

Introduction

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In the last decades videobased technology has gained an increasing importance for classroom research and teacher education. The use of videotaped lessons as a basis for the analysis of mathematics instruction was a consequence of the need for the development of research methods and research paradigms capable of generating data better able to represent the complexity of classroom settings. A strong influence on this development was due to the international comparative studies like the TIMSS video studies 1995 and 1999 as well as the Learner's Perspective Study (LPS). However, there are many other investigations all over the world using the video technology.

This special issue of the *Zentralblatt für Didaktik der Mathematik (ZDM)* is dedicated to the subjects "Videobased Instructional Research" and "The Use of Video Technology in Teacher Education". Though it contains only a few examples of videobased research in mathematics education, the different studies in this issue show a great diversity in their aims, their methods and their results.

The first article by Bih-jen Fwu and Hsiou-huai Wang presents a study about the teaching script in Taiwanese mathematics classroom. Based on a qualitative analysis of videotaped lessons the authors discovered a certain frame of mathematics classroom in Taiwan. The investigation was supplemented by a second quantitative study based on student questionnaires. The results from the video study and the student questionnaires are discussed against the background of the influence of the Confucian culture on the beliefs of students and teachers in Taiwan.

The influence of cultural aspects on mathematics classroom and on mathematics education research is the initial point for David Clarke in the second contribution. Clarke discusses several dichotomies which are fundamental assumptions in mathematics education. These dichotomies like, for

example, teaching versus learning are challenged by the results of the Learner's Perspective Study. On the basis of several illustrative examples it is questioned whether these dichotomies must be reconsidered and changed.

An example of a classical videobased analysis of conditions for teaching and learning in mathematics lessons is presented by Aiso Heinze and Markus Erhard. They investigated the wait-time between teacher questions and students answers in classwork phases of German mathematics lessons. Their results are similar to the findings of classroom research in other western countries.

The cognitive level of theory and practice phases in mathematics lessons is the subject of a study by Barbara Drollinger-Vetter et al. The authors describe an approach designed to measure both the cognitive level of the problem statement and the cognitive level of problem implementation by rating videos. They differentiate between problems for developing theory and problems for practicing.

Research on in-service teacher training on the basis of videotaped mathematics lessons is presented in the last two contributions. Sebastian Kuntze reports results of an in-service teacher training concerning the teachers' views of instructional situations presented by videos. While at the beginning of the training teachers show some divergences in rating the instructional situations depending of their instructional beliefs, at the end of the training these differences are decreased.

Krammer et al. describe an investigation of the effects of an in-service teacher training program which was organized as a blended-learning design. The teachers met five times in one school year and worked together virtually in the time between meetings. Classroom videos were used, both in the workshops and in the online phases. First results of evaluation questionnaires show that on the one hand the teachers appreciate the way of teacher training by videos. On the other hand, difficulties appeared primarily due to lack of time.

This issue of the *ZDM* shows the broad possibilities of the use of video technology in classroom research and teacher education and illustrates the relevance of this technology for developing a more specified and content related theory of instruction.

Generally, videobased classroom research has the power to uncover classrooms processes and to provide more and differentiated information about

the quality of instruction on different dimensions and criteria. From this point of view, videobased studies complement large scale achievement studies, which could give important information about the strengths and the weaknesses of different school systems but do not provide explanations for how these results are coming off.

In teacher education and school development the use of classroom videos offers new opportunities. It is easier to speak and to reflect together with teachers about instruction, because they are forced to refer their judgements to certain shared situations. Moreover, videos of their own lessons give teachers a special kind of feedback and therefore a better possibility of improving their instruction.

Though the use of video technology in research and education has great potential, it is important to note, that video technology in classroom research and teacher education is not an end in itself, it is only a tool.

Furthermore, it should be mentioned that the presenting articles represent only a sample of the different issues and approaches that make use of video technology in research and education. In particular, interpretative methods which give deeper insight into particular parts of mathematics lessons are under-represented by this special issue. The development of a fruitful combination of quantitative and interpretative methods for a comprehensive lessons analysis can be considered as an interesting task for the future. In this way we may go a further step towards understanding how learning processes in mathematics lessons work.

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