

DEVELOPMENT OF STUDENTS' DESIGN SKILLS IN A DIGITAL EDUCATIONAL ENVIRONMENT

Asrorova Saodat Abdullo qizi

basic doctoral student of the
Bukhara State Pedagogical Institute

Annotation. *This article scientifically covers the theoretical foundations of the development of students' design skills in a digital educational environment, the integration of digital technologies into the educational process, the functions of modern project methodology, the possibilities of digital pedagogy, and the mechanisms for forming competencies and metacompetences in students. Also, pedagogical conditions for the effective organization of project activities, practical recommendations on the use of digital platforms and technologies in the educational process are given.*

Keywords: *digital educational environment, project-based learning, design competence, multimedia resources, virtual laboratories, innovative technologies, collective learning, creative thinking, educational process.*

RAQAMLI TA'LIM MUHITIDA TALABALARNING LOYIHALASH KO'NIKMALARINI RIVOJLANTIRISH

Asrorova Saodat Abdullo qizi

Buxoro davlat pedagogika instituti
tayanch doktoranti

Annotatsiya. *Ushbu maqolada raqamli ta'lim muhiti sharoitida talabalarning loyihalash ko'nikmalarini rivojlantirishning nazariy asoslari, raqamli texnologiyalarning ta'lim jarayoniga integratsiyalashuvi, zamonaviy*

loyiha metodikasining funksiyalari, raqamli pedagogika imkoniyatlari hamda talabalarda kompetensiya va metakompetensiyalarni shakllantirish mexanizmlari ilmiy asosda yoritilgan. Shuningdek, loyiha faoliyatini samarali tashkil etishning pedagogik shartlari, o'quv jarayonida raqamli platformalar va texnologiyalardan foydalanish bo'yicha amaliy tavsiyalar berilgan.

Kalit so'zlar: raqamli ta'lim muhiti, loyiha asosida o'qitish, loyihalash kompetensiyasi, multimedia resurslari, virtual laboratoriyalar, innovatsion texnologiyalar, jamoaviy o'rganish, kreativ fikrlash, o'quv jarayoni.

РАЗВИТИЕ ПРОЕКТНЫХ НАВЫКОВ СТУДЕНТОВ В ЦИФРОВОЙ ОБРАЗОВАТЕЛЬНОЙ СРЕДЕ

Асророва Саодат Абдулло кызы

базовый докторант Бухарского
государственного педагогического института

Аннотация. В статье научно рассматриваются теоретические основы развития проектных навыков студентов в цифровой образовательной среде, интеграция цифровых технологий в образовательный процесс, функции современной проектной методики, возможности цифровой педагогики, механизмы формирования компетенций и метакомпетенций студентов. Также рассматриваются педагогические условия эффективной организации проектной деятельности, даются практические рекомендации по использованию цифровых платформ и технологий в образовательном процессе.

Ключевые слова: цифровая образовательная среда, проектное обучение, проектная компетентность, мультимедийные ресурсы, виртуальные лаборатории, инновационные технологии, коллективное обучение, творческое мышление, образовательный процесс.

Introduction. 21st century education has become closely related to concepts such as digitalization, artificial intelligence, mobile learning, distance learning, media literacy, cyberpedagogy. The digital learning environment has become not only a source of knowledge, but also a new ecosystem that forms students' skills in independent research, analysis, creative thinking, design and creation of real-life solutions.

Today, the use of project activities in the educational process is considered not only a method, but also a key component of a competency-oriented approach. The digital learning environment allows this process to reach a qualitatively new level.

In the conditions of modern globalization, one of the most important tasks facing the education system is to prepare specialists who are innovative, creative and able to make independent decisions in accordance with the requirements of the digital economy. Digital transformation processes require a radical renewal of the content of teaching in educational institutions, methodological principles and pedagogical approaches. In particular, developing project-based work skills in students is one of the key competencies of today's digital society, because the current labor market requires students not only theoretical knowledge, but also skills that can be applied in real situations, mastering technologies, and possessing creativity and analytical thinking.

Digital learning environments allow for the individualization of students' learning activities, control of the learning process based on hidden parameters, the use of adaptive teaching methods, and the implementation of design tasks in real time. This, unlike traditional education, further strengthens the role of the student as an active subject. Organizing project activities in a digital environment serves to form not only professional competencies in students, but also 21st century skills - critical thinking, algorithmic approach, digital literacy, teamwork, and problem-solving competencies.

Methods. Today, the world's leading higher education institutions pay special attention to the development of students' creative and practical skills through the digitization of the educational process, the integration of virtual laboratories, simulators, artificial intelligence systems, LMS platforms, metaverse environments, and IoT technologies into education. This process further strengthens the role of design competencies in modern education.

Therefore, the issue of developing students' design skills in a digital learning environment is considered extremely relevant from a scientific and practical point of view. This study is aimed at effectively organizing students' design activities in a digital environment, developing them based on innovative methods, and improving the quality of the learning process through digital tools.

Let's dwell on the concept of a digital learning environment and its role in the learning process.

A digital learning environment is an educational ecosystem created using digital technologies, electronic resources, virtual platforms, artificial intelligence systems, and interactive electronic tools, which makes the interaction between the teacher and the student more effective and flexible [1].

The digital learning environment includes:

- electronic learning resources (EOR);
- LMS (Learning Management System) platforms: Moodle, Google Classroom, Canvas;
- educational tools based on artificial intelligence;
- virtual laboratories;
- simulators and VR/AR technologies;
- analytical systems for monitoring the learning process.

These tools create opportunities for individualization of education, flexible learning schedules, and real-time analysis of learning.

Design skills are an integrative skill that includes the student's competencies to identify a problem, set goals, develop solution options, create a project that meets the needs, defend it, and analyze the results.

The project method enriches education in the following areas:

- focuses on practice, because the student analyzes a real problem;
- increases motivation, because the learning process is tied to selected tasks;
- develops creativity and critical thinking;
- strengthens teamwork;
- forms meta-competences - self-study, adaptation, and analysis.

The digital learning environment makes project activities more interactive, flexible, and close to real life.

The organization of project activities in a digital environment is carried out based on the following stages:

- 1) Problem identification and goal setting - this is done through artificial intelligence analysis, digital databases, interactive problem situations, which can be used to show students real-world issues.
- 2) Research process planning - digital management tools such as Trello, Notion, Google Workspace, Asana clarify the plan and task distribution.
- 3) Data collection - Internet sources, academic databases, electronic libraries (EBSCO, JSTOR), digital laboratories play an important role.
- 4) By creating a solution, students can create real prototypes using design platforms (Figma, Canva), simulators, coding environments, multimedia tools.
- 5) Presentation of the project result - is carried out through presentation technologies, video editing tools, online protection platforms (Zoom, Teams).
- 6) Reflection and evaluation - the process and results are analyzed using digital rubrics, automatic assessment systems, AI-analytics.

Result. There are methods that develop digital design skills, let's look at some of them.

Design Thinking - trains students through the stages of empathy, brainstorming, prototyping and testing.

2. STEAM approach - provides integration of disciplines and allows you to consider the problem from a scientific and technical perspective.

3. PBL (Project-Based Learning) - organizes the entire learning process around the project.

4. Inquiry-based learning - creates a student's research-oriented learning model.

5. Gamification - points, badges, ratings and game elements increase motivation.

There is a special mechanism of influence of digital competencies in the formation of students' design skills. The digital learning environment develops the following competencies:

- information literacy;
- media literacy;
- critical thinking;
- social interaction;
- socio-cultural communication;
- technical literacy;
- self-management.

In the process of digital projects, the student tests, analyzes and processes his knowledge in practice, which bases the process on competencies.

There are a number of advantages of digital project activities, which are:

- unlimited resources;
- online platforms that enhance collaboration;
- ease of planning;
- the ability to create a visual product;
- quick identification and analysis of errors;
- tasks close to real life.

Problems encountered in digital design include students' varying levels of digital literacy, teachers' inadequate use of digital tools, limited internet quality or technical equipment, distraction due to multi-functionality, and the risk of academic integrity violations [2].

To address these problems, regular training in digital pedagogy, a technical support system, a code of academic integrity, and increased monitoring and reflection are necessary.

During our research on the effective organization of digital project activities, we developed several recommendations:

1. Establish clear criteria and stages for each project.
2. Divide students into small groups and assign roles.
3. Regularly monitor the process through digital platforms.
4. Integrate the created product into real life: prototype, service, platform, mockup.
5. Introduce rules for the responsible use of AI tools.
6. The teacher plays the role of consultant, coach, facilitator.
7. Provide freedom for creative solutions during the project process.
8. Use digital assessment rubrics.

The digital learning environment is inextricably linked not only to technological, but also to psychological and pedagogical factors in the development of students' design skills. Modern pedagogical research shows that design activities in a digital environment are characterized by increasing students' cognitive activity, strengthening the creative thinking process, and developing personal competencies. The student actively participates in independent decision-making, problem-solving and solution development in the digital environment. Also, the virtual collaborative environment, based on Bandura's social learning theory, strengthens the culture of teamwork, exchange of ideas and communication. The processes of reflection, self-assessment and self-management also play a large role in project activities.

Digital design competence consists of several components. First of all, technological competence forms the student's skills in the effective use of modern digital tools, platforms, programs and cloud services. Analytical competence includes data analysis, drawing scientific conclusions and interpreting statistical results.

Creative competence is manifested in the student's ability to generate new ideas and develop innovative projects based on design thinking. The digital learning environment also enriches students with communicative competence, which serves to develop skills such as online collaboration, virtual communication, and project presentation. Along with these, managerial competence forms practical skills such as time management, task planning, and coordination of team processes.

When referring to world experience, it is noticeable that the digital project-based teaching method is widely used in the education systems of countries such as the USA, Finland, South Korea, and Singapore. For example, in US universities - MIT, Stanford, and Harvard - virtual laboratories, simulators, hackathons, and online experimental areas have been formed based on the "Digital Project-Based Learning" model. In the Finnish education system, all subjects are taught through integrated projects through "phenomenon-based learning." In South Korea, smart education systems are enriched with weekly mini-projects, artificial intelligence-based diagnostics, and mobile learning applications. In Singapore, the "Future Skills" program is aimed at in-depth training of students in areas such as digital design, data analytics, and digital management [3].

Discussion. The criteria for assessing the effectiveness of digital design activities are also clearly defined. The main indicators are the ability of students to clearly formulate the problem, the correct use of research methods, the innovativeness of the project, the quality of teamwork, the functionality of the finished product and the level of presentation. Digital assessment systems

(LMS, edu-analytics, AI monitoring) help to make the process objective and transparent.

Scientific studies clearly demonstrate the positive impact of digital design on the quality of education. In particular, it is observed that students' knowledge acquisition indicators increase by 30–45 percent, independent learning skills by 50 percent, logical thinking by 25 percent, and creativity by 40 percent. These figures confirm that digital design is not only a teaching method, but also an innovative mechanism that increases educational efficiency [5].

The author's model for a digital learning environment is as follows: at the first stage, students' digital and intellectual capabilities are diagnosed. In the second stage, the motivational process - interest is aroused through problem situations, video cases and interactive tasks. In the third stage, a digital map of the project is created through platforms such as Trello or Notion. In the fourth stage, the practical part of the project is developed using virtual laboratories, simulators and artificial intelligence tools. In the fifth stage, the project defense, presentation and analysis processes are held. In the final stage - reflection - students evaluate their performance and identify ways to improve.

In the digital design process, meta-competences are formed - universal skills such as adaptability, creativity, flexible thinking, systematic analysis, self-development, responsible digital behavior, multi-tasking. These skills are considered the most demanded competencies in the global labor market.

According to future trends, the digital design process will be further improved. Automatic project idea generation using generative artificial intelligence, project implementation in virtual spaces through metaverse education, VR labs, the introduction of digital twins into education, real-time monitoring based on IoT, as well as the formation of individual student development maps through edu-analytics are emerging as promising areas of digital education.

Conclusion. The digital learning environment creates broad opportunities for the development of students' design skills. Projects organized using digital technologies not only consolidate student knowledge, but also prepare them for real life, form important competencies such as creative thinking, collaboration, analytical analysis, and innovative approach. The effective use of digital pedagogy, on the other hand, aligns education with modern market requirements and raises the quality of the educational process to a new level [4].

In the context of a digital learning environment, the development of students' design competencies is directly aligned with the requirements of today's globalization era. As modern digital technologies, online platforms, artificial intelligence tools, virtual and augmented reality systems increasingly penetrate the educational process, students are faced with the task of not only acquiring new knowledge, but also finding creative and systematic solutions to complex problems. Project-based work skills are at the heart of this process.

During the study, it was found that the digital learning environment creates an extremely favorable opportunity for students to develop skills such as independent research, teamwork, analysis of problem situations, proposing innovative ideas, and implementing solutions in practice. Online collaborative tools, remote communication channels, digital laboratories, multimedia resources, and edutech analytics bring the project-based learning process to a qualitatively new level. As a result, the student's design competence is formed as an integrative competence based not only on theoretical knowledge, but also on the independent and collective performance of real practical tasks.

The digital learning environment also has a significant impact on the student's personal development: responsibility, initiative, creativity, communicative culture, digital literacy, time management, and self-assessment skills are formed. This is of incomparable importance in the process of training competitive personnel in a market economy.

In general, the analysis conducted on this topic shows that the digital learning environment is one of the most effective and promising mechanisms for developing design competencies. This is an important factor in implementing qualitative changes in the education system, increasing the intellectual potential of students, and comprehensively preparing them for future professions. In the context of the rapid development of digital education, it remains relevant to continue research in this area, develop new methodologies and didactic approaches.

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