

# Teachers' Implementation of a Curriculum Reform \*

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## **Objectives and significance of the study**

Reform 97 (R97) is the educational reform in Norway that took place in 1997. As part of the more wide-ranging Reform 97, which affected the whole of the compulsory education system, a new curriculum was implemented in August 1997. This curriculum or syllabus for grade 1-10 (age 6 to age 15) is referred to as L97 (Hagness, Veiteberg, Nasjonalt læremiddelsenter, & Kirke- utdannings- og forskningsdepartementet, 1999) from now on.

A research study (Alseth, Brekke, & Breiteig, 2003) suggests that the curriculum is not implemented as intended. Studies comparing pupils' performance on mathematical tasks before and after Reform 97 show that both in grade 7 and in grade 10 pupils perform generally lower in 2001 and 2002 than in 1995 and 1994 respectively (Alseth et al., 2003; Kleve, 2003).

The curriculum describes different working methods in all subjects in general and in mathematics in particular. According to my interpretation of the curriculum, it encourages an investigative approach to teaching. It stresses that the pupils shall be active in the learning process. They shall be experimenting and exploring and through collaboration with each other acquire new knowledge and understanding.

In my research I have worked with 4 mathematics teachers to explore how they are interpreting the curriculum, both in terms of how they are thinking about it and expressing themselves in focus groups and interviews, and also in terms of what they actually do in the classroom. My research questions are:

1. How are teachers in their mathematics teaching practice responding to the L97's recommendations?
2. What kinds of interactions between the teacher and the student are observable in the mathematics classroom?
3. How are teachers' practices in the classroom related to their beliefs about teaching and learning mathematics and to their goals for students in the subject?

## **Underlying theoretical framework**

The mathematical part of the curriculum, L97, reflects a constructivist view on learning and also a view based on socio-cultural theories. I see several principles which I interpret as reflecting a constructivist view on the teaching and learning of mathematics: pupils shall be encouraged to build up knowledge largely by themselves; they shall be active, enterprising and independent; they shall acquire new knowledge by exploring and experimenting. L97 encourages discussion and reflection, and emphasises how students' misconceptions can be ground for further learning. My interpretation is underpinned by Confrey (Confrey, 1990) who emphasises the fact that pupils themselves are supposed to construct their understanding through a process of reflection, Von Glasersfeld (Glasersfeld, 1985) who explains how teachers should be more interested in children's misconceptions and Noddings et al (Noddings, Davis, & Maher, 1990) who say that learning mathematics requires constructions and that mathematical activity in a mathematical community is a common thread in what a constructivist view implies.

Views based on socio-cultural theories are also reflected in the curriculum (L97, p. 167, 168). Collaboration and adult guidance are indicated. L97 says that pupils have developed mathematical concepts when they start school and the purposes of educational programmes are to develop these concepts. This is in accordance with Vygotsky (Vygotskij & Cole, 1978) who says that ignoring the fact that children's learning begins long before they attend school, is short-sighted. The use of tools is also emphasised in L97. Mediation through tools is essential in Vygotsky's socio-cultural theory. The tools in the Vygotskian mediation process are not limited to concretes. Language is also essential as a mediation tool. Lermann (Lermann, 2000) points to the analogy between physical tools and cultural tools and how they transform us internally.

## **Research design and procedure**

In my study, I am focusing on teachers' interpretation of the L97 curriculum and on their implementation of

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\* This paper is linked to Barbara Jaworski's paper. See p. 83.

it. The relation between the two is an essential part of the study.

I am using research methods fitting largely into an ethnographic approach (Bryman, 2001). I have used focus groups interviews to get information about what teachers say about L97 and how they relate their teaching to what is said in the curriculum. I have observed four selected teachers for one lesson a week in 3 months, and have had conversations with them before and/or after the lessons. All of this has been audio taped, and parts of it are fully transcribed, from other parts I have written summaries. I have also information from the teachers obtained through questionnaires and self estimation forms.

### Findings

So far, findings suggest that there are different attitudes to L97, different styles of teaching and thus different responses to L97. Very carefully I will indicate a Directive, a Leading, a Conceptual and an Exploring style of teaching. All four teachers have features of all styles of teaching, but to different degrees. One teacher, David, consciously and confidently carries out direct instruction. He interacts with the mathematics and poses his way of doing it over to the students. According to focus group interview this is what he believes in. Alfred leads his students towards a solution. He is concerned about his students' fragile thoughts and well being. Bent focuses on students' conceptual understanding and wants the students to understand the formulas. However he finds it hard and time consuming to carry out experimental teaching even this is what he says he believes in. Cecilie believes that students learn most by finding things out themselves and she carries out exploring activities and encourages students to find things out themselves.

Even though I experienced exploring activities during my classroom observation and also teachers wish to carry out such activities, I didn't experience that as a general working method. There are common features in all lessons I observed. They follow a traditional pattern; the teacher starts the lessons by explaining new material and/or reviewing the previous lesson, then pupils work on tasks on their own or in pairs while the teacher goes around. Specified skills are often in focus, and the entirety of the subject is rarely presented. However, as indicated and shown above, the nature of teaching from the board (the degree of students' participation) and of interactions between the teacher and the students, differ from classroom to classroom and will be subject to further analysis.

This also indicates that L97 is not implemented as intended and thus a need for further mathematics teaching development in Norway. In her associated presen-

tation, Barbara Jaworski outlines how we now are moving away from traditional models of in-service development of teachers to a collaborative model based on inquiry as a theoretical perspective.

### References

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