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MASTERING PHYSICS CONCEPTS AND DEVELOPING COGNITIVE INTEREST AMONG 7TH GRADE STUDENTS THROUGH CREATING THEIR OWN CROSSWORDS

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Abstract

The article examines the methodological value of crossword creation by 7th-grade students as a means of active engagement in the learning process of physics. It is shown that this activity contributes to deeper understanding of concepts, comprehension of physical phenomena, development of logical and creative thinking, and formation of a stable interest in the subject, which is taught for the first time as a separate discipline. Practical examples and the results of a pedagogical experiment are presented.

Keywords

Physics, school, student, crossword, learning process, interest, efficiency.

Physics is a subject that begins to be studied as a separate discipline in the 7th grade. During its study, students often experience difficulties in understanding the material.

Therefore, it is essential to motivate them from the very beginning so that their emotions and thinking become actively engaged.

This requires methods that facilitate the initial assimilation of material and develop a sustainable interest in the subject.

There are several approaches that increase students' interest in physics: preparing lesson outlines and reference cards (1–3), solving non-standard problems (4–6), creating infographics (7–13), designing tests, logical games, and so on.

From the standpoint of implementation in the 7th grade, constructing crosswords on various topics in physics (14–16) appears to be one of the most engaging and effective methods.

The term "crossword" (from the English "crossword" – the intersection of words) refers to an interweaving of rows of cells filled with words according to given

definitions.

The first crossword was created on December 21, 1913, by the American Arthur Wynne. Constructing and solving crosswords is an exciting and useful activity: they broaden horizons, train memory, serve as mental exercises, and enhance erudition.

In teaching physics in the 7th grade, crosswords can be used for quizzes, exams, tests, independent and homework assignments.

In most cases, crosswords used in school practice are ready-made by the teacher rather than created by students themselves.
Despite their engaging function, the role of student-created crosswords in school physics remains insufficiently explored and requires deeper analysis.
Such an activity motivates students much more than passively solving someone else's crossword. It helps them to better comprehend the interconnections of physical phenomena, develops critical thinking, and fosters the ability to analyze, systematize, and formulate definitions of terms.
Moreover, it enhances written communication and research skills. Creating crosswords represents not passive assimilation but active transformation of knowledge.

The pedagogical value of crosswords lies in combining elements of play and systematization of concepts. When creating them, students review and internalize terminology, practice identifying relationships between concepts, and develop creativity and analytical thinking. Students take on the role of "mini-teachers," which significantly increases the effectiveness of learning.The process of integrating crossword-creation tasks into the educational process can be organized as follows:— selecting a topic; — formulating definitions for terms, choosing key words, concepts, and names related to the topic;— creating a crossword grid using templates (manually or with ICT tools);— peer review: exchanging crosswords among students for solving;— discussing inaccuracies and challenges encountered.Discussion and exchange of their own crosswords help students develop the ability to argue and present their ideas.How to create a classical crossword. A step-by-step visual instruction can be found in the visual lesson (16). Below the crossword, one should include a list of questions arranged horizontally and vertically. Examples of crosswords on physics, created by 7th-grade students themselves, are presented in Figures 1 and 2. They can be used to reinforce students' knowledge of physics.

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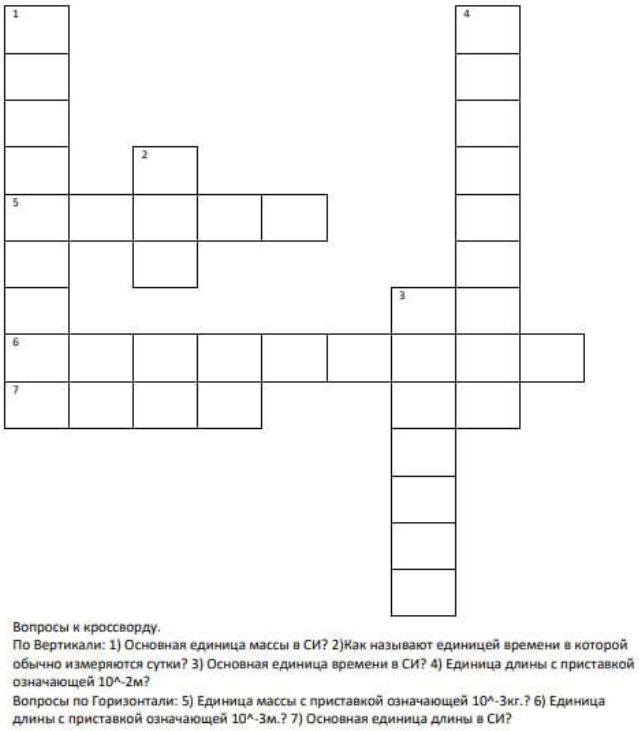
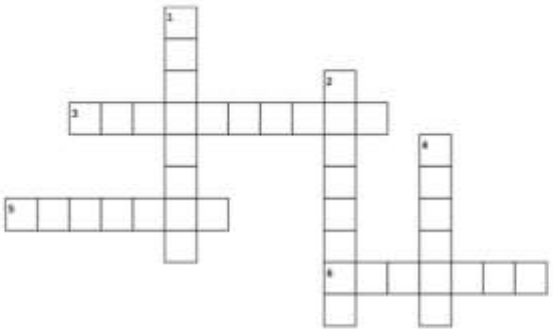


Вопросы к кроссворду.
По Вертикали: 1) Основная единица массы в СИ? 2)Как называют единицей времени в которой обычно измеряются сутки? 3) Основная единица времени в СИ? 4) Единица длины с приставкой означающей 10^-2м?
Вопросы по Горизонтали: 5) Единица массы с приставкой означающей 10^-3кг.? 6) Единица длины с приставкой означающей 10^-3м.? 7) Основная единица длины в СИ?

Fig. 1.



По горизонтали

3. Процесс перехода вещества из твёрдого состояния сразу в газообразное
5. Физическая величина, характеризующая способность тел совершать работу
6. Вид энергии, который передаётся от более нагретого тела к менее нагретому

По вертикали

1. Физическая величина характеризующая силу, с которой тело действует на единицу площади поверхности
2. Что является веществом, способным принимать форму сосуда, но сохранять свой объём?
4. Единицу энергии в системе СИ

Fig. 2.

Students independently selected terms and formulated definitions. This task not only reinforced theoretical material but also demonstrated the importance of clear and logical definition formulation.
After creating the crosswords, students exchanged and solved each other's works.

Research has shown that the use of crosswords created by students significantly increases the amount of long-term retained information.
In an experiment with 7th-grade students, the effectiveness of learning improved when crosswords were used.
Surveys revealed high motivation and positive perception of tasks involving the creation and solving of crosswords developed by the students themselves.

Conclusion

The creation of crosswords by students within physics lessons is not merely a game form but an effective method for activating cognitive activity and developing metacognition.

It is especially beneficial at the initial stage of studying physics, when basic concepts and motivation for further learning are being formed.

A pedagogical experiment with 7th-grade students demonstrated that this method improves academic performance.

Our research indicates the high potential of this method. For further development, it is advisable to conduct empirical studies among different age groups and across various topics of the school physics curriculum.

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