

# Methodology Of Teaching Astronomy by Using Pedagogical And Information Technologies In The Organization Of Educational Classes

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## Abstract

*This article examines the methodological aspects of organizing astronomy educational classes through the effective use of pedagogical and information technologies. The study analyzes the didactic potential of interactive teaching methods, digital educational resources, multimedia tools, and virtual laboratories in the formation of students' astronomical knowledge. Particular attention is paid to the structure, content, and stages of implementing teaching methodologies based on pedagogical and information technologies. The article also highlights the role of interdisciplinary integration in astronomy lessons, the development of students' independent and creative thinking, and the improvement of educational effectiveness. The research results provide a methodological basis for introducing innovative approaches in astronomy education.*

**Keywords:** Astronomy, educational classes, pedagogical technologies, information technologies, interactive methods, digital learning resources, innovative teaching, integrative approach, virtual laboratories, educational effectiveness.

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## 1. Introduction

Modern technologies, as a product of social development, are designed to make human activities easier, faster, and more efficient. In particular, the rapid advancement of information and communication technologies (ICT) has made a significant contribution to the development of all sectors. In today's society, the inability to effectively use modern technologies in professional activities is considered a serious shortcoming, especially in the field of education.

**Material and Methods.** Interdisciplinary integration in teaching astronomy: In modern education, interdisciplinary integration is considered one of the most effective approaches to improving learning outcomes. Astronomy is closely connected with physics, geography, mathematics, and information technology.

Teaching topics such as the 'Sun and the Solar System' through an integrative approach promotes deeper understanding and systematic thinking among students.

In contemporary education, interdisciplinary integration and the use of digital technologies are among the key factors in improving educational effectiveness. Natural sciences such as physics, geography, and astronomy are closely interconnected, and their integrated teaching contributes to the development of students' analytical thinking and a deeper understanding of the universe. For example, when the topic "The Sun and the Solar System" is taught using modern ICT tools in an integrated manner, students demonstrate a higher level of comprehension and engagement.

The integrative approach represents a teaching methodology that combines multiple disciplines within a

single thematic framework to provide learners with comprehensive knowledge. Within the “Sun and Solar System” section, the following interdisciplinary connections can be effectively implemented:

- Physics: the nature of solar radiation, energy transfer, electromagnetic waves;
- Geography: formation of climate zones, time zones influenced by solar radiation;
- Mathematics: planetary orbital speed, distance calculations, motion formulas;
- Information Technologies: 3D modeling, animations, simulations, and virtual laboratories.

### Analysis and Results

Teaching the “Sun and Solar System” unit through an integrative approach supported by information technologies increases students’ interest in science, strengthens their practical skills, and creates an educational environment aligned with modern pedagogical requirements. Therefore, technology-enhanced integrated lessons play a crucial role in improving educational quality. ICT tools significantly enhance the interactivity and visualization of astronomy lessons, particularly in teaching the “Sun and Solar System” section. Effective tools include:

- Stellarium – real-time simulation of celestial objects;
- Solar System Scope – a 3D model of the Solar System;
- NASA simulations – visualization of solar flares and convection processes;
- Google Earth/Maps – analysis of solar radiation distribution on Earth;
- QR-based tests and online quizzes – rapid assessment of learning outcomes.

The rapid development of ICT continues to play a vital role in the advancement of education. University professors’ ability to effectively apply digital tools in teaching demonstrates their capacity to organize exemplary instructional activities. In astronomy education, the use of modern information technologies has become one of the most pressing pedagogical challenges.

Today, numerous global databases provide extensive information in the fields of astronomy, astrophysics, and space research. These databases can be categorized into observational data repositories and bibliographic

databases. Observational databases include information on observation results, projects, software, and instrumentation. Such resources enable continuous updating of parameters and data when teaching the solar system using an integrated approach.

Specialized astronomy websites offer significant educational opportunities, including:

- interactive visualization for simplifying complex concepts;
- access to real and up-to-date scientific content;
- opportunities for independent and self-paced learning;
- interdisciplinary integration with physics, geography, and computer science.

Digital Tools and Virtual Resources: The use of digital tools such as Stellarium, Solar System Scope, NASA simulations, Google Earth, and online assessment platforms makes astronomy lessons more interactive and visually rich. These tools allow students to observe astronomical phenomena virtually and develop practical skills through simulations and interactive tasks.

### Conclusion

The integration of pedagogical and information technologies in astronomy education significantly enhances the effectiveness of the learning process. Technology-based and interdisciplinary teaching methods increase students’ interest in science, develop their analytical thinking, and contribute to the formation of a scientific worldview. Therefore, the use of modern digital technologies in astronomy teaching is a key factor in improving the quality of education.

### References

1. Barakayeva S. INTEGRATIVE APPROACH IN ASTRONOMY TEACHING AND ITS PRACTICAL ESSENCE // Science and innovations. – 2024. – T. 3. – No. B1. – S. 390-392.
2. BARAKAYEVA S. METHODOLOGY OF INTERDISCIPLINARY TEACHING OF THE SUBJECT OF THE PLANET "SATURN" FROM ASTRONOMY //News of UzMU journal. - 2024. - T. 1. – no. 1.2. - S. 71-75.
3. Barakayeva Sarvinoz Tolqunovna. "THE ROLE OF ASTRONOMICAL COMPONENTS IN THE INTERDISCIPLINARY TEACHING OF THE "SUN AND SOLAR SYSTEM" SECTION FROM ASTRONOMY." Uzbek Scholar Journal 24 (2024):

109-113.

4. Akhmedov B.J. Effect of general relativity in macroscopic electrodynamics: Autoref. ... d-ra f.-m. science - I'm sorry. Ulugbeka, 2001
5. M. Mamadazimov, B.F. Izbosarov, I.R. Kamolov. Astronomy. Typography "Sano-standard". Tashkent. 2013. str.75.
6. Kamolov I.R., Kamalova D.I. , Sayfullayeva G.I., Barakayeva S.T., Hamroyeva S.N. O.Avezmuradov "Astronomy Teaching Methodology" textbook Khorezm-2023
7. D.Kamalova and others. Research of electro physical and physicochemical properties of fillers for production of composite polymer materials. Solid State Technology. November 27. 2020. Volume 63, Issue 6. pp 9771-9777. SCOPUS.
8. Narbaev A.B. Media education as a tool in teaching astronomy based on an innovative approach: Ped. science. ... false. Dr. (Phd) ... Diss.
9. Kamolov, S.T. Barakayeva Intellectual property agency "Solar system and its planets" DGU 05797 patent for the electronic training manual program, Tashkent-2018