The Influence of a Summer Lecture/Laboratory Course on Students' Transition from a Two-Year to a Four-Year College

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Abstract

The Citadel offers many engineering curricula to day and evening students. The School of Engineering evening program accepts students from partnering and technical colleges for a 2+2 program. Evening students at The Citadel are required to take additional courses during summer in order to catch up and graduate in four years. The transition happens over the summer when students are required to take four courses in order to be ready for full-time enrollment during Fall and Spring semesters. The Civil and Mechanical Engineering Departments require their students to take Dynamics and Mechanics of Materials during the first summer along with other discipline-specific courses. This paper will study the influence of the lecture and lab of the Mechanics of Materials course on the transition. Surveys, course evaluations and additional students' comments will be assessed in order to improve students' preparedness and minimize the effect of the changing of colleges.

Keywords

Transition, 2-Year College, 4-Year University, Mechanics of Materials

Introduction

The Citadel in Charleston, SC was founded in 1842 and provides a unique education with the mission of educating principled leaders. One of the nation's six senior military colleges, The Citadel offers a liberal arts education that has an undergraduate retention rate of 86%, a four-year graduation rate of 67% and has been recognized by U.S. News and World Report as the "#1 Public College in the South" for the last seven years.[1]

The Citadel School of Engineering has had a proud record of significant contributions at The Citadel since its inception in 1842.[2] The Civil and Environmental Engineering Department was established in 1912 and became accredited in 1936. The Electrical and Computer Engineering Department was established in 1941 and became accredited in 1976. The Mechanical Engineering Program was added in 2014 and became accredited in 2017. The Citadel currently offers eight evening undergraduate degree completion programs to students who wish to pursue a bachelor's degree.[3] These degree completion or "2+2" transfer programs allow students to complete the first two years of study at a regionally accredited college or university, then transfer those credits to The Citadel for the final two years to complete the degree. Students interested in Civil, Electrical and Mechanical Engineering majors must complete all freshman and sophomore coursework at a regionally accredited college or university before attending The Citadel to complete their Bachelor's Degree. Veterans who do not have the required prerequisite courses may qualify for the Non-Cadet Veteran Day Program. Since The Citadel provides a general liberal arts education, students typically complete these general education requirements at their

initial two-year institution, in addition to introductory level engineering courses, including Engineering Statics, Surveying, Geospatial Representation, and Computer Applications[4]. The junior and senior years of study are completed at The Citadel by attending evening classes. The program is designed and offered to enable the full-time student to complete the last two years of the program and receive a Bachelor of Science in Civil, Electrical or Mechanical Engineering within two academic years and two summers.

It has often been observed that transfer students can have a difficult time adjusting to their new institutions, essentially extending what is known as the "sophomore slump" well into their junior year.[5,6,7] This is due to a number of factors, such as, adjusting to new institutional policies and procedures, new expectations, as well as faculty time commitments (e.g., research and service requirements).[5,6,7] Therefore, it is critical that students entering the 2+2 program are initially exposed to an experience that aids in their transition from a two-year program to a four-year institution and aids them in feeling as if they are a valued member of their new four-year campus community.[8] This paper will analyze Civil and Mechanical Engineering transfer students' perception and performance after the first summer at The Citadel.

Transition Between Colleges

In order to fit all junior and senior coursework in the evening program, the transfer students are required to take classes during the summer before those years. Both Civil and Mechanical Engineering students have to take CIVL 301 Dynamics, CIVL 304 Mechanics of Materials lecture and CIVL 307 Materials Laboratory during the first summer. CIVL 304 and 307 are service courses taught out of the Civil Engineering Department, but utilizing both Civil and Mechanical Engineering faculty to administer the courses. The past four summers, four faculty have taught the lecture portion of Mechanics of Materials and two faculty have taught the laboratory portion (CIVL 307). The level of student preparedness for a transition to a 4-year college and the influence on future course performance was analyzed using a survey administered to junior and senior Civil and Mechanical Engineering transfer students in the middle of fall semester. An assessment titled 'Survey of Student Perception for CIVL 304 (Mechanics of Materials lecture) and CIVL 307 (Mechanics of Materials laboratory) as a Help with Transition between Colleges' was distributed to Civil and Mechanical Engineering juniors and seniors. Twelve questions were evaluated using a 5-point Likert scale with '1' being 'Strongly Disagree' and '5' being 'Strongly Agree'. The questions are listed below.

Q1. Courses taken before transferring to The Citadel prepared me for CIVL 304.
Q2. Courses taken before transferring to The Citadel prepared me for CIVL 307 (instrumentation and measurements).
Q3. Courses taken before transferring to The Citadel prepared me for lab report writing.
Q4. CIVL 304 prepared me for future courses at The Citadel.
Q5. CIVL 307 prepared me for future lab courses at The Citadel.
Q6. CIVL 307 prepared me for future report or paper writing (engineering format and professional style).
Q7. I learned a lot in CIVL 304/307.
Q8. CIVL 304/307 instructors made the transition from Trident to The Citadel very pleasurable.

Q9. CIVL 304/307 instructors prepared me for a successful career.
Q10. Enthusiasm of CIVL 304/307 instructors motivated me to do well in my courses.
Q11. CIVL 304/307 Instructors were very caring.
Q12. Taking CIVL 304/307 during the same semester reinforced my understanding of Mechanics of Materials.

Survey Results

Questions 1 through 3 asked the students if courses taken before transitioning to The Citadel prepared them for CIVL 304, 307 and report writing. Questions 4 through 12 asked if CIVL 304, 307 prepared them for future courses and helped with the transition between colleges. Civil Engineering and Mechanical Engineering juniors and seniors participated in this survey. Student perceptions of how well CIVL 304/307 has helped them with the transition between 2-year program and a 4-year institution is shown in Figure 1. Eighty five percent of the students (4.27 out of 5) felt that the CIVL 304 well prepared them for the future courses at The Citadel. As shown in Figure 1, eighty nine and ninety one percent perceived that the CIVL 307 prepared them for future lab courses and report writing, respectively. Eighty nine percent of students felt that CIVL 304/307 instructors made the transition from Trident (2-year College) to The Citadel very pleasurable. Figure 1 also shows that ninety percent or more of the students perceived that the CIVL 304/CIVL307 instructors prepared them for successful career and motivated to do well in their courses.

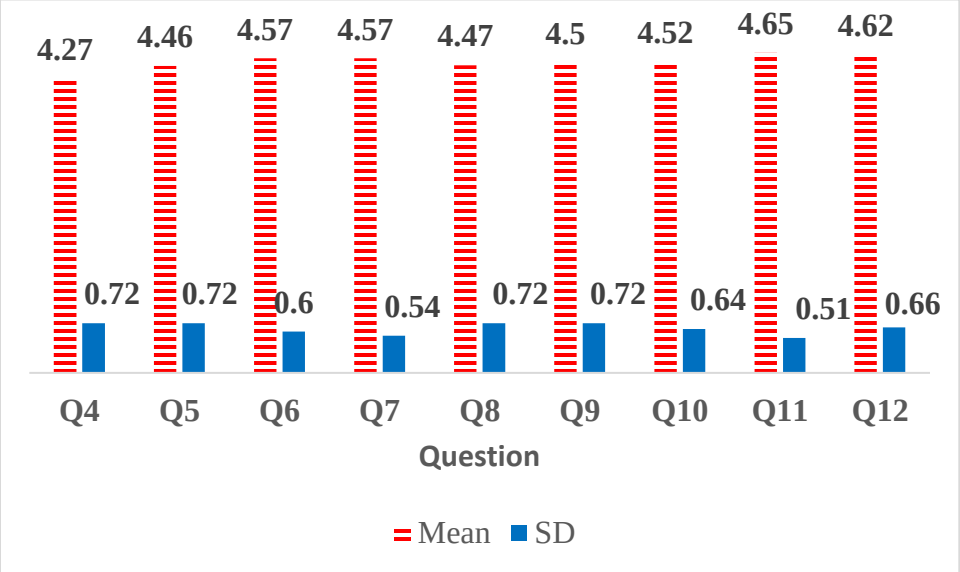

Figure 1. Results for transition questions related to CIVL 304/CIVL 307

Results comparing Civil and Mechanical Engineering students can be found in Figure 2. It is easy to notice trends between the first three questions concerning courses taken before the transition and the last 9 questions concerning courses taken after the transition. Mechanical Engineering students rated questions 1 and 3 higher than Civil Engineering students indicating a better preparation for the transition. However, Civil Engineering students feel more prepared for

future courses than Mechanical Engineering students. One reason for this could be that while the majority of the pre-requisite engineering courses taken at the initial institution before the transfer relate to all engineering disciplines. Several courses heavily favor students that are interested in Civil Engineering, for example, Surveying and Geospatial Representation. Additionally, the argument could be made that the courses encountered by students within the junior and senior years of the Civil Engineering curriculum (e.g., structural analysis, reinforced concrete design, steel design) map more closely to the CIVL 304/307 courses than the Mechanical Engineering curriculum. It can also be noted that CE faculty predominantly teach the summer offering of CIVL 304/307 course, thus tend to provide more CE examples.

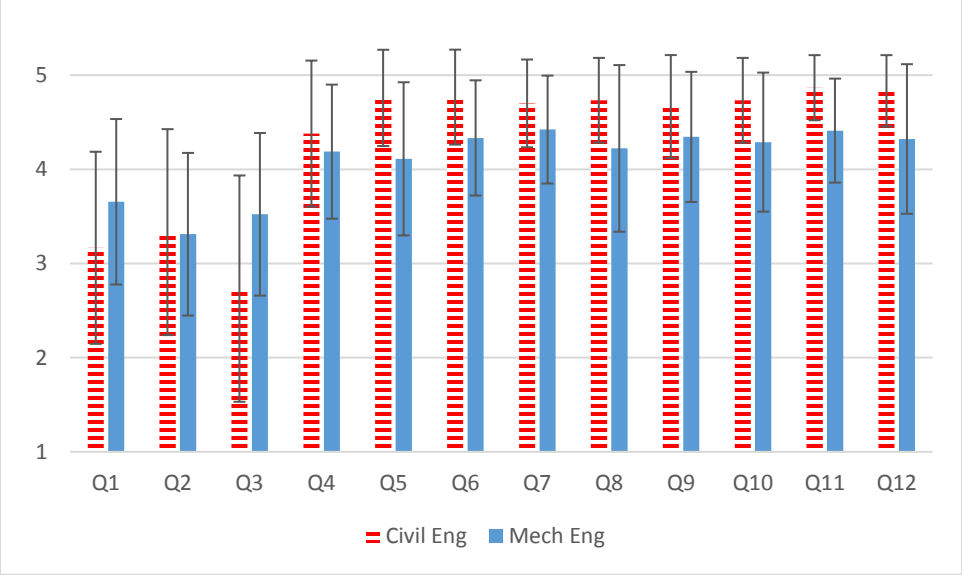

Figure 2. The comparison of Civil and Mechanical Engineering students' perception for CIVL 304 and CIVL 307 as a help with transition between colleges.

The mean plus or minus one standard deviation results comparing Mechanical Engineering juniors and seniors can be found in Fig. 3. Based on answers to Questions 1 through 3, it can be understood that Mechanical Engineering juniors feel better prepared for the transition than seniors. Based on answers to Questions 4 through 12, seniors feel that CIVL 304 and 307 better prepared them for their Citadel courses. The discrepancies may be explained by seniors' longer tenure at The Citadel and better understanding of the Mechanical Engineering program.

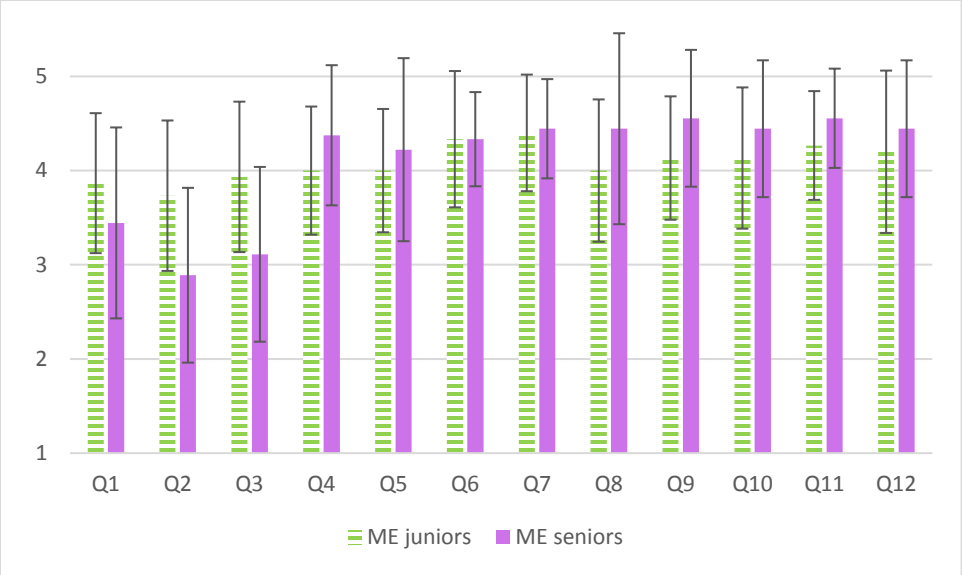

Figure 3. The comparison of Mechanical Engineering juniors and seniors' perception for CIVL 304 and CIVL 307 as a help with transition between colleges.

Conclusions

The following conclusions can be made based on the study results:

- Mechanical Engineering students perceived that 2-year program better prepared them for the transition to The Citadel than the Civil Engineering students.
- Civil Engineering students feel more prepared for future courses than Mechanical Engineering students after taking the CIVL 304/ CIVL 307.
- Almost ninety percent of the students perceived that the CIVL 307 prepared them for future lab courses and report writing, respectively.

- Eighty nine percent of students felt that CIVL 304/307 instructors made the transition from Trident (2-year College) to The Citadel very pleasurable.

- Ninety percent or more of the students perceived that the CIVL 304/CIVL307 instructors prepared them for successful career and motivated to do well in their courses.

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