

# PROSPECTIVE TEACHERS' KNOWLEDGE OF PROOFS AND REFUTATIONS

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This paper describes the characteristics of prospective teachers' knowledge of proofs and refutations of arithmetic statements. The research focuses on four types of statements: Universal theorems; Universal, false statements; Existence theorems and Existence, false statements.

The main aims of the study were: (1) To examine prospective teachers' competence in constructing proofs and refutations; (2) To probe prospective teachers' views of given, written proofs and refutations of mathematical statements; (3) To examine the relationship between the prospective teachers' competence in constructing proofs and refutations and the prospective teachers' views of given, written proofs and refutations; (4) To examine the similarities and differences between elementary school and middle school prospective teachers' competence in constructing proofs and refutations and their views of given, written proofs and refutations.

Ninety-three prospective teachers from several major teachers colleges in Israel participated in the study. They were given two questionnaires that were developed for this study: "The Constructing Proofs and Refutations Questionnaire" and "The Judging Proofs and Refutations Questionnaire". Some of the theorems that were included in these questionnaires were used in previous studies related to proofs and refutations (e.g., Healy & Hoyles, 2000; Martin & Harel, 1989).

The main findings are that a substantial number of prospective teachers, especially the elementary school teachers, claimed that only algebraic arguments are valid proofs or refutations of mathematical statements, regardless of the validity of the given arguments. Similarly, numerical examples were regarded as inadequate arguments even in cases in which they were sufficient to prove (or to refute) a statement. In the presentation we shall provide typical prospective teachers' responses and some educational implications.

## References

- Healy, L., & Hoyles, C. (2000). A study of proof conceptions in algebra. *Journal for Research in Mathematics Education*, 31, 396-428.
- Martin, G., & Harel, G. (1989). Proof frames of preservice elementary teachers. *Journal for Research in Mathematics Education*, 20, 41-51.