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LEARNING TO REPRESENT, REPRESENTING TO LEARN

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This study examined how students learned to engage in representational practice in the context of a summer school exploratory algebra class explicitly designed to foster mathematical practices.
Key words: Representation, mathematical practices, problem solving, agency

Representation is central to learning and doing mathematics. This mathematical practice involves more than simply learning to use and interpret canonical representations. Representational practice also involves learning to invent, communicate, and reasoning with representations as tools for problem-solving (Greeno & Hall, 1997). Engaging in representational practice in these ways can support the development of complex reasoning and justification skills (Maher, Powell & Uptegrove, 2009). Students may need explicit opportunities to learn how to engage in representation practice in these more active ways. This study explored how students' engagement in representation changed through participating in a five-week summer school exploratory algebra class. The teaching intervention was explicitly designed to foster mathematical practices, including representation (Boaler et al., in preparation). It took place in a diverse northern California district for middle school students. Students had no prior experience with this type of math instruction. Through a case study of a heterogeneous group of boys, we show how their written representations became more sophisticated over the five weeks. Analysis of their small group interactions provided evidence of how they learned to create, invent, communicate, and reason with representations while problem-solving. We documented how representation emerged as a tool for the boys to act upon the mathematics. Our evidence also suggests that representation supported the boys' persistence and collaboration. Changes in the boys' discourse revealed how negotiating multiple representations positioned them to engage with agency. These findings imply that representation may be generative for students. Through learning to represent, students gained tools to support further learning.

References

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