THE INTEGRATION OF TRADITIONAL AND MODERN TEACHING METHODS IN NATURAL SCIENCE EDUCATION

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Abstract *This thesis examines the integration of traditional and modern teaching methods in natural science education. It considers the educational value of explanation, demonstration, observation and practical exercises, alongside interactive, problem-based and project-based learning and the use of digital educational resources. The discussion focuses on how a purposeful combination of these approaches can support the understanding of scientific concepts, critical thinking and practical skills. It also emphasizes the importance of selecting teaching methods in accordance with lesson objectives and the content of the subject.*

Keywords: *natural science education, traditional teaching methods, modern teaching methods, interactive learning, digital technologies, critical thinking, STEM education, practical skills.*

Аннотация *В тезисе рассматривается интеграция традиционных и современных методов обучения в преподавании естественных наук. Раскрывается значение объяснения, демонстрации, наблюдения и практических занятий, а также интерактивного, проблемного и проектного обучения и цифровых образовательных ресурсов. Особое внимание уделяется возможностям сочетания данных подходов для усвоения научных понятий, развития критического мышления и практических навыков.*

Ключевые слова: *естественно-научное образование, традиционные методы обучения, современные методы обучения, интерактивное обучение, цифровые технологии, критическое мышление, STEM-образование, практические навыки.*

Аннотация *Тезисда табиий фанларни ўқитишда анъанавий ва замонавий таълим методларини уйғунлаштириш масаласи ёритилади. Тушунтириш, намойиш этиш, кузатиш ва амалий машғулотлар каби анъанавий методлар, шунингдек, интерактив, муаммоли ва лойиҳавий таълим ҳамда рақамли таълим ресурсларининг аҳамияти кўриб чиқилади. Ушбу ёндашувларни мақсадли уйғунлаштириш орқали илмий тушунчаларни ўзлаштириш, танқидий фикрлаш ва амалий кўникмаларни ривожлантириш имкониятларига эътибор қаратилади.*

Калит сўзлар: *табиий фанлар таълими, анъанавий таълим методлари, замонавий таълим методлари, интерактив таълим, рақамли технологиялар, танқидий фикрлаш, STEM таълими, амалий кўникмалар.*

INTRODUCTION

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Natural science education contributes to the development of scientific knowledge, logical reasoning and an understanding of the natural environment. Its objectives include not only the acquisition of theoretical information but also the ability to interpret phenomena, make observations and apply knowledge in practical situations. Traditional methods such as explanation, questioning, demonstration and observation remain important for the systematic presentation of subject matter. At the same time, interactive learning, problem-based tasks, project work and digital resources offer additional opportunities for active student participation. The central issue is therefore not the replacement of one group of methods by another, but their purposeful combination.

MAIN PART

Traditional teaching methods provide a structured way to introduce and consolidate scientific knowledge. Through explanation, a teacher can clarify concepts, terms and relationships between natural phenomena. Demonstration makes abstract or difficult-to-observe processes more accessible, while observation helps learners identify characteristics, compare objects and record changes. Practical and laboratory exercises allow students to connect theoretical information with direct experience.

Modern approaches can extend these learning opportunities. Interactive learning involves students in discussion, collaborative tasks and the exchange of ideas. Problem-based learning begins with a question or problem that requires learners to examine information, formulate possible explanations and justify conclusions. Project-based learning connects subject knowledge with a sustained practical task, such as investigating an environmental issue or examining the use of local natural resources.

Digital educational resources, including presentations, educational videos, simulations and virtual laboratory materials, can support the visualization of scientific processes. Their use is most effective when linked to a clear learning objective and followed by discussion, observation or practical work. Digital tools should therefore complement the teacher's explanation and students' direct engagement with the subject rather than serve as an end in themselves.

Research literature provides support for active approaches to learning. Prince's review discusses evidence on active learning and related instructional approaches [1]. Freeman and co-authors report that active learning is associated with improved student performance in science, engineering and mathematics courses [2]. These findings support the careful use of student-active methods alongside structured instruction.

The combination of methods should be determined by the content and objectives of a particular lesson. For example, when studying environmental protection, the teacher may first explain key concepts, then organize a group analysis of an environmental problem, use digital materials to examine relevant information and ask students to present practical recommendations. In this sequence, explanation provides the conceptual basis, while collaborative and project-oriented activities create opportunities to apply the knowledge.

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CONCLUSION

The integration of traditional and modern teaching methods can strengthen the organization of natural science education. Traditional methods support the clear and systematic presentation of knowledge, while interactive, problem-based and project-based approaches encourage participation, analysis and the practical application of scientific ideas. Digital resources can provide additional visualization when they are selected in accordance with the lesson objectives.

Practical recommendations include combining explanation and demonstration with interactive activities; using observation and laboratory exercises to connect theory with experience; introducing problem-based and project-based tasks where appropriate; selecting digital resources that clarify the subject matter; and choosing each method according to the learning objectives and content of the lesson.

References

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