

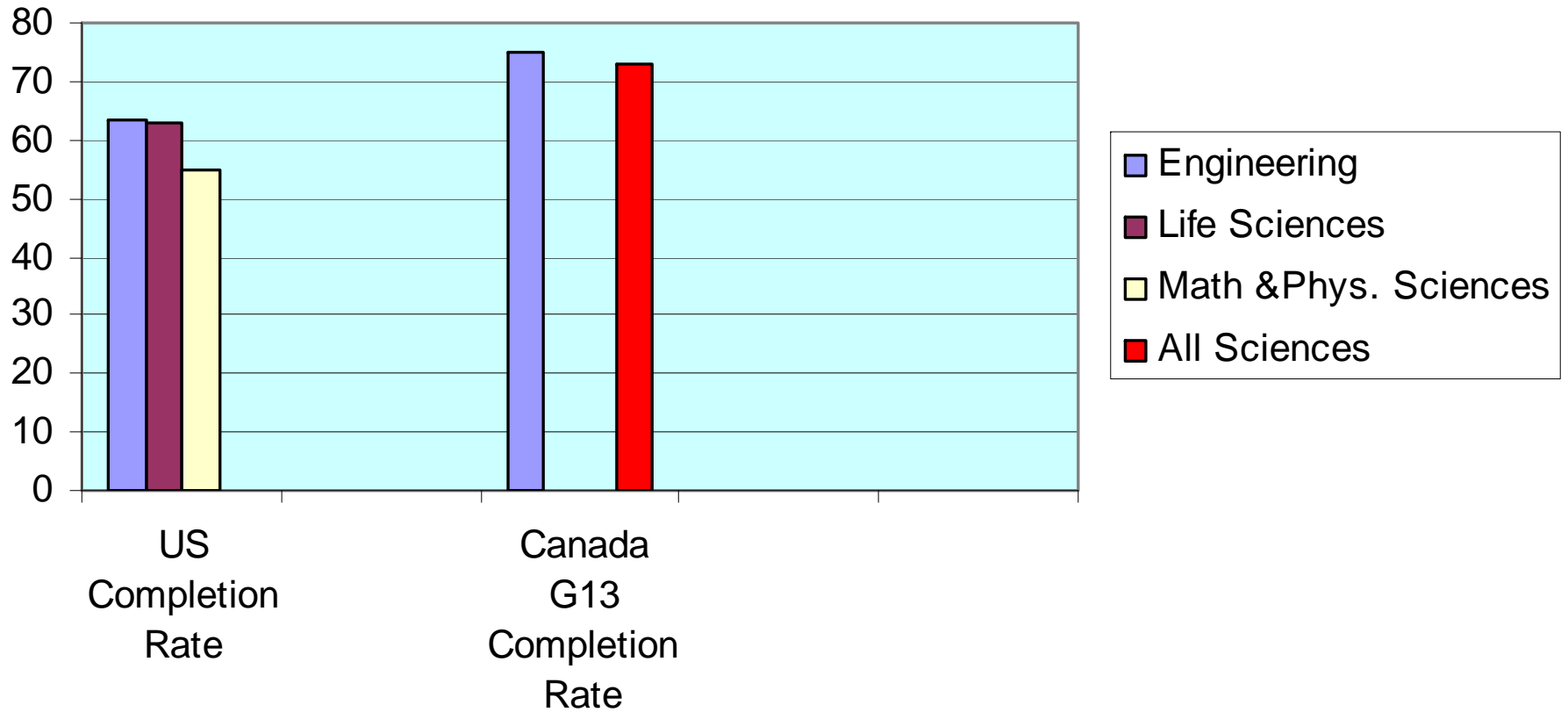
**CAN THE M.S. DEGREE INCREASE
STEM PH.D. COMPLETION RATES
AND
INCREASE DIVERSITY?**

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PART I

THE MASTER'S DEGREE AND PhD COMPLETION RATES IN STEM

US and CANADA (G13) PhD Completion Rates



Canada (Queen's University) and US Completion Rates

BROAD DISCIPLINE	U.S. 10-YEAR COMPLETION RATE	CANADA 7-YEAR COMPLETION RATE
Engineering	63.6	82.2
Life Sciences	62.9	77.1
Mathematics & Physical Sciences	54.7	80.0
Total SEM Fields	59.1	80.3

Purdue University 10-Year Completion Rates

BROAD DISCIPLINE	ENTERING WITH B.Sc.	ENTERING WITH M.S.
Engineering	48%	82%
Life Sciences	51%	80%
Mathematics	30%	65%
Physical Sciences	57%	80%

THREE REASONS FOR HIGH PhD ATTRITION AND THE ROLE OF THE MASTER'S

1. Decision to Pursue Graduate Education.
Inadequate information at the time a student makes the decision regarding enrollment in a PhD program can result in higher early attrition rates.

M.S. degree increases the likelihood that students have exposure to the expectations and the demands of the programs.

2. Program Selection

“Nearly half (49.1%) of respondents report that they would or might select a different university. Additionally, 36.8% and 41.8% answered “yes” or “maybe” to whether they might select a different advisor or dissertation topic, respectively.” *Pew Survey*

Master’s education increase the probability of making the right choices, thus reducing the probability of attrition once enrolled in a doctoral program

3. Graduate Degrees Appropriate for Career Goals

“Fully one quarter of graduate students have doubts as to whether a doctoral program is the right choice.”

The Pew Survey

Master’s program provides an opportunity to decide whether career goals are best served by earning the doctorate or by obtaining an M.S.

Adopting a system similar to that of Canadian universities where all entering graduate students are first admitted to Master's programs and then admitted to the PhD programs after completion of the MS degree will result in significantly higher PhD completion rates.

PART II
FINANCING GRADUATE EDUCATION
AND
THE SUPPLY OF MINORITIES IN
STEM PhD EDUCATION

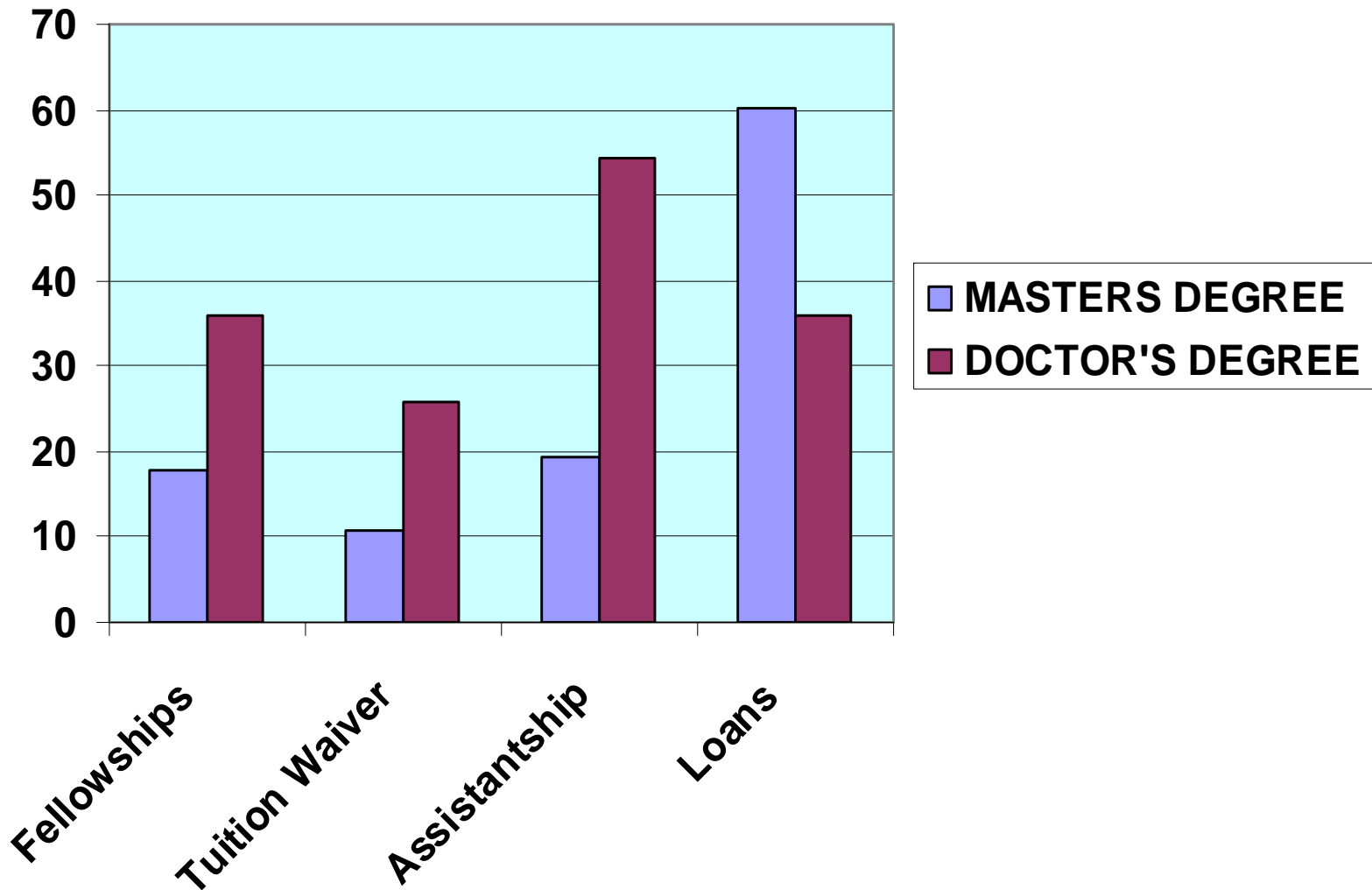
Pathways of Doctoral Recipients in STEM Fields

	White	Black	Native American	Asian/Pacific Islanders	Hispanic
Master's	61	77.2	73.2	61.7	73.9
No Master's	38	21.5	26.8	38.3	26.1
Change Institution	25.3	39.0	32.6	23.1	29.3

S. Lange, The Master's Degree: A Critical Transition in STEM Doctoral Education, Ph.D. Dissertation, University of Washington, 2006.

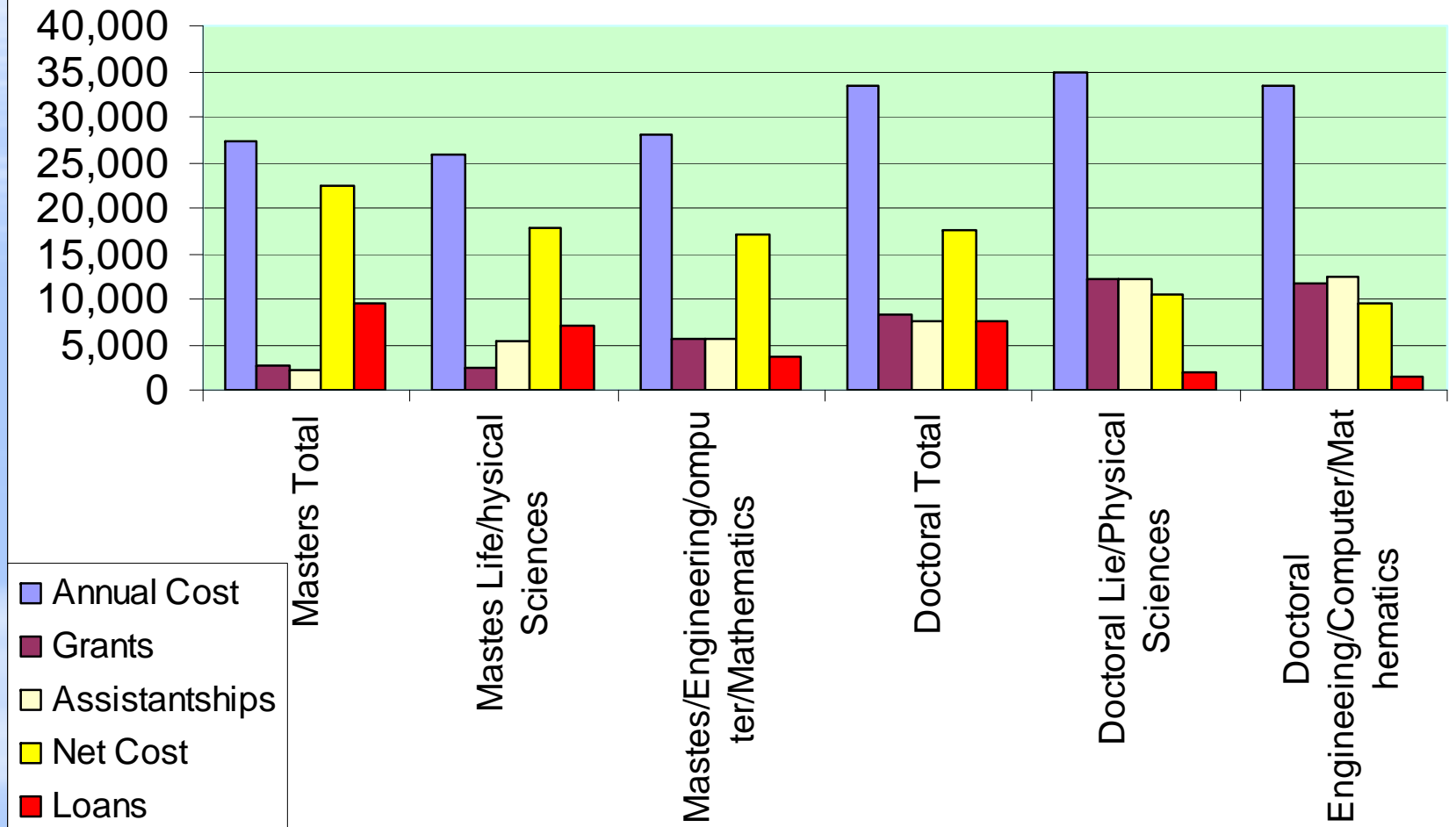
Data constructed from Appendix 5.

PERCENTAGE OF STUDENTS RECEIVING AID 2007 -08



Source: Data from National Center for Educational Statistics: http://nces.ed.gov/programs/digest/d09/tables/dt09_349.asp

ANNUAL COST OF MASTERS AND PH.D. DEGREES



Total Cost = Tuition + Books + Materials + Living Costs Net Cost = Total Cost – [Grants + Assistantships]

“Both low income and non-white borrowers are more likely than others to feel burdened by their education debt payments. ... Borrowers with lower incomes, who are African American or Hispanic, and older borrowers tend to feel more burdened at given debt levels.”

College on Credit: How Borrowers Perceive their Education Debt Results of the 2002 National Student Loan Survey- Final Report, Nellie Mae, Braintree, MA, 2003.

- **Underrepresented minorities are more likely to obtain an M.S. prior to pursuing the PhD.**
- **Master students are disadvantaged in financing their education through fellowships/assistantships and are more dependent on loans.**
- **Low-income, African-American and Hispanic students feel more burdened by any given loan level than other students.**
- **The prospect of financing an M.S. by loans may discourage students from underrepresented populations from going to graduate school**

CONCLUSIONS AND RECOMMENDATIONS

1. Adopt a policy similar to that of Canada requiring completion of an M.S. prior to admission to a PhD program. This will increase the PhD completion rates.

“Promotion” to the PhD program after the first year are made for highly promising students.

2. Universities and federal agencies need to restructure their support programs. Support would be initially for 2 or 3 years for students entering with a B.S. degree. Support for 3 additional years would be contingent on completion of an M.S. and admission to the PhD program

Effects of Restructuring Financial Support

- 1. This re-structuring provides a level field for students from underrepresented populations who are more likely to pursue the M.S. prior to the PhD in the competition for support: all applicants for admission to PhD programs will have the same opportunities for support.**

2. As financial support is opened for M.S. students, students from underrepresented populations will not need to depend on loans more extensively, This can result in significant increase of willingness of African Americans and Hispanics, to pursue the PhD in STEM fields.