

LEARNING ALGEBRAIC STRUCTURES AND TEACHING EQUATIONS: CONNECTIONS AND DISCONNECTIONS

Verónica Molfino

Consejo de Formación en Educación, ANII

The disconnect between advanced and secondary mathematics has been widely documented (Wasserman, 2018). The objective of this research was to analyse the connections that prospective mathematics teachers (PMTs) could establish in specific domains, based on specially designed instructional sequences.

The study considered various types of connections, ranging from those strictly related to mathematical content to pedagogical ones, with a focus on desirable teaching models for PMTs. The design process followed a methodological model for teaching advanced mathematics to PMTs: (i) building from teaching practice, (ii) learning advanced mathematics, (iii) stepping down to practice (Wasserman et al., 2019). This paper presents one of the three sequences designed and implemented with 25 PMTs. The first task involved analyzing a secondary student's solution to an equation (i). The second task aimed to develop knowledge of algebraic structures (ii). The final task prompted PMTs to synthesize their reflections from the previous phases through an imagined dialogue between a teacher and secondary students (iii).

The results highlight the importance of establishing connections between algebraic structures and equation solving, consistent with findings by Murray and Badinger (2018). However, PMTs' responses revealed difficulties in using their knowledge of algebraic structures to justify the steps required for solving equations. Additionally, PMTs struggled to integrate this advanced mathematical knowledge into secondary mathematics instruction. Both findings provide a foundation for an ongoing, broader project dedicated to generating pedagogical knowledge for teacher training.

References

- Murray, E. & Baldinger, E. (2018). Impact of Abstract Algebra on Teachers' Understanding of and Approaches to Instruction in Solving Equations. In N. Wasserman (Ed.), *Connecting Abstract Algebra to Secondary Mathematics, for Secondary Mathematics Teachers* (pp. 403–429). Springer.
- Wasserman, N (2018). Exploring advanced mathematics courses and content for secondary mathematics teachers. In N. Wasserman (Ed.), *Connecting Abstract Algebra to Secondary Mathematics for Secondary Mathematics Teachers* (pp. 1–15). Springer.
- Wasserman, N., Weber, K., Fukawa, T & McGuffey, W. (2019). Designing advanced mathematics courses to influence secondary teaching: fostering mathematics teachers' "attention to scope". *Journal of Mathematics Teacher Education*, 22, 379–406.