

One Woman's Use of Learning Resources in Conjunction with Her Mathematical Identity

Brandi Rygaard Gaspard
Texas State University

Kristen Lew
Texas State University

Keywords: mathematical identity, learning resources, calculus

Calculus courses are critical turning points for university students. Reporting high Drop-Fail-Withdraw rates, retention in these courses is a problem (Voigt et al., 2017). Students, particularly calculus women, navigate decreasing attitudes towards mathematics (Good et al., 2012). For instance, Ellis et al. (2016) found that many women cited lacking confidence as their reasoning for not persisting after their calculus course.

Our study highlights how one woman employed learning resources in conjunction with her mathematical identity, where mathematical identity consists of her dynamic “self-understanding ... in the context of doing mathematics” (Martin, 2006, p. 206). We aim to address the following research question: How does one woman calculus student use learning resources and how does her usage of those resources connect with her mathematical identity?

Methods

We conducted three semi-structured interviews with a university freshman, Becca, who was taking a calculus course designed for non-STEM majors at a large southern university. Interviews focused on Becca's perceptions towards her experiences in the course, how she viewed mathematics, and how she viewed herself in mathematical contexts. Analysis consisted of open coding to flag instances in which Becca described learning resources she felt supported her academic success or described a more stable sense of self in reference to mathematics – consistent with the definition of “core mathematical identity” (Cobb & Hodge, 2010).

Results

Becca's learning resources and mathematical identity were interrelated. She viewed herself as an organized mathematics learner focusing on step-by-step approaches, which led her to systematically use learning resources to process the concepts on her own. For example, Becca used apps that provided worked examples of her homework problems. Rather than copying answers, Becca focused on understanding and replicating these processes. We interpret Becca's intentional use of resources as influenced by her identity as an organized mathematics learner.

Becca's use of learning resources also impacted her mathematical identity. In particular, learning resources had a positive impact on her confidence related to mathematics. Reflecting on her instructor's open lab, in which she practiced solving problems, Becca explained, “[...] *if I can do it now, then I can do it later* [...] when I went to the lab and I was like, so stuck on those problems then I, like, figured it out, it just like, like amazed me [...]” (*author's emphasis*). This quote suggests that the lab gave Becca confidence in her ability to solve problems.

While Becca's use of learning resources may appear to put her in danger of becoming dependent on them, we observe that she has found a way to transfer learning resources to her own knowledge in alignment with how she views mathematics, ultimately leveraging them to perceive herself as capable to persist mathematically.

Acknowledgment

We would like to thank Robert Sigley for their support in the design of this study.

References

- Cobb, P., & Hodge, L. (2010). Culture, identity, and equity in the mathematics classroom. In A. Sfard, K. Gravemeijer, and E. Yackel (Eds), *A Journey in Mathematics Education Research: Insights from the Work of Paul Cobb*, pp. 179– 195.
- Ellis, J., Fosdick, B. K., & Rasmussen, C. (2016). Women 1.5 times more likely to leave STEM pipeline after calculus compared to men: Lack of mathematical confidence a potential culprit. *PloS one*, 11(7), e0157447.
- Good, C., Rattan, A., & Dweck, C. S. (2012). Why do women opt out? Sense of belonging and women's representation in mathematics. *Journal of Personality and Social Psychology*, 102(4), 700–717.
- Martin, D. B. (2006). Mathematics learning and participation as racialized forms of experience: African American parents speak on the struggle for mathematics literacy. *Mathematical Thinking and Learning*, 8(3), 197–229.
- Voigt, M., Apkarian, N., & Rasmussen, C. (2017). Diverging from the standard fare: Variations in the calculus curriculum. *MAA FOCUS*, February/March, 32-34. Retrieved from <http://digitaleditions.walworthprintgroup.com/publication/?i=392392&ver=html5&p=32>