

Exploring How Educational Math Videos Affect Student Motivation

Samuel Lippe
Rhodes College

Erika David Parr
Rhodes College

Keywords: online learning, student motivation, epistemic messaging, YouTube videos

Finding ways to generate and sustain student motivation for learning mathematics is a beneficial endeavor. Researchers have begun to examine how to measure student motivation over time in an undergraduate course (Alibek, 2024), as well as how to motivate students through problem sets aimed at promoting intellectual need (Weinberg et al., 2022). Current work to both measure and promote student motivation is primarily focused on classroom settings. However, research shows that students increasingly consult external online resources, including videos on YouTube, to support them in their math courses (e.g., Muir, 2014). Although studies have looked at how such videos may benefit students' learning of mathematical content (e.g., Esparza Puga & Aguilar, 2023; Radmehr, 2024), researchers have yet to examine how online math videos can influence motivation. This project aims to begin to address this gap by asking the question: How do popular online math videos affect undergraduate student motivation?

Three popular mathematics YouTube channels include Khan Academy, Professor Dave Explains, and 3Blue1Brown. We view such popular math videos as existing on a spectrum from conceptual to procedural, based on the goals and approaches taken by these different content creators. From our perspective, a highly conceptual video may focus more on broad math concepts and developing a general mathematical intuition (i.e. many 3Blue1Brown videos), whereas a largely procedural video may focus more on how to solve specific math problems that would be relevant to assignments in a math course (i.e. Khan Academy, Professor Dave Explains). For this study, we have selected one video from each end of this spectrum. We have begun conducting interviews with undergraduate students and ask questions to gauge their interest in and view of mathematics before, during, and after watching each of these videos.

To frame our study and support our data analysis, we apply the lens of epistemic messaging, which describes the ways in which teachers convey to students what ideas are valued in a classroom and what ways of thinking are important (Russ, 2018). By applying this concept to videos, we are able to observe how the specific epistemic messaging within each video affects student interest in mathematics. With this lens, we are additionally able to observe trends in epistemic messaging between the videos at either end of the conceptual-procedural spectrum.

This poster will describe the structure of the interviews and report findings from our grounded analysis. Although data collection and analysis are ongoing, initial findings suggest the potential for a conceptual video to influence a student's perception of mathematics. However, we have not found this across the board for students from a variety of backgrounds. Thus far, we have found that a student's mathematical background and STEM-related interests may prime some students to be more receptive to the messages contained in the videos. Additionally, a student's inherent disposition towards learning may also impact the extent to which a video may impact their perceived motivation. These initial findings suggest that students may have very different take-aways from the videos, meaning that video recommendations may need to be tailored for individual students in order to affect student motivation.

References

- Alibek, A (2024, February). Mathematics engagement in college precalculus: Understanding students' experiences through a graphing elicitation tool [Poster Presentation]. 26th Annual Conference on Research in Undergraduate Mathematics Education, Omaha, NE.
- Esparza Puga, D. S. & Aguila M. S. (2023). Students' perspectives on using YouTube as a source of mathematical help: The case of 'julioprofe.' *International Journal of Mathematical Education in Science and Technology*, 54(6), 1054-1066.
- Muir, T. (2014). Google, Mathletics and Khan Academy: Students' self-initiated use of online mathematical resources. *Mathematics Education Research Journal*, 26(4), 833-852.
- Radmehr, F. (2024). Learning eigenvalues and eigenvectors with online YouTube resources: A journey in the embodied, proceptual-symbolic, and formal worlds of mathematics learning. *PRIMUS*.
- Russ, R. S. (2018). Characterizing teacher attention to student thinking: A role for epistemological messages. *Journal of Research in Science Teaching*, 55(1), 94-120.
- Weinberg, A., Corey, D. L., Tallman, M., Jones, S. R., Martin, J. (2022). Observing intellectual need and its relationship with undergraduate students' learning of calculus. *International Journal of Research in Undergraduate Mathematics Education*, 10(1), 1-31.