The use of games in physics teaching

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Abstract. Game is a method of active learning, that teachers may use not only to fix already acquired knowledge, but also to convey new information, or as a means of assessment. In this paper we will present our research, which is focused on the use of games in physics teaching and on identifying the factors influencing the use/non-use of games in physics teaching by primary and secondary school teachers in Slovakia. The paper also compares the views of physics teachers from 2010, who were involved in research with the same focus, with the current views of physics teachers.

Introduction

The concept of game is very familiar to the pupils. They encounter it from their early childhood. This method can be much more attractive and enjoyable for them than frontal teaching. The inclusion of games into teaching can be a pleasant revitalization of regular classes not only for pupils, but also for teachers.

Kapp [1] defines a game as a system in which players are involved in solving an abstract challenge, defined by rules, interaction, and feedback. The outcome is a measurable result and often an emotional reaction.

Before including a game into teaching, it is necessary to methodically prepare it, make didactic adjustments to ensure that the outcome of the game meets the expectations [2]. In teaching, didactic, and educational games are used. Didactic games are based on solving problem tasks and situations. They are most used as forms of motivation, repetition, and practice of the topic [2]. Educational games are those didactic games that develop cognitive abilities and through which pupils acquire and develop factual knowledge and/or skills [3].

Like any teaching method, the game method has its advantages and disadvantages. Thanks to the games, pupils learn endurance, overcome obstacles and, especially, not to give up in case of failure. Games have a positive effect on the pupils' behaviour, because through games pupils also acquire ways and habits of acting. Through games, we ensure that pupils recognize their abilities and compare them with the abilities of their classmates. Pupils learn to cope with defeat. In addition, memory, imagination, and creative thinking are developed in pupils. The main obstacle to including games in the teaching process is the factor of time [5].

Theoretical framework, research, and research questions

Games in physics teaching can be used, for example, to motivate and activate pupils. Games provide not only a space for fixing knowledge, but also for a better understanding certain concepts and phenomena. Furthermore, they provide opportunities for problem-solving, exploration, and experimentation.

The aim of our research was to map the use of games in teaching physics and to identify external and internal factors influencing the use/non-use of games in teaching physics by primary and secondary school teachers in Slovakia. External factors include, for example, gender, years of practice, level of education, school size or class size. As for the internal factors, we were interested in the respondents' attitudes towards the selected 17 statements about the game as a teaching method in physics classes. Another aim of our research was to compare the attitudes of participating physics teachers with the attitudes of physics teachers from 2010 who participated in research with the same focus [6].

Methods and findings

The research was conducted among physics teachers of primary and secondary schools in Slovakia. The invitation to participate in the research was sent via email to all primary and secondary schools in Slovakia, based on the register of the Slovak Centre of Scientific and Technical Information. A total of 337 respondents participated in the research.

In the research, the method of electronic questionnaire was used. Simple-choice questions, multiple-choice questions, open-ended questions, closed-ended questions, and response matrices were used in the questionnaire. In this case, respondents rated the statements regarding game as a teaching method on a four-point Likert scale ranging from strongly disagree - disagree - agree - strongly agree.

Data collection using questionnaires took place from the beginning of December 2023 to the end of January 2024, while the analysis of the data is still ongoing.

In 2010, 167 physics teachers were involved in the same research [6]. The results of the research showed that only 28.7% of the respondents included games in their teaching. It also showed that respondents primarily used games in teaching physics as a motivational and fixation method.

Based on the initial results of our research, this percentage has not significantly increased at present. It is also true, that currently teachers use games to motivate students and practice previously acquired knowledge rather than using them for knowledge acquisition or skill development.

Conclusion

In the paper, we will present a complete descriptive statistic of the obtained data, which will also be compared with the results from 2010, to reveal how the situation has changed since then - how the rate of use of games in physics teaching is evolving and how the attitudes of physics teachers are changing. We will also summarize the possibilities of supporting physics teachers in integrating games into the teaching process, as well as preparing future physics teachers for using this method.

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