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

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Introduction

- Within the first academic year of this longitudinal study, several phenomena through multiple methods of data collection (i.e., surveys, ethnographic interviews, direct observations, and academic transcripts) emerged.

- Initial observations: difficulty in science and mathematics.

- Further explorations revealed distinctions on how African American and African Caribbean engineering students speak of competition within their discipline, how this affects their confidence level and how this later interprets into academic challenges in pursuing an engineering degree.

Relevant Educational Policies/Reports

- *Third International and Mathematics and Science Study* (TIMSS).

- The 1983 report *A Nation at Risk: The Imperative for Educational Reform*

- The recent release of the 2006 report *A Test of Leadership: Charting the Future of Higher Education*

National data has shown that Americans are scoring at lower levels in mathematics and science than their international peer group. However, the data does not feature students' voices.

Our study fills that gap by highlighting American engineering students and their international counterparts matriculating at an HBCU. The students' speech provides insight into the root of the achievement gap.

High School Preparation

- The quality of the academic experience and the intensity of the high school curriculum affect almost every dimension of success in postsecondary education (Gladieux, L. E., & Swail, W. S., 1998).

- Of the forty-five percent of students who start college and fail to complete their degree, less than one quarter are dismissed for poor academic performance (National Postsecondary Education Cooperative, 2006).

Student Characteristics

- Race, appears to play a role in students' success in college: particularly regarding persistence and retention. White and Asian American students are more likely to persist toward a degree than their African American and Hispanic counterparts (National Postsecondary Education Cooperative, 2006).

- Student interactions with peers can positively influence overall academic development, knowledge acquisition, analytical and problem-solving skills, and self-esteem (Howe, D., 1996).

The "Model Minority" Phenomenon

- Asian American students are often referred to as the "model minority" because they achieve a higher degree of success than the average student population.

- On one hand, the label appears to be positive and flattering. On the other hand, the same label causes internal and external pressure to succeed.

- In this paper, the concept and the characteristics of the "model minority" label are extended to describe the African Caribbean student who attends college in a predominantly African American setting.

Methodology

- This analysis includes an in-depth study of five students (two American and three International) from a larger pool of eight students in order to feature the students' voice, an often minimized and underutilized resource.

- The primary source of data was a content analysis of ethnographic interviews, ranging between one and three hours.
  - Survey
  - Academic transcripts

- Descriptive high school and collegiate freshman year experiences.

Findings

+ Data indicate a difference between these two student groups around competition, confidence and challenges in four broad areas:

– **(1) high school preparation,**

– **(2) first year grade point average (GPA),**

– **(3) confidence level, and**

– **(4) work ethic.**

GIVING VOICE

Through the voices, that provide first person account, of these student participants from different backgrounds experiencing the same curriculum in the same academic setting, researchers were privileged to gain insight. This insight allowed us to further understand the dynamics that posed academic challenges or success, which in every case was traced back to two over-arching themes: high school academic preparation and individual work ethic.

Demographics of Student Participants

Student	Citizenship	Gender	Major	GPA		CONFIDENCE		
				1st Semester	2nd Semester	Math	Science	Self
Douglas	African-Caribbean	Male	Civil Eng	4.0	4.0	4	4	4
Donna	African-Caribbean	Female	Elec Eng	3.8	4.0	3	3	2
Peter	African-Caribbean	Male	Comp Sci	4.0	4.0	4	4	4
Morris	African American	Male	Civil Eng	3.22	2.20	4	3	3
Peggy	African American	Female	Chem Eng	3.08	2.94	0	2	2

Note: Rankings ranged from 0 to 4, with 0 = lowest 10%, 1= below average, 2= average, 3= above average, and 4= highest 10%. Student names have been changed to protect the identity of the respondents.

High School Preparation

AMERICAN PUBLIC EDUCATION

- In the U.S., public secondary education is the norm and admission is guaranteed.

- However, the opportunity to earn Advanced Placement is neither the norm nor a guarantee. Access to these courses is not equitably distributed among US high schools.

- School districts highly populated with African American students are less likely to offer an array

  of AP courses

TRINIDADIAN PUBLIC EDUCATION

- Trinidad and Tobago's educational system is modeled after the British educational system.

- Students must compete for entrance into the free public secondary school system through the Common Entrance Examination.

- Due to this structure, students tend to be academically prepared for

  their freshman college experience.

High School Academic Preparation

- *Douglas* admits that his interest in engineering stems from *"a love for the sciences in high school."* When asked if he was prepared for calculus before coming to the US for college, he stated, *"…yeah, because … we did advanced level math."*

- *Donna* completed physics, chemistry and math "A" level courses. She states, *"I've always loved math…even as challenging as it may become eventually… [if] it wasn't for "A" levels, I still love to try it…"*

- *Peter* completed math and physics "A" level courses in his home country. *"…Everything was no harder than normal, they teach you something, you learn something, you learn, you understand, you read, and you progress."* He further commented, *"It's possible for me to get a 4.0. And, well, I consider my case kind of special in that I got 16 credits transferred from my "A" levels…"*

High School Academic Preparation

- **Morris**, graduated from a top-rated magnet high school that has a focus on the sciences. Morris's discussion about his transition from high school to college highlights a maturation process in becoming a successful student. Morris states, *"…in high school, … I realized that I would give up on a lot of things. But then … realized,…If I just keep giving up, it's not gonna help at all. So I would just keep studying even if I got bad grades, I would just keep going. And that's really what helped me my first year of college."*

- Similarly, **Peggy** also had an early introduction to a focused science curriculum before college. *"…in high school, I went through a lot of transitions. First year I was really…doin' whatever, just silly, bouncing off the walls. I got my work done, and I won [the] science fair the first year, and went to the international science and engineering fair…So that was my first real thrust into how I wanted to do… engineering…."*

Discussion Point

+ In both of the African American students' cases, there was also exposure and interest in the engineering field early in their academic careers. However, disciplined study habits had to evolve through **a maturation process** that may have temporarily impeded academic success.

+ The stories of the African Caribbean students illustrate that the discipline was present during their secondary education and their success is attributed to coming to college with that **work ethic** in place.

The "Model Minority" Phenomenon Revisited

+ **Consistent with the literature, the work ethic of the international students seem to be largely cultural.**

+ **Douglas** also spoke of work ethic when he was asked if there is a difference in African Caribbean and African American students. He replied, *"…I guess work ethics. ..where I'm from, college guarantees you that further step and I mean most [international] students here are on scholarships as well, so they know the importance of keeping their grades up as opposed to... 'Mom or Dad is paying for me…' It's not that way with us. So we, actually know… you can't come a thousand miles just to waste time… I would say innately, we …tend to work a little harder as opposed to American students…"*

+ **Donna** *responds "I think for most of us who …, use our system [The British System], you had to do, you have no choice."* Donna further compares her work ethic to her American peers: *"Like one of my American friends, he was like, 'Doesn't matter', you know, and I'm fighting down my B's … and doing everything that I can to not get a B….so when they say they'll get a C whereas for most of us … C's aren't enough, …, we don't want to even see that… You could tell basically by their mentality in class and by the way they deal with work and assignments and stuff like that."*

The "Model Minority" Phenomenon Revisited

- **Morris** discussed gender differences, but made special mention of African Caribbean female students. *"...a lot of females don't choose this major... So ... when I do see them, oh, to be honest the only ones I really see are... Caribbean ones, and ... they're just ... really dedicated and they work."*

- **Peggy** also makes mention of African Caribbean students. *"...as great as my high school experiences was and all that I know... I'm not as prepared as other students who are here in engineering...half of them are Caribbean students and they've had exposure to this information that I've never had exposure to."*

    Peggy goes on to discuss the importance of peer groups towards persistence. *"People are... prone to hang around what they know or be with people they know so when those groups are there, they won't integrate and you see it, like the Caribbean students... they do their thing, the American students do their thing, and it's like you know we should be more together, pulling together, especially in fields where if we put our heads together we could help each other out."*

Theoretical Foundation and Challenge

- According to Vincent Tinto's theory of student departure, students leave college because they are unable to effectively distance themselves from their family or community of origin and adopt the values and the behavioral patterns that typify the environment of the institution they are attending. (Tinto, V. 1988)

- However, our study shows that the primary factor contributing to international students' success is the connection that they have to their home communities.

Conclusion

- We argue that the "model minority" stereotype/label, as it is applied to Asian Americans in predominant White settings, is showing evidence of application in this academic setting. African American students repeatedly acknowledge the "model minority" label of African Caribbeans and African Caribbean students recognize, accept and in some ways strive to uphold this label.

- The voices presented in this paper are telling 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.

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