PERCEPTIONS OF FIRST-YEAR STEM STUDENTS ON RETENTION FACTORS AT A CARIBBEAN UNIVERSITY: IMPLICATIONS FOR ACADEMIC ADVISING

Joy A. Cox, PhD
INTRODUCTION: Rationale for Study

- There is very little research conducted in student retention and academic advising in the Caribbean colleges and universities.
- In the Caribbean having a university degree is a means of social mobility.
- Knowledge in STEM fields is a factor of rapid economic and industrial growth.
- Attrition rates of students at the regional universities have been increasing steadily over the last decade.
- From an institutional perspective, decreasing student attrition rates is necessary for financial management and to maintain academic programs, particularly on campuses where the government contributions have decreased.
- Education is both a public & private good.
- Academic advisors are agents of student retention.
- This study fills a gap in the literature
Why is Conducting Research in Academic Advising Important?

- Scholarly review.
- Improvement in academic advising.
- NACADA has a research agenda: Investigates academic advising’s impact, context, or theoretical basis.
- Research focuses on the creation of new knowledge, testing an experimental hypothesis, or documenting new knowledge.
BACKGROUND: The Research Setting

- Tertiary education in the English-speaking Caribbean region.
- The University of the West Indies (UWI) is the premiere university system in the Caribbean with 3 main regional campuses.
- At the UWI, the student demand for admission surpasses the number of available places; therefore, the university is highly selective.
- Research conducted at two of the 3 regional campuses: St. Augustine campus, Trinidad & Tobago and Cave Hill campus, Barbados.
Demographic Profiles of Barbados versus Trinidad and Tobago (2013)

<table>
<thead>
<tr>
<th></th>
<th>Barbados</th>
<th>Trinidad and Tobago</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>288,725</td>
<td>1,225,225</td>
</tr>
<tr>
<td>Urbanization</td>
<td>44%</td>
<td>14%</td>
</tr>
<tr>
<td>Ethnic group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>93%</td>
<td>East Indian 40%</td>
</tr>
<tr>
<td>White</td>
<td>3.2%</td>
<td>Black 37.5%</td>
</tr>
<tr>
<td>Mixed</td>
<td>2.6%</td>
<td>Mixed 20.5%</td>
</tr>
<tr>
<td>East Indian</td>
<td>1%</td>
<td>Other 1.2%</td>
</tr>
<tr>
<td>Other</td>
<td>0.2%</td>
<td>Unspecified 0.8%</td>
</tr>
<tr>
<td>*Literacy</td>
<td>99.7%</td>
<td>98.8%</td>
</tr>
</tbody>
</table>
The number of students returning to the UWI after their first year in science and technology fields has recently decreased annually.

Overall, 11% of the student body admitted at the UWI in the 2009-2010 academic year did not resume their studies in fall 2010. The difference was three percentage points higher than the 2008-2009 first year cohort with Pure and Applied Science having the highest student attrition rate (19%) for the fall 2010 semester (UWI Planning and Development, 2010).

22-23% of students surveyed at each UWI on-campus institution identified inadequate academic advising as a factor influencing their decision not to return to the institution after completing their first year.

“Good advising may be the single most underestimated characteristic of a successful college experience” (Light, 2001, p. 81).
Purpose of Academic Advising at UWI

At UWI, the purpose of academic advising is:

➢ To help students, particularly new students, in planning, monitoring and successfully managing their chosen field of study, in relation to clear career objectives. Students are guided to accept responsibility for their learning, to be informed of the services provided for them, to access information, and to be managers of their time (UWI, 2014, para.1).
Conceptual Model for First Year STEM Caribbean Students’ Institutional Departure

- **Student Background Characteristics**
  - Sex
  - Race/Ethnicity
  - Secondary School Academic Achievement
  - Secondary School Science and Math Grades
  - Degree Aspiration
  - Parental Education

- **Academic System**
  - Faculty Interactions and Concern for Student Development
  - Academic and Intellectual Development

- **Social System**
  - Peer-Group Interactions

- **Student Enrollment Factors**
  - Residency Status
  - Financial Concerns

- **Commitments**
  - Institutional and Goal Commitments

- **Persistence Decision**
Purpose Statement

The purposes of the study were:

- To examine the student attributes and institutional experiences that contribute to student retention in first year, Caribbean students in science, technology, engineering and mathematics (STEM) majors during their first semester.

- To determine the nature of, and student satisfaction with the academic advising students received during the first semester.
Research Questions

1. Does the **campus** attended predict intent to re-enroll at the two UWI campuses in first year STEM students?

2. What **student attributes** are associated with intent to re-enroll the following semester in first year STEM students, controlling for campus?

3. What **institutional experiences** are associated with intent to re-enroll the following semester in first year STEM students at the UWI, controlling for campus?

4. What perceptions do first year STEM students at the UWI have about the type of **academic advising** they received?
   - The nature of academic advising on a developmental-prescriptive continuum.
   - Students’ satisfaction with academic advising.
Biggest Challenges

Geographic locations:

 Researcher resided in the U.S.
 Two institutions were geographically separated and each had its own norms, policies, and cultures.
 Logistics of collecting the data had to carefully planned and organized.
 How do I define enrollment status and who will monitor re-enrollment?
Overcoming The Challenges

NACADA research grant to cover travel expenses.

- Proposal included:
  - Literature Review
  - Importance of Research Question
  - Procedures
  - Outcomes
  - Timeline
  - Budget
  - IRB clearance
Research Design

- The study adopted a quantitative research design in which self-reported data were collected using a survey.
- The survey had two parts:
  - (i) Student characteristics and enrollment factors identified in the conceptual model as well as the *Institutional Integration Scale* designed by Pascarella & Terenzini, (1980)
  - (ii) *Academic Advising Inventory* designed by Winston & Sandor (1972)
- 16 predictor variables were investigated, and one categorical dependent variable (intent to re-enroll).
- The unit of analysis was the individual student.
Population & Sample

- Target population for this study was first year undergraduate students at the UWI who declared a STEM major in the fall 2014 semester.

- The sample consisted of 293 students from both campuses.

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Procedures & Data Collection

UWI, Cave Hill campus,

- 12 first year courses were identified in the Science and Technology, and Medical Science departments.
- The researcher obtained the names of the professor for each course from student services personnel and contacted them for permission to distribute the survey in their class.
- The survey included a consent form and took 12 to 15 minutes to complete.

UWI, St. Augustine campus

- Science & Technology, and Engineering students were identified and asked to complete the survey.
- A snowballing technique was employed where students were asked to invite other students in their halls and dormitories to complete the surveys.
- Student services staff at the UWI Medical School in Trinidad distributed the surveys to their first year students during scheduled classes.
A binary logistic regression analysis was used to determine the effect of the predictor variables on the likelihood of spring enrollment in research questions 1, 2, and 3.

Research question 4 was evaluated using descriptive statistics (frequency, mean, standard deviation).
Study Limitations

- The study used a model tested in a U.S. university to investigate students in a Caribbean university system.
- Student’s intent to re-enroll at the institution is not synonymous with re-enrollment status and may not perfectly correlate with the student’s actual re-enrollment behavior in the spring semester.
- The findings must be generalized to other institutions cautiously.
- Selection bias was assumed to be present since students were non-randomly assigned at the two institutions and the method of data collection was different on both campuses.
- A threat to statistical conclusion validity may have occurred due to the inapplicability of the academic advising measure.
- The effects of researcher bias may be inherent in the study.
Of the 351 surveys collected, 293 surveys met the criteria for the study (16.3% of the target population).

At St. Augustine campus the sample was 8% of their target population while at the Cave Hill campus the sample was 45% of their target population.

Females overrepresented the target population at the Cave Hill campus (2:1).

Race/ethnicity were fairly represented at both campuses.

<table>
<thead>
<tr>
<th>St. Augustine</th>
<th>Cave Hill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (%)</td>
<td>Sample (%)</td>
</tr>
<tr>
<td>First-Year Students in STEM Fields</td>
<td></td>
</tr>
<tr>
<td>1,420</td>
<td>118 (8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex in STEM fields</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Males (47)</td>
<td>Male (50)</td>
<td>Males (49)</td>
<td>Males (38)</td>
</tr>
<tr>
<td>Females (53)</td>
<td>Females (50)</td>
<td>Females (51)</td>
<td>Females (62)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEM Race/Ethnicity</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Black (38)</td>
<td>Black (40)</td>
<td>Black (93)</td>
<td>Black (72)</td>
</tr>
<tr>
<td>East Indians (40)</td>
<td>East Indians (29)</td>
<td>East Indians (1)</td>
<td>East Indians (6)</td>
</tr>
<tr>
<td>Mixed (21)</td>
<td>Mixed (30)</td>
<td>Mixed (3)</td>
<td>Mixed (16)</td>
</tr>
<tr>
<td>Others (1)</td>
<td>Others (2)</td>
<td>Others (3)</td>
<td>Others (6)</td>
</tr>
</tbody>
</table>
Descriptive Statistics (Cont.)

- Secondary school academic achievement was high;
- Secondary school GPAs averaged 3.47 (relatively high);
- Students aspired to obtain at least a master’s degree;
- Most parents had at least a tertiary level education but parental education at Cave Hill was slightly higher.
- There was some financial concerns on both campuses but students at the Cave Hill had slightly more concerns.
Does the campus attended predict intent to re-enroll at the two UWI campuses?

- The odds of a student re-enrolling at the Cave Hill campus is 2 times that the odds of a student re-enrolling at the St. Augustine campus.

- Students from Cave Hill campus have a 86.6% chance of re-enrolling, while those at St. Augustine had a 75.6% chance of re-enrolling, representing a ratio of 1.15.

- Additionally, the campus the student attended was significantly correlated to gender, race, residency, science GPA, parental education, and financial concerns.

<table>
<thead>
<tr>
<th></th>
<th>B (SE)</th>
<th>Wald (df=1)</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus</td>
<td>.74 (.31)</td>
<td>5.76*</td>
<td>2.10</td>
</tr>
<tr>
<td>Constant</td>
<td>1.13</td>
<td>28.13</td>
<td>3.10</td>
</tr>
</tbody>
</table>

Note: *p < .05. Likert Scale: 1 = Strongly Disagree to 4 = Strongly Agree
What student attributes are associated with intent to re-enroll the following semester in first year STEM students at the UWI?

There was a significant relationship between

- Secondary school science and mathematics GPA and
- Parental education, with first year STEM students’ intent to re-enroll at the UWI.

<table>
<thead>
<tr>
<th></th>
<th>B (SE)</th>
<th>Wald (df=1)</th>
<th>Exp(B)</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus</td>
<td>1.21 (.40)</td>
<td>9.04*</td>
<td>3.34</td>
<td>1.52</td>
<td>7.33</td>
</tr>
<tr>
<td>Sex</td>
<td>.10 (.34)</td>
<td>.08</td>
<td>1.10</td>
<td>.57</td>
<td>2.14</td>
</tr>
<tr>
<td>Race (Black)</td>
<td>-.03 (.52)</td>
<td>.002</td>
<td>.98</td>
<td>.35</td>
<td>2.72</td>
</tr>
<tr>
<td>Black vs. East Indian</td>
<td>-.22 (.42)</td>
<td>.27</td>
<td>.80</td>
<td>.35</td>
<td>1.84</td>
</tr>
<tr>
<td>Black vs. Mixed races</td>
<td>-.44 (.85)</td>
<td>.26</td>
<td>.65</td>
<td>.12</td>
<td>3.44</td>
</tr>
<tr>
<td>Black vs. Other races</td>
<td>-.44 (.85)</td>
<td>.26</td>
<td>.65</td>
<td>.12</td>
<td>3.44</td>
</tr>
<tr>
<td>Secondary school</td>
<td>-.07 (.17)</td>
<td>.17</td>
<td>.93</td>
<td>.66</td>
<td>1.31</td>
</tr>
<tr>
<td>achievement secondary</td>
<td>.44 (.18)</td>
<td>5.87*</td>
<td>1.55</td>
<td>1.09</td>
<td>2.20</td>
</tr>
<tr>
<td>school science and math</td>
<td>.44 (.18)</td>
<td>5.87*</td>
<td>1.55</td>
<td>1.09</td>
<td>2.20</td>
</tr>
<tr>
<td>GPA</td>
<td>.12 (.18)</td>
<td>.43</td>
<td>1.15</td>
<td>.79</td>
<td>3.63</td>
</tr>
<tr>
<td>Degree aspiration</td>
<td>-.18 (.22)</td>
<td>.71</td>
<td>.83</td>
<td>.54</td>
<td>1.28</td>
</tr>
<tr>
<td>Parental education</td>
<td>-.46 (.12)</td>
<td>5.91*</td>
<td>.63</td>
<td>.44</td>
<td>.95</td>
</tr>
<tr>
<td>Residency status</td>
<td>.43 (.44)</td>
<td>.98</td>
<td>1.54</td>
<td>.65</td>
<td>3.63</td>
</tr>
<tr>
<td>Financial concern</td>
<td>.12 (.18)</td>
<td>.43</td>
<td>1.15</td>
<td>.79</td>
<td>3.63</td>
</tr>
</tbody>
</table>
Student attributes associated with intent to re-enroll

- **Secondary school science and math GPA:**
  - Students with higher GPA had a probability of 77.4% of re-enrolling, while students with a lower GPA had a 37.1% chance of re-enrolling with a ratio = 2.08

- **Parental education:**
  - Students with lower parental education had a 78.1% chance of re-enrolling, while students with higher parental education had a probability of 36.1% of re-enrolling with a ratio = 2.16.
What institutional experiences are associated with intent to re-enroll the following semester in first year STEM students at the UWI?

- Institutional and goal commitments, controlling for campus:
- Students with high levels of IG commitments had a 94.6% chance of re-enrolling and students with lower IG commitments had a 40.6% chance of re-enrolling.

### Results

<table>
<thead>
<tr>
<th></th>
<th>B (SE)</th>
<th>Wald (df=1)</th>
<th>Exp(B)</th>
<th>Lower 95% CI</th>
<th>Upper 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus</td>
<td>.78 (.34)</td>
<td>5.4*</td>
<td>2.19</td>
<td>.13</td>
<td>4.24</td>
</tr>
<tr>
<td>Interaction with faculty</td>
<td>.08 (.9 )</td>
<td>.18</td>
<td>.92</td>
<td>.64</td>
<td>1.33</td>
</tr>
<tr>
<td>Faculty concern for students</td>
<td>-.17 (.18)</td>
<td>.95</td>
<td>.84</td>
<td>.60</td>
<td>1.19</td>
</tr>
<tr>
<td>Academic and intellectual development</td>
<td>-.1 (.20)</td>
<td>.26</td>
<td>.90</td>
<td>.60</td>
<td>1.34</td>
</tr>
<tr>
<td>Institutional goals and commitments</td>
<td>.81 (.19)</td>
<td>18.44**</td>
<td>2.26</td>
<td>.56</td>
<td>3.27</td>
</tr>
<tr>
<td>Peer-group interaction</td>
<td>-.13 (.18)</td>
<td>.50</td>
<td>.88</td>
<td>.62</td>
<td>1.25</td>
</tr>
<tr>
<td>Constant</td>
<td>1.24 (.24)</td>
<td>27.38</td>
<td>3.44</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *p < .05, **p < .001. Likert Scale: 1 = Strongly Disagree to 5 = Strongly Agree
First-year students felt that the approach to academic advising was more prescriptive (authoritative) than developmental (facilitating).
Students’ satisfaction with academic advising

- The overall academic advising experience at UWI will be below the average score (< 2.5) which indicates dissatisfaction.

<table>
<thead>
<tr>
<th>Items</th>
<th>St. Augustine</th>
<th>Cave Hill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student satisfaction with academic advising (SSA)</td>
<td>83 2.59 .75</td>
<td>141 2.44 .79</td>
</tr>
<tr>
<td>Overall satisfaction</td>
<td>82 2.48 .97</td>
<td>140 2.48 .99</td>
</tr>
<tr>
<td>Accuracy of information provided</td>
<td>82 2.73 .88</td>
<td>140 2.52 .96</td>
</tr>
<tr>
<td>Adequacy of notice about important deadlines</td>
<td>82 2.61 .91</td>
<td>139 2.49 .93</td>
</tr>
<tr>
<td>Availability of advising when desired</td>
<td>80 2.54 .96</td>
<td>139 2.43 .96</td>
</tr>
<tr>
<td>Amount of time available during advising sessions</td>
<td>81 2.58 .92</td>
<td>134 2.30 .96</td>
</tr>
</tbody>
</table>

Note: Likert scale: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree
Implications for Future Studies

Research: I recommended replicating the study using a mixed method research design approach and extend it to the campus population external to STEM majors.

- For the qualitative research design conduct interviews, observations, and focus groups
- Adapt the *Academic Advising Inventory* to the needs of diverse and international higher education students or design a new instrument.

Theory: Use results from mixed methods study to develop theories which are specific to this Caribbean STEM student population.
Implications for Practice

- Have a tutoring center or assign peer mentors to students with low high school GPA.
- Develop an effective first year initiative program.
- Implement needs based grants and scholarships for students experiencing financial concerns.
- Create a small task force to explore, monitor, and coordinate the academic advising process and come up with new ideas and direction for a well-structured academic advising program.
- Offer incentives, recognition, and rewards to faculty in an effort to motivate them to accept academic advising as not just an added responsibility that increases their already heavy workload.
- Train faculty advisors in the pedagogy of academic advising or employ professional academic advisors.
Conclusions

- Conceptual framework (derived from Tinto’s model) was only partially validated in this study.
  - Academic integration and social integration failed to be significant factors in the student’s decision to stay.
  - Only institutional commitments and goal commitments (importance of attending and graduating from UWI) contributed to student persistence.

- The UWI is a very highly selective institution, especially in STEM fields.
- The campus culture seems to be one which has high expectations for student success.
- The culture of the Caribbean people.
- Successful academic advising programs cannot be solely responsible for retention rates on a campus
REFERENCES


