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A Case for a New Pedagogy: Knowledge Authority, Community of Practice and Technology

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Abstract

The paper presents a theoretical framework for pedagogy based on three concepts, namely change in teacher role, individual to shared learning, and community of practice, for redesigning curriculum. We specifically target the capstone course in the MIS major to test the framework. Using the framework, we analyze the qualitative data that are collected. Because of the early stage of the study, the discussions and conclusions are preliminary and exploratory in nature.

Keywords

Pedagogy, Community of practice, collaborative learning, online collaborative learning environment, domain expert, user-centered design, collaboration-centered design.

1. Introduction

Traditional forms of teaching and learning face significant challenges today because of the rapid advances in information technology. We have moved away from an industrial economy to a knowledge economy where patrons are expected to be well versed with knowledge tools. Moreover, in this new world, knowledge is dispersed among a wider band of sources. Learning requires collaboration and teaching beckons facilitation. A key question is, how do we transform college education, specifically college teaching and learning, to avail of the emerging opportunities.

Newman, Couturier and Scurry, in "The Future of Higher Education," portray the image of the 21st century learner through the view of Russell Edgerton (Newman, Couturier, & Scurry, 2004).

> *"The curtain has risen on the 21st century. A 20th century education, rooted in the industrial-era view of teaching as telling, is no longer adequate to prepare undergraduates for the challenges ahead. Three developments have occurred, largely in the last thirty years, that have transformed both what undergraduates need to learn as how this learning can best be facilitated. First, the character of American society has changed, raising the qualifications for performing numerous roles. Second, dramatic advances have taken place in our knowledge about how people learn, how this learning can best be facilitated, and the organizational context that are most effective in supporting this learning. Third, new technologies have been developed that provide new ways to leverage student and faculty effort. A 21st century education is an education that takes these developments to heart" (Edgerton, 2003).*

Supporting the learner's ability to perform numerous roles, adapting to the latest research on learning and utilizing new technologies are all elements that need to influence the new pedagogy. The pedagogic method must value, promote, support, and assess student learning first and foremost (Newcomb, Wilson & Baird, 1996). Furthermore, the advances in understanding about learning has emphasized that learning is a social phenomena requiring social constructs and collaborative efforts on the part of both the professor and the students. There is also evidence that learning is a process and not easily assessed with a single focus on product such as exams and papers. In traditional pedagogic methods, if learning is assessed, product is typically the focus when analyzing learning. Learning is reflected in both process and product.

Creating a learning centered environment with the 21st century learning in mind will require a new approach to teaching and new classroom structures. Professors must ask what knowledge do we expect students to acquire to be productive and effective in the 21st century workforce. Professors need to see students as learners, teammates, classroom participants, future professionals and members of multiple communities (both academic and personal). Furthermore, should professors assess learning, both the process of learning and the final products that are produced as a result? What technology can help to support and promote the new pedagogic methods? All questions, this study attempts to address.

2. Background and Theory Development

Technology provides an avenue to enhance student engagement. A 2008 study conducted by EDUCAUSE Center for Applied Research (ECAR) focused on the link between undergraduates and technology. The study surveyed 27,317 freshmen, seniors, and community college students at 98 colleges and university in the United States. The primary goal of the survey was to provide information about technology behaviors, preferences, and attitudes of higher education undergraduates as these variables relate to their academic experiences. The study found 80% of student respondents own a laptop, 53.8% own a desktop, and one-third own both. This data is approximately at 17% increase from the same survey taken two years prior. This data suggesting students have access to technology. Student respondents reported spending an average of 19.6

hours per week doing online activities for work, school or recreation. 82.3% of respondents use course management systems and 85.2% use social networking systems. When asked about the use of technology in the classroom, 59.3% of respondents prefer a moderate amount of technology to be used in their courses with trends that indicate this preference is rising. Face-to-face time is also preferred, in conjunction with technology. Addressing learning, the ECAR study found that 80.2% of students prefer to learn by running Internet searches. Respondents said the use of IT in their courses improved their learning (45.7%) and they get more actively involved in courses that use IT (31.8%). In reference to learning as social phenomena, the ECAR survey found that 49.7% of respondents use social networking sites to communicate with classmates about course-related topics.

A recent NSSE survey identified five key factors for academic success, namely, enhancing academic challenge, improving student-faculty interactions, making easier active and collaborative learning, and enriching educational experiences through technology, internships, team work, and senior level capstone courses among many.

The challenges the NSSE survey posed support the call for changes in instructional approaches that suggest a move away from instructor-led to instructor-facilitated learning where students become responsible for their own learning. In this context, learning relies largely on collaboration and interaction among students, faculty, and others as they work together to accomplish specific learning objectives.

2.1 Theoretical Framework

2.1.1. Professor - Knowledge authority vs Domain expert

Shifting pedagogic method from viewing professor as knowledge authority to professor as domain expert is the first adjustment in pedagogic approach. While, this shift may seem insignificant, a mere change in semantics, it actually attempts to profoundly change the foundation of traditional pedagogy. In most classroom settings in higher education, the professor is the authority of the knowledge that is being presented during the class. Usually taking the form of lecture, the professor dictates their knowledge to the students. In this context, ideally, the student learner, in turn, listens, takes notes, asks clarifying questions and absorbs the knowledge being presented. In obtaining this knowledge, the authority does not automatically shift from professor to student. It takes time and painstaking research to become such an authority. Authority allows the professor to make the rules and create the domain of knowledge. The student is free to learn the subject matter and play within the domain, however, no ownership over the domain is allowed. The lack of ownership, limits the students learning potential. Additionally, the collective learning opportunity that may take place in an environment where all and none are the authority is lost. Students in the 21st century come to the classroom with varied experiences and backgrounds. They posses an inarguable link to outside resources, whether through physically experience or virtual experience, that has potential to benefit the collective learning in the classroom. Taking an approach, which allows the knowledge domain to form through participatory design, whereby the professor shifts from domain creator to domain expert, distributes the authority. Distributed domain authority promotes ownership over knowledge and significantly improves the learning potential of each student and professor within the domain. Professor as domain expert will be discussed further when we discuss the concept of community of practice in the classroom.

2.1.2 Individual learning - Collaborative learning

The second shift in pedagogic method is a focus on collaborative learning versus individual learning. The British educator Edwin Mason first explored the concept of collaborative learning. Mason observed that life is comprised of our reactions to the presence of other people and carrying what we have learned from collaborating with other people while exploring the world with them (Mason, 1970). Theodore Newcomb reported the single most powerful influence on student learning is peer influence (Newcomb, Wilson & Baird, 1996). Piagetian theory states that cognitive conflict that emerges during collaboration causes conceptual growth (O'Donnell, 2006). Other theories about collaborative learning focus on the opportunities for deeper processing of content thereby enhancing existing knowledge structures (O'Donnell, 2006). Gradually the focus of learning has shifted from a single learners transfer of data to knowledge towards viewing learning as a social process constructed from communication and group collaboration. The quality and extent of the collaboration will determine the individual learning. Collaborative learning gives students authority over their own knowledge, there by supporting the shift of the professor from knowledge authority to domain expert (Bruffee, 1999).

2.1.3 Collaborative learning – Community of practice

The third adjustment in pedagogic method is to create a community of practice in the classroom. Communities of practice (COP), predominately accredited to Etienne Wenger (Wenger, 1998), is a concept that has been applied in many organizations. COPs are "groups of people who share a concern, a set of problems, or a passion about a topic and who deepen their knowledge and expertise in this area by interacting on a ongoing basis" (Wenger, 2002). Companies such as World Bank, Shell Oil, and McKinsey & Company are just a few examples of companies that are capitalizing on COPs to leverage knowledge. COPs have three critical elements to their makeup. The first element is domain. Domain is the common ground the members of the COP share. Domain provides a sense of common identity. Community is the second element in a COP. Community creates a social construct for learning. Learning and intellectual process create a senses of belonging in the community. Practice is the third element of a COP. Practice is specific knowledge the community develops, shares and maintains. Developing these three elements, in parallel, cultivates a community of practice within the classroom where students and the professor are members. A COP in the classroom provides the social structure that supports the premise of collaborative learning. By nature of being a member in a COP, members assume responsibility for developing shared knowledge. In developing shared knowledge, members of the COP share authority over that knowledge and take ownership of the collaborative learning. Learning happens due to the interaction and participation in the COP. Incorporating a COP construct as a part of the pedagogy will enable the shift from the student as pupil and therefore less knowing, professor as master, more knowing paradigm. Being a member of a community of practice encourages the student to take ownership of their learning. They are responsible to their community (their peers), hence the balance of authority shifts, thereby empowering students to be masters of their practice knowledge.

2.2 Synthesis of the framework – Online collaborative learning environment

The shift towards professor as domain expert, a focus on collaborative learning and creation of communities of practice in the classroom require a forum to synthesis the concepts and direct activity. An online collaborative learning environment (OCLE) is the most natural 21st century

forum for such an effort. The OCLE is the forum for the group community of practice as well as the classroom community of practice. The environment provides not only a forum for members of the community to exchange knowledge; it also assists in the collaborative learning process. The design and functionality of the environment assists the learners to master their practice knowledge. The environment also allows the professor to indirectly provide guidance through the design of the environment. This indirect manipulation of the design allows the locus of authority to remain dispersed among the COP. Expert practice knowledge is passed from the learner engaging with the functions of the environment, by the learner's choice. The choice to engage encourages ownership on behalf of the learner. The knowledge source is nebulous, as it is not perceived as coming from a person therefore there is no imbalance of authority between knowledge source and learner. The learner has become the master of the practice knowledge. Participating with the community given this newfound knowledge reinforces the learning and evolves the identity of the learner as a domain expert. Students still need engagement with the professor. The online collaborative environment does not replace face-to-face interaction. However, using the learning environment to reinforce the role of learner as part of a community of practice changes the interaction between professor and student. Instead of the professor as all knowing and all masterful of the practice knowledge, the student, having achieved a degree of mastery in his or her domain enters the interaction as a consult between domain members. The professor is viewed as a domain expert, perceived to have more time and experience in the given domain, but not all knowing. Just as a new organization member would solicit mentoring from a more senior organization member, hence forging a new relationship between student and professor. The interaction becomes a dialogue of idea exchange, instead of a one-way discourse.

3. Proposed Implementation Model

3.1 MyCLE Project

The proposed collaborative learning system, My Collaborative Learning Environment (MyCLE), is informed by theories of learning popular in education. The approach MyCLE project is taking to create a new pedagogy is four fold. The first shift is from professor as the knowledge authority to professor as the domain expert. The second shift is one that changes the focus from individual learning to collaborative learning. The third shift is to incorporate a community of practice paradigm to enhance collaborative learning. Finally it provides a forum, which will support and synthesize the first three shifts. It is specifically informed by the social theory of learning called Communities of Practice (Wenger, 1998). See Fig. 1 below for a visual representation of this theory.

Figure 1: Confluences of Forces on Learning
Source: Concept and illustration by Rex Heer, 2008, MyCLE Project Team

As the above illustration depicts, learning is a formation (and a transformation) of learner's identity (Wenger, 1998) and occurs when the individual learner engages with his/her community of practice. Learning is thus supported by a confluence of individual and community forces.

The My Collaborative Learning Environment (MyCLE) system would allow learners to engage with their community in several ways by providing them multiple lines of access (see Figure 2) to knowledge resources distributed within and outside of their communities. The system would provide capabilities to store, maintain, and share personal, work group, and community information and knowledge artifacts. These artifacts represent evidences of learning and moreover may be used to improve subsequent learning and assessment by self and others. The system should enable anyplace, anytime, any device, access. For example, increased mobility and pervasiveness of mobile computing devices (laptops, PDA, smart phones, etc.) will be a consideration in the final design.

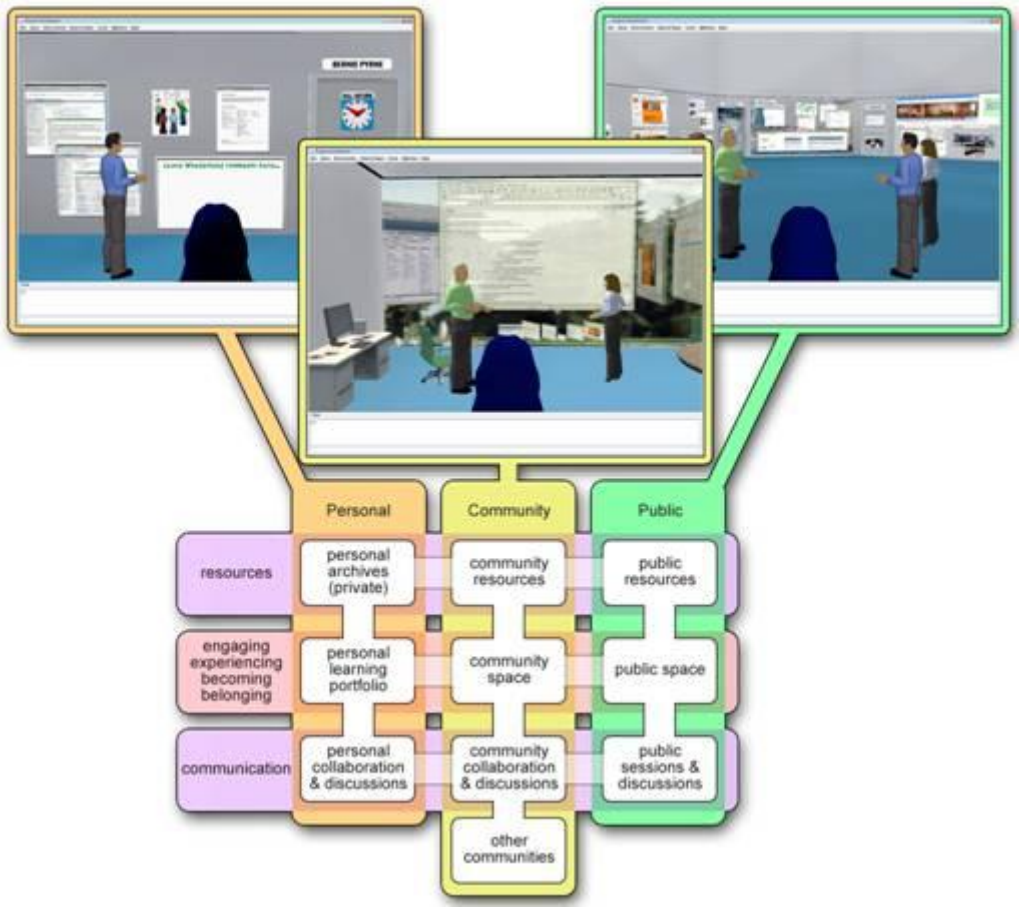

Figure 2: Mock up of MyCLE showing lines of access
Source: Illustration by Rex Heer, 2008, MyCLE Project Team

MyCLE is the ideal online collaborative learning environment to support and synthesize the shifts of professor to domain expert, a focus on collaborative learning and encouraging a community of practice in the classroom. MyCLE is currently in the conceptual stage.

3.2 The Study

The original users of the MyCLE product are the Management Information Systems students in the senior capstone courses. Information systems technology and information management are vital to the success of any modern organization as they enable business processes, maintain organizational memory, and provide predictive decision support capabilities. Students of MIS learn the technology and explore new and innovative ways to apply it in broader business contexts. Much of the learning takes place in a shared, group environment with a constant need to replenish their technology, business, and interpersonal skills. Internships, teamwork, collaboration, and frequent interaction with faculty and external resources are essential for academic success. Unlike other majors in the Business College, an MIS major (200 students a year) must finish the capstone course (MIS 438) in their senior year. A set of prerequisite courses ensures that core concepts are synthesized and applied in the course. With rapid changes taking

place both in the technology and business domains, there is a need to support and promote collaborative and interactive learning for the MIS student. We are first attempting to build and adopt a collaborative learning system that will support the new pedagogy method and improve the capstone learning experience.

The approach in pedagogy is currently being attempted in a senior level capstone course of Management Information Systems students. The class consists of 23 students (22 males, 1 female). The class meets twice per week for approximately two hours each meeting. The course will consist of approximately 36 class meetings over the course of 1 semester. The physical classroom is a computer lab stadium set up with three distinct sections. The qualitative data collected to date has been acquired through group interviews, class observation, group observation, process and product evaluation.

Resources initially provided to the students were a textbook (Robertson & Robertson, 2006), a website containing course and project overview, syllabus, deliverable deadlines and professor contact information. The website provided a list of four open source tools that could be used in online collaborative environments. Additionally, a link to a practitioners website that specialize in the systems development life cycle was provided.

The first week of class, students were told to form 5 groups. The group selection was self-regulated by the students. The resulting 5 groups were made up of 4 to 5 students per group. The class was given the project overview with a brief description of the systems development life cycle. The project presented to the class was to create an online collaborative learning environment using the systems development lifecycle.

4. Data, Analyses, and Discussion

Data are collected through classroom observations and interviews of the groups. Interviews are conducted during several points but often at the conclusion of a project milestone. Because the semester is still in progress and final project submissions are not yet completed, the data we have presented provide only a partial picture. Nevertheless we are able to analyze the observations and interview data using the theoretical framework adopted in section 2.0.

4.1 Professor as Domain Expert

Lecture is kept to a minimum during class time. The majority of the class sessions, groups are allowed time to work on their respective projects. The professor visits each group for a varied amount of time during the class. The visit allows the group to dialogue about any topic of their choosing with the professor. The professor visits with every group at a minimum of 1 time per week.

After 5 class periods (approximately 2.5 weeks) each group was asked to share their project ideas with the professor during the professor visit. The groups were given 15 minutes each for the visit. 4 of the 5 conversations between group and professor were ones that supported a shift towards viewing the professor as domain expert instead of knowledge authority. The students presented their project ideas with a primary goal of knowledge sharing as opposed to seeking approval. The dialogue for these 4 groups followed a similar path:

- Group shared concept and process overview
- Professor asked some clarifying questions
- Group addressed questions
- Group and Professor shared knowledge about the chosen approach

In contrast, the 1 group that looked to the professor as the knowledge authority instead of the domain expert, constantly sought approval during the conversation. The group was obviously struggling with the project concept and discovering a way to initiate the process. The conversation followed a much different path than the previous 4:

- Group asked professor, "What are you looking for in this assignment?"
- Professor (trying not to jump into the knowledge authority role), "What have you done so far?"
- Group tentatively shared some rough ideas about their project concept and immediately asked, "is that what we are suppose to be doing?"
- Professor asked some clarifying questions to guide group towards answer but group continued to ask questions for whose answers would provide structure and guidelines.

The conversation ended with the professor giving some structure and the group left to struggle through the perceived ambiguity of the project.

As the course progresses and the groups developed their projects, they fluctuated somewhat between seeing the professor as the knowledge authority or the domain expert. The fluctuations apparently come as a result of the group struggling on a given aspect of the project. Regardless of fluctuations, all groups are showing a shift from their original perspective of the professor towards one of domain expert and away from one of knowledge authority.

4.2 Collaborative Learning

Collaborative learning in the groups and between groups is the most challenging aspect of the study to capture. Analyzing collaborative learning involves evaluation of the as it relates to learning. Collaboration is in constant flux and thereby difficult to capture. Once the MyCLE system is fully established and deployed, understanding and evaluating collaborative learning will be easier. In the meantime, an online collaboration tool was provided to students mid-way through the semester, however groups had established a working structure and did not utilize the tool provided.

Five elements must be present in a collaborative learning group as per Johnson, Johnson, and Smith (Johnson, Johnson & Smith, 1991) and they are as follows:

- Positive interdependence - Team members are obliged to rely on one another to achieve the goal. If any team members fail to do their part, everyone suffers consequences.
- Individual accountability - All students in a group are held accountable for doing their share of the work and for mastery of all of the material to be learned.
- Face-to-face promotive interaction - Although some of the group work may be parceled out and done individually, some must be done interactively, with group members providing one another with feedback, challenging one another's conclusions and reasoning, and perhaps most importantly, teaching and encouraging one another.

- Appropriate use of collaborative skills - Students are encouraged and helped to develop and practice trust-building, leadership, decision-making, communication, and conflict management skills.
- Group processing - Team members set group goals, periodically assess what they are doing well as a team, and identify changes they will make to function more effectively in the future.

Each group commenced the project in a similar fashion. Members met face-to=face to develop the concept of their project design and method. Once the project concept was established, the group divided the tasks among the group members. The groups varied in the amount of time it took to transition from group concept design to individual task assignment. During the course of the project development, group members provide each other with feedback on tasks. Some groups have gone as far to challenged one another's conclusions. Very little teaching and encouraging have seen among groups. One group has excelled in the evaluation area of group processing. In this group, one member has taken the role of program manager for the project. The manager, in this group, has established goals for the project and for each group member. There has been some reflection observed among this group, communicated via email, about changes to improve group process.

4.3 Community of practice

In most academic settings, the senior capstone project culminates the program the student is close to completing. Usually, the capstone course is intended to synthesize all prior knowledge, tools, techniques and methods the student has acquired during their academic endeavor. The assumed academic maturity of a student in a capstone course, lends these students to most closely resemble a community of practice, similar to one in which you would find in an organization. Students have acquired a certain mastery of knowledge in their given domain. Similar educational experiences (ie: same classes and projects) lend way for the students to create a community. Furthermore, the student is close to making the transition from student to professional and more prime to practice their knowledge. These three factors, shared domain, natural community and readiness to practice are the cornerstones of a community of practice (Wenger, 1998) and are present in the class observed.

Communities develop their practice through a variety of activities (Wenger, 1998). Below is a table with the activity and an example of the activity.

Problem solving	"Can we work on this design and brainstorm some ideas; I'm stuck."
Requests for information	"Where can I find the code to connect to the server?"
Seeking experience	"Has anyone dealt with a customer in this situation?"
Reusing assets	"I have a proposal for a local area network I wrote for a client last year. I can send it to you and you can easily tweak it for this new client."
Coordination and synergy	"Can we combine our purchases of solvent to achieve bulk discounts?"
Discussing	"What do you think of the new CAD system? Does it really

developments	help?"
Documentation projects	"We have faced this problem five times now. Let us write it down once and for all."
Visits	"Can we come and see your after-school program? We need to establish one in our city."
Mapping knowledge and identifying gaps	"Who knows what, and what are we missing? What other groups should we connect with?"

Table 1: Community of Practice Activities

Little guidance and structure have been provided to the senior students in the classroom. They have been encouraged to search for applications and solutions currently available through open source networks or other networks they may be privy to. This method has encouraged the group members to exchange their own knowledge about tools, methods, approaches and ideas to accomplish the project tasks. These activities are in support of a community of practice approach.

Several groups have exhibited problem solving among group members. Occasionally, the groups have problem solved across groups, however has not a sustained activity. Requests for information among group members have been frequent among 3 of the 5 groups. Members in these groups frequently exchange code and shared previous experience. The other activities have not yet been observed in the group nor the classroom community of practice.

The community of practice concept is intended to benefit the groups during the course of the project as well as post course activities. Further analysis is needed to understand the engagement levels within the communities of practice established during the course.

Early observations would suggest a positive correlation between a community of practice approach and students shifting their view of the professor to one of domain expert.

4.4 Online collaboration tool

The concept of MyCLE has been established based on previous research on collaborative learning and community of practice however the physical system has not been created. The project deliverables for the observed class will be used in the creation of the MyCLE system. The MyCLE team reviewed several collaborative environments during the first two months of the class. Mid-way through the semester an open source solution (Redmine) was discovered and made available to students. Redmine provided the program management tools that most groups required through their stated requirements and through class observation. While groups have visited the Redmine site, none of the groups use Redmine to manage and collaborate for their projects. It is assumed that the groups have not used the Redmine site due to the late introduction of the tool. Groups have already established a working process and have not adopted the new technology.

The technology that groups are using consist of the following:

- Email – both University provided and personal accounts
- Personal servers

- Google groups, chat, sites, docs, calendar
- Drupal
- Zoomla
- MySQL
- Sharepoint
- Dropbox
- Survey Monkey
- Jaber
- SVN
- Apache
- Pubcookie

Group interviews and observation of groups' use of the various technologies suggested a positive correlation between online collaborative learning environments and communities of practice. Many times, the groups have used chat or email to problem solve and exchange information. The potential for analysis of collaborative learning has been evident in review of email traffic between group members. The groups have primarily used the internet to analyze project approaches. The search information has been shared among group members, reinforcing practice knowledge in the authority of the groups. The groups that have used more technology to collaborate have had very different discussions with the professor than the groups that have not used as much technology. One positive illustration of the change in discussion between professor and student is a group that uses multiple technologies to collaborate. This group uses email as the prime communication method, dropbox for file sharing, a common server to share the project and a group site for additional collaboration and idea exchange. They approach conversations with the instructor by bringing knowledge to the dialogue. The professor has learned of various new technologies and tools made available by this group sharing their knowledge obtained through their project work. On the contrary, the group that only uses email to coordinate on logistics (meeting times, project deliverables), exchanged less information among group members and diverted the conversation to non related topics during professor visits.

5. Future Research

5.1 Next study

Next semester the class size will double, hopefully providing additional data examining the new pedagogy that is the focus of this study. The MyCLE system will not yet be available for student use, however Redmine will be provided on the first day of the new semester. Learning from the previous course, in the spirit of the community of practice model, the students may choose to use the collaboration tool provided or another similar tool. Allowing students a choice will support the concept that learning is directly impacted by a learner's engagement in their community (community being the online collaboration tool in this context).

The adjustments in pedagogic method will continue to be analyzed through class observation and group interviews. Additionally, the online activity of each group will be analyzed according to a matrix of factors as they relate to each adjustment in pedagogy. Professor as domain expert will

be analyzed through words and behaviors of groups. To name a few questions that will assist in this analysis: Do groups look to the professor primarily for approval and direction? What is the distribution of airtime during professor/group interactions? Collaborative learning will be evaluated on the 5 factors mentioned above; positive interdependence, individual accountability, face-to-face promotive interaction, appropriate use of collaborative skills, and group processing. Community of practice will be measured based on the community of practice activities such as knowledge exchange, problem solving and mapping knowledge. Lastly, the online collaborative learning environment will be analyzed on its ability to support and synthesize the 3 adjustments in pedagogy.

5.2 Creating the MyCLE system

Developing the MyCLE system will be a prime goal of the study. Collecting data from the class will allow for deeper understanding of the needed functional requirements for MyCLE. Analyzing the online practice of the student community through collaboration efforts and final products will facilitate a optimal design of the MyCLE system. There will be a focus on gathering design elements required in the MyCLE environment to promote collaborative learning. The design approach will contain four key aspects to support the adjustment in pedagogy; collaborative learning-centered, knowledge-centered, assessment-centered, and community-centered.

6. Conclusion

The adjustments to pedagogy in this study suggests a positive correlation with learning. A teaching approach which combines collaborative learning, professor as domain expert and community of practice with the support of an online collaborative learning environment could equip professors to meet the needs of the 21st century learner. This study is a work in progress and research will continue to be conducted on current and future Management Information Systems courses. Future research will specifically focus on design that affords collaboration in the classroom and has a positive correlation with learning.

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