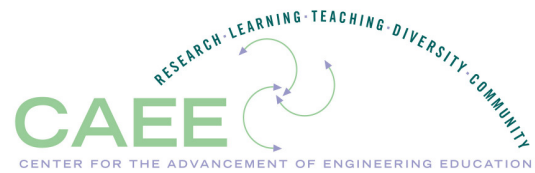


Research Brief

Center for the Advancement of
Engineering Education
NSF Grant ESI-0227558



Competition, Confidence, and Challenges in the Engineering Classroom: American and International Students Speak Out

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Source: 2007 American Society for Engineering Education Conference

National data has shown that Americans are scoring at lower levels in mathematics and science than their international peer group. Yet, the data does not feature students' voices. This study helps fill that gap by highlighting American engineering students and their international counterparts matriculating at an HBCU (Oliver University). This study is part of a large, longitudinal study designed to understand how students become engineers by examining their experiences from their freshman through their senior years.

Implications of Findings

This paper underscores the importance of including stakeholders' perspectives and voices along with numerical findings with regard to academic preparation and achievement in engineering. In creating or revising educational policies, we must remember to describe before we prescribe. The voices presented in this paper are indicative of the US educational system in regards to preparation for higher education. This perception (or reality) needs to be addressed as we attempt to find ways to decrease the number of students that are dropping out of undergraduate engineering programs. It has become apparent that funding for the continuance of pre-college preparatory programs should continue. Until US high schools become more consistently competitive and produce more students that have the necessary skills to compete for the jobs in the global market, supplemental services are needed to fill in those gaps.

Method and Background

Achievement scores for US students historically have fallen at or below international averages and have done so for three international comparative assessments of science and mathematics as referenced in the Third International Mathematics and Science Study (TIMSS). The 1983 report *A Nation at Risk: The Imperative for Educational Reform* charged federal and state governments to reform the educational system so that US students could be better prepared to compete against international economic competitors. It brought forth a federal challenge to state governments to conduct reforms on a grand scale.

The African Caribbean students at "Oliver University" have higher grade point averages (GPAs) and self-report higher confidence levels than their African American counterparts.

While the aforementioned reports have shed light on the nature of US secondary public education, this paper highlights the voices, experiences, and dispositions of first year American and international engineering students at Oliver University in order to continue to validate the urgent need to establish educational policies that address the level of preparation of US high school students for college, particularly in the areas of mathematics, science, and engineering.

This study focuses only on the first year experience of five of the pool of sixteen students matriculating at Oliver University. The five students described in this paper were all subjected to multiple method data collection including observations, ethnographic interviews, and surveys. The remaining students were interviewed and surveyed, but not observed. The students observed in this study consisted of three African Caribbean engineering students from the island of Trinidad and two African American engineering students. The primary source of data was a content analysis of ethnographic interviews, ranging between one and three hours. The themes presented in this paper emerged from the participants' discussion, rather than predetermined questions.

Several phenomena emerged from the data; one noteworthy phenomena being how African American and African Caribbean engineering students speak of competition within their discipline, how this affects their confidence level and how this later translates into academic challenges they face in pursuing an engineering degree.

What We Found

This study revealed that in their first year at Oliver University, African American engineering students began to experience difficulty particularly in the areas of science and mathematics, whereas the African Caribbean engineering students viewed the same course material as a review of information previously learned. Both qualitative and quantitative data indicate a difference between these two student groups in three broad areas: (1) high school preparation, (2) first year GPA, and (3) confidence level. The data reveal that the African Caribbean students exhibited a higher level of personal self-confidence as well as high levels of confidence in the areas of mathematics and science. GPAs for both student groups are also reflective of this pattern.

Trinidadian public education, similar to the British system, is very selective and competitive on the secondary level. Due to this structure, students tend to be academically prepared for their freshman college experience.

The high school experiences of American students differ on a structural level, thus allowing for cultural differences or vice versa. In the US, public secondary education is the norm and admission is guaranteed. However, the opportunity to take college preparatory courses is neither the norm nor a guarantee. Access to these courses is not equitably distributed among US high schools. Additionally, school districts highly populated with African American students are less likely to offer an array of these types of courses.

International students engage more often in effective educational practices than their American counterparts, especially in their first year of college and often report greater gains in social development, practical competence, and general education. The achievement gaps between international and American students have been well documented. This paper gives credence to those reports by presenting the voices of the students themselves. Furthermore, students from this study have attributed the primary difference as being work ethic and high school academic preparation.

Overall, we found that the African Caribbean students at Oliver University have higher grade point averages (GPAs) and self-report higher confidence levels. Additionally, when all students were asked if they saw themselves studying or practicing engineering next year, they all replied yes. This information provided further context in understanding where the differences between

these two student groups may lie. Although the dynamic is not explored in this study, it is interesting to note that both the American and international female students in this sample rated themselves lower than the males on each confidence scale.

Not only does national data show that Americans are scoring at lower levels in mathematics and science, but also the American and international students in this study are observing and reporting this phenomenon as well.

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August 2007