Building Adaptive Expertise by Making Expert Assessment for Learning in Mathematics Visible

Catherine Challen
Queensland University of Technology
catherine.challen@qut.edu.au

Julie Arnold
Queensland University of Technology
j7.arnold@qut.edu.au

Jill Willis
Queensland University of Technology
jill.willis@qut.edu.au

Assessment for Learning (AfL) is a high-leverage approach for improving student learning because it foregrounds in-the-moment evidence of learning during instruction (Black & Wiliam, 1998). In mathematics, effective AfL relies on teachers' capacity to attend to students' mathematical thinking, interpret partial or emergent understandings, and respond in ways that advance learning (Jacobs et al., 2010). Developing adaptive expertise - the ability to draw on sources of knowledge and apply it flexibly to specific problems - remains a goal of, and persistent challenge in, initial teacher education (ITE) (Anthony et al., 2015; Timperley et al., 2017). While expert teachers routinely draw on such expertise to interpret evidence of learning and make instructional decisions, these judgements are often enacted with such fluency that they remain largely invisible to novices. As a result, preservice teachers (PSTs) may struggle to recognise what matters in moments of AfL and why. Video examples afford PSTs opportunities to slow down and decompose classroom practice, focusing attention on significant moments and expanding the time and space for developing professional noticing (Jacobs et al., 2010; Sherin & van Es, 2009). This study uses video models of expert practice to address the question: What aspects of expert mathematics AfL are noticed by PSTs compared with in-service teachers, and what becomes newly visible when expert teacher reasoning is made explicit? The study explores how expert AfL practice in mathematics becomes visible to teachers. Participants describe what they notice about teacher actions and assessment opportunities by first viewing raw classroom footage, then re-viewing the same footage accompanied by the expert teacher's reflective commentary. The protocol is implemented with both in-service teachers and PSTs, enabling comparison across cohorts. The study aims to identify patterns of *expert ease* in mathematics AfL - those fluent, often tacit judgements that underpin responsive teaching - to inform the design of ITE approaches that develop adaptive assessment expertise.

Acknowledgments

University of Queensland ethics approval [8754] and all participants gave informed consent.

References

Anthony, G., Hunter, J., & Hunter, R. (2015). Prospective teachers' development of adaptive expertise. *Teaching and Teacher Education, 49*, 108-117.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. Assessment in Education. *Principles, Policy and Practice, 5*(1), 7–74. https://doi.org/10.1080/0969595980050102

Jacobs, V. R., Lamb, L. L., & Philipp, R. A. (2010). Professional noticing of children's mathematical thinking. *Journal for Research in Mathematics Education, 41*(2), 169-202.

Sherin, M., & van Es, E. A. (2009). Effects of Video Club Participation on Teachers' Professional Vision. *Journal of Teacher Education, 60*(1), 20-37.

Timperley, H., Ell, F., & Le Fevre, D. (2017). Developing adaptive expertise through professional learning communities. In M. Jones, J. B. Huffman, & A. Harris (Eds.), *Teachers Leading Educational Reform* (pp. 175-189). Routledge.

(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. 482). MERGA.