TA’LIMDA RAQAMLI SAVODXONLIKNI SHAKLLANTIRISH: UMUMTA’LIM MAKTABLARIDA INNOVATSION YONDASHUVLAR

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Annotatsiya: Ushbu maqolada umumta’lim maktablarida o‘quvchilarning raqamli savodxonligini shakllantirishga yo‘naltirilgan innovatsion pedagogik yondashuvlar tahlil qilinadi. Raqamli savodxonlik — bu nafaqat texnik ko‘nikmalar majmui, balki raqamli muhitda tanqidiy fikrlash, axborotni tanqidiy baholash va ijodiy muammolarni hal etish qobiliyatlaridir. Tadqiqotda loyiha asosida ta’lim (project-based learning) va gamifikatsiya usullarini birlashtirgan integratsiyalashgan model sinab ko‘rilgan. Eksperimental ma’lumotlar shuni ko‘rsatadiki, innovatsion usullardan foydalanilgan tajriba guruhida raqamli savodxonlik darajasi nazorat guruhiga nisbatan 48,7% ga oshgan. Maqolada milliy ta’lim tizimida raqamli savodxonlik standartlarini joriy etish bo‘yicha amaliy tavsiyalar ham berilgan.

Kalit so‘zlar: raqamli savodxonlik, innovatsion ta’lim, gamifikatsiya, loyiha asosida ta’lim, umumta’lim maktabi, raqamli kompetensiya, axborot madaniyati, mediasavodxonlik, pedagogik texnologiya, ta’lim sifati.

DEVELOPING DIGITAL LITERACY IN EDUCATION: INNOVATIVE APPROACHES IN SECONDARY SCHOOLS

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Abstract: This article analyzes innovative pedagogical approaches aimed at developing students' digital literacy in secondary schools. Digital literacy is considered not merely as a set of technical skills but as the ability to think critically, evaluate information analytically, and solve creative problems in a digital environment. The study tested an integrated model combining project-based learning and gamification methods. Experimental data show that the digital literacy level in the experimental group increased by 48.7% compared to the control group. The article also provides practical recommendations for implementing digital literacy standards in the national education system.

Keywords: digital literacy, innovative education, gamification, project-based learning, secondary school, digital competence, information culture, media literacy, pedagogical technology, education quality.

INTRODUCTION

Today, education systems around the world are being reshaped against the backdrop of transformations known as the digital revolution. According to data from the Organisation for Economic Co-operation and Development (OECD), by 2025, 65% of the skills required in the labor market will relate to professions that do not yet exist today. This situation confronts education systems not only with the task of providing knowledge, but also of developing individuals who can solve problems in a digital environment, think critically, and continuously improve themselves [1; 4].

In Uzbekistan, the modernization of education has been identified as a priority direction of state policy. A 2023 Decree of the President of the Republic of Uzbekistan sets the goal of fully implementing a digital learning environment in all general education schools by 2030 [2]. However, in practice, the lack of sufficient pedagogical models and methodological frameworks for developing digital literacy remains a significant challenge.

The aim of this research is to analyze innovative pedagogical approaches aimed at developing students’ digital literacy in general education schools, test

them in practice, and experimentally prove their effectiveness. The results of the study will contribute to strengthening the theoretical and practical foundations of this dissertation work.

RESEARCH OBJECT AND METHODS

The research object consisted of students in grades 7–9 (total n=128, aged 13–15) from Specialized School No. 2 and General Secondary School No. 78 in Tashkent. The students were divided into two groups: an experimental group (n=65) and a control group (n=63). The study was conducted during the 2023–2024 academic year over one full semester.

The following methods were used in the study: observation and questionnaire survey, pedagogical experiment, a digital literacy assessment test developed based on the European DigComp 2.2 framework, the Mann–Whitney U test (to determine differences between groups), and the Wilcoxon signed-rank test (to determine within-group dynamics). In addition, semi-structured interviews were conducted with teachers, and pedagogical observations were recorded [3; 7].

In the experimental group, an innovative integrated model combining Project-Based Learning (PBL) and gamification was implemented. In the control group, traditional teaching methods were maintained.

LITERATURE REVIEW

The concept of digital literacy is interpreted differently in scientific literature. P. Gilster (1997) was among the first to introduce this concept into academic discourse, defining it as the ability to critically evaluate internet resources [4]. Later, this concept expanded significantly—UNESCO (2021) considers digital literacy as a combination of three main components: information literacy, media literacy, and technological literacy [5].

The European Union's DigComp 2.2 framework defines five key areas of digital competence: information literacy, communication and collaboration, digital content creation, safety, and problem-solving [3]. This framework serves

as the basis for updating educational standards in more than 30 countries worldwide.

Regarding Project-Based Learning (PBL), T. Markham (2011) emphasizes that PBL develops not only knowledge but also the ability to solve real-life problems [6]. Research by J. Larmer and J. Mergendoller (2015) demonstrates that PBL increases students' cognitive engagement by 35–40% compared to traditional education [8].

The effectiveness of gamification in education was extensively studied by K. Kapp (2012), who highlighted its role in increasing motivation [9]. Swiss researchers J. Hamari et al. (2016), based on 24 different studies, found that student engagement increases by 22–48% in gamified learning environments [10].

In the context of Uzbekistan, A. A. Xoliqov (2022) substantiated the need to improve teachers' professional competence in implementing digital technologies in education [11]. M. R. Haydarov (2023) conducted research on a national model for developing media literacy among school students, emphasizing the need for standardized approaches in this field [12].

DISCUSSION

The innovative model implemented in the experimental group organically combines two main pedagogical approaches:

1. Project-Based Learning (PBL): Students worked in groups of 4–5 over six weeks on projects aimed at solving real digital problems. Project topics were selected by the students themselves, including identifying misinformation on social media, preparing digital reports for their local community, and creating cybersecurity video guides for classmates. At each stage, the teacher acted as a facilitator.

2. Gamification elements: The learning process incorporated ranking systems, badges, and level systems through Kahoot!, Quizizz, and a specially

developed “RaqamliUz” online platform. Students completed weekly “digital challenge” tasks and earned virtual rewards.

A key feature of the model is that each digital skill was taught not as an isolated technical exercise, but within the context of real-life problems. For example, in information literacy lessons, students conducted comparative analyses of internet sources on topics such as COVID-19 or climate change, evaluated the reliability of sources, and presented their conclusions to classmates.

RESULTS AND ANALYSIS

The results of the pedagogical experiment are presented in the following table:

Table 1. Dynamics of digital literacy indicators (DigComp 2.2, 100-point system)

Indicators	Initial (points)	Final (points)	Growth (%)
Experimental group (n=65)	48.7	72.4	+48.7%
Control group (n=63)	49.1	58.6	+19.3%

According to the Mann–Whitney U test, the difference between the experimental and control groups was statistically significant ($p < 0.01$). This confirms the effectiveness of the innovative pedagogical model on a solid scientific basis.

Analysis by specific indicators showed that the highest growth in the experimental group was observed in “digital content creation” (56.3% increase) and “information security” (51.4% increase). These results confirm the ability of the PBL method to actively engage students in creative activities.

Qualitative observations revealed that 91.2% of students in the experimental group independently learned additional digital tools during project work. Moreover, compared to the control group, extracurricular digital activities (such as blogging and creating socially meaningful content) were observed to be 3.2 times higher in the experimental group.

CONCLUSION

The conducted research allows the following conclusions:

First, the integrated model combining PBL and gamification is 2.5 times more effective than traditional approaches in developing digital literacy in general education schools. This highlights the necessity of incorporating innovative methods into national educational standards.

Second, digital literacy should not be taught as a separate subject but integrated across all disciplines. A holistic approach that includes not only technical skills but also critical thinking, ethical responsibility, and digital citizenship yields the most effective results.

Third, improving teachers' digital competence is a crucial condition for implementing digital literacy in education. Therefore, systematic modernization of teacher training and professional development systems is required.

Future research will focus on integrating artificial intelligence–based adaptive learning systems into this model and developing specialized methodologies for younger students (primary school level).

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