

Instruction to use a graphic calculator to solve problems in a context of secondary vocational education

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Mathematics education is gradually changing from teacher oriented instruction towards student self-regulated learning. Co-operative and collaborative learning are increasingly emphasised as effective learning environments. This means that both the learning context and the didactics for teaching mathematics are changing, emphasising that students have to plan, to discuss and construct their own knowledge.

Beside the context of the learning situation the content of mathematics is also changing. In the Netherlands a new mathematics curriculum has been implemented, in which the use of a graphic calculator is more or less integrated in the booklets. The graphic calculator is integrated in the new mathematics curriculum because it is expected that the use of a graphic calculator in a setting of co-operative, small group work will improve students' flexibility in solving mathematical problems in an engineering context.

To investigate this hypothesis teachers of four schools of secondary vocational education are being supported in using the graphic calculator as a problem solving and learning tool and for applying mathematics as well as in guiding small group work. We try to describe the possibilities and obstacles of instruction in this learning environment. Students' discourses are analysed while they are working collaboratively. Videotapes are used to write down verbatim protocols. Preliminary qualitative analyses of verbatim protocols and observations show that students mostly use their graphic calculator as a computational tool. However, during a whole class instruction and discussion the graphic calculator stimulates discussion between students. Especially when the teacher asks challenging questions about different mathematical phenomena.

On the basis of the protocols, the interviews and the field notes conclusions are drawn and recommendations are formulated. Finally we will discuss some implications for the use of the graphic calculator as an integral part of mathematics education.