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Reinventing fractions and division as they are used in algebra: the power of preformal productions.

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Summary: In this paper, we explore algebra students' mathematical realities around fractions and division, and the ways in which students reinvented mathematical productions involving fractions and division. We find that algebra students' initial realities do not include the fraction-as-quotient sub-construct. This can be problematic because in algebra, quotients are almost always represented as fractions. In a design experiment, students progressively reinvented the fraction-as-quotient sub-construct. Analyzing this experiment, we find that a particular type of mathematical production, which we call preformal productions, played two meditational roles: (1) they mediated mathematical activity, and (2) they mediated the reinvention of more formal mathematical productions. We suggest that preformal productions may emerge even when they are not designed for, and we show how preformal productions embody historic classroom activity and social interaction.

Classification: F40 H30

Keywords: realistic mathematics education; fractions; division; algebra; preformal productions

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