

INQUIRING THE TEACHING OF MATHEMATICAL PROOF AT THE UNIVERSITY LEVEL

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This paper is based on a study of the teaching of Calculus in a Mathematics department by a team of three researchers who collaborated in the frame of a community of inquiry (Jaworski, 2006). This research team included one mathematics educator, one high school mathematics teacher who was graduate student in mathematics education and one mathematician who was also researcher in mathematics education. The mathematics educator and the high school teacher observed the 26 two-hour lectures given by the third member of the team during a semester Calculus course. The course included limits of sequences and functions, continuous functions and the related theorems, derivative and its applications (local maximum and minimum, the Rolle's and Mean Value Theorem, the study function's monotony and the L' Hospital rule). After each class the three researchers discussed the issues emerged during the lesson. The lessons and the discussions were audio-recorded and transcribed. In this paper we focus on the teaching of mathematical proof at the university level. In particular, we explore, through the collaboration of the three researchers, the teaching that emphasizes proof's semantic aspects (Weber, 2005) and its development. From the classroom observations we identified the way that the lecturer approached didactically the teaching of proof. His teaching goal was to highlight the meaning and the key ideas of proof. Initially, he encouraged the conjecturing process and the transition from argumentation to proof. He usually used graphs or connections with mathematical ideas and processes familiar to the students and presented the construction of proof in an informal way. In the presentation of the formal proof, he related the typical proof steps to the previous informal approach. In the end, he summarised the main ideas of the proof by helping the students to construct a global picture of the proof and its role in mathematics. During the discussions among the researchers this proving circle was identified as an emerging pattern and its role in students' learning was investigated. Moreover, issues concerning the lecturer's decision making, the rationale behind it and the effect of the collaboration on the development of the teaching of proof were addressed.

References

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