

WIP: Developing the Husky PAWS S-STEM Scholar Application

Michelle Jarvie-Eggart
Engineering Fundamentals
Michigan Technological
University
Houghton, USA
ORCID: 0000-0002-6795-3899

Briana Bettin
Computer Science
Michigan Technological
University
Houghton, USA
bcbettin@mtu.edu

Kathryn Hannum
Social Sciences
Michigan Technological
University
Houghton, USA
khannum@mtu.edu

Melissa Baird
Social Sciences
Michigan Technological
University
Houghton, USA
mfbaird@mtu.edu

Adrienne Minerick
Chemical Engineering
Michigan Technological
University
Houghton, USA
minerick@mtu.edu

Wayne Gersie
VP Diversity Equity And Inclusion
Michigan Technological
University
Houghton, USA
wmgersie@mtu.edu

Abstract—This work in progress innovative practice paper is focused on the development of S-STEM scholarship application. The purpose of the National Science Foundation’s S-STEM program is to provide support for “academically talented low-income students” through scholarships and accompanying programming, which fosters their recruitment, retention, and ultimately their graduation with STEM degrees [1]. The S-STEM program requires awardees to provide for all of the annual unmet financial need of individual Pell-eligible scholars, up to \$15,000 per undergraduate scholar and \$20,000 per graduate scholar. The S-STEM dollars must be applied after all other funding sources have been exhausted for a student. Awardees may develop recruitment programs within disadvantaged communities and under resourced schools to attract students to apply for the scholarship. However, selection cannot be based upon race/ethnicity/ gender demographic criteria.

This in-development project, the Husky PAWS Pathways for Academic Wellness and Success) program, will implement a unique adaptation of Yosso’s Cultural Wealth Model [2] to elevate students’ existing assets, with the goal of increasing retention, success indicators, and raising Pell-eligible students’ graduation rates to non-Pell levels. The project will support students in engineering, computing, and physics majors by funding approximately six scholars each of the first three years. Scholars will receive annual scholarships ranging from \$2,000 - \$20,000 based on established criteria and unmet financial need - with options for one-time finishing scholarships as well. However, the anticipated applicant pool is over 1,000 eligible students. Thus, the first project challenge - beyond advertising the scholarships and recruiting applicants - is to refine appropriate application materials.

To develop these application materials, a series of questions were proposed to inform the S-STEM team about additional indicators of financial need among students (such as experiencing food insecurity, experiencing the foster care system, etc.). However, the team acknowledged that some of these questions may alienate students. To address this concern, the criteria questions were refined, along with their framing language,

through focus group feedback from existing Pell-eligible students on campus, to reduce the risk of alienating prospective students with whom we aim to build connections.

Keywords—*Scholarships, Action Research, Diversity Concerns, Matriculation*

I. BACKGROUND

Within US higher education, students of color are more likely to be low-income than White students [3]. The links between race and low-income within the US are apparent, and directly contribute to the ability of historically minoritized students to attend and afford college. Historically, many universities concerned with increasing student body racial/ethnic diversity considered an applicant’s race among the factors for undergraduate admissions - giving additional consideration to under-represented groups on campus. However, the National Science Foundation disallows identity-based criteria for S-STEM scholarships while it allows recruitment materials targeted toward historically minoritized students [1,4]. Qualification for the S-STEM scholarship is need-based, as determined by Free Application for Federal Student Aid (FAFSA) assessment of qualification for Federal Pell Grants (United States government grants for students with exceptional financial need) [5]. The National Science Foundation also tasks S-STEM awardees with determining applicant selection criteria and explains that “Academic ability, talent or potential must be defined by the institution in a way that allows for equitable consideration of all students” [4, p.5]. This project’s team selected an asset-based approach to evaluating applicant potential.

A. CULTURAL WEALTH MODEL

The CWM aims to disrupt harmful deficit-based thinking with an asset-focused approach that centers the ways in which historically minoritized student experiences provide them with

the tools needed to succeed. These non-traditional and historically obfuscated skills have been shown to help students navigate institutions of higher education and obtain higher degrees of satisfaction in careers [6,7]. These assets within the CWM can be leveraged within the selected S-STEM scholars to support their progression through higher education:

1. *Aspirational* - including dreams and hopes
2. *Linguistic* - the skills gained from communicating in multiple languages/styles
3. *Familial* - cultural knowledge and intuition learned through family
4. *Social* - community resources and individual networks
5. *Navigational* - the knowledge and skills required to move through institutions, such as higher education
6. *Resistant* - skills and knowledge resulting from efforts to produce justice and equality [2].

In order to translate Yosso's theoretical framework into an applied prompt and rubric for high school students, we had to think carefully about how to illicit an asset-focused response within a low-income applicant pool. To ensure all applicants were provided the opportunity to consider how their unique life experiences developed these assets, the CWM was provided as an essay prompt for students to contemplate and then discuss their assets within their application audio/video/essays. The responses of these essays were used to determine scholar potential.

To receive an S-STEM scholarship, recipients must also be "low-income", following institutional guidelines for low-income, such as Pell-eligibility, and have "demonstrated unmet financial need", based on FAFSA information [4, p.11].

The challenge arises when considering the paradox of "low-income", a deficit approach, as the key criteria for the scholarship and then asking for an asset-focused response from students with (understandably) no solid background on this theory. As the intent of the S-STEM scholarship is to make higher education achievable for low-income students with financial need, other indicators of financial strain were integrated within the S-STEM scholar application to round out our understanding of the circumstances that may have led to the cultural wealth that students choose to discuss in their essays.

B. OTHER INDICATORS OF ECONOMIC NEED

Numerous factors can exacerbate the financial strain of low income students. Students are more likely to be low-income if they are of independent status [3]. Thus, students with no one to claim them as permanent dependents are more likely to be in economic need of assistance for tuition. Low-income people may also struggle with frequent housing moves, which are known to have long-term effects on children's well-being and stability [8]. Low-income students may struggle with the cost of food. Food insecurity is an issue for approximately half of all college students in the US [9], and students who experienced food insecurity growing up are more likely to experience food insecurity in college than their peers [10]. Low-income students may find it difficult to afford transportation. The cost of transportation has been identified as a barrier to higher education in America [11]. Low-income students may also struggle to pay medical bills. According to the US Census Bureau, medical expenses can also be burdensome for those who are low-income,

driving many on the edge below the poverty line when medical expenses are accounted for [12]. Low-income students are also more likely to be affected by the incarceration system. A recent study found that within the 21st century, "Imprisonment in the United States is increasingly reserved for the poor." [13, p.i]. The incarceration of a family member can have cascading effects on the economic success of a family missing their income. Questions were added to the S-STEM application regarding all of these factors more likely to add to the financial strain of applicants who are already low-income.

The S-STEM is an essential funding source in raising individuals out of intergenerational poverty. Parental income is well linked to the career outcomes and trajectories of children, but so is parental education status [14]. Thus, the team added a question about the highest level of parental education to the scholarship application.

Finally, it should be noted that many of these added background questions are included in the FAFSA. However, due to the delays in the FAFSA data reaching institutions in 2024 [15], it was uncertain whether all the FAFSA information would be made available to the S-STEM team beyond Pell eligibility. Thus, all questions were included in the S-STEM application. Details are in Section III.

II. METHODS

Participatory action research (PAR) includes acknowledgment of the expertise of those with lived experiences, involving them as co-researchers with the aim of not only generating knowledge but also co-creating systemic changes [16,17]. Students are well-positioned to recognize the areas where systemic change is needed within academic systems and programs [17]. The S-STEM team recognize the S-STEM PAWS scholars as experts in their lived experiences and will welcome them to share their expertise through individual interviews and focus groups regarding the impact of the program on their social capital development and belongingness on campus. A focus of PAR is "building the capacity of impacted people to participate in all aspects of the research process" [16, p. 130]; thus, this S-STEM project plans to involve two to three PAWS scholars as undergraduate co-researchers helping to shape the research questions, protocols, and interpretation of results. Additionally, the S-STEM scholars will serve on a participatory advisory panel, which will review the results of the project's formative feedback annually and make additional recommendations for programmatic changes throughout the next year, including review of recruitment questions and screening materials.

As the project is in its first year, S-STEM scholars are in the process of being recruited and selected, and thus were not available as PAR co-researchers at the time of this writing. In keeping with the PAR approach, the S-STEM team developed the recruitment materials with input from students on campus who could have been S-STEM applicants had the program been available when they applied to college. To do this, the research team worked with the campus Center for Diversity and Inclusion, whose staff reached out to low-income historically minoritized students on campus, requesting their feedback on our proposed applicant questions. Specifically, the S-STEM

team wanted to ensure that none of the questions would be triggering for students, cause shame, or discourage them from applying for the funding source.

In December of 2023, in anticipation of the spring 2024 S-STEM scholar recruitment season, the research team reviewed the proposed questions with a focus group of two students at Michigan Technological University to address the face validity of the questionnaire. No monetary compensation was provided to the focus group participants, but they did receive a free lunch during the focus group. The proposed S-STEM scholarship questions were reviewed with the focus group, whose members provided feedback and offered suggestions for improvement. Concerns regarding possibly offending applicants with the questions were discussed.

III. QUESTIONNAIRE

Overwhelmingly, the focus group members approved of the questions asked regarding applicants' background, indicating that they would provide essential context for their economic need and academic performance in high school. The focus group members preferred more open-ended questions, where applicants could provide richer details of their life experiences and circumstances. In response to their feedback, an open-ended question was added to the S-STEM applicant questions, shown below. It should be noted that the questionnaire provided below has been used in year 1 to solicit S-STEM applicants. It will be revised with feedback from the accepted S-STEM scholars, again led by a student PAR co-researcher.

A. QUESTIONNAIRE FOR S-STEM APPLICANTS IN PROJECT YEAR 1

The prompt provided to perspective scholarship applicants was as follows: Please submit a short 2-5 minute audio/video essay or a 500-1,500 word written essay on the following topic:

According to Dr. Tara J. Yosso's research, every student (including you!) has assets that stem from their unique, lived experiences, circumstances, and background including their familial and community culture. These assets come in many forms and may also be called capital, wealth, or strengths (Cultural Wealth of Students, Yosso, 2005):

- Aspiration is the ability to sustain hopes and dreams for the future in the face of real and imagined barriers.
- Navigation is the ability to move through college and into a desired job.
- Social skills use existing community resources and connections to build a group of people supporting your goals.
- Language assets are the knowledge, social, and communication skills gained from your language, history, and experiences.
- Family includes the cultural knowledge gained from family and community experiences.
- Resistance is the ability to resist inequality within systems. This includes resisting stereotypes that are not authentic to your sense of self.

Explain the types of assets you possess (you don't need to discuss every one - just highlight the top ones of importance to you) that will help you attain a STEM degree. You are welcome to search online for other resources on cultural wealth to support your audio/video/written essay. Feel free to share a story or experience illustrating how this type of asset (or capital) has impacted your life. There is no wrong answer, so have fun—and don't be afraid to think outside the box. We want to get to know you!

You also have the opportunity to provide additional information to the scholarship committee about your lived experiences. These questions are optional. Although the following information is not required information for the S-STEM program, it will help us determine the need for scholarships. We recognize that some of these questions may be difficult to answer, and thank you for your honesty and willingness to share.

1. What is one thing that is important for others to know about you in order to understand your experiences better? [text box for applicant response]
2. Do you or anyone in your family have experience with the foster care system? [Yes/No/I'm not sure/Prefer not to answer]
3. Have you experienced unstable, irregular, or inadequate housing? [Yes/No/I'm not sure/Prefer not to answer]
4. Have you felt stress or been impacted by caregiving for other family members (siblings, parents, grandparents, cousins, etc.)? [Yes/No/I'm not sure/Prefer not to answer]
5. Has your family been affected by the policing or incarceration system? [Yes/No/I'm not sure/Prefer not to answer]
6. Have you been emancipated, or left home before 18? [Yes/No/I'm not sure/Prefer not to answer]
7. Have you or your family ever felt strain or stress regarding food and meals, or food insecurity? This can include having limited access to food or good-quality food, missing meals, or not knowing when or where your next meal will come from. [Yes/No/I'm not sure/Prefer not to answer]
8. Do you feel there has been a substantial burden on you or your family regarding medical bills and expenses, including access to insurance and insurance costs? [Yes/No/I'm not sure/Prefer not to answer]
9. Have you had a time where circumstances outside of your control had you missing classes at a high rate? [Yes/No/I'm not sure/Prefer not to answer]
10. Have you experienced unreliable transportation? [Yes/No/I'm not sure/Prefer not to answer]
11. Please select the highest level of education your parent(s) or guardian(s) have completed. [High School Diploma or GED / Associate's Degree (2 yr) / Bachelor's Degree (4 yr) / Master's Degree / PhD / I'm not sure / Prefer not to answer]

12. You are welcome to provide further insight, details, or additional context to these questions in the space below. [text box for applicant response]

IV CONCLUSION

In total, 132 applications were reviewed, resulting in seven Husky PAWS S-STEM Scholarships awarded in the 2024/5 academic year. Screening of the applications utilized a scoring rubric for the essays consisting of three categories (discussion of the CWM as it connects to their life experience and can be leveraged in attaining a STEM degree; interest and determination in thriving at the university; and coherence and structure of the argument) each assessed on a four-point scale. Scholar applicants have taken advantage of the flexible format with essays being submitted in writing, as audio files, and as videos. However, in the initial review of the applications, it should be noted that the review team did experience more noticeable feelings of connection with the students whose voices they could hear and faces they could see. Thus, caution is recommended that reviewers of audio/video essays take special care to pay attention to the content of the applications and not give undue credit to their enhanced sense of connection with these applicants.

The additional background questions provided essential context regarding the circumstances under which scholars were living, highlighting those whose economic need may be creating additional disparities within their lives. They provided valuable context for discussing the applicants and understanding their achievements. Framing applicant essays in terms of the CWM provided the applicant review team with a greater understanding of the individual assets possessed to support student success in college.

It should again be noted that this version of the scholarship application will undergo continuous improvement from year to year; it will be revised with feedback from the initial and subsequent cohorts of S-STEM scholars via the PAR process.

ACKNOWLEDGMENT

The authors would like to thank Christopher Sanders of the Michigan Technological University Center for Diversity and Inclusion for their assistance in soliciting focus group members.

REFERENCES

- [1] National Science Foundation (NSF). NSF Scholarships in Science, Technology, Engineering, and Mathematics Program (S-STEM). published Dec 2, 2022. <https://new.nsf.gov/funding/opportunities/nsf-scholarships-science-technology-engineering>
- [2] T. J. Yosso. "Whose culture has capital? A critical race theory discussion of community cultural wealth." *Race Ethnicity and Education* 8(1), 2005, p. 69-91.
- [3] M. Taylor and J. M. Turk.. "Race And Ethnicity In Higher Education: A Status Report". American Council on Education and Andrew W. Mellon foundation. 2019.
- [4] National Science Foundation (NSF). NSF 24-511: NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM). Program Solicitation. Published December 15, 2023. <https://new.nsf.gov/funding/opportunities/nsf-scholarships-science-technology-engineering/nsf24-511/solicitation>
- [5] United States Department of Education, Federal Pell Grants, Who is Eligible, accessed May 15, 2024: <https://studentaid.gov/understand-aid/types/grants/pell>
- [6] Duffy, R. D., Kim, H. J., Gensmer, N. P., Pendleton, L. H., Boren, S., & Garriott, P. O. (2020). Testing a critical cultural wealth model of well-being among first-generation students. *Journal of Counseling Psychology*, 67(2), 171–183. <https://doi.org/10.1037/cou0000388>
- [7] Reyes, H. L. & Duran, A. (2021). Higher education scholars challenging deficit thinking: An analysis of research informed by community cultural wealth. *Journal of Critical Scholarship on Higher Education and Student Affairs*
- [8] S. Gold, "Housing Assistance and Residential Stability among Low-Income Children," *Social Service Review*, vol. 92, no. 2, pp. 171–201, Jun. 2018, doi: 10.1086/697372.
- [9] A. Nazmi, , S. Martinez, A. Byrd, D. Robinson, S. Bianco, J. Maguire, R. Crutchfield, K. Condrón, and L. Ritchie. 2018. A Systematic Review of Food Insecurity among US students in Higher Education. *Journal of Hunger & Environmental Nutrition*, 1–16.
- [10] K. M. Broton, K. E. Weaver, and M. Mai, "Hunger in Higher Education: Experiences and Correlates of Food Insecurity among Wisconsin Undergraduates from Low-Income Families," *Social Sciences*, vol. 7, no. 10, Art. no. 10, Oct. 2018, doi: 10.3390/socsci7100179.
- [11] West, C. A surprising reason keeping students from finishing college: A lack of transportation. *The Hechinger Report*. Posted Dec. 10, 2021. Accessed March 7, 2023: <https://hechingerreport.org/a-surprising-reason-keeping-students-from-finishing-college-a-lack-of-transportation/>
- [12] Creamer, J. Examining the Impact of Medical Expenses on Supplemental Poverty Rates. US Census Bureau. SEHSD WP 2022-13. June 2022. Accessed May 7, 2024. <https://www.census.gov/content/dam/Census/library/working-papers/2022/demo/sehds-wp2022-13.pdf>
- [13] C. Muller and A. F. Roehrkasse, "Racial and Class Inequality in US Incarceration in the Early Twenty-First Century," *Social Forces*, vol. 101, no. 2, pp. 803–828, Dec. 2022, doi: 10.1093/sf/soab141.
- [14] J. Erola, S. Jalonen, and H. Lehti, "Parental education, class and income over early life course and children's achievement," *Research in Social Stratification and Mobility*, vol. 44, pp. 33–43, Jun. 2016, doi: 10.1016/j.rssm.2016.01.003.
- [15] Knox, L. "Fallout From a FAFSA Fiasco." *Inside Higher Ed*. Published Feb 5, 2024. Accessed May 7, 2024: <https://www.insidehighered.com/news/admissions/traditional-age/2024/02/05/how-fafsa-delay-throwing-admission-timelines>
- [16] Raynor, K., Participatory Action Research and Early Career Researchers: The Structural Barriers to Engagement and Why We Should Do It Anyway. *Planning Theory & Practice*, 2019. 20(1): p. 130-136.
- [17] Reid, J.A. and N. Santoro, Cinders in snow? Indigenous teacher identities in formation. *Asia-Pacific Journal of Teacher Education*, 2006. 34(2): p. 143-160