Considering Emotions in Undergraduate Mathematics Education

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This poster aims to motivate the consideration of emotions in undergraduate mathematics education. An underexplored area of undergraduate mathematics education is the role of emotional intelligence and the related concept of social emotional learning. Emotional intelligence is a subcategory of social intelligence consisting of three competencies: recognizing and expressing emotions accurately, regulating emotions in oneself and others, and utilizing emotions to problem solve (Salovey & Mayer, 1990). This poster will review constructs such as affect, emotional intelligence, social emotional learning, and mathematical intimacy and connect these constructs to undergraduate mathematics education. In particular, these constructs can be leveraged to improve communication and reduce the impact of frustration in collaborative classrooms.

Emotions are part of mathematical affect but are understudied in undergraduate contexts as compared to other components of the affective domain, such as attitudes and beliefs (McLeod, 1992). One reason for this is that emotions are fleeting, making their study challenging (Leder & Grootenboer, 2005), although the role of emotion has been studied in other educational contexts. For example, secondary school students with emotionally intelligent skills perform better academically (Sánchez-Álvarez et al., 2020); in a high school mathematics classroom where active learning practices were implemented, Ilyas and colleagues concluded that emotional intelligence was productive for the students' learning, indicated by increased responsibility, increased focus, and skillful communication (Ilyas et al., 2018). In light of the calls for undergraduate mathematics classes to become more collaborative, I hypothesize that research focused on emotions could be beneficial to students' academic success at the undergraduate level. For example, in courses which employ inquiry oriented instruction (IOI). One of the four pillars for inquiry based mathematics education is "student collaboration for sensemaking" (Laursen & Rasmussen, 2019). The expectation of inquiry oriented classrooms is that students are sharing their thoughts to make more sense of the material (Kuster et al., 2017).

Emotional responses are also an important aspect of an individual's mathematical problem-solving process (Carlson & Bloom, 2005). Studies have documented that confronting a challenging mathematics problem can make one feel vulnerable, sometimes leading to avoidance of the subject altogether (e.g. Haase et al., 2019; DeBellis, 1998; DeBellis & Goldin, 1999). Researchers have coined terms like "math anxiety" to denote the unique, negative responses mathematics causes for some students (Ashcraft, 2002). *Mathematical intimacy* describes a relationship between internally represented mathematics and its potential connection to that student's value or sense of self. Mathematical intimacy has the potential to bring positive outcomes, but the effects of intimate betrayal can be drastic, such as if a student decides to engage and struggle through a problem but consistently gets it incorrect. There is a vulnerability associated with mathematical intimacy, so experiencing a betrayal can lead someone to develop a negative sense of self (DeBellis & Goldin, 1999). This poster will show how research exploring ways of encouraging and preserving mathematical intimacy and preventing betrayals can support increased student success and persistence in STEM.

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