School-leaving Examination in Physics at the end of Upper Secondary School in the Czech Republic – Current State

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Abstract. The paper presents selected results from a questionnaire survey conducted at Czech upper secondary schools. We focused mainly on the form of the school-leaving examination in physics, on the proportion of students who choose to take this exam in physics, and also on why students choose physics as one of the subjects, how they prepare for the examination in physics, and which topics in physics are, in their opinion, the easiest or, on the contrary, the most difficult in terms of preparation for the school-leaving examination in physics.

Introduction

In the Czech Republic, the framework educational programmes (FEPs) determine the compulsory content and the form of education. According to the FEPs, schools create their own school educational programmes (SEPs) in which the content of education is organized into integrated parts of the curriculum - most often into subjects. Our goal was to find out what the final examination in physics at the end of upper secondary school looks like.

Theoretical framework

The authors' literature searches [1] showed that the final exam in physics is chosen only by students of the general secondary school (*gymnasium*) and by students of the study field *technical lyceum*. The school-leaving examination in these types of schools is the **Maturita examination**. Its requirements are generally defined by the Education Act. The Maturita examination consists of a common (state) part and a profile (school) part. Within the profile part, the student chooses 2 to 3 subjects, and one of them can be physics. However, the offer, forms, and topics of the examinations in the profile part of the Maturita examination are the responsibility of the school headmasters, who determine them in accordance with the FEP and SEP. The Maturita examination in physics, as the only formal output of secondary physics education in the Czech Republic, differs to a certain extent between schools. Therefore, we decided to map it.

Methodology

We conducted a questionnaire survey, which consisted of two types of questionnaire: a **questionnaire for physics teachers** and a **student questionnaire** for students who chose physics as one of the subjects in the profile part of the Maturita examination in the school year 2020/2021. The sample consisted of general secondary schools (*gymnasiums*) and secondary schools with the study programme *technical lyceum*. Questionnaires were first sent to schools in April 2021, due to the COVID pandemic, repeated data collection took place in October 2021.

In total, questionnaires were sent to **366 gymnasiums** and **32 technical lyceums**. **102 questionnaires from gymnasiums** and **10 from technical lyceums have been returned to us**. The return rate is approximately 28.14 %. **94 questionnaires were filled in by students.**

Selected findings

Teacher questionnaire:

97 % of respondents answered that the Maturita examination in physics at their school has (also) an **oral form**, of which 97 % agreed with the statement that **"In the oral form of the Maturita exam, the student first draws a question**, **then has some time to prepare**, and **then presents his/her answer to the committee**."

89 % of respondents answered that **solving the problem (in physics) is part of the oral form of the Maturita exam in physics**. Typical **sources of problems** were **collections of tasks for gymnasium** and **textbooks for gymnasium**.

A **practical form** of the Maturita examination in physics can be found at 4 gymnasiums[1] and students can **write and defend their graduation thesis in physics** at 10 secondary schools.

Student questionnaire:

95 % of the students **studied** for the Maturita exam in physics **themselves**, 68 % **attended a physics seminar**, 44 % used **consultations with a teacher,** and 39 % **prepared** together **with their classmates**.

60 % of the students learned from their own **workbooks**, 49 % used already **processed Maturita topics from classmates and friends**, and 46 % mentioned **physics topics processed by themselves** as one of the sources of preparation for the Maturita examination.

82 % of students marked **mechanics** as the **easiest topic**, 41 % of students ranked **electricity and magnetism** among **the most difficult topics** in terms of preparation for the Maturita exam.

83 % of the **students** responded that they **are interested in and enjoy physics** and (also) therefore **chose it as one of the subjects** of the Maturita exam. 45 % and 44 % **understand and are good at it** or **need it for further study**.

79 respondents decided to **provide future school-leaving students with advice on preparing for the Maturita examination** (e.g. “start learning earlier and love physics”).

Conclusion

The questionnaire data confirmed the hypothesis that the oral form of the Maturita examination in physics prevails in most schools. In most schools, students are required to solve the physics problem in the oral part of the exam.

The proportion of school-leaving students who decide to take the Maturita examination in physics has been stable at around one-tenth of students over the last 3 school years. The students' interest in physics is the main reason to take the Maturita examination in physics. By far, mechanics was the easiest thematic area for school-leaving students in terms of preparation for the Maturita examination in physics; the most difficult area was electricity and magnetism.

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References

[1] Pschotnerová P. Physics Education in Upper Secondary Schools. In: Šafránková J, Pavlů J, editors. Week of Doctoral Students 2021. WDS'21 Proceedings of Contributed Papers — Physics; 2021 June 15-17; online. Prague: Matfyzpress; 2021. pp. 134-139.

[1] Teachers described the practical form of the Maturita examination in physics rather as a simple demonstration of a physics phenomenon, measurement of values or as work in a laboratory at the FNSPE.