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Definitions and their application in writing proofs on divisibility of integers.

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Summary: Beginning students in algebra classes have little experience and struggle to write proofs. The aim of this study was to look at students' use of definitions in determining the validity of statements and in writing proofs for given propositions on divisibility of integers. The main objectives were to highlight the difficulties students have with proofs and suggest strategies to help them in writing proofs. In the first part of the study the class was given the definition of divisibility and problems were set to which written responses were obtained. In the second part of the study, divisibility problems were set and students were guided through their proofs using dialogue. The final set of tasks involved skeleton proofs to support the writing of proofs. We found that all the students had difficulties with problems involving generalised variables as opposed to numerical tasks. There was conflict between the new definition and preconceptions and prior knowledge. Students had language problems, problems of division by zero, and were reluctant to use proof by counter-example or contradiction when no direct proof was possible. The implications are that new definitions must be introduced carefully, using a wide range of examples and appropriate prompts. Dialogue and skeleton proofs are two strategies that can be used to improve students' understanding of proofs.

Classification: E50 F60 D70

Keywords: definitions; proofs; divisibility of integers; skeleton proofs; dialogue

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