Team Teaching in an Online Environment: Effects on Instructors and Students

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ABSTRACT

As demand for online programs and courses increase, institutions of higher education are faced with the challenge of delivering sufficient numbers of high quality online courses to meet the demand. Team-teaching is one avenue to address barriers and assist faculty in retooling to deliver online courses. Team teaching can take several forms but always includes sharing responsibility of planning and providing instruction and feedback for the same students by two or more teachers. This study included participants enrolled in a graduate online earth science for in-service middle school teachers at three major research universities located in the Northwest, Midwest, and Southeast United States. Students were divided into cross-university, cooperative groups with colleagues across the country. There were 32 teachers enrolled in the course. Each university was responsible for the facilitation of one of the four major topics covered in the course. Results indicate, that the use of team-teaching provided novice instructors professional development in effective use of the medium and reduced the workload of an online learning environment. Colleges and universities across the nation now offer online courses and degree programs via the Internet (Thormann, 1999). It is estimated that over 6 million adults will enroll in an online course in the 2002-03 academic year (Hons, 2002). As demand for these programs and courses increase institutions of higher education are faced with the challenge of delivering sufficient numbers of high quality online courses to meet the demand. Often, a lag in student enrollment in online sections of a course results as institutions enter the online market. At the same time, faculty members have to retool their skills to master online course environments and teaching online. The complexity of the learning process (Schon, 1983; Whitaker, 1993), time intensive nature of online courses (Kroder, Suess, & Sachs, 1998; Mende, 1998; Tetter, 1997), and the need for extensive scaffolding (Loucks-Horsley, 1998) can be barriers for professional development. Team-teaching is one avenue to address these barriers and assist faculty in retooling to deliver online courses. Team teaching can take several forms but always includes sharing responsibility of planning and providing instruction and feedback for the same students by two or more teachers. A review of current research from classroom teaching, since online research is very sparse on team-teaching, can provide an empirical framework to view a grounded theory for best practice.

WHAT ARE THE ADVANTAGES OF USING A TEAM-TEACHING FRAME-WORK?

Encourages Reflective Practice

Encouraging reflective practice is one of the characteristics of team teaching derived from the literature. Roth (1998) conducted a case study of two teachers who co-tanght an engineering module for grades 4-5. He concluded three types of teacher learning emerged from the research: "…learning-in-practice; learning to talk about (to theorize) practice; and learning by attempting to put theory (prepositional knowledge) into practice" (p. 363). The affect of the aforementioned rapid pace of the classroom, a barrier to reflective teaching, can be lessened as the teachers learn from each other "learning-in-practice" (p. 363) during the progress of the instruction. As the two teachers reviewed videotaped teaching episodes, they were "learning to talk about (to theorize) practice" (p. 363). Finally, they attempted to put their knowledge base of educational theory into practice, termed "learning by attempting to put theory (prepositional knowledge) into practice (p. 363)." Roth noted co-teaching allowed the teacher on the side the opportunity to reflect as the instruction progress. Like Fullan (1982), Roth indicated without reflection there is no significant change in practice. Thus, co-teaching allows for a more reflective practice, resulting in increased teacher learning.

Provides Novice Teachers with Scaffolding

Although the instructors had experience teaching in a traditional live classroom, many experienced instructors find that they become novices when delivering instruction through a new medium. Roth, Masciotra, and Boyd (1999) concluded in a case study of two teachers, a teacher intern and an expert teacher co-teaching affords the novice teacher extensive scaffolding not available from traditional university pre-service courses. The researchers noted the rapid pace of the classroom typically allows very little reflection time, thns co-teaching allowed the novice teacher an opportunity to see how an expert teacher selects various educational theories to apply to a particular situation. In other words, the expert teacher provided scaffolding, when necessary, to assist the novice in choosing the appropriate response to a classroom situation. Additionally, the model allowed the teacher not currently responsible for instruction to reflect on the learning environment and reflect on the progress of the lesson and student learning.

Another benefit to novice instructors is that the workload is shared. Collins and others (1996) reported the use of teams reduces the workload in terms of planning, teaching, and grading. The reduction of the workload is very crucial, especially considering the typical workload is intensive in online courses (Kroder et al., 1998; Mende, 1998; Saurino, Bentley, Glasson, & Casey, 1999; Tetter, 1997).

In a study of team teaching in a clinical educational research course George and Davis-Wiley (2000) developed guidelines to proactively create effective teams: (1) Agree on roles prior to beginning course. (2) Allow for additional planning time. (3) Decide ahead of time if the team members are allowed to interrupt each other during instruction. (4) Explain evaluation criteria to students. (5) Team members must be consistent with the students. (6) Remember each team member brings strengths to the class.

Models Effective Pedagogy

Team teaching not only allows additional time for reflective practice, team teaching can be used to model effective pedagogy. In research of a team-taught, nndergraduate educational foundations course, primarily freshmen and sophomores, Hinton and Downing (1998) conclnded team teaching with instructors from diverse racial and cultural backgrounds provided a positive role model for students. The diversity of the team allowed students to experience an exemplary model of a multicultural classroom and modeled the university's policy of recognition and appreciation for diversity on the campus. Collins and others'(1996) also supported the use of team-teaching because the model offers students, not only diverse viewpoints, bnt also a more extensive knowledge base.

In an effort to determine the effects of various models of team teaching Collins and others (1996) investigated five different team teaching models in several undergraduate courses. In the first model, a lead teacher delivered the majority of the instruction and was supported by several supplemental instructors. The second model, involved the multiple instructor-teaching model, where guest speakers shared equal responsibility for teaching the course. In the third model one course was taught by one instructor with one guest lecturer. The fourth model used co-instructors in a single course. Finally, the last model involved co-instructors concurrently teaching two courses. The analysis of grades earned in the courses, indicated the co-instructor-two course model was the most effective, followed by the lead-supplemental model. Off-campus students had more difficulty in the co-instructor-single-content model compared to their on-campus counterparts. The guest lecturer model was the least effective model for students.

Provides Additional Assistance for Struggling Students

Team teaching provides an avenue for additional assistance for struggling students. In a summary of research Gatliff and Wendel (1998) noted the learning curve for students with limited technical skills was considerably higher than the learning curve for students with better skills. The use of a team of instructors facilitated students to progress at their own rate of learning. In a similar study by Jin and Nasara (2000), involving a team-taught university technology education course noted team-teaching could be used to reduce student frustration with technology. Over 75% of the students indicated the teaching approach enhanced the learning experience and about 55% of the students recommended the use of a team-teaching approach for the following semester. Collins and others (1996) noted more than one teacher in the classroom enriched the learning environment with a broader knowledge base and diversity. Thus, there was more assistance for struggling students.

Enriches Classroom Dialogue

Best practices advocate group collaboration (DeSimone, Schmid, & Lou, 2000; Jiang & Ting, 1998; McLellan, 1997). Collins and others (1996) reported team-teaching provides students with an exemplary model of the collaborative approach to teaching. Collaboration is crucial in learning because the group interaction fosters a rich learning environment where the learners and instructors re-construct knowledge both independently and corporately from the ensuing dialogue (Fensham, 1995; Vygotsky, 1978 as cited in Glasson & Lalik, 1993; John-Steiner & Meehan, 2000; Lee & Smagorinsky, 2000; Vygotsky, 1978 as cited in Moll, 1990). The team-teaching model provides students with additional mentors with diverse experiences and subsequently enriches the classroom dialogue. In general, the literature supports using team teaching in face-to-face classroom settings. Little is known about the impact or the effectiveness of team teaching in an online environment. Guidance is needed in developing best practices for the online education environment.

PURPOSE

The present study was designed to develop a research base for effectively using team teaching in an online environment. The purpose of the research was to investigate the effectiveness of using team teaching in an online course and to determine the effects on 1) reflective teaching, 2) scaffolding provided to instructors, 3) pedagogical practices, 4) teacher and student classroom dialog and 5) assistance provided to students. The research question was: How does team-teaching impact an online learning environment for instructors and students?

PARTICIPANTS AND SETTING

The participants were enrolled in a graduate online earth science for in-service middle school teachers at three major research universities located in the Northwest, Midwest, and Southeast United States. Students were divided into cross-university, cooperative groups with colleagues across the country. There were 32 teachers enrolled in the course. Each university was responsible for the facilitation of one of the

four major topics covered in the course. Thus, the workload was distributed to three instructors, Jonathan, Julie, and Tina.

The graduate level course, Earth System Science, was originally designed by NASA's Classroom of the Future at Wheeling Jesuit University through National Aeronautics and Space Administration (NASA) funding. The purpose of the course was to provide experiences for inservice teachers to investigate the earth as a system. This includes knowledge of actions and interactions of events between the earth's major spheres, biosphere, lithosphere, hydrosphere, and atmosphere. The course was delivered asynchronously, fully online, over fifteen weeks. The first three weeks of the course was designed to get the teachers comfortable with the online environment and prepare them for four three-week modules based on events that are the result of interactions in the four spheres of the earth system as defined by the course. Each module examines an event that impacts all spheres and students engage in discussions, readings, and research to investigate these events. The focus events included in the four modules are deforestation, volcanic eruptions, sea ice, and hurricanes. In week one of a module, students divide into online groups. Each student examines and reports on the impact of an event on one sphere individually. The second week, the students return to their groups and examine what was found in each sphere interaction and develop a model that includes direct effects on a sphere and interactions between spheres. During the third week of a module, students search for cause and effect relationships that connect these types of activities and create lessons that were be integrated into classrooms. Course instructors mediate the discussions and assist individuals and groups to access resources and content they may have missed.

In this virtual classroom, the three instructors brought a diversity of professional experiences. All instructors had strong background in at least one of the course content areas. One of the instructors had experience teaching the online course and a strong background in technology. The other two, Tina and Julie, had classroom teaching experience. The team teaching

model that was utilized included elements of collaborative teaching and turn teaching. Collaborative teaching involved multiple instructors being equally active in the online environment at the same time. Collaborative teaching was done to facilitate the professional development of the novice online instructors in addition to facilitate student learning. Turn teaching involved a lead instructor taking over for a period of time. Turn teaching was designed to help instructors become independent for future delivery of the course. To help the other instructors be better prepared to teach in the online environment, all three instructors worked together the first three weeks.

In week four, Jonathan facilitated the biosphere module as the other two instructors monitored online activities and played a secondary role in instruction. Julie was the primary instructor for the atmosphere module and Tina moderated the lithosphere module. All three instructors taught the hydrosphere module. Throughout the semester, all the facilitators provided students with needed feedback and support when decided it was appropriate based on online communications. Jonathan primarily focused on techical problems. Julie and Tina worked more with content questions.

METHODOLOGY

The research methodology involved qualitative analysis using naturalistic research of artifacts collected in the course including e-mail dialogue, transcripts of telephone interviews, and field notes of course facilitators. "Investigator triangulation" was established through the use of the multiple data sources (Craft, 1996; Denzin, 1978; Joyce & Showers, 1995; Patton, 1990). "Methodological triangulation" was obtained through analysis of the data over the course of the semester (Cohen & Manion, 1989; Craft, 1996; Denzin, 1978; Patton, 1990). The data was initially coded based on common terms. The terms were subsequently collapsed into the categories of requests for technical assistance, science content, pedagogical content, and social interaction. Items categorized as technical assistance (accessing E-mail, posting to the dis-

cussion board, accessing the Internet) focused on either a request for assistance or a response to a request. The category "science content" included online dialogue, transcripts of telephone interviews, or assignments that directly related to the course content, centered on earth system science. Dialogue categorized as "pedagogy" involved the implementation of course content through student learning activities and the subsequent analysis of the impact of learning activities on student learning outcomes. Finally, "social" dialogue focused on the affective component of using the Internet and telecommunication for instruction. For example: "How are you doing? Are you able to get online now?" would be coded as social.

In particular, the research focused on how the use of more than one instructor affected learning in an online environment. After initial categorization, the data was further analyzed for dialogue centered on the interaction of multiple instructors with students to provide assistance, how instructors impacted the response to the students, and how differences in characteristics of online instructors provided opportunities for modeling and scaffolding for the other instructors.

RESULTS

The instructors were in continuous communication with students and each other throughout the semester. As one instructor was teaching, the other two were able to observe, ask questions and make suggestions. For example, while Jonathan moderated the first module Julie and Tina monitored and assisted students. As Julie watched the online discourse during this time, she noted a problem with the group configurations.

Many of the students had a very strong Earth systems science background and the depth of their postings was evident. I had some concerns about the impact this might have had on students with very weak science backgrounds. I think assessing prior knowledge in the very beginning of the course (e.g., concept map) would be useful and could be used in assigning group members. (Field notes)

Julie was able to reflect on the discourse and offer a suggestion for course improvement. Usually this would have been evident only at the end of the semester when it would be too late for the current students. Julie had the time to reflect while the other instructor was responsible for teaching and this allowed Julie an opportunity to provide more support for struggling students. Jonathan also noted the composition of the groups was problematic. "Good group results depended upon the participation and expertise of each group member…"

There was evidence of scaffolding from the more experienced online instructor to the other two course facilitators. Jonathan was the most experienced facilitator and had taught several courses in an online learning environment. He took the first round of facilitation to model best practices for Julie and Tina. This was an added advantage of team-teaching. This strategy provided scaffolding for the other two instructors. They were able to observe and participate, but were not responsible for the daily teaching and facilitation of discussion boards.

This strategy provided the two novice instructors with experience and time to reflect on how they would approach the facilitation of their assigned modules. However, even with Jonathan's modeling of course facilitation, Julie still was not comfortable with her role. One issue that emerged was the novice instructors were still feeling anxiety concerning the facilitation of their modules. This was due to a lack of experience as a student in an online course.

My own personal background in online courses was nonexistent prior to this course. I would recommend that future facilitators have participated in at least one online course that utilized a discussion board. I did not have problems with the technology, but I did have some difficulty in trying to insert comments that would promote online discussion and was somewhat tentative in the beginning. I think that I became more comfortable as the class progressed, but regret that I did not feel more comfortable with the format at the beginning. (Field notes)

Effective pedagogy has two purposes in the online environment. One is to make the course manageable and the other is to maximize the

learning outcomes for students. The team teaching model allowed the course to be manageable for the novice instructors, by decreasing the workload when delivering a course in a new medium.

To illustrate how this was effective one teacher commented, "What I am finding difficult is finding the resources for the inquiry-based learning…It does work great for my grade level because we do ecosystems…(Bill, midterm evaluation). Sam indicated the course curriculum was congruent with national standards.

I think the content was right on task. It seemed to fulfill all the standards plus it added a different dimension of the student interacting with the student and the third aspect of those same students then interacting with other groups. Which I think is really good, because it brings out a global type-learning situation and being that this class is nationwide and could be worldwide. (Midterm evaluation)

The use of team teaching in an online learning environment provided the students with additional assistance. For example, Angelica had technical difficulties. Jonathan and Tina worked in collaboration to assist Angelica. "At first I did not get it. I did not know how to post, but I emailed Jonathan and Tina, and you guys both have been very helpful. I do not have a problem with it now, and I think it is fine." (Angelica, midterm interview)

The use of three course facilitators lessened the workload. However, the course was still time consuming. As typically reported in other studies, analysis of the e-mail dialogue revealed the majority of the messages centered on technical concerns (48%). Jonathan, the first facilitator, bore the brunt of the email questions concerning problems with effective use of the technology.

The time factor in facilitating the course is tremendous. I don't even want to think about all the time Jonathan put in early on answering all the technical questions. Simply logging on and reading postings and e-mail each day took about two hours per day, and more on Mondays after Sunday postings. (Julie, field notes)

For example, the following e-mail indicated the student had very little skill in using the technology prior to the course. "I am on my way tonight - I was in shell shock last week." (E-mail) Even with the use of a team teaching concept, the task of the online work was overwhelming. Jonathan recommended that each facilitator should be responsible for a different facet of the administrative tasks.

Each state [teaching site] put in many hours on this task, but I feel that instead of dividing the time up into separate section blocks we should all work the entire course. This allows for individual areas of expertise to come into play to give the students differing insights into the subject matter and helps to keep any one person from becoming overloaded. For example I was responsible for the first few weeks, but also for setting up the groups, and trying to coordinate the tech portion. This totally overwhelmed me at the start and my other workloads suffered accordingly and when I later shifted time to them to catch up my ESS time was hurt. It would make sense to have one person handling the tech coordination at startup, while another carries on class introduction, and even a third covers some of the responses or just monitors for needed assistance. (Field notes)

Julie agreed.

I felt that Jonathan was the most burdened of all of us. Also, his role at the beginning put him in the unenviable position of being the "go-to" guy for everything for everybody, instead of the students being able to fully access the other facilitators. This is a great idea! (Field notes)

Teachers participating in the course were grateful to have three instructors to discuss issues. The students did not complain about the use of three course facilitators. Jennifer expressed gratitude to Tina for effective facilitation. "Just continue to be a facilitator that is easy to approach and access." (Midterm evaluation) In fact, one student even felt comfortable sharing personal concerns with Julie,

Yes, I was terribly frustrated…but was determined to hang in there until my mom was out of the hospital…she is a stout woman, but is 86 years old. This may take awhile, but I must drop…will there be another class? I have enjoyed sharing this with my kids and they seem to really learn and like this. (E-mail)

Even small amounts of technical assistance enabled the students to better navigate the site and achieve success in the course. "A couple of times, Jonathan has come on and put, for example, hydrosphere post here." (Tory, Midterm evaluation)

Not only did the team-teaching ease the burden of a mountain of e-mails, each facilitator had a different perspective on solutions to typical problems.

Julie noted:

To prevent the replacement of the discussion board with e-mail, I would have the facilitators be adamant about using the discussion board for routine questions. That way, the facilitator (i.e. in this case mainly Jonathan) would not have to answer 10 e-mails asking basically the same question. This should be addressed up front with the students. The facilitator can always respond to the later, inevitable e-mails with a gentle reminder such as

"Your question might be of help to others in the class. If you will post your question on the discussion board, I will answer it so that everybody will have the information." Also, a "Frequently Asked Questions" area could be added for students to refer to. (Field notes)

While Julie indicated the students should better utilize the discussion board, Jonathan used subtle reminders of the purpose of the course and protocols to be used in the online learning environment.

Just a reminder that this class is a group project class and that means you must carry out discussions with those two [assigned] groups. I am receiving multiple emails from concerned students on lack of participation by group members. If you are responding I thank you. If not, please start so that the class can proceed as expected. Thank you. Jonathan.

Finally, the use of more than one classroom facilitator brought more diverse and varied experience to the classroom. For example, one of the respondents indicated the diverse classroom interaction, including the discourse from the facilitators was beneficial.

I found it [the course] to be real positive. The people that I have talked to in my group, as I found out, have a lot of similarities or areas we

can relate to. They either lived in or visited the same places, so it was really interesting to interact with people from different parts of Kansas or other parts of the country, that have the same problems as we do here. (Susie, midterm evaluation)

Another student, Holly, echoed Susie.

The positive aspect was that I did get to meet some new people and interact with them, listen to some of their ideas and use them. Like I have said before, I do not think there was enough of that. (Midterm evaluation)

DISCUSSION

In addition to evaluations taking place at the end of the semester there was evidence of teacher reflection throughout the course. Team-teaching roles of each facilitator should be discussed and a consensus formed, allowing time for each instructor to reflect on the progress of the course throughout the semester.

Even though Julie expressed concern over her lack of experience with an online course, she indicated Jonathan was a good mentor. Therefore, novice online instructors should be paired with experienced teachers. The scaffolding prevents the new teacher from being so overwhelmed from the novel learning environment that she or he does not become ineffective.

As indicated from the research, the team format provides students with an exemplary model of how to do cooperative learning, and team-teaching. It also gives insight into how teachers can work together in a school to improve student learning. In addition, it reduces teacher isolation, a barrier in professional development (Loucks-Horsley, 1998).

If a student struggled with the content or the technology, there was more than one person who could provide aide. Typically, the overwhelming burden of e-mails means that it takes an inordinate amount of time to respond to students' needs. With three facilitators, the response time was reduced and student frustration lessened. If at all possible, have at least two facilitators for online courses. The online environment can viewed as unfriendly without sufficient contact with other students and the instructor.

Even with three facilitators, time was a barrier. Since most of the e-mails concerned technology, students should be required to have adequate equipment, reliable access, and training in the use of the technology before registering for the course, or at least by the first class meeting. A section for FAQ (Frequently Asked Questions) on the website and a training module should reduce many queries on technical issues.

Team-teaching in the course reduced the workload on the individual facilitator and allowed the less experienced facilitators a model of how to work successfully within an online learning environment. The pairing of an experienced online teacher with a less experienced instructor is recommended. In this manner, the novice "shadows" the expert.

Other concerns emerged from the team collaboration. One important concern was a proactive strategy for dealing with technical problems. Typically, technical problems are the most often cited problem with online learning environments. Reflection throughout the course between team members and students provided support for the following actions to meet technical concerns:

1) Provide students with training in the online technology either before the course begins or at the first class meeting.

2) Have a periodic face-to-face meeting, teleconference, videoconference, or gronp chat to address concerns.

3) Insist students have access to adequate equipment and consistent Internet access before registering for an online course.

In conclusion, the use of team-teaching provided novice instructors professional development in effective use of the medium and reduced the workload of an online learning environment. The following implications are based on the results of the study that support best practice in the online learning environment:

The team teaching format

1) Offers an opportunity for instructors to reflect on practice throughout the course. Thus, the use of the model allows for continual interaction between professionals, feedback, and opportunities for renewal leading to improvement in instruction and student learning.

2) Provides scaffolding for novice teachers in the use of an online learning environment.

3) Provides students with an opportunity to view exemplary modeling of research-based pedagogy.

4) Enriches student discussions. The effective online environment is highly dependent on rich interactions on discussion boards, in journals, shared portfolios, and email.

5) Provides students with additional mentors for feedback, needed assistance, and fosters student dialogue.

Implications of this team teaching concept in online courses can lead to a new view of instructor teaching load. This is the "distributed teaching concept" with faculty from two or more universities involved in team teaching the same course. In this study student tuition was paid to one of the three institutions involved. Credit was given to students by the institution in the student's region or to the institution chosen by the student. Each of the three institutions registered about 1/3 of the stndents and gave graduate credit. The students were from states in each of the 3 regions where the universities were located. In other offerings of this same course, a national and international makeup of students were involved.. This "distributed teaching concept" may work between other universities and consortia of universities. Faculty, at one university, could teach low enrollment courses using a part time load. For example, an instructor can receive one credit instead of three credits for the course team taught with two other universities. The course credit can build across the semesters to make up a full course for the instructor. Or one can teach three portions of three courses and get full credit for one course during a single semester. This "distributed teaching concept" can provide a unique way for universities to have quality undergraduate, preservice, and graduate, inservice, programs.

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