

MATHEMATICAL MODELING, PRODUCTIVE DISPOSITIONS, AND EMOTIONAL ENGAGEMENT

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Pre-service elementary teachers (PSTs) are a particularly vulnerable population in terms of mathematical identity and self-efficacy. Research has shown that they have higher levels of mathematics anxiety and poorer attitudes toward mathematics compared to other undergraduate students. They often enter college mathematics classrooms with feelings of uncertainty, irrational dread of the subject, and shame over their perceived lack of ability to do mathematics. Engaging PSTs in mathematical modeling is one possible avenue in promoting productive mathematical dispositions. By using mathematics to make sense of real-world problems, modeling provides powerful learning opportunities that allow PSTs to understand the role of mathematics in their world and its relationship to their lived experiences.

Through research funded by an NSF IUSE (Improving Undergraduate Stem Education) grant, we taught a semester-long modeling course for PSTs. To capture PSTs' perspectives during the modeling process, they kept and updated a journal across eight tasks total. We sourced prompts from Middleton, Jansen, and Goldin's (2017) attributes in understanding motivation and engagement including self-regulation, goals, interest, and utility. Through the lens of emotional engagement (DeBellis & Goldin, 2006). We examined emotions that PSTs report across different phases of the modeling cycle and how these emotions change across time with respect to the nature of the task and experience with modeling. Results indicate that modeling is initially very challenging and PSTs' report emotions like frustration or being overwhelmed tackling open-ended problems. As PSTs engage in multiple rounds of the modeling cycle, they are able to contextualize their emotions in relation to the process and build productive dispositions toward modeling and mathematics. Our results indicate that modeling expands PSTs' understanding of what it means to know and do mathematics. By expanding views of mathematics and reflecting on emotions, PSTs are empowered to engage in challenging work.

References

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