

ZMATH 2016f.00809

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An analysis of the essential difficulties with mathematical induction: in the case of prospective teachers.

Adams, G. (ed.), Proceedings of the British Society for Research into Learning Mathematics (BSRLM). Vol. 35, No. 3. Proceedings of the day conference, University of Reading, UK, November 7, 2015. London: British Society for Research into Learning Mathematics (BSRLM). 102-107 (2016).

Summary: Although proof by mathematical induction (MI) is one of the important methods of mathematical proof, gaps and difficulties have been reported in mathematics education research so far. This study provides an analysis of the essential difficulties with mathematical induction that are experienced by prospective mathematics teachers. We take the notion of “mathematical theorem” proposed by an Italian research group, and use this to describe in more detail the structural understanding of MI from a theoretical standpoint. Data are collected by a set of questions based on the idea of “proof script” method. The results suggest that the difficulties of MI are concerned with prospective teachers’ understanding of logical relations which we call “sub-theorem” or “meta-theorem”.

Classification: E59 D79

Keywords: proving; mathematical induction; learning problems; educational research; student errors; understanding; prospective teachers; preservice teacher education; mathematical theorems; theoretical modelling of proof by mathematical induction; sub-theorems; meta-theorems; meta-statements; meta-proofs; meta-theory

<http://www.bsrlm.org.uk/IPs/ip35-3/BSRLM-IP-35-3-18.pdf>