

Refining Knowledge in a Virtual Community: A Case-Based Collaborative Project for Preservice Teachers

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Abstract

This paper examines issues of integrating technology into teacher education. By looking at a case-based project designed to help preservice teachers at two United States higher learning institutions to examine and refine their beliefs about teaching and learning through collaboration via electronic mail, the study attempted to investigate how computer networks can be effectively used to enhance constructivist learning. Major findings include: (1) case-based projects promoted critical thinking and knowledge revision; (2) collaborative thinking and critiquing were affected by many factors—technology was only one of them; and (3) technology was more effectively learned when embedded in content-based projects.

Keywords — computer network, teacher beliefs, teacher education.

1. Introduction

Technology, particularly telecomputing technology, has been praised for its potential to facilitate collaborative learning activities [4, 6]. In a project utilizing computer networks to provide “teacher education students with hands-on opportunities to experience collaborative, constructive learning,” [2, p. 149], the Teaching Teleapprenticeships (TTa) team found computer networks have several advantages: (1) time flexibility; (2) distance flexibility; and (3) immediate feedback. Additionally, Zhao [8], suggested that information on computer networks is less authoritative because it is easier to create and publish, thus making it easier to reveal the inadequacies of one’s knowledge.

However technology, in and of itself, contains neither pedagogical nor content bias [3]. For instance the computer network can be used to transmit traditional instructional packages or used to promote cooperative learning. To use technology to support constructivist learning, the teacher must understand the precepts of constructivism. It is also necessary for teachers to be

familiar and comfortable with technology so that they can focus more on the possibilities of the technology rather than being inhibited by their anxiety from exploration of its potential.

In light of the above considerations, we designed a case-based collaborative activity that is intended to help teacher education students: (1) refine their beliefs about learning and teaching; (2) experience a collaborative and constructivist learning project; (3) acquire skills with computer networking technology; and (4) develop a positive attitude toward medium-mediated communication.

2. Edpsycommunity: The Project

2.1. Participants

Participants were 68 teacher education students at two United States higher education institutions. One is a public research-oriented midwestern university while the other is a private four-year teaching-centered liberal arts college in the Northwest. Overall about 30 percent of the students had experience with email prior to the project. Most had used computers for word processing. About 5 percent of the students had access to the Internet at home. The rest had to go to a computer lab in order to use email and other network related tasks.

2.2. Procedures

The project lasted one semester. Initially, the participants were asked to write five essays analyzing a classroom case from different perspectives. For the first analysis, the participants were asked to analyze the case and provide a hypothetical action plan to cope with the problem situation based on their experiences and beliefs. This was intended as a vehicle for them to reveal their present beliefs. The second analysis asked the participants to provide an analysis and action plan for the same case using a Behaviorist perspective. The third one required analysis from a Cognitive perspec-

tive. The fourth one asked the participants to analyze the case from multiple motivational theories. The final essay requested students to again provide an analysis from a revised perspective of their own.

Halfway through the semester following completion of the second case analysis, we realized that the participants were not taking advantage of the system and collaborating as much as we had expected. We asked the participants to reflect upon the experience and solicited suggestions using the weekly email processing journal mechanism. Based on the feedback, we made the following adjustments: (1) split the large group into eight groups of 10 to 12 people equally divided between students from each section at Linfield and the section at UIUC; (2) gave longer time-gaps between assignment instructions and assignment due dates; and (3) discussed the importance of the experience. As a result of this change, only three case analyses were completed.

3. Results

Based on the 406 messages exchanged among the students during the project, students' weekly process journals (726 total), and interviews with six selected participants, we have the following findings to report. The findings are organized around each of the four goals we expected to achieve.

3.1. Goal One: Help Students Refine Their Beliefs About Learning and Teaching

To find out to what degree this goal was met, we categorized participants' case analyses into four groups along two dimensions: (1) basis of beliefs and (2) teaching approaches. After reading all the messages, we found that the participants generally based their analysis on two sources: their own learning experiences or a known theory. Therefore we first coded the messages into two groups: Experience-based and Theory-based. The second dimension was about the approach each student would take to teach the first class. Two distinguishable types were identified: Quasi-Behavioral and Cognitive-Humanistic. The coding was first completed independently by the two researchers. They then exchanged the results through email. When there was a disagreement, the two researchers discussed (over email) and reached an agreement. Table 1 summarizes the analysis of the messages.

As indicated in Table 1, Goal One was achieved for the most part. From the first to the last case analyses, we observed a clear shift of beliefs about teaching and learning. While the beliefs as revealed in the first case analysis reflect the students' own learning experience and a disposition toward teacher-centered and quasi-behavioral (assertive discipline type) approaches, beliefs revealed in the last case are more theoretically-based and cognitively-oriented.

Table 1. Distribution of Case Analyses.

Case #	Total	Basis of Beliefs		Teaching Approach	
		Experience	Theory	Behavioral	Cog-humanistic
1	51	46	5	48	3
2	48	43	5	48	0
3	50	11	39	0	50

The participants noted their changes of beliefs in their process journals. Almost every participant reported in their final process journals that as a result of the class, particularly the case-based project, they will teach differently. More tellingly, students began to think and discuss theories.

Technology or The Project: What Made the Difference?

Faced with these results, we asked ourselves the question: Would students have changed their beliefs without using the technology? The answer is yes because:

First, although we had expected that the participants would make use of the network to exchange ideas before they wrote up their analyses, the amount of exchange among the participants over the network was minimal. For the first two case analyses, every student posted their final drafts to the whole group. No single message was posted prior to their posting of the final copy, although there were seven messages commenting on the second case analysis immediately after the message was posted. After getting an unsatisfactory grade, one participant posted his revision of the second analysis to the group and solicited comments and suggestions before he turned it in for regrading. No responses were recorded on the network, and it is not known if he received any comments privately. Basically the first two case analysis were independently completed by each individual. The email only served as a bulletin board where the participants posted their final products. The technology did not make a big difference in the quality of the analyses.

Second, even though there was a tremendous increase in the number of messages exchanged among the participants before they began to write the third analysis, it is not obvious if that exchange had any impact on individual analysis. As mentioned earlier, due to the lack of collaboration during the first half of the semester, we made two structural changes: breaking the participants into smaller groups and allowing more time between assignments. Evidently the changes greatly facilitated the collaboration, at least in terms of the number of messages exchanged (from 0 to 139). However, a closer look at the content of these

messages suggests that most (87%) of these messages were more confirming than challenging to the original ideas posted.

In summary, the result that the participants' beliefs about teaching and learning, and their way of expressing that changed during the project was primarily due to the case-based nature of the project instead of the collaborative aspect of the project. In other words, the same results could have been achieved without the use of the technology as a medium for collaboration.

3.2. Goal Two: Provide the Participants a Collaborative and Constructivist Learning Experience

Apparently this goal was only half successful. As pointed out in the previous section, the collaborative aspect of the project was not very successful. While the project took the form of collaboration, it was more of an individual process. However, the project provided the participants an opportunity to experience Constructivist learning. In this project, the participants were guided through a typical constructivist process of learning. First, the tasks in the project were authentic in that it acknowledged learners' ownership of learning; it was project-based; and it fostered multiple perspectives [1]. Second, it started from the learner's prior experience and existent knowledge. Third, it encouraged the participants to construct knowledge instead of memorizing information.

Why the lack of collaboration?

The failure of the collaboration aspect of the project resulted from a combination of several factors: some organizational, some technical, and some epistemological.

The belief in authority or trying to be "correct" prohibited collaboration.

When asked to comment in their process journals about the reasons for such limited collaboration over the network in the first half of the project, many participants reported they were afraid that what they said might be wrong. Most of the participants had not been prepared to treat knowledge as an object that can be criticized, modified, compared, and regarded from different perspectives. Instead they subjectify knowledge, treating it as part of them. Therefore criticizing one's knowledge was considered equivalent to a value judgment about the person.

Unfamiliarity with the technology was another factor that negatively affected collaboration.

While we had expected that the using email would bring the convenience needed for frequent communication in this project, we completely underestimated the difficulties of using the technology. Although we provided training before and technical assistance during the

project, in the first two months of the project, the participants experienced a tremendous amount of anxiety and frustration with email. Since this was the first time that many of the participants used email, they had little knowledge about how the system works. Thus when a problem occurred, they made the wrong interpretation and started to panic. For example, because at one time one participant's mailbox exceeded quota, everyone who sent a message to the list at that time received an error message from the mail server saying that the message "was not deliverable." While the error message explained clearly that the message was not deliverable to one person and that it was sent successfully to everyone else, most participants interpreted it as the message had not been sent to anyone. So they started to either blame themselves for not being skillful or the computer for being so "stupid." One participant sent out five self introductions, while blaming himself for not being smart enough to know what to do. But his messages were successfully received by the list.

"Not sure about the email thing" was also one of the most often cited reasons for the lack of collaboration in the participants' process journals. Over half of the participants made statements similar to the following:

I really think that a lot of people are still "computer phobic". In speaking from experience, I can honestly say that I felt overwhelmed with all of this e-mail stuff that we had to do.

Collaborating electronically also meant for some people a change in their way of composing. Some participants were not yet used to composing directly on a computer. They first wrote on paper and then typed into a computer. This might have influenced the project as well.

The large group was another factor that inhibited students from collaborating.

One mistake we made in terms of design was beginning the project by putting all students in a group of over sixty people from two different institutions. Initially we made that decision based on two considerations. First, most professional listserv groups have many more members than 60. Since one of our goals was to introduce the participants to the utilization of technology in education, we thought it would be a good way to help them develop the skills to cope with large number of email messages, a situation likely to be encountered when subscribing to any of the thousands of professional mailing lists. Second, we thought having a large group would produce more diversity of ideas and thus evoke better discussions. Evidently our assumptions were wrong.

After we put the participants in smaller groups, there was much more discussion and collaboration.

Students reported that they felt much more comfortable posting ideas and critiquing others when they "know the names of the group."

To summarize, even though the project failed to provide the participants the opportunity of a collaborative learning experience, they did witness how a collaborative project could be organized and then adjusted when it did not work. They also experienced, as expected, constructivist learning.

3.3. Goal Three: Help the Participants Develop Skills With Technology and Goal Four: Help the Participants Develop a Positive Attitude Toward Medium-Mediated Communication.

These two goals are closely related. We found that the more skillful the participants became with the technology they more positive they felt about email communication. These two goals are thus discussed together.

In general, these two goals were achieved. As a result of this project, all participants can use email for communication. Although proficiency may vary from individual to individual, all participants have acquired at least the basic knowledge and skills to use one or another application program to send and receive electronic mail. Toward the end of the project, the number of messages exchanged over the network increased dramatically. While this increase resulted from a combination of factors, familiarity with technology was certainly among the primary ones.

Another indication is that after the participants were put into small groups, they had to create their subgroup list, a non-trivial task for beginners. Except for two, all did so successfully. When one group misspelled one instructor's email address, their messages were bounced back. Unlike earlier, not only did they not panic, but also successfully forwarded the message to the instructor without resending the messages to the whole group.

Participants unanimously reported in their process journals that one of the biggest achievements for them was that they learned "how to do email" or advanced their skills with the Internet. One student commented:

E-mail was very helpful. At first I hated the idea, and I don't know if I have gotten over my fear of not having a hard copy in hand of things, but I sure don't have a fear of using e-mail anymore. I learned how to keep my mailbox clean. I learned how to use pine. And now I know how to send documents through pine.

A reason to use technology is perhaps the most important factor contributing to improved skill.

A recent report by the Office of Technology Assessment [5] on Teacher and Technology suggest that teachers need more knowledge about technology in or-

der to make use of it in their classrooms, but a problem remains in how to deliver that knowledge. This project provides at least one alternative. Instead of teaching technology, we gave the students a reason to use it. To use it was to learn it.

This, however, does not mean that they can learn automatically or easily. During this project we provided training at the beginning and on-going support during the project. We did not attempt to teach them everything at once, rather we provided resources whenever they needed in a supportive atmosphere.

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