Engineering - Technological Design: students’, teachers’ and professional designers’ ideas about learning goals

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Engineering gets more and more attention in secondary school curriculum. In the Netherlands, seven years ago, an enquiry based learning approach was started with an in meantime widespread initiative called Technasium. Main difference with regular secondary school is the subject research and design, in which students learn complex skills by working out design and research problems. For students it is difficult to learn these complex skills (Abell & Lederman, 2007), and thus for teachers to teach (de Corte, 2004). The role of the teacher in the implementation process of this new subject is important as the curriculum leaves many decisions to the teacher. In this arrangement, the picture is even more complex when is considered the role of a third party: professional designers who are supplier of the problem or design question. In case of the Technasium this can be somebody from for example a company, university or municipality. This person plays as well an additional source for making inquiries for the students and is as well one of the assessors.

In order to achieve good education in research and design, literature states that the curriculum should be contingent and congruent: expected learning goals should be traceable by teachers and students in intended as well as actual goals (Van den Akker, 2003).

The question is if this contingency and congruency is expected to be found for technological design for the practice of a good running school. Practice of the technasium, a bottom-up initiative in the Netherlands, shows that technological design is not only implemented for the skill itself, but i.e. by many seen as the panacea for creating more interest in science and technology studies.

The research question therefore is how this complicated picture of intended and final goals works out in school practice by means of a case study. We will discuss the practical contingency and congruency of learning goals for research and design.

In order to answer the research question, we used an in-depth study after the implementation process of technological design in the school. First the researcher observed the school for three months. After this, management, teachers, students and professional designers were interviewed along a semi-structured protocol. Students’ ideas were also tested by paper questionnaires. Data analysis was completed by an analysis of official documents from different initiatives on technological design as well as documents from the schools. Data are analysed qualitatively, as well as by quantitative statistical analysis (if suitable).

First data show that in a school that shows good results in implementing technological design the goals as given by students very well correlate with those as given by the teachers. This indeed is a sign of good education (Van den Akker, 2003). On the other hand do these goals not necessary need to correlate one on one with those as demanded by countrywide examination programs.

A difference has been found between the initial goals and the final goals: not all final goals are tested although these goals can be found in the education program. This is contrary to what is stated by Van den Akker (2003).

The results showed as well that students think of themselves that they have a higher level of the different skills as analysed by the teachers, and even more by the professional designers. This might be seen as self-confidence as felt by the students, a positive factor in general. However, this can also be seen as an incorrect insight in one’s own qualities (Bransford, Brown & Cocking, 2000).

Bibliography


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