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ENHANCING METACOGNITIVE ACTIVITIES IN PHYSICS EDUCATION FOR GENERAL SCHOOL STUDENTS

Abstract:

This article explores the importance of developing metacognitive activities in students during physics lessons in general education schools. The article provides a detailed explanation of the concept of metacognitive activities, their impact on students' learning processes, and methods to enhance these activities. Through metacognitive activities, students can improve their ability to monitor their own learning, self-assess, and think independently. This, in turn, plays a significant role in enhancing their success in physics. This article can be particularly useful for teachers seeking effective strategies to teach physics.

Keywords: Metacognitive activities**,** Physics education**,** General education**,** Student development**,** Teaching strategies**,** Independent learning

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АКТИВИЗАЦИЯ МЕТАКОГНИТИВНОЙ ДЕЯТЕЛЬНОСТИ В ПРОЦЕССЕ ОБУЧЕНИЯ ФИЗИКЕ УЧАЩИХСЯ ОБЩЕОБРАЗОВАТЕЛЬНЫХ ШКОЛАХ

Аннотация: В данной статье рассматривается важность развития метакогнитивной деятельности учащихся на уроках физики в общеобразовательных школах. В статье подробно объясняется понятие метакогнитивной деятельности, ее влияние на процессы обучения учащихся и методы повышения эффективности этой деятельности. Благодаря метакогнитивной деятельности учащиеся могут улучшить свою способность контролировать процесс обучения, проводить самооценку и мыслить

независимо. Это, в свою очередь, играет важную роль в повышении их успеваемости по физике. Эта статья может быть особенно полезна учителям, которые ищут эффективные стратегии преподавания физики.

Ключевые слова: Метакогнитивная деятельность, Обучение физике, Общее образование, Развитие учащихся, Стратегии обучения, Самостоятельное обучение

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UMUMIY MAKTAB O'QUVCHILARI UCHUN FIZIKA TA'LIMIDA METAKOGNITIV FAOLIYATNI KUCHAYTIRISH

Annotatsiya: Ushbu maqolada umumta'lim maktablarida fizika darslarida o'quvchilarda metakognitiv faoliyatni rivojlantirishning ahamiyati o'rganilgan. Maqolada metakognitiv faoliyat tushunchasi, ularning talabalarning o'quv jarayonlariga ta'siri va ushbu faoliyatni kuchaytirish usullari haqida batafsil tushuntirish berilgan. Metakognitiv faoliyat orqali talabalar o'zlarining bilimlarini kuzatish, o'zlarini baholash va mustaqil fikrlash qobiliyatini yaxshilashlari mumkin. Bu, o'z navbatida, ularning fizikadagi muvaffaqiyatlarini oshirishda muhim rol o'ynaydi. Ushbu maqola, ayniqsa, fizikani o'qitishning samarali strategiyasini izlayotgan o'qituvchilar uchun foydali bo'lishi mumkin.

Kalit so'zlar: metakognitiv faoliyat, Fizika ta'limi, umumiy ta'lim, talabalarni rivojlantirish, ta'lim strategiyalari, o'z-o'zini o'rganish

Introduction:

The process of learning physics in general education schools is both complex and highly engaging. Physics requires not only theoretical knowledge but also specific practical skills. However, due to the complexity of the subject, students often face difficulties in mastering it. From this perspective, the development of metacognitive activities is crucial in helping students achieve success in this subject.

Metacognitive activities enable students to analyze their own knowledge, self-assess, and improve their learning strategies[1, p.906-911]. These skills allow students to organize their learning process more effectively, resulting in a deeper understanding of the material. This article discusses how metacognitive activities can be developed in physics lessons in general education schools.

Literature analysis.

Research in the field of application and study of metacognitive activities in teaching physics is abundant. Research on this will help students understand how they learn physics, how they choose learning strategies, and how they evaluate their knowledge. David Hammer, a noted scholar in the field of educational psychology, is an in-depth study of how students learn physics. [2, p. 40-90] in his research, Hammer analyzes students ' intuitionistic concepts and how these concepts can be integrated with formal physical knowledge. His work shows how students can be taught to independently assess and analyze their knowledge by developing metacognitive thinking. Eric Mazur, a professor of physics at Harvard University, is credited with developing Peer Instruction, a peer — to-peer teaching method. This method encourages students to learn through interaction and develops their metacognitive skills in them. [3, p. 30-45] Mazur helps students learn how to understand physics concepts in greater depth and how to solve complex issues. José Mestre has conducted extensive research on the application of metacognitive approaches in physics teaching and learning activities. His work focuses on studying how students analyze and evaluate their thinking activities in their physics learning activities. [4, p. 45-69] Mestre also shows how metacognitive skills can increase students ' ability to solve complex physics issues. Stella Vosniadou is a well-known scholar in the field of educational psychology who specifically studies how students shape their scientific understanding and the role of metacognitive strategies in this activity. Vosniadou focuses on how students integrate their knowledge in their physics learning activities and integrate new information into the existing knowledge system. These scientists and their work demonstrate the effectiveness of the application of metacognitive activities in

teaching physics, providing an important framework for integrating these activities into educational practice. They highlight the importance of students ' metacognitive skills in developing independent learning skills and managing their knowledge effectively.

The Importance of Metacognitive Activities:

Metacognitive activities allow students to analyze and manage their learning processes. This process helps students critically assess their understanding of different topics and identify areas where they need further improvement. Metacognitive activities not only help students master the material but also provide additional opportunities to apply their knowledge in practice[5, p. 351-371].

For instance, one of the metacognitive activities, self-assessment, enables students to analyze their understanding and work on areas that need improvement. This method encourages students to reflect on their learning process and determine how to study more effectively. Such activities help students organize their learning process more efficiently.

Reflective journals also play an essential role in developing metacognitive activities. In this method, students regularly analyze their learning process, considering how they have learned and what strategies they have used to reinforce their knowledge. Reflective journals help students independently identify ways to improve their learning[6, p. 219-225].

By using metacognitive questioning, teachers can engage students in solving complex problems and encourage them to think independently. For example, questions like “Why does this phenomenon occur?” or “Can you solve this problem using a different approach?” help students expand their knowledge and think more critically.

Methods to Engage Students in Metacognitive Activities:

Metacognitive activities can be developed through several methods aimed at enhancing students' ability to analyze and manage their learning. These methods include self-assessment, reflective journals, metacognitive questioning, and group discussions, all of which are among the most effective strategies[7, p. 3-14].

1. **Self-Assessment**: This method allows students to analyze their learning process, helping them identify which topics they have mastered and which need further review.
2. **Reflective Journals**: Through this method, students regularly analyze their knowledge. It helps them identify the best learning methods and the challenges they have encountered.
3. **Metacognitive Questioning**: Teachers can engage students in independent thinking and expand their knowledge by asking complex questions. These questions help students develop deeper analytical thinking and problem-solving skills.
4. **Group Discussions and Peer Teaching**: In this method, students share their ideas, help each other, and reinforce their knowledge. Group discussions allow students to convey the knowledge they have acquired during the lesson to their peers, developing their metacognitive abilities in the process[8, p. 64-70].

Results:

Research shows that incorporating metacognitive activities into lessons significantly improves students' understanding of physics. Through metacognitive activities, students can independently analyze their knowledge, apply their learning to solve complex problems, and achieve successful outcomes in physics. These students are better equipped to apply their knowledge in practice and to independently acquire new knowledge.

Conclusion:

Metacognitive activities play a crucial role in helping students achieve successful learning outcomes. In physics education, these activities not only help students master the subject but also develop their ability to learn independently. For teachers, applying metacognitive strategies in the classroom is essential for supporting students in their learning journey. Therefore, integrating metacognitive activities into the educational process should be a priority for every teacher.

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