

Pre-Service Teachers Use of a Pedagogical Framework to Notice Students' Mathematical Thinking

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Teachers' noticing of students' learning is essential for all teachers of mathematics (Choy & Dindyal, 2017). Although noticing is a complex process, it can help pre-service teachers (PSTs) make sense of the mathematical content knowledge and the pedagogy to teach it. Noticing students' mathematical thinking requires PSTs to attend to students' thinking, interpret their understandings and decide how to respond to these understandings (Jacobs et al., 2022).

PSTs can benefit from learning a pedagogical framework that supports their noticing of students' mathematical thinking when teaching mathematics (Choy, 2016). The CRIG pedagogical framework (Gronow et al., 2020) is presented as an instrument for PSTs to notice students' mathematical thinking. The framework comprises four mathematical components (Connections, Recognising patterns, Identifying similarities and differences, and Generalising and Reasoning).

In this short communication, we present the results from a two phased study, where four PSTs (two primary and two secondary mathematics) engaged in a professional learning program and classroom support to implement the CRIG pedagogical framework in mathematics lessons. Data collected over two separate three-week periods included audio recordings of professional learning workshops, video recordings of lessons, and audio recordings of interviews with PSTs. This study describes how the PSTs' understanding and use of the CRIG pedagogical framework supported their noticing of students' mathematical thinking.

We identify the affordances and challenges that the PSTs experienced when implementing the CRIG pedagogical framework into their mathematics lessons. We draw comparisons between the interpretation and implementation of CRIG in the primary and secondary school settings.

References

- Choy, B. H. (2016). Snapshots of mathematics teacher noticing during task design. *Mathematics Education Research Journal*, 28(3), 421–440.
- Choy, B. H., & Dindyal, J. (2017). Noticing affordances of a typical problem. In B. Kaur, W. K. Ho, T. L. Toh, & B. H. Choy (Eds.), *Proceedings of the 41st conference of the International Group for the Psychology of Mathematics Education* (pp. 249–256). Singapore: PME.
- Gronow, M., Mulligan, J., & Cavanagh, M. (2020). Teachers' understanding and use of mathematical structure. *Mathematics Education Research Journal*, 34(2), 215–240. <https://doi.org/10.1007/s13394-020-00342-x>
- Jacobs, V. R., Empson, S. B., Jessup, N. A., Dunning, A., Pynes, D., Krause, G., & Franke, T. M. (2022). Profiles of teachers' expertise in professional noticing of children's mathematical thinking. *Journal of Mathematics Teacher Education*. <https://doi.org/10.1007/s10857-022-09558-z>
- Stockero, S. L., Rupnow, R. L., & Pascoe, A. E. (2017). Learning to notice important student mathematical thinking in complex classroom interactions. *Teaching and Teacher Education*, 63, 384–395.

(2023). In B. Reid-O'Connor, E. Prieto-Rodriguez, K. Holmes, & A. Hughes (Eds.), *Weaving mathematics education research from all perspectives. Proceedings of the 45th annual conference of the Mathematics Education Research Group of Australasia* (p. 583). Newcastle: MERGA.