

Scholarships, Community, and STEM Success: An Empirical Analysis

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BLUF

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- **A supportive community in combination with financial support raises graduation rates further.**

BACKGROUND

- It's well understood from literature that:
 - People who complete college have significantly higher lifetime earnings than those who don't.
 - Starting but not completing college adversely affects earnings, especially if the non-completer took on debt.
- States and citizens cite a degree's economic return as a primary reason for going to college.
 - Median earnings for BA/BS holders is 65% higher than for high school completers.
 - Among BA/BS holders, STEM graduates have the highest economic return on their education.

BACKGROUND

- Students who must work to pay for college have less time to devote to their studies, which lowers graduation rates.
 - This especially affects STEM disciplines, where study time outside class hours is generally more significant than for other disciplines.
- Students who come from lower SES backgrounds more commonly need to work than their wealthier peers.

HYPOTHESES

- STEM classes tend to involve significant study outside of class hours—e.g., assignments, projects.
- If students must work to afford college—especially in multiple or off-campus jobs—they have less time for outside-of-class study.
- This causes STEM majors to drop out of college (or switch to a less demanding major).
- ***Providing scholarships to such students—to eliminate or significantly reduce the number of hours they must work—will yield higher graduation rates.***

HYPOTHESES

- Students who come from lower SES backgrounds typically need to work the most.
 - Such students are often the first generation in college and from groups historically underrepresented in higher education.
 - These students are less likely to have a supportive community to fall back on when they face obstacles.
- ***Providing a supportive community in addition to scholarships further increases graduation rates.***

DATA AND ANALYSIS

- I. **USM 2014 entering cohort:** ~30K students across 12 universities; all disciplines
 - Analysis done for entire data set & various subsets.
 - USM: 12 universities of various sizes; rural, urban & suburban; HBCUs, MSIs, RIs, doctoral/comprehensives.

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3. **UMGC 2014 entering cohort**
 - UMGCC delivers education largely online or at U.S. military bases overseas.

DATA AND ANALYSIS

- Analysis done using Jupyter notebooks and standard libraries like Scikit-learn.
- Data was de-identified; analysis done on a Virtual Server for security.

FINDINGS



UNIVERSITY SYSTEM
of MARYLAND

ALL USM STUDENTS: EFFECT OF SCHOLARSHIPS



Financial Need	Supported	Graduation Rate
High	No	25%
	Yes	59%
Medium	No	45%
	Yes	77%
Low	No	62%
	Yes	79%

USM STEM STUDENTS: EFFECT OF SCHOLARSHIPS



Financial Need	Supported	Graduation Rate
High	No	22%
	Yes	60%
Medium	No	44%
	Yes	78%
Low	No	57%
	Yes	81%

Graduation rate increase for STEM students greater than for overall cohort

USM CS STUDENTS: EFFECT OF SCHOLARSHIPS



Financial Need	Supported	Graduation Rate
High	No	27%
	Yes	52%
Medium	No	32%
	Yes	69%
Low	No	53%
	Yes	68%

Graduation rate for CS students lower than for overall cohort. Still a strong increase in graduation rates, but not as high as overall or STEM generally

USM ENGINEERING STUDENTS: EFFECT OF SCHOLARSHIPS



Financial Need	Supported	Graduation Rate
High	No	None
	Yes	69%
Medium	No	67%
	Yes	78%
Low	No	67%
	Yes	87%

Graduation rate for ENG students higher than for overall cohort. Still a strong increase in graduation rates, but not as high as overall or STEM generally

RESULTS FOR USM STEM WOMEN

Financial Need	Supported	Gender	Graduation Rate
High	No	Female	27%
		Male	22%
	Yes	Female	62%
		Male	59%
Medium	No	Female	55%
		Male	38%
	Yes	Female	84%
		Male	74%
Low	No	Female	67%
		Male	52%
	Yes	Female	85%
		Male	79%

UMBC STEM STUDENTS: EFFECT OF COMMUNITY

Financial Need	Support/Community	Graduation Rate
High	No	38%
	Financial Support Only	70%
	Support and Community	87%
Medium	No	63%
	Financial Support Only	76%
	Support and Community	100%
Low	No	67%
	Financial Support Only	83%
	Support and Community	92%

CONCLUSIONS | FUTURE WORK

- Statistically significant results show that providing scholarship support increases graduation rates.
 - Results are even stronger for students from historically underrepresented groups
- Combining financial support with community structure increases graduation rates even more.
- Results are likely generalizable beyond the USM, given the diversity of the universities involved.
- Ongoing work:
 - What level of support works? Can we personalize this prediction?
 - Link a specific degree outcome with ROI. Can that make an economically rational case for stakeholders?

Questions | Comments?



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