

Developing Proof Demonstration Skills in Teaching Mathematics in the Secondary School

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Abstract : The article describes the theoretical concept of teaching secondary school students proof demonstration skills in mathematics. It describes in detail different levels of mastery of the concept of proof-which correspond to Piaget's idea of there being three distinct and progressively more complex stages in the development of human reflection. Lessons for each level contain a specific combination of the visual-figurative components and deductive reasoning. It is vital at the transition point between levels to carefully and rigorously recalibrate teaching to reflect the development of more complex reflective understanding. This can apply even within the same age range, since students will develop at different speeds and to different potential. The authors argue that this requires an aware and adaptive approach to lessons to reflect this complexity and variation. The authors also contend that effective teaching which enables students to properly understand the implementation of proof arguments must develop specific competences. These are: understanding of the importance of completeness and generality in making a valid argument; being task focused; having an internalised locus of control and being flexible in approach and evaluation. These criteria must be correlated with the systematic application of corresponding methodologies which are best likely to achieve success. The particular pedagogical decisions which are made to deliver this objective are illustrated by concrete examples from the existing secondary school mathematics courses. The proposed theoretical concept formed the basis of the development of methodological materials which have been tested in 47 secondary schools.

Keywords : education, teaching of mathematics, proof, deductive reasoning, secondary school

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