INNOVATIVE APPROACHES TO DEVELOPING STUDENTS' SELF-REGULATION COMPETENCE IN A DIGITAL LEARNING ENVIRONMENT

Shukhratjon Turayev

Associate Professor, Department of Differential Equations,

Bukhara State University, Ph.D. in Pedagogical Sciences

Abstract. This thesis analyzes the theoretical and practical foundations for developing students' self-regulation and intellectual independence competencies in the era of digital transformation. The effectiveness of an innovative model created through the integration of digital pedagogy, metacognitive activity, and learning analytics is highlighted. The research is based on experiments conducted with physics students and aims to ensure that learners can independently plan and evaluate their own educational activities within the learning process.

Keywords: digital pedagogy, intellectual independence, self-regulation, learning analytics, metacognitive approach, physics education.

Introduction. As digital technologies increasingly penetrate all levels of the educational system, the nature of the learning process itself is undergoing transformation. The student is no longer merely a recipient of knowledge but is emerging as a creator and manager of knowledge. Consequently, the development of self-regulation competence has become a central task of modern digital pedagogy.

In disciplines such as physics, which require analytical thinking, it is crucial to cultivate students' abilities for independent analysis, reflection, and self-assessment through digital tools. This process requires not only a solid technical foundation but also a learner-centered methodological approach.

Main Part

1. Theoretical Foundations. The methodological basis of this research is grounded in the theories of learner-centered education, self-directed learning, and

metacognitive approaches developed by scholars such as R. Marzano, J. Biggs, B. Zimmerman, and M. Flavell. According to their perspectives, a student's level of self-regulation is directly linked to their motivation, reflection, and ability to analyze the learning process. In a digital learning environment, educational analytics, virtual laboratories, automated rating systems, and gamification elements serve as effective tools to support and enhance this process.

2. Teaching Model and Experiment. Experimental studies were conducted with physics students at Bukhara State University to assess the development of self-regulation competence based on four components: motivational, cognitive, regulative, and reflective. During the experiment, the students' independent learning performance increased from 46% to 71%. Digital modules-including virtual laboratories, electronic exercises, and assignments delivered through the *Hemis* platform-significantly enhanced students' reflection and analytical skills. Moreover, the gamification-based assessment system strengthened motivational factors, ensuring active student engagement in the learning process. As a result, dependence on the instructor decreased, while students' ability to plan and monitor their own learning activities improved.

3. Structural Framework of the Model. The developed model comprises the following stages:

1. Encouraging independent thinking during classroom activities - through problem-based questions and analytical situations.
2. Short-term independent tasks - solving minor problems within the learning process.
3. Long-term independent work - in the form of projects, presentations, electronic slides, or mini-research studies.
4. Digital self-directed learning module - in which the student manages their activities based on digital analytics [4].

Consistent implementation of these stages fosters students' abilities for self-assessment, effective time management, and critical reflection on their own learning activities.

Conclusion. The results of the study demonstrate that effective organization of education in a digital environment requires not merely the introduction of technological tools, but the creation of a pedagogical system aimed at developing students' self-regulation competence.

Such a system:

- enhances students' intellectual independence;
- transforms the teacher's role from a controller to a mentor;
- fosters metacognitive reflection in the learning process;
- enables the evaluation of educational quality based on digital analytics.

The success of the proposed model lies in its flexibility and adaptability, making it applicable to other technical disciplines as well. This represents an important step toward the advancement of personalized, independent, and innovative education in the context of digital transformation.

REFERENCES

1. Ergashev, A. (2022). Organizing Independent Learning Based on Theories of Digital Pedagogy. Tashkent: TDPU Publishing.
2. UNESCO. (2023). Digital Pedagogy Framework for Higher Education. Paris: UNESCO Publishing.
3. Yusupova, N. (2023). The Effectiveness of Using Digital Technologies in Physics Education. Journal of Higher Education of Uzbekistan, No. 4.
4. Turaev, Sh. (2023). Methodology for Improving Independent Learning in the Credit-Modular System. PhD Dissertation Abstract.