Holistic Approaches to PhD Admissions: Advancing Excellence and Diversity

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“Expanding Underrepresented Minority Participation”
National Academies (2011)
Question 1: The average PhD program in Physics graduates a black woman every ___ years.

- 1
- 5
- 10
- 15
- 20
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- 1
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Average among PhD granting institutions:
- 1 every 6 years in physics
- 1 every 11 years in astro
Question 2: The average completion rate in physical science PhD programs is

- 70%
- 60%
- 50%
- 40%
- 30%
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- 70%
- 60%
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- 40%
- 30%
PhD Completion Project
Council of Graduate Schools (2008)
Fisk-Vanderbilt Masters-to-PhD Bridge Program

Get the preparation you need to earn a PhD

1. Earn a Masters degree in physics, chemistry, or biology at Fisk, with full funding support.
2. Get valuable, paid research experience.
3. Receive preparation for the GRE.
4. Get fast-track admission to the Vanderbilt PhD program, with full funding support.

- Physics & Astronomy
- Biology and Biomedical sciences
- Chemistry
- Materials science and engineering

www.vanderbilt.edu/gradschool/bridge
Snapshot of program outcomes so far

**Since 2004:**
- 132 Bridge students
- 90% underrepresented minorities (all US citizens)
- 45% female
- 81% persistence to PhD (compare to 50% national average)

**Since 2006:**
- Fisk is top producer of Black MA degrees in physics, and top 10 producer of MA degrees in physics to US citizens

**2010:**
- First Bridge PhD (now faculty at Alabama A&M)

**2012-17**
- 30 Bridge PhDs graduate (100% received postdoc/faculty offers before graduation)
Where are the minorities in science?

- Top 10 producers of Black physics baccalaureates are all HBCUs.
- Just 20 HBCUs produce 55% of Black physics baccalaureates.
- Future PhDs: HBCUs are the top 8, and 20 of the top 50, baccalaureate origin institutions of future African American PhDs.

**Universities that awarded the most physics bachelor’s to African Americans.**

Physics departments in these twenty universities awarded more than 55% of all physics bachelor’s degrees earned by African Americans since 1998.

- Alabama A&M University
- Benedict College
- Chicago State University
- Delaware State University
- Dillard University
- Fisk University
- Florida A&M University
- Grambling University
- Hampton University
- Jackson State University
- Lincoln University
- Morehouse University
- Morgan State University
- Norfolk State University
- North Carolina A&T State University
- Southern University and A&M College
- Spelman College
- Tennessee State University
- Tuskegee University
- Xavier University

The physics departments on this list reported conferring 15 or more bachelor’s degrees to African Americans between 1998 and 2007.
Source: AIP Statistical Research Center, Enrollment & Degrees Survey
Recognizing key transition points

Underrepresented minorities ~50% more likely to earn Masters en route to PhD.
More institutional transitions, with less guidance.

Lange (2006)
Question 3: According to NRC data, the median GRE quantitative score for physics PhD programs is (on 800 point scale)

- 800
- 750
- 700
- 650
- 600
Question 3: According to NRC data, the median GRE quantitative score for physics PhD programs is (on 800 point scale)

- 800
- **750**
- 700
- 650
- 600
Question 4: In an average year, there are ___ African Americans in physical sciences who score above 700 on the GRE.

• 1000
• 500
• 100
• 50
• 10
Question 4: In an average year, there are ___ African Americans in physical sciences who score above 700 on the GRE.

- 1000
- 500
- 100
- 50
- 10
Question 5: In an average year, there are ___ African Americans who receive the PhD in physics.

- 100
- 75
- 50
- 25
- 15
Question 5: In an average year, there are ___ African Americans who receive the PhD in physics.

- 100
- 75
- 50
- 25
- 15
Question 6: In an average year, there are ___ African Americans in physics who take the GRE.

- 500
- 250
- 100
- 50
- 10
Question 6: In an average year, there are __ African Americans in physics who take the GRE.

- 500
- 250
- 100
- 50
- 10
How GRE suppresses diversity

Miller & Stassun (2014, Nature)
Question 7: GRE scores have been shown to correlate with long-term outcomes such as PhD completion, research productivity, and scholarly citations.

• False
• True
Question 7: GRE scores have been shown to correlate with long-term outcomes such as PhD completion, research productivity, and scholarly citations.

• False
• True
Question 8: The strength of this correlation is

- 0.9
- 0.7
- 0.5
- 0.3
- 0.1
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- 0.9
- 0.7
- 0.5
- 0.3
- **0.1**
GRE does have some residual correlation with long-term success

Note: These are “in-group” correlations, i.e. after adjusting for the dominant correlations with gender, ethnicity, and socio-economic status.

Kuncel & Hezlett (2010)
How to find the stars you want...

Johnson & Apps (2009)
## Identifying Students With the Right Stuff

<table>
<thead>
<tr>
<th>What roles are we looking for?</th>
</tr>
</thead>
<tbody>
<tr>
<td>✴ Commitment and academic potential</td>
</tr>
<tr>
<td>✴ Productive, creative, entrepreneurial researchers</td>
</tr>
<tr>
<td>✴ Effective teachers and mentors</td>
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<tr>
<td>✴ Transformational leadership</td>
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</tbody>
</table>

<table>
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<tr>
<th>What qualities predict success?</th>
</tr>
</thead>
<tbody>
<tr>
<td>✴ Passion, “fire in the belly”</td>
</tr>
<tr>
<td>✴ Ability to succeed in relevant courses</td>
</tr>
<tr>
<td>✴ Ability in the laboratory</td>
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<tr>
<td>✴ Persistence in the face of hardship (the “P” in PhD)</td>
</tr>
<tr>
<td>✴ Entrepreneurial spirit</td>
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</table>

**Two most important elements in admissions:**

(1) **basic academic preparation**, (2) **growth mindset**

“performance character”, “successful intelligence”
## Measuring grit and growth mindset

<table>
<thead>
<tr>
<th>Attribute</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Self-Concept</td>
<td>Expresses confidence they can complete challenging goals, makes positive statements about abilities</td>
<td>Shows confidence and independence but may be unsure about adequacy or skills</td>
<td>Is unsure they can complete the program, exhibits low self-esteem</td>
</tr>
<tr>
<td>Realistic Self-Appraisal</td>
<td>Can clearly and realistically delineate strengths and weaknesses, works on self development</td>
<td>Has trouble identifying strengths and weakness but appreciates/seeks both positive and negative feedback</td>
<td>Over or underestates abilities, does little to no self-assessment, does not appear to have learned from experiences</td>
</tr>
<tr>
<td>Preference for Long vs. Short Term Goals</td>
<td>Clearly communicates long-range goals beyond the PhD</td>
<td>Primary goal is PhD completion</td>
<td>Is vague about long-term goals, or goals are short term such as coursework</td>
</tr>
<tr>
<td>Support Person Availability</td>
<td>Can define a professional support network including mentors</td>
<td>Expresses support from one individual, or family or community</td>
<td>Expresses little or no support from family or institution for goals</td>
</tr>
<tr>
<td>Leadership/Community Involvement</td>
<td>Demonstrates involvement and leadership ability in either academics, family, community, religious group,</td>
<td>Demonstrates involvement in groups in academia or extramurals but has not shown leadership</td>
<td>Not involved in institutional or community group, no demonstrated leadership</td>
</tr>
<tr>
<td>Knowledge in a Field/Non-Traditional Learning</td>
<td>Has engaged in, and learned from, experiences outside the classroom, i.e. performed independent research, extramural activities, self-taught skills</td>
<td>Shows some evidence of non-traditional learning experience</td>
<td>Has not engaged in or indicated learning from experiences outside the classroom</td>
</tr>
<tr>
<td>Perseverance</td>
<td>Can describe a time they failed or encountered an obstacle and successfully coped.</td>
<td>Can identify a time they hit an obstacle but has trouble defining how they overcame the challenge.</td>
<td>Has little experience with failure/obstacles. Cannot provide an example or describe response</td>
</tr>
</tbody>
</table>

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*fisk-vanderbilt-bridge.org*
Applicant Interview Protocol
College Experience:
  • High points
    o Describe the high points of your college experience.
    o What went well for you? / What are you most proud of?
    o Describe a time when you have faced a difficult academic challenge or hurdle that you successfully navigated. What was the challenge and how did you handle it?
    o What are you most proud of accomplishing?
  • Low points
    o Were there any personal or academic obstacles or challenges that had a significant impact on your college experience?
    o Describe the low points./What didn’t go well and why?
    o What failures did you have (a time also to probe for issues with the transcript)? How did you handle them?
    o What mistakes did you make?
    o What would you do differently?

Research Experience (in class, lab or other)
  • Tell us about your most successful or interesting research experience, either in class, in the lab or at work?
  • What was most challenging about it?
  • How did you figure out what to do?
  • What did you learn most from this experience?
  • Who did you work with, and describe the working relationships.

On the lookout for true grit

With the right mix of persistence and support structures, scholars from minority groups can thrive as they pursue their PhDs.

Nature, 2013, 504, 471
Bridge Program “Firsts”

» First Black woman to receive PhD in physics from Yale (now NSF/Harvard postdoc).

» First Black woman to lead an astrophysics paper in *Nature* (now Penn State professor).

» First Sioux woman to earn advanced physics degree (now DOE postdoc).

» First Native Hawaiian woman to receive NSF graduate fellowship (now Caltech postdoc).

» 85% PhD completion rate, 100% placement post-PhD.
Networking and Jobs

• Conference Support
• Face time with and Presentations to Visitors
• Internships/Collaborations
• Practice for job talks and job negotiation
• Building a Community inside and outside Fisk-Vanderbilt
Wrap Around Mentoring

- Peer Mentoring
  - Bridge Buddies
- Bridge Post-Doctoral Fellows
  - Office Hours
  - Assigned First Year Master’s or 4-5th year PhD Students
- Program Coordinators
- Track Coordinators
- Executive Director
- Advisor
Bridge Program Design Principles
(or, the four things you should remember from this talk)

- Minority Serving Institutions are important sources of minorities in science and engineering.
- Master’s degree is important transition point to PhD for underrepresented minorities.
- Misuse of GRE scores in graduate admissions suppresses diversity in PhD programs.
- Mentor: monitor progress, develop and nurture ability, attend to identity formation.

Toolkit: fisk-vanderbilt-bridge.org/tool-kit
Fisk-Vanderbilt Masters-to-PhD Bridge Program
Small group discussion questions

1. Think about the very best graduate students whom you have mentored over the years. What have been their most important qualities? In retrospect, what aspects of their admissions files were most indicative of those qualities?

2. Think about the most promising graduate students you have known (not necessarily your own) who didn’t make it through the program. What have been the common factors? In retrospect, could any of these have been identified in the admissions process? If so, how?

3. Think about the approaches discussed today. Which of these could be implemented at your institution? In what ways might the approaches need to be adapted to work at your institution? What are the main impediments to adopting/adapting these approaches at your institution?
Additional small group questions

• Do your admissions committees use GRE thresholds as a tool to triage applicants?

• Do your admissions committees use holistic review?

• How would you rank order these in terms of the most important factors in admissions?
  - GPA
  - GREs
  - Personal statement
  - Letters of recommendation
  - Previous research experience
  - Prior publications
  - Undergraduate institution