Development of Teacher and Student Perception Surveys of Mathematical Resilience

Vanessa Gorman
Adelaide University
vanessa.gorman@adelaide.edu.au

Amie Albrecht
Adelaide University
amie.albrecht@adelaide.edu.au

Lisa O'Keeffe
Adelaide University
lisa.okeeffe@adelaide.edu.au

Florence Gabriel
Adelaide University
florence.gabriel@adelaide.edu.au

Mathematics education aims to support students developing the capacity to reason, problem solve, communicate mathematically, and make connections across mathematical ideas (Niss & Højgaard, 2019; Phonapichat et al., 2014). Achieving these forms of mathematical proficiency, however, requires students to engage with tasks that are both cognitively and emotionally demanding. A substantial body of research shows that many students experience mathematics as challenging and anxiety-provoking, which can limit their persistence and willingness to engage with complex problems (Quintero et al., 2022).

In response to these concerns, researchers have increasingly emphasised the importance of mathematical resilience, defined as students' capacity to persist, adapt and remain engaged when encountering difficulty in mathematics (Lee & Johnston-Wilder, 2017). Resilient learners are able to respond constructively to challenge and sustain effort when developing new mathematical understanding (Ariyanto et al., 2017). While the concept has gained attention, there are few validated instruments for measuring how teachers and students understand it as a multidimensional construct.

To address this gap, the lead author's doctoral study developed perception surveys to investigate teachers' (n=82) and students' (n=781) understandings of mathematical resilience as a multidimensional construct. Practitioner insights and a targeted literature review informed survey development, which was framed by two overarching theoretical frameworks and operationalised through five constructs, emotion regulation, meaningful conceptual understanding, motivational engagement, self-regulation strategies and supportive learning environment, translated into aligned survey items. This talk outlines the methodological approach used to develop and operationalise the surveys.

References

Ariyanto, L., Herman, T., Sumarmo, U., & Suryadi, D. (2017). Developing mathematical resilience of prospective math teachers. *Journal of Physics: Conference Series*, *895*, 12062. https://doi.org/10.1088/1742-6596/895/1/012062

Lee, C., & Johnston-Wilder, S. (2017). The construct of mathematical resilience. In (pp. 269-291). https://doi.org/10.1016/B978-0-12-802218-4.00010-8

Niss, M., & Højgaard, T. (2019). Mathematical competencies revisited. *Educational Studies in Mathematics*, *102*(1), 9-28. https://doi.org/10.1007/s10649-019-09903-9

Phonapichat, P., Wongwanich, S., & Sujiva, S. (2014). An analysis of elementary school students' difficulties in mathematical problem solving. *Procedia – Social and Behavioral Sciences*, *116*, 3169-3174. https://doi.org/10.1016/j.sbspro.2014.01.728

Quintero, M., Hasty, L., Li, T., Song, S., & Wang, Z. (2022). A multidimensional examination of math anxiety and engagement on math achievement. *British Journal of Educational Psychology*, *92*(3), 955-973. https://doi.org/10.1111/bjep.12482

(2026). In N. Berger, M. Thompson, J. Ley & C. Wilsmore (Eds.), *Beyond boundaries: Strengthening futures in mathematics education. Proceedings of the 48th annual conference of the Mathematics Education Research Group of Australasia, Sydney* (p. 488). MERGA.