

A focus group study of physics students' views on physics and their reasons for choosing physics in upper secondary school

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Executive summary

This chapter presents the aim of the research, the research method, principal findings and some suggestions for recommendations.

The aim of the research

The aim of the research reported was to document the range of views that pupils in Norwegian senior secondary physics courses (2FY and 3FY, pupils aged 17 and 18) held about physics as a general subject, the teaching they had received, and the influences they regarded as important to choose/not to choose physics as a subject in school. As such, the research aimed to articulate student views as a contribution to the debate about physics courses in Norway.

The research method

This report provides the findings from eight focus groups conducted with a total of 54 pupils studying physics at seven different schools in Oslo and Akershus, spring 2001. Eight focus groups split both by gender and the pupils experience with school physics (2FY/3FY) were conducted.

Principal findings

- The pupils under investigation considered the mathematical approach to the physics curriculum as simple. The pupils in 3FY claimed the curriculum in 2FY was more strongly influenced by mathematics than the 3FY curriculum. The normal combination of physics and mathematics was believed to be too hard and difficult. Some of the pupils that choose to study physics found the mathematics courses even harder than the physics courses.

- 3FY is believed to be an easier course than 2FY, and to have greater relevance to their own personal lives. Pupils did not find it hard to make connections between school physics and their everyday lives. Despite this, physics is not a popular subject for discussions among pupils, their friends and families. Physics is yet a prestigious subject, and valued by the pupils for the understanding it offers of the natural world.

- Pupils feel that teachers and their style of teaching were important determinants of their interest in physics.

- Findings suggest that girls make a more quiet appearance in the physics courses than in other school subjects. Despite this, girls do not want to study physics in single gender classes. Girls seem to be less encouraged to pursue physics by parents and school advisers, and their interest in physics beyond school is not as strong as boys'. This is supposed to be conducive to the girls' low self-confidence in physics. Girls expressed a greater desire to have knowledge *about* physics rather than simply *in* physics.

- The school science curriculum in first year studies, was seen upon as an introductory course in biology, and lacked relevance to succeeding physics courses. A keen interest in physics seems to be dependent on the pupils' skill in first year mathematics. Results gained in first year mathematics studies were of greater relevance than results in the first year science course. The demand of simultaneous studies in mathematics, are believed to be the main reason that more students are not taking physics.

- There seems to be a great lack of information about the content of the physics courses 2FY and 3FY. Girls are particularly interested in information relating to "physics beyond school". In short terms; what does a physicist do?

- Pupils valued discussions as a teaching method, but did not want project related work in physics. There is, however, a demand for excursions.

- Experiments were viewed as an entertaining variation of the teaching of physics. Most pupils did not see the relevance of the practical work, and they did not believe in laboratory work as a source of knowledge. Some concepts of physics could yet be enlightened by the practical work.

Main conclusions

From these findings one can "conclude" that the demand of mathematics skills in the physics courses could be reduced. Pupils themselves do not believe knowledge in mathematics corresponding to the courses 2MX and 3MX is essential to studies in physics. A large number of pupils expressed dissatisfaction with the teaching of mathematics in general. Intentions of the 2FY formal curriculum as a more descriptive qualitative approach to physics than 3FY, does not seem to be fulfilled. It is therefore recommended that physics teachers apply a less mathematical approach to 2FY.

Pupils do not express a need for change in the contents of the physics curriculum, but many seem to take a strong stand towards the abundance of topics. There seems to be a need for more information about the topics presented in the physics courses. Pupils want to know what they will have to face when they choose physics as a subject. Schools should address this information to boys and girls separately. Due to the lack of female role models in physics, schools should guide the girls that already participate in physics courses since girls represent the greatest potential of future physics students.

Many pupils experience the passage between first year and second year studies at "videregående skole" as difficult. In addition they experience the first year of science and mathematics studies to be repetitive from earlier days at school. It is therefore suggested that a discussion of some of the contents in 2FY could/should be transferred to the first year science course, and that fragments of the mathematics course 2MX likewise are transferred to 1MX.

Pupils experience especially the mechanics of waves as a hard subject. It is therefore recommended that the teaching of, and the textbooks approach to this subject should be revisited.

The physics curriculum emphasizes that the teaching of physics should comprise project work. Pupils seem not to support this manner of teaching physics, but they would like excursions. These findings lead to recommend project work (if necessary), to form a part of excursions. Resources need to be established so that pupils have the opportunity to participate in this type of excursions. Through project work, girls may be confronted with literature beyond the school physics curriculum. In such a manner they may be given the opportunity to engage in the kind of literature (popular science magazines) they claim to be a greater part of boys' culture, than their own.

Girls should be heard when they ask for more of the subjects' historical – philosophical dimension. This would substantiate the curriculum's request for pupil's knowledge of the history of physics, and make clear that physics is an inherent part of our cultural heritage.

The kind of laboratory equipment pupils face in school science is not sufficient to conduct good experimental work.