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Evidence of theory in training design Collaboratory Learning Communities

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Abstract

In recent years, the concept of learning communities has gained popularity among many academics in the classroom. However, this raises a number of issues about the design of learning environments. For example, the student assumes the responsibility to make sense of the body of knowledge associated with the instructional content being delivered. The instructor supports this process using assignments designed to foster collaboration, facilitation of active discussion, and promote development of critical thinking and research skills.

This study examines the experiences and achievements of 16 first-year graduate students participating in a collaborative learning community while engaged in problem-solving activities. The findings produced a new model titled the Learning Community Model. The findings also indicate that students tend to adopt a theory that fits their own personal view of instruction and learning. Participants reported gaining new knowledge and an appreciation for instructional theory as it pertains to design

Introduction

In the research literature on collaborative and peer-assisted learning communities, there is a broad acceptance of instructional practices in which the teacher guides and directs learners about ways to work together in order to achieve an instructional goal or learning outcome. Dillenbourg (1999) states, "The broadest (but unsatisfactory) definition of 'collaborative learning' is that it is a situation in which two or more people learn or attempt to learn something together" (p. 1). There are four aspects of learning that might apply to a collaborative learning community. They are: 1) interactions between teacher and student; 2) interactions between student and student; 3) learning mechanisms that support collaboration and design to engage learners; and 4) promote opportunities for students to engage and take ownership of their own learning and become critical thinkers (Gokhale, 1995; Totten, Sills, Digby & Russ, 1991). Thus, acceptance of collaborative learning by students and its ultimate success often depends upon resolving the question of how learning can be assessed in ways that are credible and that also enhance its use (Boud, Cohen, & Sampson, 2001).

Review of Literature. "In a learning-communities approach the goal is to foster a culture of learning, where both individuals and the community as a whole are learning how to learn" (Bielaczy & Collins, 1999, p. 3). The most compelling theoretical rationale for learning communities comes from the educational theories of Vygotsky. His theories of value, knowledge, human nature, learning and society provide the foundation for his overall goal of education which is to "generate and lead development

which is the result of social learning through internalization of culture and social relationships" (Communiquè 25, 1997). The purpose of this article is to explore use of selected instructional theories as they are tested in community-learning practice. Based on the four aspects of collaborative learning, a few instructional theories can be empirically tested.

In a collaborative learning community, the instructor models expert learning and problem-solving strategies explicitly in group activities and in direct interaction with smaller groups. Students observe how an "expert" approaches a learning task, a problem-solving task, a presentation task. The chance to reflect on what they have observed, then discuss and apply the strategies in realistic, relevant activities increases the likelihood that students will apply them more consistently in the classroom as well as outside the instructional setting. Especially effective for older students, this observe-reflect-discuss-apply pattern promotes gains for students of all ability levels, especially in analysis and solution of problems (Heller & Hollabaugh, 1992).

There have been several studies that report that higher education is "declining by degrees" and it is "underachieving" (Johnson, Johnson & Smith, 2007, Hersh & Merrow, 2005, and Bok, 2005). Johnson et al. (2007) state, "While the conclusion seems to be that postsecondary education is not performing well, there is a lack of focus on how to improve it" (p. 15-16). The author addresses this claim and provides an example using theory-into-practice as one step towards improvement.

The focus of the study examines the use of a learning community among graduate students. The author uses the Topping and Ehly's *Theoretical Model of Peer-Assisted Learning* (Topping, 2005). This theoretical model begins by identifying five groups of processes that influence effectiveness in a learning community. They are: organization and engagement, cognitive conflict, scaffolding and error management, communication, and affect. In a waterfall approach, each process flows through iterative cycles in a top-down and circular manner. The processes are: situated accretion, retuning, restructuring, inter-subjective cognitive construction, practice/fluency/automaticity/retention, general-ization, feedback and reinforcement, self-monitoring/self-regulation, metacognition and self-attribution/self-esteem. These processes will be further defined in the next section.

Community learning has been defined as "educational practice in which students interact with other students to attain educational goals" (O'Donnell & King, 1999, p.3). When students work together toward a common objective, their mutual dependency often motivates them to work harder to help the group succeed (Thousand, Villa, & Nevin, 1994). The importance of good team climate as a basis for discussion is an essential factor for communication and collaboration in peer-learning groups (Frankenberger and Balde-Schaub, 1999). According to Topping (2005), "Peer [Community] learning can be defined as the acquisition of knowledge and skill through active helping and supporting among status equals or matched companions" (p. 631). He continues, "The longest established and most intensively researched forms of peer learning are peer tutoring and cooperative learning" (p. 632).

There have been numerous studies that have compared the performance of learners working individually versus working in pairs. For example, Blaye et al. (1991) found that peer-learning based on a computer-based problem had a beneficial effect which transferred to later individual work. Similar beneficial effects have been reported by Amigue and Agostinelli (1992), Mevarech, Stern and Levita (1978) and Mevarech (1993). However, Jackson and Kutnick (1996) report a study on the effects of peer interaction that found that individuals performed better than pairs. They report that the beneficial effects of peer interaction are dependent on the nature of the task (Joiner, Issroff and Demiris, 1999).

This article examines the experiences and achievements of first-year graduate students participating in learning communities while engaged in problem-solving activities. The findings indicate that students tend to experience difficulty in adopting theory into practice while at the same time demonstrating success in an application-based learning community. However, students provided feedback that stated high satisfaction while participating in a learning community.

Method. This article describes current research-into-practice in a learning community. The population for this study was 16 graduate students enrolled in a graduate-level course titled, *Principles of Multimedia Technology*. The purpose of this learning community was to give students an opportunity to develop new knowledge and problem solving skills using the framework of an instructional theory.

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Each learning community was dyadic. Students (learners) were expected to select an instructional theory and then design an instructional module using a multimedia application.

Learners were guided through the Theoretical Model of Peer-Assisted Learning (Topping and Ehly, 2001). Beginning with Organization and Engagement, learners articulated goals, objectives, and learning outcomes using their selected instructional theory as a guide. Each instructional theory was examined for appropriateness in the areas of goals and preconditions, values, and methods. For example, in Nelson's Collaborative Problem Solving Theory (Reigeluth, 1999) the primary goal is to develop content using problem-solving and critical thinking skills. The values of this theory are based on learning to use natural collaborative processes in social contexts. This theory focuses on learning environments that are situated, learner-centered, integrated, and collaborative. Learners selected this theory based on these attributes.

The next phase was the delivery of instructional design example based on the Theoretical Model of Peer-Assisted Learning. Each area of the model is a process. The first process is Cognitive Conflict. Learners were expected to discard old myths and false beliefs about instructional and learning theory. Next, in Scaffolding and Error Management learners designed and developed their instructional module using a constructivist approach. Learners built their designs on previous knowledge and experience. The next process is the Communication phase. Each learning community implemented its own language, listening, adopting, and implementing skills necessary for the learning community to survive. The final process is the Affect stage. Learners were motivated and developed a sense of accountability to their learning community through ownership of the instructional design.

The Theoretical Model of Peer-Assisted Learning uses a waterfall approach where each process flows through iterative cycles in a top-down and circular manner. These processes are: Surface, Strategic, Deep, Declarative, Procedural, and Condition. "This development into fully conscious explicit and strategic metacognition not only promotes more effective onward learning, it should make helper and helped more confident that they can achieve even more, and that their success is the result of their own efforts. . . The five sub-processes offer a continuous iterative process…The model should continue to apply as the learning move from the surface level to the strategic and on to the deep level, and from the declarative into the procedural and conditional" (Topping, 2001, p. 683).

The ADDIE (Analysis, Design, Development, Implementation, and Evaluation) Model presents a cyclical process that evolves over time and continues throughout the instructional planning and implementation process. Five stages comprise the framework, each with its own distinct purpose and function in the progression of instructional design (Peterson, 2003). Figure 1 shows a correlation between the Theoretical Model of Peer-Assisted Learning and the ADDIE model used by many instructional designers. The author labels this new model as: the Learning Community Model.
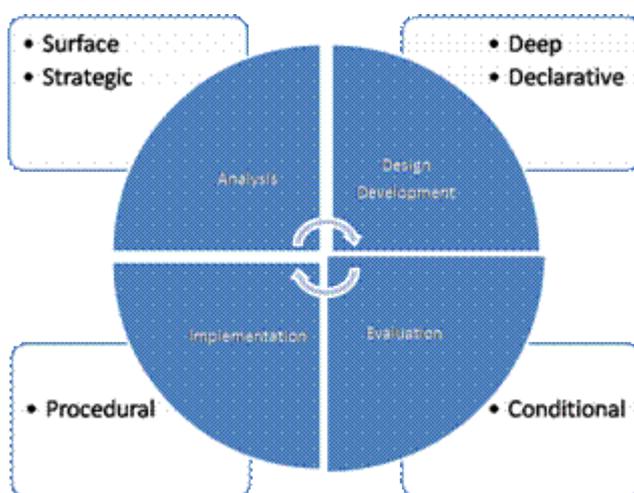

Figure 1. **Learning Community Model**

The ADDIE instructional design process is embedded in the Theoretical Model of Peer-Assisted Learning. Surface and Strategic processes are found in the Analysis phase of the model, Deep and Declarative processes are in the Design and Development phase, the Procedural process is in the Implementation phase, and the Conditional process is in the Evaluation phase.

Each process and phase in this Learning Community model is iterative.

Using a constructivist approach, learners were guided through each phase of the Learning Community Model. The first phase of the process described the instructional theories found in Table 1. The second phase provided instruction and examples on writing objectives and learning outcomes using an instructional module on graphic design. The third phase was the presentation of the instructional module. The instructional module presentation allowed learners to experience the context in which an instructional module might be delivered in the required time frame for their delivery. Each Learning Community was given forty-five minutes to present their module.

Once the outlying processes of the Learning Community Model were addressed and the instructional module example had been presented, each learning community began to address the inner process (ADDIE) to design and develop their instructional modules. The first requirement was to have students review selected instructional theorists and conduct focused research into the writings of these theorists. Table 1 shows a list of instructional theorists presented to the students. Learners demonstrated high levels of engagement and interaction which contributed to the positive results from their learning communities.

Table 1
Instructional Theories

Theorist	Theory
Benjamin Bloom	Taxonomy of Learning Domain
John Dewey	Theory of Experience
Robert Gagne	Nine Events of Instruction
Malcolm Knowles	Andragogical Learning Theory
Laurie Nelson	Collaborative Problem Solving
Roger Shank, Tamara Berman, Kimberli Macpherson	Learn by Doing
B.F. Skinner	Behaviorism

Students were expected to deliver instructional module presentations to the peers using step-by-step instructions in the area of multimedia technology applications to achieve learning outcomes they had identified. Using a constructivist approach, students were introduced to the various stages of developing an instructional design topic. Using the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model, students moved through each phase week-by-week as they developed their instructional design module. During the Analysis phase, students were expected to conduct research on several instructional theories. The evidence from their research consisted of published articles that discuss, use or evaluate each theory. Students were expected to discuss how their instructional theory would influence their module. During the Design and Development phases students created their instructional design modules. The modules consisted of a Pre-test, a pre-instructional strategy to assess the learner's prior knowledge and Post-test, to determine the level of learning that actually occurred (Morrison, Ross, Kemp, 2004).

Table 2
Learner Adopted Theories

Learning Community	Adopted Theory	Instructional Design Module

1	Dewey-Experiential Learning	Basic Web Design using XHTML
2	Social Learning Theory	Special Effects Video
3	Cooperative Learning	Interactive Web Design
4	Learn by Doing	Basic Web Design using CSS
5	Cooperative Learning	Editing Digital Audio Samples
6	Social Learning Theory	Stereoscopic video on YouTube
7	Collaborative Problem Solving	Graphics Design Photo Restoration
8	Andragogy	Animation Kinesthetic Techniques

Each learning community was given forty-five minutes to present their module in the Implementation phase. The Evaluation phases consisted of a 10 item Likert style questionnaire. This questionnaire was used to evaluate the performance of the learning community's presentation.

Results. This study produced a new Learning Community Model. The model fuses the Theoretical Model of Peer-Assisted Learning and the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) used by many instructional designers. The findings also indicated that students tend to adopt a theory that fits their own personal view of instruction and learning. Students reported gaining new knowledge and an appreciation for instructional theory as it pertains to design.

Students were required to deliver a formal report documenting their learning community experience and instructional design module. In addition to the documentation, students were required to assess pre-and post-test learning, present and discuss peer-evaluations on their modules and delivery style, and provide self-reflection and self-evaluation. Table 3 presents pre-and post-test gains from each learning community.

Table 3 contains pretest-posttest data showing the results from each learning community instructional module presentation. Each learning community reported gains in new knowledge; from 14 to 58. In each learning community, students were asked to remain in the room during the delivery of pre- and post tests, asked each participant to complete the questionnaires individually, and record and summarize the responses for their report.

Table 3
Learning Community Data

Learning Community	Adopted Theory	Instructional Design Module	PreTest Scores	PostTest scores	Gain
1	Dewey-Experiential Learning	Basic Web Design using XHTML	46	84	38
2	Social Learning Theory	Special Effects Video	58	90	32
3	Cooperative Learning	Interactive Web Design	76	90	14
4	Learn by Doing	Basic Web Design using CSS	50	94	44

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5	Cooperative Learning	Editing Digital Audio Samples	80	94	14
6	Social Learning Theory	Stereoscopic video on YouTube	30	88	58
7	Collaborative Problem Solving	Graphics Design Photo Restoration	68	98	30
8	Andragogy	Animation Kinesthetic Techniques	36	84	48

Discussion. The ability of students to work in a learning community is the keystone to building a solid foundation in higher education. This study describes the development of collaborative learning or peer-learning communities among 16 graduate students enrolled in a graduate level course titled, Principles of Multimedia Technology.

Limitations of the Study. Because this was a one-group, pre-test post-test study, there was minimal control for this experiment. A single selected group was used for observation with careful measurement being done before applying the experimental treatment and then measuring the results. This design has minimal internal validity, controlling only for selection of subject and experimental mortality. It has no external validity. Any surface threats to validity for both the pre/post evaluation instruments were minimized reviewing the wording of each question asked. The results are not generalizable among the participants due to the unique nature of the instructional content. The loss of external validity comes from the fact that the participants were selected from a small sample obtained from a single geographic location. Because of this, it is not certain if these results would apply to participants in other geographic locations or higher education settings.

Conclusions. The author recommends future research using the Learning Community Model with both undergraduate and continued graduate populations. Research should be conducted using this model in blended learning communities (integrating online learning and face-to-face meetings). Areas that might be addressed are: 1) the deeper the personal relationships between learners and the collaborative learning experience; and (2) the relationship between learners and group interactions (using technology) before and/or after a face-to-face meeting. The learning community experience in higher education serves to enhance the college experience for students. This practice is worthy of continued research to ensure student success.

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