

The Role of Self-Efficacy in Student Personas for Redesigning a Calculus Recitation

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A common format for Calculus 1 at large universities across the United States is a large lecture with an accompanying recitation led by a graduate teaching assistant. A Merit recitation program, based on a model developed by Uri Treisman (1983) at the University of California, Berkeley, replaces the typical recitation with a Merit one that meets for twice as long. Merit recitations also have smaller class size and a specifically trained facilitator who guides students through tough problems and understanding the core concepts of calculus. Our design problem concerns building personas of students participating in Merit recitation to understand (1) their choice to enroll, (2) their in-recitation learning experience, and (3) self-efficacy. Personas, which are “life-like archetypes that stress users’ diverse goals and motivations and embrace their corresponding needs and challenges” (Huynh et al., 2020) can help a Merit program director to predict how students will engage with the program and can guide program refinement to more fully support students in achieving their academic goals. Our Merit student personas address mathematical self-efficacy. Bandura argued that self-efficacy, an individual’s belief that they can successfully execute a behavior to produce a desirable outcome, influences the effort and persistence a person puts into a task (Bandura, 1978). Further, he posits four sources of information that strengthen or hinder self-efficacy: performance accomplishments, vicarious experiences, verbal persuasion, and emotional arousal. Students can provide insight into how and why these sources of information change students’ self-efficacy (White, 2025).

To generate our personas, we conducted two in-person focus groups with a total of 12 students. These were audio-recorded, transcribed by AI (Otter and Rev), and cleaned by the first author. Both authors independently coded the transcripts for sources of self-efficacy, then met and discussed codes to reach consensus on all codes. Code mapping was used with each source of information to form the basis for the development of each persona (Saldaña, 2016). From these results, we constructed 2 personas - Maddie and Jacob - who had distinct motivations for enrolling in a Merit-style recitation. Maddie had low mathematical self-efficacy coming in and just wanted to pass calculus. Maddie’s parents strongly encouraged her to enroll, affirming that she needed the additional support outside of the large lecture. Jacob had at least modest mathematical self-efficacy in general, however had very low self-efficacy with respect to passing Calculus 2 at our institution, which they had heard was “apparently really hard.” His parents were more neutral than Maddie’s, telling their student to decide for himself if he wanted to take Merit. Being able to ask questions during their Merit recitation was extremely important to both student personas. Jacob just needed the time and space for questions, especially in contrast to lecture and regular-timed recitations. In addition to time and space, Maddie additionally needed to feel safe to ask “humbling” questions, particularly about prerequisite material.

With these newly developed personas, the Merit director better understands the role of parents in the enrollment process and can better market the program. Additionally, the director can stress particular aspects of the Merit graduate teaching assistant training, to better support students’ comfort in asking questions during recitation. Thus, these personas guide structural adjustments that better support the wide variety of students who choose a Merit recitation.

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