

TRAINING PEER-MENTORS TO MANAGE ON-LINE CLASS PARTICIPATION

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Abstract—Although classes in all disciplines are being offered from almost every university and college on-line, the College of Engineering at Texas Tech University feels that first year engineering courses offered on-line need more than just technology in order to keep them engaged in course content; they need support from faculty and from peers. This paper discusses the process of training peer-mentors to act as managers for on-line student support in the Introduction to Electrical Engineering and Computer Engineering course; how the selection process for peer-mentors plays a significant part in students', mentors, and faculty expectations; and how web technology allows the peer-mentors to develop skills beyond those found in traditional face-to-face peer-mentoring programs

INTRODUCTION

In order to provide adequate support to both on- and off-campus students in the Introduction to Electrical and Computer Engineering course, Texas Tech University's College of Engineering feels that it is imperative that students have access to reliable people for on-line mentoring. Although Internet technology has become relatively commonplace for many students, there is still a relatively large number of students who are not familiar with conducting e-business on-line. This course introduces them to on-line synchronous and asynchronous discussions and to on-line group work. Having access to a peer-mentor (a student who has taken the course a previous semester) gives students technological support, course content support, and team-building/group support. It took three semesters before the on-line peer-mentoring program was developed into a design that could be replicated.

Initially, the on-line peer-mentors were to primarily assist off-campus students in the Early Admissions Program since these students would not be attending class on-campus but would, instead, be proctored and monitored by their high school teacher [1]. It seemed that the off-campus students would benefit by not only interacting with their classmates on-line, but would greatly benefit by mentoring from students who were on campus and who had taken the class

previously. However, the peer-mentors in the first-year Electrical and Computer Engineering course at Texas Tech University quickly became mentors for homework, for help with critical reading issues, and as advisors about the class content and about other engineering and non-engineering classes. Although the mentors did not view this as undue additional responsibility, assessing the students' demands made on the mentors was a sure sign that some organizational structure needed to be implemented. Mentors should not be overworked, but should get the training and faculty support they need to facilitate and to develop their own managerial skills. Students in the class should feel that on-line class participation is as valuable and as effortless as participating in a traditional class [2].

Although on-campus students met in class to accomplish the usual classroom functions [3,4], both on-campus and off-campus students accessed essentially all course materials on a website [5]. The site includes Lotus ScreenCam [6] tutorials, 5-minute videos that introduce each week's work, notes and homework assignments with hyperlinks to relevant sites, access to the synchronous and asynchronous discussions for the course, as well as a syllabus and a detailed weekly course schedule that contains links to the notes, tutorials, videos, and homework assignments for that week.

Students are introduced to principles of electronics hardware and Visual Basic 6, and first-semester students enrolled in Introduction to Electrical and Computer Engineering also read *Soul of a New Machine* [7], by Pulitzer Prize winner Tracy Kidder, and *The Civilized Engineer*, by Samuel Florman [8]. In addition, students enrolled in the honors section of the course read *Dealers of Lightning: Xerox PARC and the Dawn of the Computer Age*, by Michael Hiltzik [9].

The following sections discuss the web technology that was used in the course that allowed the mentors to interact with the students, how the peer-mentors were selected from an Honors Section of Introduction to Electrical and Computer Engineering, the training and expectations of the mentors, the role they eventually played in the course, and the managerial skills they developed. The conclusion will

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address how selection might be conducted without a class from which to choose top students and why, with the correct training and web technology, with an on-line peer-mentoring program, class participation by all students can be scaled up.

WEB-TECHNOLOGY USED FOR THE COURSE

The web technology for the course had been developed over a period of time. However, in order to develop the interaction between on- and off-campus students, a synchronous environment would be needed for off-campus students to feel they are participating in the course along with the on-campus students. Lotus ScreenCam tutorials provided adequate training on the use of the web interfaces, such as Visual Basic homework, how to access different elements on the website, and how to access the synchronous and asynchronous environments. Five-minute overviews gave the off-campus students an opportunity to see and hear the instructors, and put a face to the instructors' names. Email was used in the traditional sense of contacting students and students contacting faculty, as well as contacting the mentors and class peers. A distribution list was established in order to deliver class announcements, and *News* was added to the course web for notices of student organizations meetings, special lectures, changes in the course content, or other pertinent announcements.

The greatest weaknesses in on-line distance-education courses designed for undergraduates are the lack of interaction with numerous on-campus peers at one time, and the lack of academic community building that undergraduates need in order to feel connected to the university community. Conceivably, off-campus students can email each other and the faculty anytime and get some on-line interaction; however, emailing does not guarantee interaction in the same way a synchronous environment like a MOO (Multi-user Object Oriented) environment does. The MOO environment, although similar to a chat room, is very conducive to dialogue because it is text based (although, there are some web-based MOOs available), and the entire conversation can be logged and saved. This ability to engage in dialogue anytime-anywhere releases faculty from the constraints of setting up meeting rooms for students and being present for the discussion. Also, the faculty member is free to evaluate participation in the discussions at anytime and anyplace. Logs can be converted to HTML and posted on the course website, giving access to anyone who wishes to view a team's discussion. This proved to be an invaluable part of the course when Carl Alsing, a principal player in Kidder's *Soul of the New Machine* was asked to participate in discussions and respond to students' questions on the asynchronous threaded discussion list.

The synchronous MOO discussion is designed to duplicate in-class discussions of a text; however, 50-75

students participating on-line at the same time will resemble a class of students in a face-to-face class all talking at the same time. It is therefore necessary to divide the class into workable teams. This on-line approach of dividing students into teams for on-line discussions has been used in literature courses and composition courses over the last decade [10,11], and promotes critical thinking about readings and promotes community building for both on- and off-campus students. The Introduction to Electrical and Computer Engineering students used DaMOO of California State University—Northridge [12]. Peer-mentors met their assigned teams in DaMOO during the discussions.

In addition to the MOO environment, students were required to write a synopsis of their discussions and post them on the asynchronous threaded discussion list using the Allaire Forums interface. The interaction is asynchronous, providing students, faculty and guests the opportunity to respond to summaries in more detail than the synchronous environment of the MOO.

Interestingly, many of the students who engaged in the on-line dialogue carried the tools into their personal and social lives. A MOO is open 24 hours, and there are abundant rooms where students can meet. The MOO environment allows for numerous conversations to be synchronous, with absolutely no interference of one conversation on the other, so it was not surprising to find two or more students socializing in another room while one or two teams were discussing the text in other rooms.

SELECTION OF ON-LINE PEER-MENTORS

For students to be accepted to the Texas Tech University Honors Section course, they must have a 1200 SAT score and must graduate in the top 10 percent of their class. In the 1999 fall semester, there were 15 students registered for the Honors Section of the Introduction to Electrical and Computer Engineering class. Because of the size of the class, only the Honors section participated in the on-line discussions the first semester of using on-line discussions for critical reading and discussions. The Honors Section students read *Dealers of Lightning* with the instructors acting as facilitators for the on-line discussions of *Dealers of Lightning*. This is extremely time consuming for faculty who also must convert the discussion log to HTML, evaluate the participation, and prepare for the course content. After the semester was over, the honor students' responses, participation and level of writing maturity were evaluated.

Although off-campus students in the spring 2000 class would have their high school teachers as facilitators, on-campus mentors seemed necessary to give the off-campus students the same opportunities and direction as on-campus students. After evaluating the responses, participation, and written responses from students in the fall

1999 semester's honors class; six honor students were chosen to be interviewed as possible peer-mentors. After spending a semester interacting with the honor students, faculty had a fairly good feeling about who would be able to handle the responsibility of mentoring.

Responses: Honor students' responses should show a sophisticated level of understanding of the material. Students enrolled in the Honors Section of the course participate in the synchronous and asynchronous discussions of *The Soul of the New Machine* and *The Civilized Engineer* with students who are not enrolled in that special section. In addition, students in the Honors Section read and discussed an additional Hiltzik's book, *Dealers of Lightning: Xerox PARC and the Dawn of the Computer Age*. The book has numerous "characters" that play a vital role in the development of the personal computer and APARNET. At the same time, students were expected to be able to see how ethics, competition, promotion, accountability and teamwork played a vital role at Xerox PARC. They were also expected to see the correlation between what happened with the engineers and researchers at Xerox PARC to their own role as a student, albeit a beginning student, in engineering.

Participation: Because the discussions can be logged and each student's name is automatically added next to the comments, it was easy to note if a student was participating or not and the depth of the student's participation in the discussion.

The students who were chosen as possible mentors frequently joked around during the discussion, which is not only to be expected but also to be encouraged in order to build community. Palloff and Pratt point out that for on-line environments to work effectively, there must be an equal playing field, everyone must be able to participate at the same time with the same level of expertise with the technology. At the same time, strictly imposed guidelines will constrain the discussion. There has to be a balance of social intercourse along with in-depth discussion of the works. [13]. The Electrical Engineering course on-line guidelines contained the length of the discussion (one hour), directions for responding to prompts posted on the website by faculty, common good "netiquette" which was elaborated on in later classes, and a final summation of the team's discussion over the readings.

Maturity of writing: Although these were high achieving students, the maturity of writing played a vital part in selection. Mentors for other students should set examples, and the maturity of writing not only demonstrates that the mentors are striving for excellence for themselves, but also will demonstrate that engineers need to be good writers.

Face-to-face interview: After evaluating on-line participation and taking into consideration all elements of participation, six of the top students were invited for a face-

to-face interview with course instructors. Students were evaluated on their willingness to participate in a new approach to teaching on-line, their willingness to be responsible for interacting with students, their willingness to organize teams, their willingness to account to faculty both in a bi-monthly face-to-face meetings and in a final report on their own assessment of the on-line mentoring experience, and, most importantly, their willingness to be accessible to their teams.

Selection: After interviewing the six students, all were selected to take part in the first full on-line course during the spring 2000 Introduction to Electrical and Computer Engineering course. The students were Electrical Engineering, Engineering Physics, or Electrical Engineering and Computer Science majors. All were still at freshman level; two were female. After selection and a brief orientation about their responsibilities, they were told that they would be paid a small salary as undergraduate student assistants, based on 20-hour week working schedule. All of the students said that they were happy with the salary but that they were committed to acting as on-line mentors with or without a salary. They were not required to have "office hours" or to be on-campus in order to fulfill their duties. However, it was very evident when a mentor did not fulfill the functions of an on-line peer mentor.

TRAINING ON-LINE PEER-MENTORS

Even though the mentors participated in on-line teams the semester before they were employed and they had some experience with teamwork, managing a team is different; therefore, it was necessary to establish some criteria and guidelines for the mentors.

Email addresses and phone numbers: Mentors made sure that not only faculty had their email addresses, but that all the students in the class had their email addresses. This was easily addressed by establishing a distribution list of the class members, the mentors, and the faculty. And as the teams were divided into teams by faculty and the teams were posted on the web, mailto links were attached to team-members' and the mentors' names. This insured that a team member and a mentor could be contacted by email at all times. Also, the mentors were asked to contact each team member and introduce themselves and to give the team members a phone number where the mentor could be reached.

Accessing information: Mentors were directed to make sure that all the team members could access all the information and the web technology like ScreenCam, videos, Allaire forums, and to make sure that students accessed DaMOO and requested a character name to use in the MOO. Students were asked to use their first name and last initial or something close to their identity so that mentors and faculty

would not have difficulty in denoting that they had attended the discussions. If a student had problems with any of the web technology or with DaMOO, the mentors guided the student through the web technology. These tutorials were often conducted by phone; however, few students requested help the first semester. The second semester was more productive with technology tutoring because: (1) entering students are increasingly more adapt at web technology, and (2) we developed guidelines that if a student did not seem to be participating, the mentor would get in touch with the student and offer technological assistance. This is what we initially perceived as the major function of the mentor.

Meetings with faculty: The first semester, mentor and faculty meetings were conducted mostly via email with monthly face-to-face meetings; however, by the end of the first semester, it became evident that bi-monthly face-to-face meetings were needed in order to address specific problems the mentors were having, and the bi-monthly meetings allowed for more interaction between the mentors. Although this seems to contradict the idea of on-line mentoring, mentors rarely had the opportunity to meet on-line as a whole to discuss problems and issues. Establishing a "class" time for the mentors to meet in DaMOO with the faculty would be a sound concept for establishing the viability of the on-line program, and it would also provide written documentation of problems that can be evaluated.

Peer-mentor team building: Not only is it important to development a sense of community among the students, it is just as important to develop a sense of community among the mentors. As Palloff and Pratt point out, learning occurs online because of the learning community[13]. If a student continually shows up for a discussion and no one else is there, the student will quickly become discouraged and feel abandoned—this is true whether the discussion is conducted in an on-line community or a face-to-face community. It is very important that the mentors feel that they belong to a community and that their community is separate from their students' communities. They are just as much in the learning process and need the learning community just as much as the students; they are learning to manage, to be responsible for others, and to be accountable in a manner that might be quite different from early forms of accountability—they know their performance will be evaluated based on how they perform outside the realm of a normal work environment.

Final report: Mentors were asked to submit a report at the end of the semester evaluating what did and did not work. Although they all expressed a sincere excitement at being "a managing mentor," their biggest concern was that team members did not participate at the level they would have liked. The 2000 spring semester was the first year that we had off-campus high school students who were participating in the Early Admissions Program as part of the

class, with seven off-campus students registered for the course after the drop-add period. This is significant because it was assumed the off-campus students would have more problems with the technology than the on-campus students would; however, this did not prove to be the case. In fact, the mentors saw no significant difference between the off-campus students and the on-campus students in the on-line discussions.

The only negative comments from the mentors were that they felt that students should be awarded punitive grades if they did not participate. Students were graded on their participation, which counted 20% of their overall semester grade. Most of the mentors wanted more severe punishment for non-participation. However, when asked if they would consider participating as on-line peer-mentors again, they all said that they would.

Expectations: The first semester (spring 2000) faculty expected that the mentors would mainly facilitate with the web technology by making sure that all the students in the respective teams were acquainted with the technology and were able to use it. The faculty also expected that the mentors would oversee on-line discussions and make sure there were no technical difficulties. However, the mentors, on the whole, performed well beyond faculty expectations. Mentors made sure that students could get in touch with them by phone even when the mentors were out of town for spring break. The mentors also performed social interaction roles that went beyond faculty's expectations. The mentors advised students on student organizations, where to attend organizational meetings and why it is important to belong to student organizations, and mentors tutored students on Visual Basic 6 and electronic homework problems.

Students' expectations are much harder to discern because we did not survey the students the first semester. However, based on second semester surveys, it seems some students expected the mentors to manage the team and to take on the role of team member and engage in discussions when team members did not attend. On a few occasions, the later did occur. However, by the second semester, if no other team member showed up for the discussion, the mentors were told that the students should email the instructor to ask for an extension, and then the team should negotiate when they could arrange a discussion time. This system mimics a real-world scenario where a meeting time has to be postponed to a later date in order that all or most of the members can attend and participate.

The mentors were expected to oversee the discussions and help with technology; however, they earned valuable managerial skills and played roles they had not anticipated.

ROLE OF ON-LINE PEER-MENTORS

Sometime within the semester, especially the second or fall 2000 semester, the mentors found they were responding to help with homework problems over VB 6 or electronics. On their own, the mentors took on the role as tutor, and helped the students, primarily those students in their own teams, who needed help. When the faculty discovered that the mentors had also become tutors, the mentors were encouraged to continue acting as tutors as long as it did not infringe on their own study time. The mentors seemed to relish the tutoring role, and unanimously said that they would be willing for tutoring to be part of their job description.

Mentors developed a collaborative team and a community by sharing stories with each other and with the faculty. They willingly oversaw a fellow mentor's team discussion if a mentor had to be absent from his/her team discussions.

By the fall 2000 semester, it was evident that at least two more mentors were needed to handle the size of the class and the Honors Section. The same process for selection was used to find two more mentors. However, because the top student in the spring 2000 semester was one of the off-campus high school students, he was recruited; his experience as an off-campus student participating in an on-line course was invaluable for the students, the faculty, and the peer-mentors. The other additional mentor was a non-traditional student who had a great deal of team-building skills developed while he was in the Navy Seals. Adding these two to the mentoring community could have caused an insider/outsider syndrome. But by giving the "old" mentors the role of teacher to the "new" mentors, the community sustained itself.

One of the "old" mentors failed to perform on par with the other seven. Whether because of a lack of maturity, time constraints, or other factors, he failed to contact students and respond to faculty emails. It does not matter how hard one tries to scrutinize "employees," it is impossible to ascertain performance until performance is required.

DEVELOPMENT OF MANAGERIAL SKILLS

Besides learning how to work on-line, the mentors learned organizational skills. The mentors were also made aware of the time constraints that can be placed on them when they least expect it. For instance, when the network was down for all of one Sunday when three of the teams were going to meet for discussions, the mentors had to determine that there really was a network problem, find out how long the network would be down, if possible, and help the team set up another time for the meeting.

The mentors developed some team building skills of their own. They observed their teams and evaluated if they were successful. They shared information, helped each other, took on additional roles, and reported to faculty. They developed a shared vision of how they wanted to be perceived as mentors in the College of Engineering, and they addressed concerns and prejudices they had about students and faculty. On one hand, they directed the students in their teams toward participation, yet on the other hand, they maintained a collegial attitude with the students and other mentors. All in all, they learned the importance of responsibility and accountability in their role as on-line peer-mentors.

CONCLUSION

Although we had an honors section from which to choose some of the top performing students, the traditional form of choosing students from application, letters of recommendations, and face-to-face interviews could still be used to select mentors. It seems that for selecting on-line peer-mentors it is imperative that part of the interview process should be done in a synchronous environment like the MOO, and that student should write a summary of their on-line technological experience and their classroom experiences and post them on a threaded discussion list. This allows for closer scrutiny of the applicant's credentials and allows for analysis of web-based technological knowledge and experience.

An on-line peer-mentoring program could be scaled up to handle a large number of students in a class or combined classes. Accountability and responsibility is the most important aspects of a good on-line mentor. Any student can learn how to use the technology, and in fact most students are far more experienced with web technology than faculty, and most top-notch students are good participators because they have learned to work in teams; however, our experience shows that if a on-line peer mentor does not take responsibility for the teams and being accountable to teams as well as the faculty, everyone loses. Although responsibility and accountability are two of the most difficult things to assess in a face-to-face interview, close scrutiny of letters of recommendations might prohibit a student taking on the role of mentor who does not have the maturity to handle it. The ideal situation would be peer-evaluations. After the fall 2000 semester, students in the class were asked to evaluate their team members and their mentors. It seems that asking the mentors to evaluate each other is a solid way to weed-out students who are not ready to act as mentors.

Anecdotal evidence demonstrates that the mentors developed managerial skills as well leadership skills, and they gained a better understanding of collaborative work and team building.

The only limitation to scaling up the number of mentors that can be trained and managed is the ability to pay stipends. Although many schools do not pay stipends, and might award scholarships, the paycheck denotes an element of professionalism, supports work policies for showing up for the job, and gives the mentors credibility that goes beyond just awarding scholarships. On the university side, it allows for dismissal for failure to perform on the part of the mentor.

As the program grows and more classes as well as more high schools are added, we plan to scale up the mentoring process by hiring experienced mentors to train the new mentors, giving experienced mentors the role of "middle-management" so that they are responsible for training and mentoring other mentors. This will allow for large classes to participate in on-line in discussions while building collaboration and teamwork with mentors and with students.

The synchronous and asynchronous tools on the web opens doors to students, and when used as a tool to reach students who might not otherwise pursue a college education can be extremely powerful. Although some students find meeting and working on-line cumbersome at first, we have found that once they engage in this type of on-line network learning, many students not only become comfortable with the medium, but also expect other courses to offer course material and interaction in the same way.

When scaling up the program, the student mentors are going to be an important part because they can facilitate much of the tedious technology issues and students' on-line participation, leaving time for instructors to focus on course content

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