

The role of aspirational experiences and behaviors in cultivating momentum for transfer access in STEM: Variations across gender and race

Aspirations can serve as motivational factors, and can help push a person to achieve. Applied to college students, aspirational experiences are those that keep them on the path toward an academic goal. The goal that we are focus on here is upward transfer in STEM. For those interested in transfer, the Community College Review has released a special issue dedicated to the topic. "Transfer Matters" highlights new research on this key community college function. The special issue is available without a subscription through October 31, 2017 at <https://journals.sagepub.com/toc/crwa/45/4>. As part of the STEM Transfer project, we contributed the piece "The Role of Aspirational Experiences and Behaviors in Cultivating Momentum for Transfer Access in STEM: Variation Across Gender and Race" to Transfer Matters. In the study, the question we asked related to this was "What role do aspirational experiences have in cultivating momentum for access to transfer in STEM pathways?" Further, given the lower rates of success in transfer in STEM for women and students of color relative to their White male counterparts, we also sought to understand how variations may occur across gender and race. To answer these questions, we analyzed student records and survey data from 1,245 first-time students beginning in STEM majors or courses at all public 2-year colleges with upward transfer as part of their institutional missions in one Midwestern state, using logistic regression modeling.

The notion of aspirational momentum is a key concept drawn from Wang's (2017) Momentum for Community College Student Success framework. As such, it refers to students' clear understanding of and sustained persistence related to their educational goals. Building and maintaining aspirational momentum is necessary if community college students hope to access transfer pathways.

About 75-80% of students who start out at community colleges indicate that they want to transfer, but only one-fourth of these students actualize this intent within six years of enrollment. These dismal numbers are even more pronounced in STEM fields, indicating transfer pathways that are too narrow and filled with barriers. Further, challenges related to transfer in STEM are more pronounced and more numerous for women and students of color.

In determining how aspirational experiences can impact student momentum toward transfer, we investigated student experiences and behaviors related to their transfer intent. These include 1) having support for transfer (from anyone in their network – family, friends and peers, etc.); 2) using transfer services – informational meetings, orientations, appointments with advisors dedicated to mapping transfer; 3) interacting with others related to transfer – listening to others students' transfer plans and experiences related to 4-year colleges, talking to peers, instructors, parents or friends; 4) working to acquire information for transfer, whether online or using print materials. Gender and race were moderating variables, as we were particularly interested in how females versus males may be impacted, as well as different racial/ethnic groups.

Data for this project was collected using The Expanding STEM Talent Survey was developed as part of the STEM Transfer project, "Expanding STEM Talent through Upward Transfer" (NSF DUE-1430642), which aims to not only illuminate upward transfer in STEM fields, but also create data collection tools that allow this work to continue beyond the project's lifetime. The fully developed survey consists of various survey items that can measure factors affecting upward transfer in STEM, and is free to use

(<http://stemtransfer.wceruw.org/survey.html>). Additional details related to the development of the survey can be found in Wang & Lee, 2017 (in press).

Overall, students who engaged more frequently in transfer service usage were significantly more likely to indicate aspirational momentum in STEM transfer. In fact, transfer service usage was the only factor that showed significant impact on aspirational momentum. Further, there were noteworthy gender and race differences. Male students used transfer services more frequently and were more likely to have aspirational momentum. In contrast, Female students' aspirational momentum was negatively associated with transfer service usage. Factors contributing to these results could be due to the male-dominance and systemic barriers inherent in STEM fields. Women might be turned off by the academic culture within these fields, seen as hostile and unwelcoming, or fall victim to biased social beliefs, such as the stereotype that men are better than women in math and science.

With regard to race and ethnicity, holding all other variables constant, with more support for transfer, White students were more likely to maintain aspirational momentum, while Black and Hispanic students were less likely to do so. Though this may seem surprising, consider that there is a deeply seated academic culture that impedes the formation of scientific identity in non-White males. As a result, students of color may find it difficult to fit in within these disciplines, may feel unwelcome or unsupported, and therefore unwilling to continue on the path to a STEM degree, regardless of the supports given.

If we understand perseverance as how long a student is able to maintain momentum in the face of obstacles, these results are important, as we recognize that women and students of color face greater obstacles in their pursuit of a four-year degree in STEM. Developing an understanding of this notion of aspirational momentum and what leads to the gain or loss of momentum is critical if we are to improve outcomes for a diverse student body.

Here are some strategies that could improve aspirational momentum, especially for women and minorities:

- Offering explicit information about the breadth of STEM career choices out there – providing examples of people who hold these jobs that share similar characteristics with women and students of color.
- Obligations to family and jobs, as well as major financial concerns often thwart upward transfer. Providing the flexible class schedules, services (such as child care and transportation) and scholarships at four-year institutions that are often available at two-year colleges would make students more able to transfer.
- Create forums to help students form comprehensive and reliable student networks. The better the network a student forms, the better prepared a student will be to transfer. It is of utmost importance that students acquire accurate information related to transfer early on in their college experience.
- Create programs that involve direct mentoring, giving students a chance to develop personal relationships that improve academic and social development.

- Provide opportunities for students to develop identities as STEM professionals. Examples might include attending professional meetings, creating communities and offering hands-on experiences that students can refer to as they develop their careers.
- Create synergistic programs that align degree completion, upward transfer, and career preparation, so that students are more aware of how coursework is connected to jobs.

References and Works Cited:

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