expertise included sharing stories from my professional life, inviting stories from students, and exposure to professionals in action (e.g., guest speakers and site observations). Theoretical discussions were often linked to real world problems and events. Contributions to the class wikis supported sharing of expertise and added to the community knowledge base. Through collaboration on group projects, students developed shared standards, practices, and values around centers of expertise within the group.

Formative and Summative Assessment Methods

The formative and summative assessment methods used in this study were derived from design-based research (DBR). DBR involves the integration of design, theory, research, and practice in naturalistic settings (Bell, 2004). The design and the hypotheses upon which it is based are continually refined during implementation until a more coherent theory emerges, embodied in the design. Sandoval (2004) calls these hypotheses "embodied conjectures" (p. 213). In this study, the embodied conjectures are the CoP learning processes (Figure 1).

Data collected for DBR studies typically include a comprehensive record of the design process, how learning was organized and supported, and data about the learning processes and outcomes (Borko, Liston, & Whitcomb, 2007). While previous work has examined the design and implementation of the CoP blended learning model in greater

depth (Yukawa, 2010), this paper focuses on CoP learning processes and outcomes. The primary data sources for this study were anonymous student responses to closed-ended and open-ended questions on pre-, mid-, and post-course questionnaires. The pre-course questionnaire[1] addressed attitudes toward technology and the use of technology for learning and daily life. The mid-course questionnaire addressed what had helped students most and least in learning about the subject of the course and what could be improved. The post-course questionnaire addressed what students valued about their learning related to the model, their attitudes toward the technology used in the courses, and any changes in attitude toward technology for learning. Informed consent was received from all participants. Content analysis was used to analyze the responses to the open-ended questions. An additional data source was an instructor's journal with documentation of the design process and teaching reflections.

The number of participants and the response rates on the questionnaires varied considerably, influenced by an unusually high number of course withdrawals that resulted from setbacks in the MLIS Program's progress toward initial accreditation by the American Library Association. Of the 42 students enrolled in the courses, 34 completed the classes. Thirty-three students completed the pre-course questionnaire (79% response rate), 40 students completed the mid-course questionnaire (95% response rate), and 16 students completed the post-course questionnaire (47% response rate). While the small number of participants, the change in student population over the semester, and the variation in response rates limit the ability to draw firm conclusions from the data, data across the three courses are consistent.

Data were analyzed on three levels: micro, meso, and macro. Micro-level analysis examines the use of online tools to support the fifth creative tension – negotiating face-to-face and online media. The questions asked at this level are: (1) Do students have basic fluency

with the online tools? (2) What are students' attitudes toward the online tools? (3) How well do the online tools meet usability guidelines? (4) How well do the online tools support interaction? (5) How well do the online tools support learning?

Meso-level analysis addresses social and pedagogical factors influencing social constructivist learning that are primarily associated with the stages of learning – engagement, imagination, and alignment. The questions considered at this level included: What evidence exists that shows that students shared experiences, ideas, and competence over time (engagement); extended experience through reflection and exploration (imagination); and converged around vision, goals, practices, and accountability to each other (alignment)?

Macro-level analysis attempts to ascertain whether or not students achieved the goals of the learning experience through examining student perceptions of their learning in two interrelated ways: (1) as related to course learning objectives and (2) as CoP learning outcomes, namely, knowledge of core concepts, acquisition of new practices, and the

development of professional identity and leadership skills.

The strengths of this study are that: (1) it presents a realistic view of learning as the result of a complex interaction between educational intervention, learner attitudes and needs, personal histories, and situational contexts; (2) it recognizes that the educational intervention, the CoP blended learning model, is itself an outcome; and (3) it provides reports from the insider's intimate knowledge of the design process, the students, and teaching and learning in context. DBR may in fact be more rigorous than experimental research at aligning theory, treatments, and measurement in complex classroom situations (Hoadley, 2004). The study's major weaknesses are: (1) the threat to rigor of a single individual as designer, researcher, and implementer; (2) the difficulty of ascertaining whether outcomes result from the design rather than other factors in the learning environment; (3) limitations of the study's population – the small number of classes and participants, and the change in student population over the semester; and (4) the variation in response rates to the questionnaires.
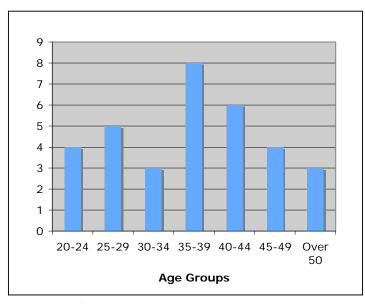

Fig. 3. Age of students.

Table 2
Student Attitudes toward New Technologies: Pre-Course Questionnaire
N=33

Question 15. Which of the following best describes you?[1]	Responses	Percent
I love new technologies and am among the first to experiment with and use them.	0	0
I like new technologies and use them before most people I know.	4	12%
I usually use new technologies when most people I know do.	25	76%
I am usually one of the last people I know to use new technologies.	4	12%
I am skeptical of new technologies and use them only when I have to.	0	0

Findings

This section begins with a description of the study participants. It then presents findings on the effectiveness of the CoP model for fostering student learning, using the three levels of analysis.

Profile of the Students

While the overwhelming majority of the students were female, in order to preclude identification of individual students, a gender question was not included on the questionnaires. While the overall age range was from the early 20s to over 50 years of age, the majority of students were in the middle age ranges (Figure 3).

Question 7 of the pre-course questionnaire asked students which technologies they used, from a list of 31 common as well as emerging technologies. More than half used technologies such as presentation software, spreadsheets, multimedia downloading, text messaging, and social networking websites, while less than 1% had used video creation software, webcasts, or online virtual worlds.

Regarding their attitudes toward new technologies, the responses on the pre-course questionnaire indicate that the students were neither strongly positive nor negative about using new technologies, with the vast majority following the trends of their peers (Table 2).

In sum, the students in the three courses can be characterized as adult learners who were neither early nor late adopters of technology (Rogers, 2003).

Micro-Level Analysis

Micro-level analysis examines the use of online tools to support the fifth creative tension – negotiating face-to-face and online media. Questions addressed were: Do students have basic fluency with the online tools? What are students' attitudes toward the online tools? How well do the online tools meet usability guidelines – ease of navigation, clear information design, and dialogue support? How well do the online tools support interaction? How well do the online tools support learning? Micro-level analysis is fundamental, as usability issues, lack of technical skills, or negative attitudes toward technology can inhibit communication and potentially derail the blended learning process at the outset.

At the start of the semester, nearly half of the students had never contributed content to either wikis or blogs (Table 3).

Students new to wikis expressed initial trepidation but also confidence and a sense of accomplishment after use. At the end of the semester, on a scale from strongly disagree (1) to strongly agree (5), the mean response of all 16 respondents for a rating of PBwiki as helpful to learning was 4.75.

Table 3
Student Use of Social Networking Tools: Pre-Course Questionnaire
N=32

Use of Social Networking Tools[1]	Never	Once per year	Several times a year	Monthly	Weekly	Several times per week	Daily
Question 9a. How often do you contribute content to wikis (e.g., Wikipedia) (for school, work, or recreation)?	15 (47%)	0 (0%)	5 (16%)	2 (6%)	10 (31%)	0 (0%)	0 (0%)
Question 9b. How often do you contribute content to blogs (for school, work, or recreation)?	15 (47%)	3 (9%)	8 (25%)	3 (9%)	3 (9%)	0 (0%)	0 (0%)

Thirteen of the 16 respondents to the final questionnaire commented on the usefulness of the online tools (Table 4). These comments indicate that the tools were easy to navigate, provided a clear information design, and allowed students to stay connected between classes. The responses also indicate the varied ways the students used the tools for learning, as well as comments for improvement.

On the final questionnaire, in answer to the question "In what ways did using both face-to-face and online environments not help you learn? What improvements would you suggest?", student responses appeared to confirm the overall usefulness of the online tools. Four respondents answered that they had no suggestions for improvement and eight respondents did not answer. Four respondents provided suggestions for improvement, which are included in Table 4.

Students also provided valuable information to aid in negotiating face-to-face and online media. In answering the question, "In what ways did using both face-to-face and online environments help you learn?", students identified preferences for each type of media. In general, they stated that face-to-face was essential for creating a collaborative

environment, getting to know each other, learning from presentations and demonstrations, and deepening their understanding of ideas initially discussed online. Online environments were useful for "staying connected" in biweekly classes, submitting assignments, keeping track of one's own work, balancing the workload, and submitting peer assessments.

Several questions related to the use of technology for learning were repeated on the pre- and post-course questionnaires to ascertain any changes in attitude. The use of the technology tools seems to have positively affected attitudes toward technology for learning (Table 5). The percentage of respondents who strongly agreed or agreed with the statement, "I get more actively involved in courses that use information technology," increased from 48% in the pre-course questionnaire to 82% in the post-course questionnaire, with the mean score rising from 3.48 to 4.00. Similarly, the percentage of respondents who strongly agreed or agreed with the statement, "The use of information technology in my courses improves my learning," increased from 69% to 88%, with the mean score rising from 3.81 to 4.13.

Table 4
Usefulness of Online Tools for Learning: Post-Course Questionnaire
N=16

Course	Student Responses (R=Anonymous Respondent Number)
Reference & Online Services	It is a great approximation of the "real" world. Since we will very likely be serving patrons in all of these environments, it is good to practice in a multitude of settings. (R9)
	One aspect I really liked was having access to the lecture notes before class via PB Wiki. I like to read ahead. I found this useful when addressing topics I might have otherwise struggled with. (R12)
	I think the scope of coverage was very helpful and interesting, and [I hope we have] the possibility to revisit these pages for future reference. I know I will if it is possible … Moodle was great for feedback - wiki works fine otherwise. (R14)
	This class made use of technology as a way to organize the class objectives and subject matter more than any previous course. I found the combination of Moodle and PBwiki to be very effective. I liked to use the Calendar on PBwiki to get an excellent overview of each session's lecture notes, readings and assignments all in one place. (R15)
	I am also grateful for all of the wonderful examples and resources [the instructor] provided for the class (including the use of this wiki) … I don't think I have ever had a class that provided such wonderful and extensive resources. What a gift! Because of this, I probably learned more in this course than in any other … I don't have any suggestions for improvement, except options for when technology isn't cooperating. I appreciated the experience. (R16)
Library User Instruction	It made it easy to balance workload. I found using the Focus Questions online really helped to keep everything in one location. It was the best "journal" I've ever kept and I don't do journals. This is one that will help me (I'm printing it off to keep) … Sometimes, I didn't feel I had the technology down. I'm not tech savvy, so it was difficult finding methods that I could use effectively and not look old fashioned. I would have liked to have a little more exposure to some tech. (R2)
	The wiki was structured in a very thoughtful way. It was easy to find the information … I think some of the information on the wiki just never gets read. As students we posted information but were not encouraged to view what others posted. (I occasionally did as time allows, but then was wondering if I was "snooping".) (R3)
	I think these [face-to-face and online environments] compliment each other and help keep us connected. I would have enjoyed more online sharing & communication. (R7)
	I liked the pbwiki for following the calendar and syllabus … I didn't like the PBwiki for posting assignments and reviewing other people's posts. (R8)
	The face-to-face was an important part of this class, but because the class met every other weekend the wiki was also a very important way to stay connected. (R10)
	The wiki was very well done! It could be used as an example for other classes. It took a while to get used to it, but once I had, it was very thorough. (R13)
Information Seeking Behavior	The online environment made turning in assignments, peer evaluation, etc. much easier and kept us connected to the class between sessions. (R1)
	I really liked the Wiki page to keep track of my research!!!!! Without it I would have completely lost track of what I was doing and when … I can't think of anything [for improvement]. (R4)

Table 5

Student Attitudes Toward Information Technology for Learning: Pre- and Post-Comparison

Use of information technology	Pre 5	Post 5	Pre 4	Post 4	Pre 3	Post 3	Pre 2	Post 2	Pre 1	Post 1	Pre Mean	Post Mean
Key: 5 = Strongly agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly disagree Pre-Course Questionnaire: N = 33; Post-Course Questionnaire: N = 16												
I get more actively involved in courses that use information technology.	12% 4	19% 3	36% 12	63% 10	39% 13	19% 3	12% 4	0% 0	0% 0	0% 0	3.48	4.00
The use of information technology in my courses improves my learning.	21% 7	25% 4	48% 16	63% 10	24% 8	13% 2	6% 2	0% 0	0% 0	0% 0	3.81	4.13
Information technology makes doing my course activities more convenient.	39% 13	75% 12	55% 18	25% 4	9% 3	0% 0	0% 0	0% 0	0% 0	0% 0	4.28	4.75
I have less incentive to attend class when materials from course lectures are available online.	0% 0	0% 0	3% 1	0% 0	9% 3	0% 0	30% 10	75% 12	58% 19	25% 4	1.27	1.25

At the micro-level of analysis, on the whole, student responses indicate that the online tools met high standards of usability and effectively supported online communication and learning. More positive attitudes toward the use of technology for learning at the end of the course may indicate that an effective balance between face-to-face and online media was achieved.

Meso-Level Analysis

Meso-level analysis addresses social and pedagogical factors influencing social constructivist learning that are primarily associated with the stages of learning. The questions considered were: What evidence exists that shows that students shared experiences, ideas, and competence over time

(engagement); extended experience through reflection and exploration (imagination); and converged around vision, goals, practices, and accountability to each other (alignment)? This level of analysis draws attention to individual factors such as learning styles and individual barriers to communication or collaborative learning, as well as factors in the learning environment such as norms of communication and facilitation strategies.

In response to open-ended questions on the post-course questionnaires, all 16 respondents provided evidence that engagement, imagination, and alignment were part of their collective learning experiences. Table 6 summarizes aspects identified by students with the frequencies that the items

Table 6
Student Views on Community Learning: Post-Course Questionnaire
N=16

Aspect	Response Frequency	Sample Responses (R=Anonymous Respondent Number)
Engagement: Sharing		
Collegial atmosphere	2	Classroom environment was comfortable and conducive to learning. (R14)
Diverse perspectives	2	It was really valuable to hear from several perspectives. (R1)
Self confidence and comfort with peers	2	I learned to be less shy about asking for input and feedback from the professor and to not be nervous to ask others for help in getting the data collection done. (R6)
Enjoyable learning	2	The community style of the class really made five hours go by very quickly. (R1)
Encourages collaboration	1	This is a career change for me. My current career is competitive not collaborative. Working with my peers really helped me to overcome that obstacle. (R12)
Encourages respect	1	Developed great respect for fellow students, both our differences and common goals. (R7)
Learning from each other	4	I enjoy, and get more from, classes where there is a lot of discussion on topics. Loved working in teams or partners in assignments. I "think" better and have better ideas when bouncing them off of others. (R5)
Imagination: Extending		
Better problem solving	1	[Working with peers] was huge for me - as many times the way a classmate would approach solving a problem was in and of itself an eye opener. I learned that there are as many ways to think about solving a problem as there are problems to be solved. (R9)
Broaden one's perspective on issues	3	Because so many of my classmates have actual library experience, it was great to hear real life examples of concepts we were learning. (R15)
New ideas for completing course projects	2	It was helpful to see what other people were doing and how they were approaching their instructional sessions - it gave me a good idea of how I wanted to approach mine. (R10)
Feedback on course projects	1	I really liked all the additional help I received on my project and all the insight people had with my area. It made me understand what I didn't explain well enough for others to understand the subject. (R4)
Alignment: Converging		
Convergence around best practices	1	There was a lot more discussion and idea sharing in this class. It was more than a traditional class with a huge project, small groups, etc. The whole class worked toward an end result (Best Practice) and each assignment was incorporated into that final event. This caused me to focus specifically on parts and whole at the same time in such a depth that I was able to keep up and really take hold of the information more completely. (R2)
Discussion focus led by students	1	This class felt very "organic." There was a structure and a plan, but it also felt flexible, so that class discussions and topics could naturally evolve. I appreciated that we, as students, could focus on the areas that were important to us. (R11)

were mentioned in student responses, accompanied by a sample response to indicate how the information was coded, labeled by anonymous respondent number. While the opinions of the other 53% of students who did not complete the final questionnaire could paint a different picture, the views of the 16 respondents are consistent across the three courses. These responses also indicate that students valued community learning for developing mutual respect, confidence building, deeper and more varied learning, collaborative learning, and greater enjoyment in the class.

One comment in particular clearly indicates the value of community learning for this student: "*I really enjoyed working with my peers and getting to know their searching styles and communication styles – I think I learned as much from them as the instructor.*"

On the final questionnaire, in answer to the question "In what ways did working with your peers not help you learn? What improvements would you suggest?", student responses appeared to confirm the value of community learning. Five respondents stated that there were no disadvantages, eight respondents did not answer, and one noted, "*I can only say that I wish I had gotten to work with a larger variety of the students. There are a few that I never worked with at all.*"

One student's response on the final questionnaire indicates a recognition that the sense of community that developed was at least in part due to the CoP design as an educational intervention:

> *My favorite part of this course … was the wonderful mix of personalities we had in the room. I really appreciated that everyone was encouraged to participate and that any input was respected and valued. There was a real sense of community that is not found in most classes. I think it was deliberately crafted and that it was simply brilliant.*"

As noted previously, engaging students to

commit to collaborative learning necessitates building an atmosphere of trust and a climate of collaboration in order to encourage confidence building, risk taking, and relationship building. As I implemented the model, I realized the critical importance of facilitation strategies for learner-centered and social constructivist teaching approaches (cf. Savin-Baden, 2007). Selected student responses from the three classes to the question, "In what ways did your instructor's teaching style and methods help you learn?", indicate that these CoP-based facilitation strategies achieved some success:

- *You were very collaborative/inclusive, focused, positive, and genuinely interested in topic and students.* (Reference & Online Services, Respondent 14)
- *Allowed me to focus on specific areas that were of interest to me, fostered thought-provoking class discussions, encouraged class members to talk to each other and learn from each other, promoted self-discovery.* (Library User Instruction, Respondent 11)
- *She really facilitated the learning process in a very collegial manner.* (Information Seeking Behavior, Respondent 1)

At the same time, teaching to a CoP design requires changes and innovations that challenge instructors to develop new skills and students to be open to nontraditional formats. Several responses on the mid-course questionnaire indicated the need for more lectures: (1) "*We still lack the traditional lecture about the subject*" (Library User Instruction) and (2) "*Perhaps more lecture about the different parts of the overall research proposal: literature review, research methods, research analysis, etc.*" (Information Seeking Behavior). These may be indications that my teaching methods were ineffective or that the CoP approach did not meet with student expectations of a more traditional format.

At the meso-level of analysis, the findings indicate that engagement, imagination, and alignment were part of the students' collective learning experiences. Students also valued

community learning for developing mutual respect, confidence building, deeper and more varied learning, collaborative learning, and greater enjoyment in the classes.

Macro-Level Analysis

The micro-level and meso-level analyses have established with reasonable certainty that the students were able to effectively use the tools for learning and that students experienced engagement, imagination, and alignment in their learning. We now turn to the macro-level analysis of whether or not the CoP learning outcomes were achieved.

This analysis examines student perceptions of their learning in two interrelated ways: (1) as related to course learning objectives and (2) as CoP learning outcomes, namely, knowledge of core concepts, acquisition of new practices, and the development of professional identity and leadership skills. My course learning objectives in the three courses were aligned to the MLIS Program's student learning objectives and focused on disciplinary knowledge and practices. Consideration of these is thus integral to an examination of the outcomes of negotiating core concepts and practices – the first and second creative tensions of the CoP model. The third and fourth creative tensions (negotiating expertise and identity/leadership) go beyond the course learning objectives and were more challenging to analyze. The reasons for this will be discussed in the final sections of this article.

Knowledge of Core Concepts

Based on the assumption that highly valued learning is a valid indicator of learning achievement, the final questionnaire included the open-ended question, "What concepts did you learn/develop in this course that were most valuable to you?"

Of the 14 students who completed Reference & Online Services, 6 completed the final questionnaire (response rate of 43%). Responses to this question were coded by core

concepts included in the course learning objectives that were articulated in the syllabus, as well as one concept not included in the syllabus, the structure of the learning. In their answers, respondents identified from one to five highly valued concepts. The numbers of occurrences of these concepts are summarized in Table 7, with sample responses to indicate how the data were coded.

Of the core concepts articulated in the syllabus, three were not mentioned by the respondents – Kuhlthau's (2004) model of information seeking, information literacy instruction, and issues and trends in reference services. This may indicate that these concepts were not highly valued or were not learned.

Of the 13 students who completed Library User Instruction, 7 completed the final questionnaire (response rate of 54%). Responses to this question were coded by core concepts included in the course learning objectives that were articulated in the syllabus. In their answers, respondents identified from one to three highly valued concepts. The numbers of occurrences of these concepts are summarized in Table 8, with sample responses.

The highly valued concepts mentioned by respondents included all course learning objectives in the syllabus. A number of responses articulated the core concepts as a process of instructional design, such as this response: "The language of teaching: learning styles, active learning & its importance, goals/objectives, assessments & rubrics. How to put this all together to design a teaching program/lesson."

Of the 7 students who completed Information Seeking Behavior, 3 completed the final questionnaire (response rate of 43%). The core concepts articulated in the course learning objectives included information behavior concepts, models and theories of information seeking behavior, and research methods. The three respondents mentioned all of the core concepts in their answers:

- *Qualitative research, the research process, and professional presentations during this course.* (Respondent 1)
- *I am amazed at all the models associated with qualitative techniques.* (Respondent 4)
- *Reviewed some research methodologies I had previously learned and was introduced to new ones*. (Respondent 6)

The fact that the highly valued concepts were correlated with most of the core concepts included in the course learning objectives is not necessarily a comment about the efficacy of the CoP model in comparison to other methods. At the least, it can be said that the model probably did not interfere with student achievement of the learning objectives. However, what is revealed by this analysis is that students varied in the concepts they most valued from their learning. Because adult learners create new knowledge from a base of previous experiences and worldviews, it is not surprising that no two students were alike in this regard. While this may happen in any class, it may be an indication that negotiating the creative tensions in a learning community grounds the learning outcomes in a process of individual identity formation and empowerment. Because each individual brings a different set of assumptions, experiences, expectations, and needs to the learning experience, this process is unique to each individual. The result appears to be differentiated learning of professional knowledge. This will be further examined in the "Discussion" section.

Table 7
Most Valuable Concepts Learned in Reference & Online Services: Post-Course Questionnaire
N=6

Core Concept	Response Frequency	Sample Responses (R=Anonymous Respondent Number)
Organization of information for access	3	How information is organized in resources. Types of resources available. (R5)
Search and retrieval	4	The concept of carefully observing what works in research and retrieval and what does not was very valuable to me. With the number of database searches involved, it was critical to learn various steps and options to finish the exercises and bibliography plan. (R16)
Criteria for evaluating references sources	2	The concept of authority in reference resources. That is okay to use a resource with questionable authority (like Wikipedia) as a starting point. (R15)
Reference interview	2	Reference interview. It was not something I had thought about before ... the need to work with someone to figure out exactly what they were trying to say. (R12)
Reference ethics and values	2	I think that one of the most important concepts of ref librarianship is that it is a service oriented profession that we are in … It is professionally incumbent upon us to thoroughly research and learn the best ways to "service" users. (R14)
Structure of learning	2	I appreciated most that the learning was structured so that we looked at not just the technological aspects but the human centered part of reference service. (R9)

Table 8
Most Valuable Concepts Learned in Library User Instruction: Post-Course Questionnaire
N=7

Core Concept	Response Frequency	Sample Responses (R=Anonymous Respondent Number)
Information literacy concepts	2	Before this class, I knew virtually nothing about information literacy instruction. Learning about this concept and how to practice it has been incredibly valuable. (R11)
Learning theories	4	Learning styles and the effect that has on successful teaching. Especially Active Learning, which has not been my preference, but now I understand how effective it is and how it can also be used for assessment. (R7)
Instructional methods	5	I've never taught anything--so I learned a lot about teaching and instruction in this course, including: The idea that people have different learning styles--and to incorporate as many as possible in lessons. (R13)
Instructional planning and assessment	5	Building assessment into teaching [is] essential for evaluation. (R7)

Development of Professional Practices

In order to ascertain practices learned or developed in the courses, the final questionnaire included the open-ended question, "What professional practices did you learn/develop in this course that were most valuable to you?"

In Reference & Online Services, the six respondents identified from one to four highly valued practices in their answers. Responses to this question were coded by skills of practice included in the course learning objectives that were articulated in the syllabus, as well as an additional category, collaboration. The numbers of occurrences of these practices are summarized in Table 9, with sample responses. Of those articulated in the syllabus, two areas were not mentioned by the respondents – synthesis and presentation of information for users, and basic information literacy instruction.

In Library User Instruction, the practices articulated in the course learning objectives included reviewing the literature for evidence of best practices in user education and designing and implementing user education sessions. Four of the 7 respondents identified

specific aspects of designing and implementing user education sessions as the most valuable. No respondent mentioned the literature review. In addition, 2 mentioned the importance of collaboration for fostering information literacy instruction, not included in the course objectives.

In Information Seeking Behavior, the practices articulated in the course learning objectives included conducting research into information seeking behavior and presenting the results. The three respondents mentioned these skills, as well as the importance of research collaboration:

- *Professional practices learned/developed during this course include thinking about approaching an information seeking behavior research projects, how to design a study that will effectively measure/answer research objectives/questions. Additionally, I further developed professional speaking skills, working in groups, and critically thinking about the literature.* (Respondent 1)
- *How to conduct/setup an interview.* (Respondent 4)
- *I learned to incorporate research practices into the library profession and how to*

collaborate with others in a library setting for research purposes. (Respondent 6)

Again, the fact that the highly valued practices were correlated with most of the practices included in the course learning objectives is not necessarily an indication that they were

the result of the use of the CoP model. However, this analysis revealed that collaboration, not included in the course learning objectives, was highly valued by some students in all three classes. This appears to be an effect of using the CoP model.

Table 9
Most Valuable Practices Learned in Reference & Online Services: Post-Course Questionnaire
N=6

Professional Practice	Response Frequency	Sample Responses (R=Anonymous Respondent Number)
Basic search skills	3	Learning more in depth about resources and how best to search databases. (R12)
Evaluation of reference sources	1	Evaluate, question information sources. (R5)
Reference interview skills	5	Reference interview skills. In addition to class discussions, the hands-on online reference chat exercise and reference observations were very helpful. (R15)
Collaboration	2	Knowing our own strengths and developing rapport and relationships with librarians who have other strengths so that, as a team, we can best serve the people who come to us. (R9)

Table 10
Most Valuable Practices Learned in Library User Instruction: Post-Course Questionnaire
N=7

Professional Practice	Response Frequency	Sample Responses (R=Anonymous Respondent Number)
Developing lesson plans	2	I increased my ability to plan lessons and to create learning objectives. (R8)
Developing rubrics	1	I also learned how to develop and use rubrics well. (R2)
Developing assessment measures	3	The necessity of assessment - on a small scale and on a much larger level. (R10)
Use of technology for instruction	1	Use of technology in developing instruction. (R3)
Collaboration	2	Collaboration -- how important it can be for information literacy instruction, and ideas for fostering collaboration. (R11)

Development of Professional Identity and Leadership Skills

The fourth creative tension involves developing an identity in relationship to the community, influencing others, and taking leadership. Based on the assumption that the acquisition of professional values is an important dimension of professional identity, the final questionnaire included the open-ended question, "What professional values did you learn/develop in this course that were most valuable to you?" Student responses across all courses indicate a range of professional values addressed in the classes (Table 11). The emphasis on the value of collaboration, as well as respect for diverse perspectives, may indicate that the use of the CoP model encouraged a regard for characteristics that foster community building.

Table 11
Most Valuable Professional Values Developed - All Courses: Post-Course Questionnaire
N=16

Professional Value	Response Frequency	Sample Responses (R=Anonymous Respondent Number)
Collaboration	7	The most valuable professional value that was reinforced in this class concerned learning from others. This course really demonstrated the value of hearing different perspectives and how these can benefit the work that we do. (R1)
Respect for diverse perspectives	5	Respecting and providing for different learning styles and levels; encouraging and fostering lifelong learning and information literacy in people of all ages; making instruction fun & stress-free. (R11)
Service	5	We are at the service of users, so it is our obligation to be neutral, non-judgmental providers of information that they request. (R14)
Integrity	2	Reaffirmed the integrity of our profession. (R7)

Table 12
Most Valuable Identity and Leadership Skills Developed - All Courses: Post-Course Questionnaire
N=16

Leadership Skills	Response Frequency	Sample Responses (R=Anonymous Respondent Number)
Self confidence	5	I learned that I could actually instruct a class! I had no experience in instruction or teaching, and have been surprised to find that not only can I actually do it, but that I enjoy it, too. The mini demonstration and the teaching demonstration have been great confidence builders. (R11)
Collaboration	2	Learned when to say something wasn't quite right or to take the initiative to guide a project to keep it on track. Also, when to step back and ask for assessment from others to make sure it was still an effective lesson. (R2)
Risk taking	1	Interestingly, the strongest leadership skills I feel that I personally have developed came from having to do the reference observations. Making contacts, meeting librarians, going outside of my comfort zone. (R9)
Flexibility	1	Not sure what these would be except to ask and then pursue a different path with my project than what was originally expected. (R3)

In order to ascertain leadership skills developed in the courses, the final questionnaire included the open-ended question, "What leadership skills did you learn/develop in this course that were most valuable to you?" The respondents across courses identified self confidence, risk taking, flexibility, and collaboration skills as important leadership skills (Table 12).

Five of the 16 respondents either did not answer this question or stated that they did not know how to answer it. Students who had difficulty identifying leadership skills developed in the classes may have had a view of leadership as "taking charge." Effective leaders are more than decision makers. They also demonstrate interpersonal effectiveness and valued personal attributes, many of which were evident in the students' post-course questionnaire responses. Appreciation of diverse perspectives and the willingness to learn from others are consistent themes in the student responses, as well as desirable traits of LIS professionals and leaders (Ammons-Stephens et al., 2009).

In sum, the macro-level analysis has shown that the concepts and practices most valued by the students at the end of the courses corresponded to most of the core concepts and practices stated in the syllabi, with one exception: collaboration. In addition, collaboration was mentioned most frequently as the professional value most valued at the end of the course. Collaboration was also mentioned twice as an important leadership skill that had been developed. This emphasis on collaboration, which had not been included in the course learning objectives of any of the courses, appears to be an effect of using the CoP model.

Discussion

The purposes of this study were to: (1) test the efficacy of a CoP model for blended learning in supporting student growth related to core LIS concepts, practices, professional identity, and leadership skills; and (2) develop methods for formative and summative assessment using the model. This section discusses how well these goals were achieved, insights gained from the study, and directions for future research using the CoP model.

The aspects of the CoP model tested in this study were the three stages of learning and the five creative tensions. The micro-level analysis has established with reasonable certainty that the online tools met high standards of usability and effectively supported online communication and learning. This indicates that the design of the course and the wiki websites enabled a satisfactory negotiation of face-to-face and online media.

The meso-level analysis has indicated that engagement, imagination, and alignment were present in the students' learning experiences and resulted in mutual respect, confidence building, deeper and more varied learning, collaborative learning, and greater enjoyment in the classes. This indicates that the course design and facilitation strategies were adequate to implement the model with regard to the stages of learning.

The macro-level analysis has shown that most of the course learning objectives were correlated with highly valued concepts and practices learned or developed by the students in the three courses. While it may be that the negotiation of core concepts and models of practice effectively supported students in achieving the course learning objectives, firm conclusions cannot be drawn from the data. However, one important effect of the use of the CoP model appears to be an enhanced regard for the value of collaboration. The data gathered through the questionnaires were insufficient to support definitive conclusions about negotiating expertise or identity/leadership. One reason may be that the survey questions were designed to elicit perceptions of individual learning and were inappropriate for determining the outcomes of reciprocal processes, such as shared expertise or influence and leadership. Such outcomes may be better identified through observation or group reports. As discussed previously, another reason may be that students who had

difficulty identifying leadership skills developed in the classes may have had a view of leadership as "taking charge."

A tentative finding that deserves further research attention is that the CoP model may effectively support differentiated professional learning through grounding the learning outcomes in a process of identity formation and empowerment. Adult learners need to create new knowledge from a base of previous experiences and worldviews. Because each student brings different personal history, assumptions, and needs to the learning experience, the learning process is individual. I suggest that meaningful, differentiated learning about the profession was achieved by students in this study, through dialogue, exploration, critical reflection, negotiating meanings, sharing expertise, collaborative problem solving, and teamwork.

The demographics of the student population in these three classes are not atypical of students in LIS programs in general – a wide range of ages and experience with libraries and technology, career changes from varied professions, and differing expectations of their education, among others. Teachers at K-12 levels have used differentiated learning to serve academically diverse learners and promote educational equity. Tomlinson et al. (2003) define differentiation as:

> *An approach to teaching in which teachers proactively modify curricula, teaching methods, resources, learning activities, and student products to address the diverse needs of individual students and small groups of students to maximize the learning opportunity for each student in a classroom* (p. 121).

Learners' readiness levels, interests, and modes of learning are critical factors. The implications for LIS education are to recognize the need for differentiation and to adapt teaching and learning approaches for differentiated learning. The CoP model may provide one alternative.

Working with the model revealed new dimensions of the first four creative tensions, with implications for the design of future courses. While I have viewed myself as a learning facilitator and a co-learner with the students, my view of our roles has become more distinct. To support negotiating the meaning of core concepts and models of practice, the instructor plays a large role in designing for effective learning through determining learning goals, course structure, resource materials, activities, assignments, and assessment, as well as careful website design. Students respond to the initial design, bringing their own experience, expertise, and values into the negotiation to achieve better concepts and practices for effective action. Students play a larger role than the instructor in negotiating expertise, identity, and leadership. While this can be aided by design (e.g., future courses will include leadership as a core concept), the role of the instructor here is based less on design than on fostering the conditions for these negotiations to take place.

Modeling may be one of the most effective strategies for a CoP approach, rooted as it is in apprenticeship learning. This was affirmed by one student response on the mid-course questionnaire: "[The instructor] is modeling a fine example of information literacy instruction; we are experiencing it first hand. Expectations are defined, readings are appropriate and meaningful. Many modes of instruction included, feedback encouraged … It is easy to understand the concept when it is modeled so clearly for us." The implication is that solely online learning environments may be insufficient for developing classroom CoPs and by extension the skills needed for a full range of face-to-face and online professional settings.

The formative and summative assessment methods and instruments were sufficient for testing the efficacy of most aspects of the CoP model. Responses to the self-perception questionnaires provided data adequate for conducting the micro- and meso-levels of analysis but did not provide data of sufficient depth and breadth to examine CoP learning

outcomes at the macro-level of analysis, particularly regarding the third and fourth creative tensions. Further iterations of design-based research are planned to develop a better articulation of the model and an integrated set of methods and tools for the analysis of data, including additional sources such as site use statistics, student-generated wiki content, and student products with self- and peer-assessments. These will be important for a fuller examination at the meso and macro levels of analysis.

An important difference for future analyses is that the identity of students will be known, allowing for a better understanding of how differentiated professional learning occurs. More probing questions will be asked about the stages of learning. Group reports will be analyzed for evidence of the development of shared expertise and leadership skills. Other research questions relate to possible differences in results among the courses.

Conclusion

The findings strongly indicate that the use of the CoP model had positive effects on the learning process among students in three graduate-level LIS courses. Students valued learning in community for developing mutual respect, confidence building, risk taking, deeper and more varied learning, learning with and from their peers, and greater enjoyment in the classes. While the findings of the model's effects on student growth related to core LIS concepts, practices, professional identity, and leadership skills were suggestive but not conclusive, students' high regard for the value of collaboration appears to be a clear effect of using the CoP model. Moreover, there were indications that the model supported differentiated learning of professional knowledge and skills.

The formative and summative assessment methods were sufficient for testing the efficacy of major aspects of the model under the limited conditions of the study. The planning, implementation, and assessment process has led to a deeper understanding of how the

creative tensions operate in practice, as well as refinements to the model and the strategies for its successful implementation. This study contributes to social constructivist learning approaches and LIS curricular development by presenting an innovative model for supporting professional growth among adult learners, as well as a conceptual framework to guide evidence based practice. Further testing, refinement, and use of the model in other contexts and by other educators are needed to ensure that the model is robust and broadly applicable.

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Endnote

[1] The survey questions were adapted from Students and Information Technology in Higher Education: 2008 Survey Questionnaire, created by and publicly available from the ECAR-EDUCAUSE Center for Applied Research (http://net.educause.edu/ir/library/pdf/SI/ESI08a.pdf).