

ZMATH 2015d.00922

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Reality – theoretical models – mathematics: a ternary perspective on physics lessons in upper-secondary school.

Sci. Educ. (Dordrecht) 24, No. 5-6, 615-644 (2015).

Summary: This article discusses the role of mathematics during physics lessons in upper-secondary school. Mathematics is an inherent part of theoretical models in physics and makes powerful predictions of natural phenomena possible. Ability to use both theoretical models and mathematics is central in physics. This paper takes as a starting point that the relations made during physics lessons between the three entities reality, theoretical models and mathematics are of the outmost importance. A framework has been developed to sustain analyses of the communication during physics lessons. The study described in this article has explored the role of mathematics for physics teaching and learning in upper-secondary school during different kinds of physics lessons (lectures, problem solving and labwork). Observations are from three physics classes (in total 7 lessons) led by one teacher. The developed analytical framework is described together with results from the analysis of the 7 lessons. The results show that there are some relations made by students and teacher between theoretical models and reality, but the bulk of the discussion in the classroom is concerning the relation between theoretical models and mathematics. The results reported on here indicate that this also holds true for all the investigated organizational forms lectures, problem solving in groups and labwork.

Classification: M54

Keywords: role of mathematics; mathematics and physics; modeling

doi:10.1007/s11191-015-9750-1