DIDACTIC OPPORTUNITIES OF INNOVATIVE APPROACHES IN TEACHING ENGINEERING AND COMPUTER GRAPHICS

Xamidov Dilshod Olimjon o'g'li
Gulistan State University
dilshod970422@gmail.com

Abstract: *This article analyzes the pedagogical opportunities of teaching engineering and computer graphics based on innovative approaches. The role of graphical thinking, spatial imagination, and digital technologies in developing students' professional and creative competencies is highlighted. In addition, the didactic effectiveness of the integrated use of traditional graphic activities and the AutoCAD program is revealed. According to the research results, the educational process organized on the basis of innovative approaches contributes to the development of students' independent thinking, practical activity, and creative competencies.*

Keywords: *Engineering graphics, computer graphics, innovative approach, professional-creative competence, graphic thinking, AutoCAD, spatial imagination, didactic system, creative activity.*

Introduction

Today, one of the important tasks of higher education is the formation of professional competencies of students studying in engineering and technological fields in accordance with modern requirements. In particular, teaching engineering and computer graphics based on innovative approaches is becoming increasingly important in the context of rapidly developing digital technologies.

Engineering and computer graphics play a significant role in developing students' technical thinking, graphic literacy, spatial imagination, and design skills. Therefore, along with traditional teaching methods, the use of modern digital technologies and graphic software contributes to improving the effectiveness of education.

The widespread use of software tools such as AutoCAD, Kompas 3D, and SolidWorks in higher education practice is bringing graphic activity to a new stage. This expands the didactic opportunities for developing students' professional and creative competencies.

The main purpose of innovative approaches in teaching engineering and computer graphics is to develop professional competencies by integrating theoretical knowledge with practical activities. In this process, graphical thinking, spatial imagination, creative thinking, and modeling skills are of particular importance.

In an educational process organized on the basis of innovative approaches, the student transforms from a passive listener into an active participant. In particular, the use of methods such as problem-based learning (PBL) and design-based learning (DBL) develops students' independent thinking abilities.

The integration of traditional graphic activities and digital technologies is an important pedagogical factor in engineering graphics education. Manual drawing helps students develop graphical imagination, geometric thinking, and constructive abilities, while the use of AutoCAD enables practical designing, modeling, and preparation of technical drawings according to modern standards.

Organizing graphic assignments in gradually increasing levels of complexity activates students' cognitive activity. In this process:

- graphical analysis;
- object modeling;
- searching for technical solutions;
- practical designing;
- reflective assessment

are implemented in an interconnected manner.

The effectiveness of innovative approaches in teaching engineering and computer graphics is determined by the following pedagogical factors:

- the use of interactive methods;
- application of visual information technologies;
- organization of students' independent learning activities;
- practical assignments based on graphic modeling;
- implementation of reflective monitoring and diagnostic assessment.

Research results show that practical classes organized through graphic software significantly improve students' graphic literacy and spatial thinking. In particular, practical tasks performed using AutoCAD help students develop skills in preparing technical drawings accurately and according to standard requirements.

Furthermore, an educational environment organized on the basis of innovative approaches contributes to the development of:

- creative thinking;
- professional adaptability;
- problem-solving skills;
- independent decision-making;
- analytical practical activity.

Conclusion

In conclusion, teaching engineering and computer graphics based on innovative approaches has important pedagogical opportunities for developing students' professional and creative competencies. The integration of traditional graphic activities with modern graphic software contributes to the development of students' graphical thinking, spatial imagination, and practical design skills.

In addition, the educational process organized through interactive methods, graphic modeling, and digital technologies activates students' independent and creative activities. Therefore, the use of innovative approaches in teaching engineering and computer graphics is considered one of the important factors in improving the quality of higher education.

References:

1. Tolipov O., Usmonboyeva M. Theory and Practice of Pedagogical Technologies. – Tashkent: Fan, 2017.
2. Sayidahmedov N. Modern Pedagogical Technologies. – Tashkent: Moliya, 2019.
3. Abduqodirov A. Innovative Technologies in Education. – Tashkent: O‘qituvchi, 2020.
4. Shomirzayev M.X. Engineering Graphics and Computer Technologies. – Tashkent, 2021.
5. AutoCAD User Guide. Autodesk Official Documentation, 2023.
6. Yuldoshev J., Xasanboyev J. Modern Pedagogical Technologies. – Tashkent, 2020.
7. Qodirov R. Methods of Teaching Engineering Graphics. – Tashkent, 2022.
8. Karshiboeva, D. B. "The role of composition in activation of creative abilities." Экономика и социум 3-1 (130) (2025): 152-156.

9. Ch, Sadatov, and D. O. Xamidov. "AUTOCAD DASTURINING UCH O ‘LCHAMLI LOYIHALASH IMKONIYATLARI." MODELING" PANELI BUYRUQLARI." VISUAL STYLES"," VIEW" PANELI BUYRUQLARI VA ULARNING IMKONIYATLARI." Экономика и социум 5-2 (108) (2023): 325-329.

10. Olimjon o‘g‘li, Xamidov Dilshod. "AUTOCAD DASTURI ASOSIDA TALABALARNING KASBIY-IJODIY KOMPETENSIYALARINI SHAKLLANTIRISH METODIKASI." MASTERS 3.31 (2025): 1-5.

11. Xamidov, D. O. "AutoCAD dasturi yordamida muhandislik va kompyuter grafikasi fanini o ‘qitishda innovatsion metodlardan foydalanish." Строительство и образование 4.6 (2025): 188-191.

12. Abdalov, Umidbek, et al. "Smart Museum Technologies and Their Role in Promoting Technical Understanding of Industrial History." Archives for Technical Sciences 2.33 (2025): 421-429.

13. Xamidov, Dilshod. "THE IMPORTANCE OF TEACHING." ENGINEERING ENGINEERING COMPUTER GRAPHICS" IN HIGHER EDUCATION INSTITUTIONS." International journal of scientific researchers (IJSR) INDEXING 4 (2024): 320-323.

14. Pardaboevich J. N. Education of Young People in Eastern and Modern Spirit Taking Historical Values into Account //Innovative Science in Modern Research. – 2023. – С. 156-157.

15. Pardaboevich J. N. ORGANIZING VISUAL ARTS LESSONS AND ENHANCING THEIR EFFECTIVENESS BASED ON MODERN PEDAGOGICAL REQUIREMENTS //CONFERENCE OF MODERN SCIENCE & PEDAGOGY. – 2025. – Т. 1. – №. 5. – С. 162-166.