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Does Peer Mentoring Help Students be Successful in an Introductory Engineering Course?

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Complete Paper- Research: Does Peer Mentoring help students be successful in an introductory engineering course?

Abstract

Previous literature shows that first year engineering students face challenges transitioning from high school to college due to higher academic expectations. In addition to the registration process, financial aid application and tuition requirements, there are other aspects of college admission that add to the challenges for students. For engineering students, the academic challenges arise due to lack of technical and problem-solving skills that are required for higher level mathematics, science and introductory engineering coursework. Many higher education institutions have developed their first-year engineering curriculum with a broad perspective that welcomes students and allow them to explore options for choosing their majors. Even though the first-year curriculum is fundamental, students seem to find the coursework difficult and overwhelming especially during the first semester. In order to help students in overcoming these academic challenges, several learning pedagogies have been developed by instructors and implemented in the classrooms. Many of these studies focus on strategies to improve student performance in a classroom. The assessment of the student performance in most of these studies is limited to the overall student grade. This research study presents peer mentoring strategy that helps students succeed in an introductory engineering course. The research objectives in this study are: 1) to illustrate how peer mentoring helps improve the student performance and 2) to explore the correlation between student participation in peer mentoring sessions and the overall grade of the student which serves as a factor to determine student's success in a classroom.

First year engineering curriculum includes two semester course sequence: Fundamentals of Engineering I (offered in the first semester) and Fundamentals of Engineering II (offered in the second semester). Data is presented from the first semester course offered at the regional campus of a large, research institution. Fundamentals of Engineering I course include the following sections as three main components of the coursework. a) Introduction to data analysis tool such as Microsoft Excel, b) Computer programming in MATLAB, and c) Design project. Teamwork and collaboration are heavily weighted for the assessment of student performance in the course. The peer mentoring strategy presented in this study is unique in terms of scheduling flexibility, accessibility of resources and support from academic success center on campus to help sustain the mentoring program.

Preliminary research findings indicate that students benefit from the interactions with mentors and learn from the shared experiences. Being mentored from a peer has helped students develop critical thinking skills that are important to solve open-ended and real-world problems. It is also noted that students were able to advance their computer programming skills because of their interactions with peers. Analysis of the preliminary data shows that the peer mentoring sessions help students score a better grade in the weekly assignments and exams. The mentoring seemed to help improve team performance because teams are required to attend training sessions to build team working and leadership skills. Statistical analysis of the data shows that there is higher

correlation between student participation and overall grade compared to students not attending the mentoring sessions. There was a subset of students who performed well irrespective of the participation in mentoring sessions and some who did not perform well. These findings will provide guidance to encourage student participation in curricular activities outside the classroom and help improve student success rate in introductory engineering courses. If these strategies prove to be successful at an introductory level, these could be adopted for advanced level courses.

Introduction

Engineering Institutions have been revising/redesigning the first-year engineering curriculum to provide a wide variety of topics that allows students to explore many disciplines in engineering. The goal for first year engineering programs is not only to captivate the exploring student population but also to educate engineering students about various disciplines in engineering. First year in college presents academic challenges to students in addition to social and psychological challenges. The transition from high school to college is known to be a difficult adjustment because of the higher academic expectations in college. Freshmen feel overwhelmed with the admission, advising, financial aid and many other processes. Several institutions are making efforts to improve the orientation process in order to make the transition smooth for the incoming freshmen. Research is being conducted in all areas of higher education system to aim for student satisfaction in the first semester. Several methodologies have been introduced to address the issues and concerns of admissions process such as Six Sigma, Pre-admission education and developing cultural models to help navigate through the admissions process [1, 2, 3]. Regarding advising, strategies are being developed to educate engineering students more effectively to enable students to graduate in a timely manner. Some of studies include designing a predictive model for student progression, building interest groups among freshman and utilizing web-based tools to facilitate advising and intervention to increase retention [4, 5, 6, 7]. To address the financial issues, universities are revolutionizing financial aid processes and educating the students about the options earlier on through outreach.

Academics proves to be a struggle in college as courses become more demanding in terms of time and effort. In order to assist students in overcoming the academic challenges, several learning pedagogies have been developed such as active, cooperative and collaborative learning, flipped classroom, and interactive classroom or online discussion groups. Active learning is defined as a teaching method to engage students in the learning process through meaningful activities [8, 9]. Cooperative and Collaborative learning pedagogies focuses on how collaboration influences learning outcomes. These techniques are shown to improve academic achievement, interpersonal interactions, attitudes and retention [10, 11, 12]. In a flipped classroom approach, content is presented outside of class in the form of lecture slides or video while the class time is used for application of the content such as problem-solving, critical thinking and innovation. Prior literature has shown that flipped classroom approach helps improve self-efficacy and engagement in students [13, 14]. Advances in computer-based technologies had facilitated educators to integrate tools into the classroom and form diverse discussion groups. Students are interested in participating in the classroom discussions and other online learning activities. Research has also shown that interactive on-line discussion groups helps promote learner engagement with the content by providing comfortable learning environment [15].

Although active learning strategy is well recognized, there are only a few activities that are suitable for a given subject or topic. Flipped classroom was also shown to be an efficient approach. However, it limits the flexibility of tailoring the lecture material by the instructor. Therefore, there is a need to develop strategies that collaboratively work to enhance student learning and improve performance in class. Prior studies have also presented a unique approach of utilizing experienced individual (mentor) to guide and train a less-experienced individual (mentee) in an academic setting [16, 17]. The results show that it not only helps in overcoming academic challenges but also provides support for psychological and social development [18, 19, 20, 21]. It is evident from studies that both mentors and mentees benefit from this type of collaborations [22, 23, 24]. In addition, mentoring supports retention of minority and female students in engineering and other relates fields [25, 26]. Most successful mentoring programs train the mentors, find mentor-mentee match, create mentee-mentor expectation worksheets, and social activities [24]. Another approach researched in this area is utilizing peer leaders and teaching assistants as peer mentors [27].

From literature, most of the peer mentoring strategies focus on a broad goal of improving student performance and increasing retention without the focus of the first-year engineering curriculum or course content. Due to the rapid changes and development in the industry related to engineering field, colleges are consistently revising the first-year curriculum. Because of the continuous enhancement of the curriculum, there is a need to provide rigorous mentoring program that provides support for students to be successful. This study presents a unique approach to utilize peers for mentoring the first-year engineering students. This paper is an extension of the work in progress paper published in 2018 [28]. It explores two peer mentoring options: a) Scheduled Peer Mentoring and b) Mentors-Mentee Pair. Peer mentors are recruited by the teaching faculty based on a selection criterion. In this study, mentors are selected based on the following criterion: i) successful completion of the course with B or better grade and ii) completion of the course within the last two semesters. University's Academic Success Center offers enrichment programs and helps support the peer mentors and tutors. Some of the previous successful peer mentoring programs offer credit hours for mentoring work, hourly wage or provide some incentives as volunteer opportunities to gain experience [24, 29]. In this study, peer mentors are hired through the Academic Success Center and are paid hourly wage. The goal of this study is to: 1) illustrate how peer mentoring helps improve the student performance and 2) explore the correlation between student participation in peer mentoring sessions and the overall grade of the student which serves as a factor to determine student's success in a classroom. The First Year Engineering curriculum is divided into two semester coursework: Fundamentals of Engineering I and Fundamentals of Engineering II, which are both two credit hour courses. This study is conducted for the first semester engineering course offered at a regional campus with small class size. The number of sections vary in each semester depending on the enrollments. Enrollments in autumn are comparatively higher than in spring semester. Since Fundamentals of Engineering I does not require any pre-requisites, it is expected to be the first semester course and Fundamentals of Engineering II the second semester course for a regular (on-schedule) freshman. Some students coming in with lower mathematics background start with engineering curriculum in the spring semester (off-schedule) instead of autumn. Also, some transfer students end up taking the Fundamentals of Engineering I in their spring semester. The first semester course introduces topics such as problem solving, engineering design process, technical communication, ethics in engineering, teamwork and engineering tools that aid in critical thinking, planning and data analysis. Three major components of this course are: Data analysis in Excel, Programming in MATLAB and Design Project. Because of these three broad areas, the mentoring sessions are also divided into three categories for the purpose of assessment.

In this paper, student's success is assessed based on motivation, growth and development during the semester and overall grade. Several factors play a role in determining the success of students in the Fundamentals of Engineering I course which includes the type of mentoring sessions students attend. Attendance in each mentoring option is compared and grades are assessed to determine student motivation. Growth and development are assessed based on student grades in individual assignments, midterm and final exams. Overall performance is assessed based on individual and team participation, attendance and grades, though the author realizes that grades are not the only factor to study the performance. The following sections present the following in order: course content, learning resource center and its purpose in facilitating peer-mentoring, selection of peer mentors, analysis of two mentoring approaches with the focus on the performance, conclusions drawn from this study and recommendations for future work.

Course Content

First Year Engineering courses are housed in the Department of Engineering Education and are required courses for all engineering disciplines. The two-course sequence is: Fundamentals of Engineering I and Fundamentals of Engineering II. In Fundamentals of Engineering I, students are introduced to mostly all areas of engineering and a broad overview of topics is provided with the help of hands-on laboratory experiments. The course is divided into lecture and hand-on labs. The topics included covered in lecture are engineering design process, problem solving, technical communication, engineering ethics and teamwork. Utilizing engineering tools to analyze data and solve real world problems is an important aspect of the course. Analyzing data in Microsoft Excel, Programming in MATLAB and Design Project are three major areas of the lecture components of the course. Data analysis concepts involve creation of arrays, use of arithmetic operators, use of built-in functions, graphing techniques for single or multiple datasets in Microsoft Excel. An Alternative approach to data analysis is presented using MATLAB programming to enhance student's ability to code and develop algorithms. The end-of-the semester Software design project serves as an application of knowledge and use of the two tools to develop a computer-based game. During the hands-on labs, students are exposed to a variety of engineering topics such as electrical circuits, structural stress and stress with computation of moment of intertia and young's modulus, renewable sources of energy such as wind turbine and significance of lean and six sigma in industrial systems engineering processes to improve quality and productivity. These experiments allow students to explore the concepts from electrical, computer science, mechanical, material science and industrial engineering. In addition to analytical skills, the First-Year programs cover a wide variety of tasks that teach students about team building, leadership and communication skills. Teams are randomly formed in the beginning of the class and work collaboratively throughout the semester. Flipped classroom concept is used in this course to provide reading material, demonstrations and practice problems to the students to prepare them in advance. Weekly activities include application assignments, class quizzes and journals. Each week, concepts are covered in one lecture and application assignments are presented in the following lecture to assess the student's ability to apply the knowledge to solve real world scenarios. Class quizzes are administered in the beginning of lecture in which concepts are covered to assess if students proactively make efforts. Since the class quizzes are graded, students are required to read the material prior to the lecture. This classroom model is illustrated in Figure 1. Journals serve as a medium for students to provide a feedback to the instructor about the weekly topics, activities and any concerns, likes and dislikes. Two midterm exams and a final exam is administered in this course. An even break-down of topics facilitates a similar split in the topics for first and second midterm exams. First midterm exam covers the Excel topics whereas the second midterm exam covers the MATLAB topics. The final exam is comprehensive.

Teamwork is encouraged in most of the assignments, but independent work is also required to assess the understanding of the content and individual performance. Teams of four students are formed in the beginning of the semester and group assignments are assigned to teach them skills to collaborate. Evaluation of the team performance is conducted as a survey at the end of the course which allows students to rate individual performance. It also allows the students to assess themselves as part of the team. These evaluations serve as a feedback for instructors since team participation is weighed in for the final grade. The Design Project is a four-week long project that allows students to apply engineering problem solving skills and programming skills to develop a computer-based game. Technical writing is a considered as a significant piece in project documentation. Students write up the technical project notebook, utilize marketing skills to create an advertisement and develop a sales pitch for their project. Project requirements and constraints are provided to the students in the beginning of the four-week term. Instructors ensure that students are completing the weekly tasks in a timely manner by using checkpoints in the gradebook, so students are aware of the areas that need more attention. These checkpoints allow students to realize the significance of deadlines in a project.

Content is delivered through the university's learning management system. Weekly activities are posted with the deadlines, so students have a clear expectation of the deadlines. Updates to the schedule or addition and removal of the content is posted as announcements to inform students.

Learning Resource Center

The Academic Success Center (ASC) is a collaborative learning resource available to student from all disciplines. The center was formerly known as the Academic Enrichment Center. The center used to consist of the Writing Center and the Math Lab until Autumn 2017. After the evaluation of the unique needs of the science and engineering students and academic support for related courses, the center added the STEM Center. ASC offers one-on-one tutoring and walk-in sessions for all areas of math, science and engineering. In addition to STEM areas, the center also provides tutoring in English and writing. Subject matter experts are hired to assist students with foreign languages, economics, psychology and geography. ASC is a university funded center and provides support to hire the tutors and mentors on a semester-long paid appointment. A formal application process followed by the Institutional Data Policy (IDP) training and Title IX training and interview with the coordinators, tutors and mentors are selected to serve for a semester-long appointment. The center strives to serve the needs of the students. Tutors are generally recruited through the campus advertising. In case the center does not provide tutoring service for a specific area, the center reaches out to the faculty for tutor recommendation. Peer-Mentoring program for engineering students was introduced as part of the ASC in Autumn 2017 with a desire to provide academic support and enrichment to incoming first-year engineering students.

Peer Mentors

The selection process for peer mentors including the criteria, organization of sessions and communication methods is presented in this section. Every semester, instructor teaching the course assess the overall performance of the students and provides a recommendation for the prospective mentors. The pedagogical approach with two mentoring options, expectations of the mentors and mentees and expected outcomes are discussed. The criteria to select the mentors is based on grade and time requirement. Students who have completed the course with a B or better grade and those who have completed the coursework within the last two semesters. Performance in the software design project also plays a role. Students who demonstrated excellent communication skills in addition to technical and programming skills are best fit to mentor freshman. The time requirement is selected such that the mentors are thorough in the content. Since the First-Year Engineering curriculum is revised continuously to improve the quality and rigor, it is critical to have mentors who know the material well. Once the prospective candidates for mentoring are determined, an email invitation is sent to all the qualified students prior to the beginning of the semester. Interested students respond back with their interests and availability and are then hired as peer mentors. Usually, the mentors are compensated for the mentoring work either by providing credit hours or by paying hourly wage. In our study, we chose to pay our mentors. ASC coordinators train the peer mentors and the mentoring begins the second week of the semester. As mentioned before two mentoring types are explored in this study: a) Scheduled Peer Mentoring and b) Mentors-Mentee Pair. In the first type of mentoring, the mentoring sessions are scheduled based on mentor's availability. Mentors are available during the scheduled time for students to walk-in for any help. In the second type, mentees are paired with mentors based on both mentor's and mentee's availability. The second type requires effective coordination. After the previous work-in-progress paper was published, the author was able to explore a scheduling mechanism to better serve the needs of both mentor and mentee. A doodle poll is setup in the first week to collect the availability of students. This arrangement allows students to view the timeslots available for pairing. After polling students, timeslots with maximum poll are chosen. It was observed that students are mostly available for paired mentoring during the lunch break or in the evening hours. The Mentor-Mentee Pair option allows flexibility in terms of schedule as it can be changed anytime during the semester. Although the Schedule Peer Mentoring option is not flexible it is convenient for students when there in need for assistance. For instance, during the exam weeks, students can plan to attend the schedule sessions. On occasions, a group of mentees schedule time and come together as a team. During the Design Project, teams reach out for help with project documentation. Mentors are trained on several topics ranging from data analysis to programming to technical writing.

The topics covered during the Scheduled Peer Mentoring sessions depend on the weekly content covered in lecture. Since the weekly application assignments are closely related to the lecture material, students tend to attend sessions for the purpose of getting help on assignments. Sessions close to the midterm exams are focused on the review of the topics included in the exams.

Categorization of Mentoring Sessions

A unique model for categorizing the mentoring sessions is presented in this paper. Content specific categorization of Peer Mentoring is discussed and offered to students with each type of mentoring (Scheduled Peer Mentoring and Mentor-Mentee Pair). Due three major topics in the lecture component of the course, the peer mentoring sessions were observed to driven by the material in those topics. Therefore, for the purpose of data collection and analysis of performance, the peer mentoring schedules were categorized. The three categories are: 1) Assistance with MS Excel concepts and Graphing Techniques 2) Assistance with Programming in MATLAB and 3) Assistance with Project Management and technical writing for the Design Project. In the previous work, the baseline was determined based on the grades in the first two application assignments. The author noticed that the topics presented in the first couple of weeks are ethics and problem solving. Data analysis concepts are not introduced until week 3 of the semester. Therefore, the baseline for the performance is now determined based on grades in the first Excel application assignment. Based on the grades, a threshold is determined to identify students needing assistance with the concepts. Reminders are sent to students about the availability of peer mentoring sessions to encourage participation. Often students struggling in the fundamental concepts are paired with a mentor by the instructor. Student attendance in the mentoring sessions is not mandatory, however it serves as a factor to assess the growth and development over time.

For each of the mentoring type (Scheduled Peer Mentoring and Mentor-Mentee Pair), data is collected for all three scheduling categories and presented in this section. For assistance with Excel (Category 1), student participation was high since freshman are getting used to college environment and building interactions with their peers and instructors. Above average students tend to start early and figure out resources to make use of them. However, the participation for Mentor-Mentee Pair option for the same assistance (Category 1) seemed to be zero due to lack of desire and need for help in the early weeks of the semester. Students tend to be in a relaxed mode until the work begins to increase and assignments begin to become more challenging. The data presented in Figure 1 shows the percent of students participating in the two mentoring options for all three categories. It shows that about 13% of students attended Scheduled Peer Mentoring sessions for assistance with Excel concepts and 0% of students signed up for a Mentor. The other reason for low attendance for Category 1 is the student's prior knowledge of Microsoft tools such as Excel. For Category 2, where programming concepts using matrices was introduced. In general, freshman have programming experience from high school or attending summer camps.

However, most of programming taught at high school level is object oriented. MATLAB being a matrix-based programming tool, it poses challenges to students in understanding syntax and turning the minds away from object-oriented concepts. For students coming with no prior programming background, it adds more complexity understanding MATLAB tools and functions. Even though instructors present the material on array operations, loops, conditional statements and graphing functions in MATLAB with the help of demonstrations utilizing MATLAB syntax, students find it difficult to apply the knowledge to solve the problems. In Category 2, the application assignment gets challenging and begins to impact their grades. More help on understanding the problem statement and determining the functions to apply becomes strenuous. For the same reason, students tend to utilize resource to overcome the difficulty. For Scheduled Peer Mentoring, the Category 2 was not significantly different from Mentor-Mentee Pair. The data shows that about 26% of students attended Scheduled Peer Mentoring sessions for assistance with MATLAB concepts and about 18% of students signed up for a Mentor. Lastly, the Category 3 is when Design Project is introduced, and students seem to gain considerable amount of knowledge on MATLAB concepts by attending session in Category 2. Therefore, students seem to be prepared to design a computer-based game for the Design Project. The only other difficulty for students at this time of the course is the technical writing, video creation and project management. The technical aspect of the project is handled by brainstorming, researching ideas, reading articles and journals to gain understanding of the project. However, in order to complete the project, significant amount of documentation in the form of Project Notebook is required. Students return to the mentors for assistance with writing especially writing user manual, program description for developers and algorithm and flowchart drawing. The data shows that about 23% of students participated in the Scheduled Peer Mentoring sessions for assistance with Design Project and about 8% of students signed up for Mentor-Mentee Pair. Mostly, the students signing up for help with the Design Project are teams as the project is heavy on teamwork and the tasks are distributed among all team members.

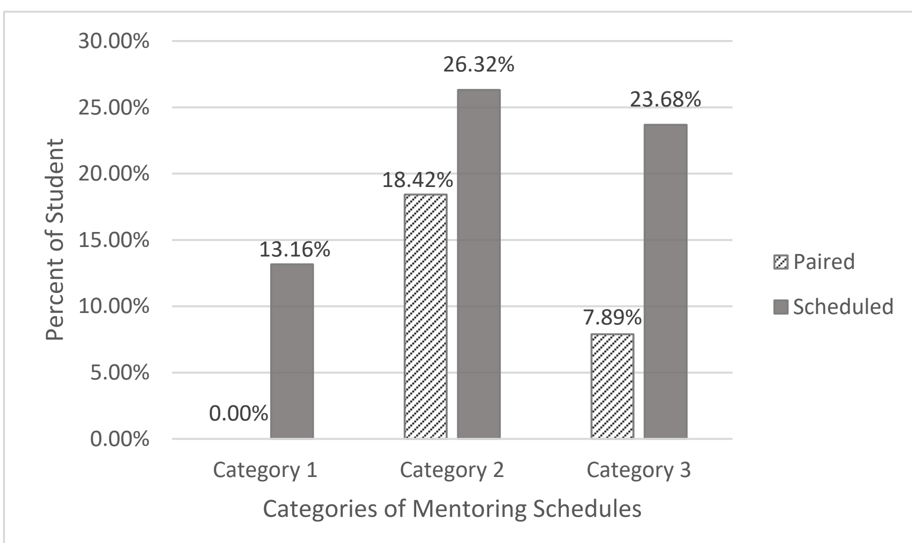

Figure 1. Percent of Student Participation in Two Mentoring Session Types: Scheduled Peer Mentoring (Scheduled) and Mentor-Mentee Pair (Paired)

Although students utilized the resources, on average higher participation was observed only during the peak periods of exams. With the study being conducted at a regional campus and class sizes being small, the sample size is relatively small. With N = 38, the average participation scores for combined peer mentoring sessions from Figure 2 shows about 7% students participated for assistance with Excel topics, about 22% students participated for assistance with MATLAB topics and about 16% participated for assistance with project documentation, coding and final exam. It was also observed that the students starting in the beginning kept coming back and were consistent mentees. Although, there was an influx of students in the mid of the semester which validates the data from previous work-in-progress paper. Programming is not everyone's favorite area. Much of the engineering curriculum requires programming background, however students find it difficult to learn a programming language. Even students coming in with the programming background found MATLAB programming challenging because of the differences in syntax and use of tools and applications. It was observed that after the second midterm exam, students start working on the Design Project and require less support with the concepts as the project work, team meetings and documentation consumes more time. To motivate students to participate and utilize resources to be successful in the course instructors can provide incentives to the students.

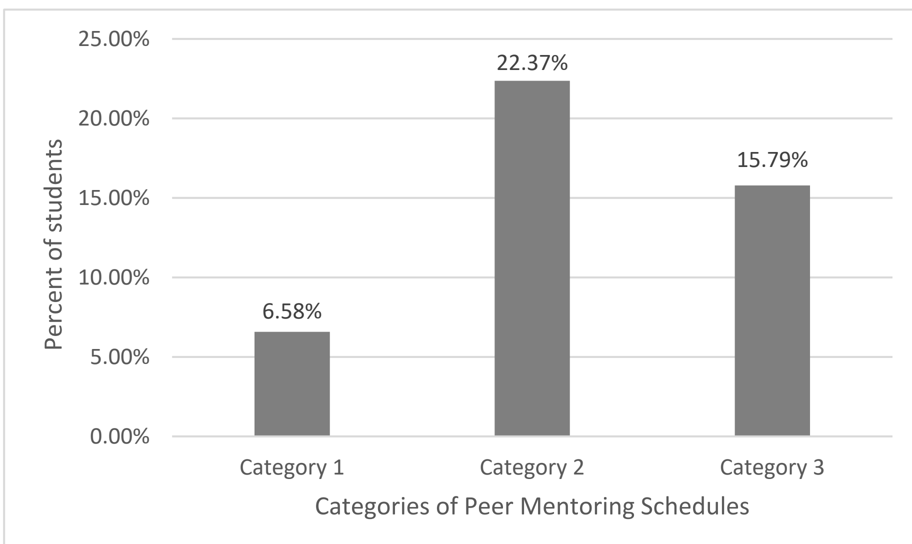

Figure 2. Average Student Participation in Peer Mentoring for all three categories of schedules

Analysis of Performance

Student performance is assess using the final grades and overall performance in class. In this study, the analysis of performance varies for each type of mentoring. For Scheduled Peer Mentoring, the student attendance is recorded and their scores in application assignments were observed. The midterm grades also provide information about the performance and development of the student knowledge. A feedback from mentors is also recorded to learn about the challenges that students are facing. Scores of the students attending the peer mentoring sessions are compared with the rest of the population and the results are shown in the Figure 3. The results show that on average students attending the peer mentoring sessions performed well compared to students not attending the peer mentoring sessions. The mentored students benefitted learning from the mentors by practicing application problems and reviewing sample tests before the exams. It can be noted from Figure 3, that there is not significant difference in the scores for Application Assignments and Midterm1. However, for Midterm2, there is significant difference of about 10% in the scores between the two populations. This proves that freshman engineers require additional support beyond the lecture, activities and demonstrations in class especially understanding programming concepts when a new tool like MATLAB is presented.

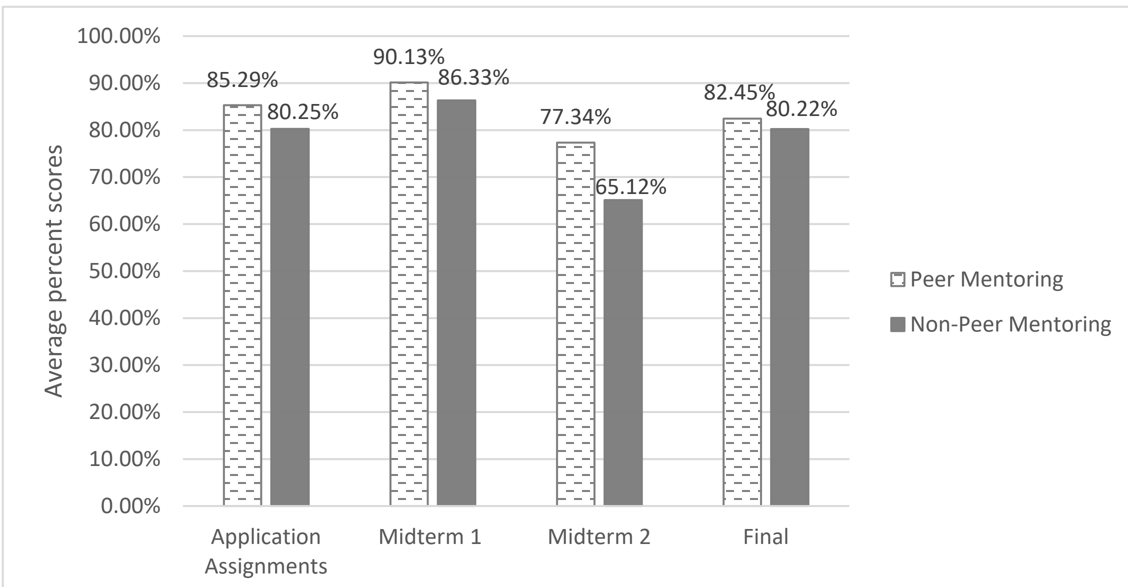

Figure 3. Average Grade Distribution for various assignment
(Application Assignments and Exams)

Application Assignments are a mix of Excel and programming applications and therefore the data is varied but still provides an outlook on benefits of peer mentoring. The analysis of correlation between average scores for students attending peer mentoring sessions and those are does not attend peer mentoring sessions showed a positive correlation of 0.939. This shows that students not attending peer mentoring performed relatively similar to those attending peer mentoring sessions. However, if the final grades are computed, the overall grades for students attending peer mentoring sessions are higher compared to the students not attending the peer mentoring sessions. It is observed that there is a difference of two letter grade on average between the two populations. This difference could be a huge factor when determining the final grade. Results also shows that with a small sample size, students attending the peer mentoring sessions have a higher possibility of passing the course with a C or better grade compared to those who does not attend the peer mentoring sessions. Figure 4 shows that 80% of the students participating in peer mentoring sessions pass the course while the remaining 20% of the students fail the course. And, about 70% of the students not attending the peer mentoring sessions pass the course with a C or better grade and about 30% of the students fail the course. This pattern has been consistently visible from multiple semester's data and it proves the objective of this study that peer mentoring helps improve the student performance and their overall grades in the Fundamentals of Engineering I course thereby allowing them to continue with their engineering program in a timely manner.

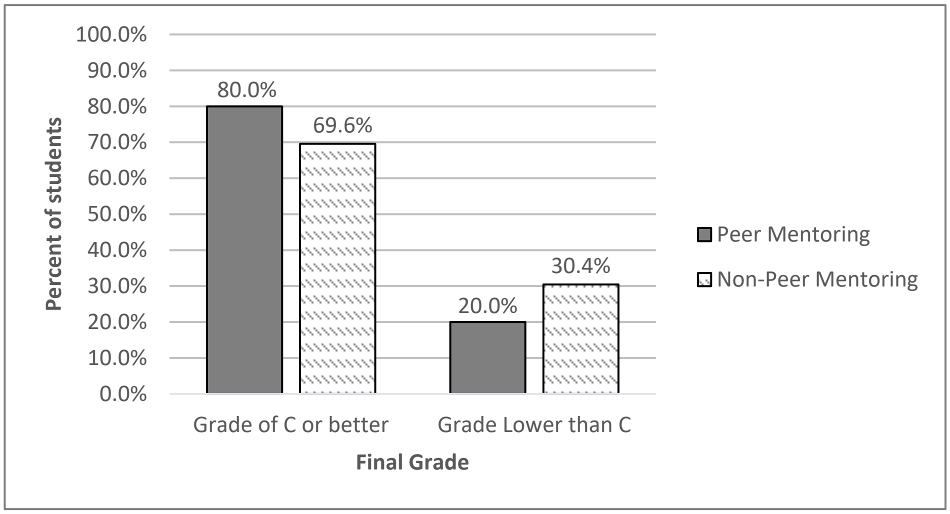

Figure 4. Final Grade Distribution for Two populations of class: a) Students attending Peer Mentoring sessions and b) Students not attending Peer Mentoring sessions

Conclusion and Recommendations

In order to continuously enhance the quality of First Year Engineering Program and the student experience, this campus continues to transform programs and include activities such as Peer Mentoring to serve the needs of the student population. The Peer Mentoring Program has consistently show to prove improvement in student learning and performance in the Fundamentals of Engineering I course. The results presented in this paper confirms prior studies that the peer mentoring is helpful in enhancing the performance of the students. Other factors such as different types of mentoring (Scheduled and Mentor-Mentee Pair) are also explored to learn about the student response and provide flexibility to accommodate various schedules. It was shown that Scheduled Mentoring type received considerably higher participation compared to Mentor-Mentee Pair. However, the Mentor-Mentee Pair has been helpful in scheduling sessions on a regular basis whereas Scheduled Mentoring sessions served the need based student population. The correlation analysis showed no significant difference between individual assignment scores for students attending the Peer Mentoring sessions and those that are not. However, the overall final grades do show significant differences in two populations. This shows that the probability of students passing the course with a C or better grade is higher for those attending the Peer Mentoring sessions. Because of the positive feedback from mentors and mentees, the organization of the sessions will remain the same, with a few modifications, for the next academic year. Modification would include the integration of Peer Mentors into the classroom experience and to expand upon their ability to assist in with communication and leadership skills. Other modification will include mentor and mentee surveys and assessment of mentoring sessions by the Academic Success Center coordinators. Since the Academic Success Center is a university funded program, it's role in this study is important to ensure the sustainability of the Peer Mentoring program for Engineering Freshman. Since these courses are not required for transfer students, this data does not include such population. The Fundamentals of Engineering – Transfers is another program with two-course sequence that transfer students take. The use of polling mechanism also proved to be successful and therefore similar polling options will be used in future. Student self-assessments, mentor and mentee surveys and team evaluations are going to be conducted as part of the future work. Peer Mentoring option for second semester and higher-level courses will be explored in future. Another strategy to be explored in the future study would be to integrate peer mentors in the classroom setting. Peer mentors would be invited to the sessions when the application assignments are discussed, and they could present their perspective on the approach for each problem in the assignment. This strategy might be time consuming, especially during the class time but it is expected to yield positive results. Another advantage could be the awareness of the Peer Mentoring session among the students as many seem to not to utilize the resources available on campus.

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