AC 2011-2322: MENTOR TRAINING PROGRAM FOR A PEER-TO-PEER LEARNING ENVIRONMENT: LEADERSHIP VS. CURRICULUM BALANCE

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Mentor Training Program for a Peer-to-Peer Learning Environment: Leadership vs. Curriculum Balance

Abstract

In a computer engineering technology program, mentors are expected to have a high level of technical knowledge and skill. However, mentors must also be able to serve as guides and role models for their mentees. A key dynamic in the mentor training process is finding a balance between technical knowledge and the intrapersonal skills necessary to create a supportive learning environment. The College of Technology – Computer Engineering Technology (CoT – CETE) program at the University of Houston has implemented an undergraduate peer mentoring model as part of an NSF-sponsored program examining the impact of concept mapping and undergraduate mentors on student learning. The training for this mentoring model has been adapted from a peer-led team learning program and incorporates concept mapping as a primary pedagogical tool for increasing mentee understanding of key concepts.

Expected challenges include: social issues among mentees, possible tension between mentors and mentees. Since a mentor candidate may become a mentor in one's mind when there is actual feeling of taking him/her as a role model, the interaction is purely psychological. Hence there is an element of best effort to create this environment. The paper will present challenges, experiences gained and lessons learned through this program implementation.

Introduction

With the current trend of fast changing technology there is a need for providing high quality education that closes the gap between traditional training and what is required by the high technology industries. For the past three years the University of Houston has collaborated with Houston Community College System and Texas A&M University – Corpus Christi to bridge the educational gap. The project, which was funded by the NSF-CCLI program, was initiated first as a pilot program and is now moving into the implementation phase[1-3]. The purpose of this NSF-funded project is to address this gap based on the STEM curricula in order to produce adaptive workers for industry and stem the digital divide that affects underrepresented students.

It has been shown[4-5] that some of the missing components include creativity, knowledge transfer, innovation and adaptability. When leadership, team work, analytical thinking, problem solving and communications skills are delivered through engaging and interactive teaching strategies, then the possibility of closing the gap increases. Another mechanism for closing this gap is the implementation of efficient peer-to-peer mentorship programs to facilitate knowledge and skills transfer.

With these concerns in mind, the main objectives of the project included:

(1) *developing experiments that engage students with inquiry-based learning style;*
(2) introducing students to real world projects; and
(3) improving communication skills through required product documentation.

In our capstone course specifically, the student project has many components that emphasize communication skills. These include weekly progress reports, weekly meeting agenda and meeting minutes, weekly meetings with the advisor and graduate assistants, a proposal presentation and proposal report, a final project presentation and final report documentation of the product. Although final project designs require the mastery of technical knowledge, it also demands the mastery of communication skills in order to effectively express their design process to others. For the students, this will have an impact in their future career by increasing their understanding and involvement in inquiry-based learning style with real team work experience.

In this paper, we present the resources required and challenges faced in order to create a quality peer mentorship program for undergraduate students. In addition to the mentoring program, a concept mapping activity was used in order to channel the peer-to-peer interaction towards a framework of knowledge and skills transfer. A concept map is a spatial representation of concepts and their interrelationships that is intended to visually represent the structural knowledge that a learner has stored in long-term memory[6-7.] The process of building a concept map engages the learner with the content and is considered an active learning strategy. A number of concept mapping software applications are readily available that have also been used for this project. By incorporating CMaps with the peer-to-peer mentorship program, we sought to create students with increased capacity to engage in real world problem solving, increased writing and oral communications skills, and increased conceptual and factual knowledge of engineering technology to better retain and engage underrepresented students.

Peer-led mentoring model

The project activities launched with the selection of a group of mentors with the appropriate knowledge base and experiences that would make them good role models for the project. Based on their academic record and feedback given by the professors, lab managers and teaching assistants, potential mentor candidates were shortlisted. They were thoroughly interviewed by the project team. This was a major activity as the success of the project depended on the ability of mentors to carry out the some of the essential project activities related to students.

The mentoring program within the Computer Engineering Technology discipline highlights the many valuable contributions that mentors made in helping mentees understand the basic concepts and the importance of using concept maps (CMaps) tools in building and retaining their knowledge. Moreover, the mentoring session included a friendly discussion on how a group of students can work together to enhance their learning experience. The selected mentors were given extensive training with guidance from the Houston-Louis Stokes Alliance for Minority Participation at University of Houston to familiarize them with the mentoring role and how to conduct the mentoring sessions. Specifically the mentors were taught about different approaches for conducting mentoring sessions, ways to deal with the issues faced by the mentees etc. They were also given the opportunity to learn about CMaps development tools and other administrative procedures. At the beginning of the each academic session, the mentees were asked to complete a survey and schedule where they indicated their available time slots to meet with the mentors. Performance of the mentees was monitored to assess the effectiveness of the mentoring sessions and the use of CMaps.

One of the major responsibilities of each of the mentors was writing weekly reports of their meetings with their mentees. In order to help them in this activity, the project PI's conducted an extensive training for the mentors which included guidance on how to write reports regarding the outcomes, issues and resolutions discussed with students during the sessions. The mentors turned in a report for every mentoring session they conducted. While concept maps were the central focus of these sessions, mentees also took the opportunity to clarify theoretical concepts and ask questions about homework assignments. Survey results suggested that the mentees respected their mentors and indicated appreciation for the guidance provided.

In order to check on the proceedings of the sessions and keep track of the project progress, a weekly meeting between mentors and a graduate student project assistant was also scheduled. Such meetings helped ensure that the mentor-mentee activities for the project were being implemented as intended. This also helped in identifying specific needs (e.g. preparation for the tests) and allowed the mentors to learn from each other's experiences. If any mentor faced a particular problem (e.g. troubling students), it was resolved by discussing with fellow mentors and the project assistant. The matter was also reported to the project team, so they were aware of any immediate challenges. Highlights of some of the concerns expressed by the mentors included: the mentees wanted more time slots for the mentoring sessions; the mentees also needed help in concepts taught in theory class and home work.

The project then documented suggestions by the project assistant for improvement such as: increasing the number of mentoring sessions which ensured greater availability of mentors; encouraging mentors to guide the mentees with their difficulties in lessons learned in class and help them with preparation for tests. This was highly appreciated by the mentees.

Team training and development

The training of all participants in this project was divided in three workshops. The workshops were oriented specifically to the project members in the different stages of project. The focus of the first one was the PI's and lab assistants who worked in the initial part of the project. The second one was directed to the lab assistants who worked in the freshman and sophomores laboratories and the third one was aimed to the undergraduate mentors.

Fundamentals of concept mapping were presented by invited faculty. Samples of concept maps created by current lab assistants were presented as learning objects. One additional goal was the creation of a library of concept maps for CLABS. In addition, at the beginning of each semester, the Lab Management team and faculty offer a two-day laboratory assistant orientation workshop. Topics such as teaching techniques, safety procedures, professional etiquette, and organization of laboratories were covered during the workshops. The attendees included Lab Assistants (LA), Student Assistants (SA) and Undergraduate Mentors (UGM) although, this specific workshop was aimed to the LA's, SA's and UGM who were involved directly in the ELET 1100, ELET 1101, ELET 2103 laboratories as well as their corresponding lectures.

As mentioned earlier our mentors were recruited in a careful selection process where the most important skills were leadership, technical background, creativity and pro-active attitudes. In addition to these important skills, the mentors needed to have some knowledge and background

on how to be a role model for their peers. During this workshop, mock discussion sessions were prepared on real-life subjects such as learning, teaching and learning styles, ethics in workplace, etc. The fundamental goal of this workshop was to train the mentors on how to lead a discussion session with their mentees and resolve conflicts. It was held at the beginning of 2008 fall semester with the participation of 4 mentors and the project team. The training was also held in each subsequent semester.

Mentorship program implementation challenges

The mentors provided their academic as well as work schedules to the PI's through the project assistant. This gave a fair idea of the availability of the mentors to conduct the mentoring sessions. Based on our experience, this was a major concern during the implementation phase since the mentors' schedules and the mentees' availability were not always congruent. The project tried to create as many mentoring session time slots as possible so that mentees would be able to find one that suits them. In some cases we had a single mentee or even no mentees per time slot. Most of the students were also either full-time or part-time workers and as a result these students did not show any interest in participating in any of the mentoring sessions.

The project graduate assistant met with the mentors every week in order to give them instructions regarding their upcoming mentoring session activities. During those meetings the mentors were able to share their experiences with each other about the mentoring sessions they conducted that week. If any of the mentors felt that a certain way of conducting mentoring sessions was helpful, he/she shared it with the other mentors. Such discussions helped in continuously improving the sessions. When mentees and mentors did meet, they freely interacted with each other in an informal setting. Unfortunately, sessions moved from room to room based on class or lab space availability. The fact that there was no permanently assigned room for the mentoring sessions became a reason for no fixed office hours available for students and mentors. Another issue, alluded to by mentors, was the fact that some mentees took the sessions lightly since they received no credit for the activity. Several mentees felt the mentoring sessions took up too much of their time. Thus, they were not willing to attend the sessions.

We now summarize the most important lessons learned from this project:

(i) Mentoring of lower division courses needs to have a tutoring component to be effective;

(ii) Mentors who were hired through the grant were students with high levels of accomplishments and good communication skills, hence a small increase in these soft skills have been observed as a result of mentoring experience;

(iii) Due to the demographics of students at the University Houston's College of Technology, where most students in CET work at least part-time as shown in Table 1, mentees were better off with on-target tutoring and mentoring of courses in combination with personalized support mechanisms;

(iv) All students agreed on the interaction with their peers as being valuable experience.

Table 1. Summary of Working Hours for Students in Capstone Project Class (ELET 4208 and 4308) for the past few semesters. Average enrollment is 32 students per course per semester.

		Full Time (%)	Part Time (%)	Not Working (%)
Fall 2010	ELET4208	46.67	40.00	13.33
	ELET4308	3.33	43.33	53.33
Spring 2010	ELET4208	9.52	61.90	28.57
	ELET4308	52.94	41.18	5.88
Fall 2009	ELET4208	0.00	45.45	54.55
	ELET4308	4.55	72.73	22.73

Conclusion and future directions

Peer to peer mentoring have been used as a means of knowledge and skills exchange among students in different academic contexts. The first phase of the implementation required all lower division students to attend mentoring sessions. While the primary intent of the proposal was to directly improve the learning experience of students enrolled in STEM courses as measured through performance, the experience of mentors in the program was that many students simply did not engage in the process especially if they (the mentees) felt that their learning experience was adequate. As a result, program personnel modified the mentoring strategy to target students flagged as underperforming in these classes during consecutive semesters. The project goals of mentoring students in their academic experiences have been modified to emphasize more tutoring for course-related subjects. Mentoring of students is an organic activity where students will need to have a personal relationship with the mentors to build a trusting relationship. Project personnel are continuing to review data from mentoring sessions as well as student performance information to make informed decisions about any changes that may need to take place to enhance the learning experience for students.

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