

What is “best practice” for video-based in-service teacher trainings?

Views and experiences of secondary mathematics teachers and findings from evaluation research¹

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Abstract

This paper focuses on selected empirical results of a study on characteristics of “best practice” of video-based in-service teacher trainings. Based on a theoretical background of professional knowledge and instruction-related beliefs, the views and experiences of mathematics teachers presented in the paper allow discussing on characteristics of effective video-based teacher trainings.

INTRODUCTION

The use of videotapes has become more and more accessible for teacher trainings in the last decades. As this medium can facilitate a repeated viewing of classroom situations and offers a broad range of context information about the situational setting in classrooms, it has the potential to foster reflection of teachers on instructional practices and on alternative actions when teaching mathematics. However, very different ways of using video technology in in-service teacher trainings have been developed. Accordingly, knowing more about which settings of video-based teacher trainings are most effective is an important question for developing teacher training interventions.

In this paper, we address this question integrating two perspectives. On the one hand, we discuss findings from the evaluation research of video-based teacher trainings, focusing especially on two bi-national programs with Swiss and German secondary mathematics teachers. On the other hand, we concentrate on the teachers’ views on their experiences in these projects and on how they describe and imagine “best practice” in video-based teacher trainings in a follow-up research project. Some of the central aspects of the teachers’ views were that they favoured a structured and focused way of reflecting on videotaped every-day classroom situations and that they preferred to combine the use of videos with coaching support by an expert or colleague.

In the following, we will give (1) an overview on the theoretical background leading to a set of criteria for conceiving video-based in-service mathematics teacher trainings, characterising two examples of such programs and citing results from the accompanying evaluation research. Having deduced research questions (2) and given information on sample and methods of this study (3), we present qualitative results on the teachers’ views (4). The results and implications for teacher trainings are discussed in the concluding section (5).

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1 THEORETICAL BACKGROUND

In-service teacher training projects that aim at improving the quality of instruction in mathematics classrooms often focus on the participating teachers' professional knowledge (Shulman, 1986; Bromme, 2001), because professional knowledge, including instruction-related beliefs of teachers (cf. Pajares, 1992) may have an impact on their instructional practice and instruction-related decisions (Malara, 2003). Professional knowledge has global and more content- or situation-specific components (Törner, 2002). Supporting the model of situated components of professional knowledge, Leinhard and Greeno (1986) as well as Bromme (1992) stated that professional knowledge is often organised in rather episodic structures. Conforming to these findings and referring to the model of situated learning, in-service teacher training projects often aim at fostering growth of their participants' knowledge related to classroom situations, in order to develop not only situation-specific, but also more global professional knowledge. Indeed, empirical results in an earlier study (Kuntze & Reiss, 2005; cf. also Lerman, 1990) suggest that there are connections between situation-specific and rather global instruction-related beliefs of mathematics teachers.

In his overview study on characteristics of effective teacher trainings, Lipowsky (2004) identified instruction-related reflection by the participants as a prerequisite of the success of teacher trainings in the domain of developing professional knowledge. For the case of video-based trainings, the role of encouraging reflection processes is emphasised e.g. by the findings of Beck, King and Marshall (2002).

However, as video technology "is but a tool" (Seago, 2004, p. 263), video-based teacher training projects can be conceived very differently, according to how this tool is used. Table 1 can provide orientation for possible aspects.

<p>Shaping video-based teacher training: Aspects concerning the choice of classroom videos used in the training:</p> <ul style="list-style-type: none"> • classroom videos can be used to show "<i>best practice</i>" lessons vs. "<i>everyday</i>" instructional situations • the classroom videos can come from <i>one country</i> or be chosen according to a <i>cross-cultural</i> focus • the training can be based on videos showing the "<i>own</i>" <i>classroom</i> of the teachers or showing "<i>foreign</i>" <i>classrooms</i> • the classroom videos used can show <i>entire lessons</i> vs. only <i>shorter instructional situations</i>
<p>Shaping video-based teacher training: Aspects concerning the focus of the instruction-related reflections:</p> <ul style="list-style-type: none"> • when discussing on videotaped classroom situations, there can be a pre-defined, rather <i>narrow focus</i> on particular characteristics vs. a <i>broad focus</i> including heterogeneous aspects of the classroom situation shown to the teachers • the video-based reflections can concentrate on <i>mathematics education</i> vs. non-content-specific <i>pedagogical aspects</i> • the attention may be drawn rather on the <i>teachers actions and reactions</i> vs. rather on <i>learning processes of students</i> • The video-based work can be strongly <i>structured</i> and providing input or follow a rather <i>self-regulated</i> process
<p>Shaping video-based teacher training: Aspects concerning the organisational form of the training:</p> <ul style="list-style-type: none"> • the training can include <i>web-based</i> (e.g. <i>blended</i>) video-based work vs. consist in <i>face-to-face</i> work with videos only • the video-based training can be <i>short and intensive</i> vs. offering <i>longer implementation phases</i> of the video-based reflections between shorter training units • there can be <i>coaching support by external experts</i> vs. reflections in groups <i>without individual coaching</i> • the choice of participants can follow a <i>bi-national or cross-cultural approach</i> vs. the participants can be recruited in <i>one country or school environment</i> • participating teacher teams may come from <i>one school</i> or be recruited from <i>different schools</i>

Table 1: Possible decisions when conceiving video-based teacher training interventions

We do not claim that the list of aspects in Table 1 is complete. Several researchers have discussed subsets of the aspects above and argued how the advantages of using video technology in in-service teacher trainings for encouraging situation-based reflection can be transferred into practice (e.g. Reusser, 2005; Krammer & Reusser, 2004; Bao et al., 2005; Sherin, 2004, Sherin & Han, 2003), how advantages of coaching interventions can be described (e. g. Staub, 2001) or to what extent the potential of intercultural differences for reflection on instruction can be used (Stigler & Hiebert, 1999).

What are characteristics of best practice against the background of these aspects? In order to give first answers, we follow two approaches: The first approach consists in taking a look to empirical results from the evaluation of video-based teacher trainings. For example, the teachers in the study of Kuntze (2006, cf. Kuntze & Reiss, 2006) developed their situation-specific judgements on the instructional quality of a classroom situation which was marked by discourse, whereas the judgements on another classroom situation with a small-step question-response interaction corresponding to the dominant teaching script in Germany remained rather stable. Krammer et al. (2006) reported positive feedback of the participants of a blended learning training project. Hence, there are quantitative and qualitative findings allowing first implications for characteristics of effective video-based trainings (cf. also Beck, King, & Marshall, 2002; van Es & Sherin, 2006).

However, it appears as very complex endeavour to investigate the role of all the aspects listed in Table 1 separately by varying one of them and keeping the others constant. In this situation, the views of in-service teachers as participants of video-based trainings concerning aspects of what they see as best practice in video-based teacher trainings can provide insights.

The second approach consists in asking experienced participants of video-based in-service teacher trainings to describe their experiences and what they consider as “best practice” in video-based teacher training. This approach allows a cumulative insight into individual views of mathematics teachers on characteristics of successful and supportive video-based trainings. Even if such individual or shared views hardly allow generalisations, this research might bridge the limitations of the first approach, which, up to now, only gives punctual evidence.

2 RESEARCH QUESTIONS

Consequently, for addressing this second approach in more detail, we focus on the following research questions:

- How do former participants of video-based teacher trainings describe their individual experiences and growth from a long-term perspective?
- How do former participants of video-based teacher trainings describe best practice for in-service teacher training?

3 SAMPLE AND METHODS

The study is based on a sample of 32 secondary mathematics teachers from Germany and Switzerland. These teachers were former participants of the two video-based teacher training programs described by Kuntze (2006) and Krammer et al. (2006).

The views of the teachers were collected more than one year after the training in an individual questionnaire containing open questions and in an additional co-constructive process, in which the participants had the opportunity to express agreement or disapproval related to statements about characteristics of best practice in video-based in-service teacher trainings.

4 RESULTS

In the following, given the length limit of this paper, we can only give some examples of the results of our study. The research report by Lipowsky et al. (2006) reports more details, especially for the second research question.

In an open questionnaire, the teachers were asked to describe their individual experiences and learning outcomes encouraged by the teacher training. This is an example for the responses of a teacher (“Tamara”) to some of the open items of the questionnaire:

What short-term and long-term impacts did the video-based training have on your instructional practice? Short-term impacts (on instruction in the first weeks after the training):

I have examined my instruction very critically according to the emphases of the teacher training – I was often unsatisfied with myself. By far more than before

Long-term impacts (on my instruction today):

I can mostly avoid a small-step question-response-game today; I try much more intensively than before to activate the students by interesting problems

Have you got new insights in the teacher training? Can you describe them?

Yes, that I can be less dominant in the classroom interaction, as soon as I have succeeded in activating the class.

These answers of Tamara, like those of many other participating teachers, highlight the role of reflection on interaction processes in the classroom as a starting point for own developments. These own developments are often reported as being supported by experimenting with the own practice, a process framed by the training intervention. For the case of Tamara, video-based reflections on “foreign” classrooms (as adopted in the training) seem to have led her to dissatisfaction with her own, small-step interaction script. This may have encouraged her to experiment with her instructional practice also in a long-term self-regulated implementation activity.

The second research question focuses on characteristics of best practice of in-service teacher trainings. The teacher’s views were collected by a partly co-constructive process, in which they could discuss their experiences and views and document them on posters with given focuses. These given focuses corresponded to aspects as shown in Table 1. An over-all, dominant result regarding the teachers’ views was that they favoured a structured and focused way of reflecting on videotaped classrooms, that they preferred the use of every-day situations to viewing best-practice-lessons and that they wished to combine the use of videos with coaching support by an expert or colleague. Moreover, some answers suggest that the criteria for video-based discussions should be in line with research findings concerning instructional quality. For the example of “narrow vs. broad focus of video-based work”, original statements of the teachers are displayed in Table 2 on the following page.

5 CONCLUSIONS AND DISCUSSION

Encouraging reflection seems crucial in video-based teacher trainings. In particular, the teachers’ views support that “best practice” trainings should support effective and focused ways of encouraging and accompanying reflection processes (cf. the results of van Es & Sherin, 2006). Also the preference for support by external coaches may be interpreted as a way of

focusing and strengthening the own instruction-related reflections and their implications for instructional practice. However, the findings of this study should be interpreted with care. For generalisation, further research is needed. Especially on the international level, the question about cultural factors should be taken into account when experiences with video-based trainings are reported and discussed by teachers and teacher trainers. The questions whether and how video-based teacher training can enhance teacher learning and teacher education and how video as a medium can be integrated in teacher education in effective ways requires especially further empirical research in this area. This may be a first answer to the discussion question in which directions research concerning video-based teacher trainings should develop.

Narrow vs. broad focus	
I find it better to look at classroom videos under the perspective of a rather narrow question (example: Reactions on wrong answers of students), because...	I find it better to look at classroom videos under a broad focus with a rather open question (example: what is good mathematics instruction?), because...
<ul style="list-style-type: none"> ... there are better possibilities for comparisons ... you keep the overlook. You can concentrate on two or three features and have the confidence to work on them more profoundly ... the processes in the classroom are so complex that you have the risk to get bogged down. ... the breakdown of an instructional concept can be studied. ... in this way, a better, well-grounded exchange of opinions can take place, you won't talk at cross-purposes ... the results are more concrete ... then, by simple hints, the focus can be directed to concrete situations of the classroom and potentially strengthened, assured or corrected. 	<ul style="list-style-type: none"> ... it is basically more stimulating...

Table 2: Statements regarding views of “best practice” of video-based teacher trainings for the aspect “narrow vs. broad focus” of the video-based work

References

- Bao, J., Lu, Y. & Xia, Y. (2005). *A Hypermedia Video-Case: A New Tool for teachers' Professional Development*. Earcome 3, Shanghai, 7th-12th of august, 2005. Retrieved 1/17/08 from http://www.math.ecnu.edu.cn/earcome3/TSG5/full_video-case-Bao.doc.
- Beck, R.J., King, A., & Marshall, S.K. (2002). Effect of Videocase Construction on Preservice Teachers' Observations of Teaching. *The Journal of Exp. Educ.*, 70(4), 345–361.
- Bromme, R. (1992). *Der Lehrer als Experte. Zur Psychologie des professionellen Wissens*. [The teacher as an expert. On the psych. of professional knowledge]. Bern: Hans Huber.
- Bromme, R. (2001). Teacher expertise. In J.J. Smelser & P.B. Baltes (Eds.), *International Encyclopedia of the Social and Behavioural Sciences* (pp. 15459–15465). Amsterdam.
- van Es, E.A. & Sherin, M.G. (2006). How Different Video Club Designs Support Teachers in „Learning to Notice“. *Journal of Computing in Teacher Education*, 22(4), 125-135.
- Krammer, K., Ratzka, N., Klieme, E., Lipowsky, F., Pauli, C. & Reusser, K. (2006) Learning with Classroom Videos: Conception and first results of an online teacher-training program. *Zentralblatt für Didaktik der Mathematik (ZDM)*, 38(5), 422–432.
- Krammer, K. & Reusser, K. (2004). Unterrichtsvideos als Medium der Lehrerinnen- und Lehrerbildung. *SEMINAR – Lehrerbildung und Schule*, 10(4), 80–101.
- Kuntze, S. (2006). Video technology in the assessment of an in-service teacher learning program – Differences in mathematics teachers' judgements on instructional quality. *Zentralblatt für Didaktik der Mathematik (ZDM)*, 38(5), 413–421.

- Kuntze, S. & Reiss, K. (2005). Situation-specific and generalized components of professional knowledge of mathematics teachers – Research on a video-based in-service teacher learning program. In H. L. Chick & J. L. Vincent (Eds.), *Proc. of the 29th Conf. of the Int. Gr. for the Psych. of Math. Educ. (PME)*, Vol. 3 (pp. 225–232). Melbourne: Univ.
- Kuntze, S. & Reiss, K. (2006). Evaluational Research on a Video-Based In-Service Mathematics Teacher Training Project - Reported Instructional Practice and Judgements on Instructional Quality. In J. Novotná, H. Moraová, M. Krátká & N. Stehlíková (Eds.), *Proceedings of the 30th Conference of the International Group for the Psychology of Mathematics Education (PME)*, Vol. 4 (pp. 1–8). Prague: Charles University.
- Leinhardt, G. & Greeno, J. (1986). The cognitive skill of teaching. *Journal of Educational Psychology*, 78, 75–95.
- Lerman, S. (1990). Alternative perspectives of the nature of mathematics and their influence on the teaching of mathematics. *British Educational Research Journal*, 16 (1), 53–61.
- Lipowsky, F. (2004). Was macht Fortbildungen für Lehrkräfte erfolgreich? Befunde der Forschung und mögliche Konsequenzen für die Praxis. [What makes in-service teacher training programs successful? Research findings and possible consequences for practice]. *Die Deutsche Schule*, 96(4), 1–20.
- Lipowsky, F., Kuntze, S., Ratzka, N., Klieme, E., & Reiss, K. (2006). *Unterricht entwickeln und verbessern – Was leisten videobasierte Lehrerfortbildungen?* [Developing and improving instruction – what can be achieved by video-based in-service teacher trainings?]. [Concluding research report on a project funded by Robert Bosch Stiftung].
- Malara, N. (2003). Dialectics between theory and practice: Theoretical issues and aspects of practice from an early algebra project. In N. Pateman et al. (Hrsg.), *Proceedings of the 27th Conference of the international Group for the Psychology of Mathematics Education* (S. 33–48). Honolulu: PME.
- Pajares, F.M. (1992). Teachers' Beliefs and Educational Research: Cleaning Up a Messy Construct. *Review of Educational Research*, 62(3), 307–332.
- Reusser, K. (2005). Situiertes Lernen mit Unterrichtsvideos. Unterrichtsvideografie als Medium des situierten beruflichen Lernens. *Journal für Lehrerinnen- und Lehrerbildung*, 5(2), 8–18.
- Seago, N. (2004). Using Video as an Object of Inquiry for mathematics Teaching and Learning. In Brophy, J. (Ed.), *Using Video in Teacher Educ.* (pp. 259–286). Oxford: Elsv.
- Sherin, M. G. (2004). New Perspectives on the Role of Video in Teacher Education. In J. Brophy (Ed.), *Using Video in Teacher Education* (pp. 1–27). Oxford: Elsevier.
- Sherin, M. G. & Han S. Y. (2003). Teacher Learning in the Context of Video Club. *Teaching and Teacher Education*, 20, 163–183.
- Shulman, L. (1986). Those who understand: Knowledge growth in teaching, *Educational Researcher*, 15 (2), 4–14.
- Staub, F. (2001). Fachspezifisch-pädagogisches Coaching: Theoriebezogene Unterrichtsentwicklung zur Förderung von Unterrichtsexpertise. *Beitr. z. Lehrerbild.*, 19(2), 175–198.
- Stigler, J. & Hiebert, J. (1999). *The teaching Gap: Best Ideas from the World's Teachers for Improving Education in the classroom*. New York: The Free Press.
- Törner, G. (2002). Mathematical Beliefs – A Search for a Common Ground: Some Theoretical Considerations on Structuring Beliefs, some Research Questions, and some Phenomenological Observations. In G. Leder, E. Pehkonen, & G. Törner (Eds.), *Beliefs: A Hidden Variable in Mathematics Education?* (pp. 73–94). Dordrecht: Kluwer.