Findings on Graduate Admissions Studies
2017 Joint Graduate Education and Bridge Program Conference

Geoff Potvin

Department of Physics, and
STEM Transformation Institute,
Florida International University


© 2017 Geoff Potvin. Verbatim copying and distribution of this entire document are permitted worldwide, without royalty, in any medium, provided this notice is preserved.
Acknowledgements

• APS Bridge Program team (past and present): Asmaa Khatib, Bushraa Khatib, Arlene Modeste Knowles, Erika Alexander Brown, Brian Beckford, Brián Clash, Monica Plisch, Geraldine Cochran, Ted Hodapp, Kathyne Woodle and Rachel Scherr.

• Deepa Chari and Ida Rodriguez (FIU).

• Participants in all the studies I will present.

• The AIP for providing opportunity to conduct the recent student survey study.
Motivations
Representation Worries in Physics

![Graph showing the number of physics bachelor's degrees earned by African Americans and Hispanic Americans, Classes of 1994 through 2010.](http://www.aip.org/statistics)
## Motivations

Representation Worries in Physics

### Race and Ethnicity of Physics PhDs, Classes of 2010 through 2012.

<table>
<thead>
<tr>
<th>Race and Ethnicity</th>
<th>3-Year Average Number</th>
<th>Percent of all Physics PhDs</th>
<th>Percent of U.S. Physics PhDs*</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>744</td>
<td>45</td>
<td>88</td>
</tr>
<tr>
<td>Asian American</td>
<td>41</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Hispanic American</td>
<td>28</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>African American</td>
<td>17</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Other U.S. Citizens</td>
<td>13</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Non-U.S. Citizens</td>
<td>826</td>
<td>49</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,669</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*Based on a 3-year average of 843 U.S. citizens.

http://www.aip.org/statistics
Motivations
Representation Worries in Physics

• A disproportionate number of students who identify as African American, Hispanic American and/or American Indian/Alaskan Native and who complete Bachelor’s degrees do not go on to enroll in graduate programs.

• Graduate admissions can be difficult (and intimidating for applicants), so a thorough investigation is warranted.
  • We should be conscientious to ensure that admissions decisions are based on valid and appropriate factors.
  • Students’ perceptions of admissions are important, because students make decisions about applying to school based on these perceptions.
APS Bridge Program-Associated Research Activities

Scope

Student Perspective

Current: Survey of Prospective Graduate Students

Current: Study of Bridge Program Students

Pre-Admissions

Previous: Survey of Graduate Programs (MS and PhD Programs)

Faculty Perspective

Post-Admissions
APS Bridge Program-Associated Research Activities

Scope

- **Pre-Admissions**
  - Previous: Survey of Graduate Programs (MS and PhD Programs)

- **Student Perspective**
  - Current: Survey of Prospective Graduate Students

- **Faculty Perspective**
  - Current: Study of Bridge Program Students

- **Post-Admissions**
  - Current Activities
  - APS Bridge Program-Associated Research Activities
  - Scope
    - Post-Admissions
    - Student Perspective
      - Current: Survey of Prospective Graduate Students
    - Faculty Perspective
      - Current: Study of Bridge Program Students
    - Previous: Survey of Graduate Programs (MS and PhD Programs)
Survey of Graduate Programs (PhD and MS-granting)

Data collected

- **Doctoral programs:**
  - Solicited responses from 199 different institutions.
  - Received responses from 170 individuals at 153 different institutions.
  - 77% response rate, representing about 85% of active PhD programs.

- **Master’s-only programs:**
  - Solicited responses from 57 different institutions.
  - Received responses from 45 individuals identified as being at 43 different institutions.
  - 75% response rate, representing about half of active MS-only programs.
How are student factors (prior performances, experiences, etc) ranked in importance when evaluating student applications, as reported by graduate directors and related faculty?

- High priorities shared by both PhD-granting and Master’s-only programs:
  - GPA/grades in physics/math, and letters of recommendation.
  - Undergraduate courses taken, tied with physics subject GRE.
- Differences between PhD-granting and Master’s-only programs:
  - Master’s-granting institutions appear to be using fewer criteria in admissions.
  - Importance of GRE quantitative and physics subject scores, and overall use of any parts of the GRE.
Survey of Graduate Programs (PhD and MS-granting)

Overview of findings

How are GRE scores (quantitative, verbal, written, and physics subject in particular) being used by departments in the admissions process?

• There is widespread (but not universal) use of GRE cutoffs:
  “No fixed cutoff, but GRE quantitative should be about 90 percentile or higher.”
  “No hard cutoff, but used as a first cut in going through applications and GRE scores trump GPA scores in assessing students.”

How are considerations of diversity (race/ethnicity, gender) accounted for in admissions decisions, if at all?

• Many programs report little success towards dealing with underrepresentation:
  “Unlike the male/female situation, we are not very successful in recruiting underrepresented minorities. If we find a candidate, we find a fellowship. The numbers are just not there in our pool.”
APS Bridge Program-Associated Research Activities

Scope

Current Activities:
- APS Bridge Program-Associated Research Activities

Scope:
- Pre-Admissions
  - Student Perspective
    - Current: Survey of Prospective Graduate Students
  - Faculty Perspective
    - Previous: Survey of Graduate Programs (MS and PhD Programs)
- Post-Admissions
  - Current: Study of Bridge Program Students
Survey of Upper Division Physics Majors

Preliminary results

- National survey of upper division physics majors on their post-graduation career intentions, conducted in conjunction with AIP’s annual data collection.
- 27 (multi-part) questions, with 1031 respondents.
  - 21% indicate no interest in graduate school (of any type).
  - 1% are 1st or 2nd year.
  - 25% female respondents.
  - 4% identified as Black or African-American.
  - 12% identified as Hispanic, Latino, or Spanish origin.
Survey of Upper Division Physics Majors

How important do you think the following criteria are for a successful graduate school application?

- GPA/grades - general
- GPA/grades - physics/math
- Undergraduate courses taken
- Undergraduate institution type/reputation
- GRE quantitative scores
- GRE verbal scores
- GRE written scores
- GRE physics subject scores
- Letters of recommendation
- Reputation of recommenders
- Proximity/familiarity to department
- Personal statements
- Prior research experiences
- Prior publications

Data.Set
- Doctoral.Data
- Masters.Data
- Student.Data

Criterion
Mean Score (0–6)
Survey of Upper Division Physics Majors
How important do you think the following criteria are for a successful graduate school application?

• Students generally distinguish less between various factors (rate most things as quite important).
• Students & doctoral programs have notable agreement in grades/GPA, GRE, and courses taken.
• Students break from faculty on factors like personal statements, prior research, and publications.
Survey of Upper Division Physics Majors
To what extent are the following factors a potential barrier to your pursuit of graduate school?

a. Graduate application fees
b. The need to do well on the GRE general (quantitative, verbal, analytical writing)
c. The need to do well on the GRE physics subject test
d. The admissions process is long/complicated
e. Uncertain I will get accepted to graduate school
f. Possibly having to move to a new place
g. The length of a Ph.D.
h. Availability of scholarships/funds
  i. Difficulty of graduate courses
  j. Difficulty of conducting novel research
k. Finding a good research advisor
  l. Work-life balance
m. Parenting or family responsibilities
  n. Uncertainty about job opportunities after Ph.D.

(All on a scale of “0 – Not at all a barrier” to “4 – Very significant barrier”.)
Female respondents (25%) report statistically significantly higher barrier for:

- The need to do well on the GRE physics subject test \( (p < 0.05) \)
- Difficulty of graduate courses \( (p < 0.001) \)
- Difficulty of conducting novel research \( (p < 0.05) \)
- Finding a good research advisor \( (p < 0.01) \)
Survey of Upper Division Physics Majors
To what extent are the following factors a potential barrier to your pursuit of graduate school?

Those who identify as Black or African-American (4%) report statistically significantly higher barrier for:

• The need to do well on the GRE general (quantitative, verbal, analytical writing) \( (p < 0.05) \)
• Availability of scholarships/funds \( (p < 0.05) \)
Survey of Upper Division Physics Majors
To what extent are the following factors a potential barrier to your pursuit of graduate school?

Those who identify as Hispanic, Latino, or Spanish Origin (12%) report statistically significantly higher barrier for:

- Graduate application fees ($p < 0.001$)
- The need to do well on the GRE general (quantitative, verbal, analytical writing) ($p < 0.001$)
- The admissions process is long/complicated ($p < 0.05$)
- Uncertain I will get accepted to graduate school ($p < 0.01$)
- Possibly having to move to a new place ($p < 0.05$)
- Availability of scholarships/funds ($p < 0.05$)
APS Bridge Program-Associated Research Activities

Scope

Motivations and prior work

Current Activities

APS Bridge Program-Associated Research Activities

Scope

Pre-Admissions

Post-Admissions

Student Perspective

Faculty Perspective

Previous:
Survey of Graduate Programs
(MS and PhD Programs)

Current:
Survey of Prospective Graduate Students

Current:
Study of Bridge Program Students
Investigation into Bridge Student Experiences

Study design

- What motivations and expectations of departmental/institutional practices do bridge students hold at the beginning of their graduate studies?
- What structural, programmatic, and community factors encourage students to engage in their graduate community (formal and informal)?
  - Currently conducting in-depth study of four Bridge sites, with an estimated 4-5 student participants at each site.
  - Participants are in their 1st or 2nd year.
  - Conducting semi-structured interviews (half of interviews completed).
Investigation into Bridge Student Experiences

Framing

Departmental/Institutional Support Structures

Program Improvement

Student Expertise and Professionalization
Investigation into Bridge Student Experiences

Preliminary results

• Importance of shared physical space to student success (and building community):

  [Student 1:] So, we have a floor where everybody taking the core courses sit, and everybody keeps their door open when they are in their office. So, I can just pop in and ask, “Hey, are you working on this?” So, yeah, it makes it a lot easier to interact with people in my class. And, I know there are few others who have changed their floor (laughs) and moved with us . . . they were taking these core courses last semester and they did not do so well. So, those were kind of isolated earlier because nobody kind of goes down on that floor to meet with them.

• The Bridge Program as a critical opportunity:

  [Student 2:] Honestly, the best moment of being a bridge student was when I became one. I had applied to many schools, and I was rejected from every single one. Someone reminded me about this program; I had seen it a long time ago and I was like, yeah, I have this in my back pocket in case I need it. But, you know, I was so delusional when it came to graduate admissions because, you know, you forget that you are competing with students globally . . . So, it was the most exciting time [when] . . . I was selected.
This material is based upon work supported by the National Science Foundation under Grant No. 1143070

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.