

Methodological Challenges in Implementing Integrative Software in The Educational Process

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Abstract: This article examines methodological challenges associated with the implementation of integrative software in the educational process. Through an analysis of pedagogical experiment results, the effectiveness of the integrative approach and the primary barriers to its application have been identified. Based on the research findings, practical recommendations have been developed.

Keywords: Integrative software, methodological challenges, pedagogical technologies, Articulate software, interactive education, educational process, digital education, competence, electronic learning resources, pedagogical experiment, quality of education.

Introduction: The rapid development of information and communication technologies in the twenty-first century demands fundamentally new approaches to the education system. The Concept for the Development of the Education System of the Republic of Uzbekistan for 2019–2030 designates the integration of modern digital technologies into the educational process as a priority direction [1]. At the same time, it must be acknowledged that the practical implementation of integrative software entails a number of methodological challenges.

The integrative approach refers to the coordinated application of various disciplines, methods, and technologies [2]. In the field of education, this approach makes it possible to develop students' knowledge, skills, and competencies as a unified system. However, in practice, educators encounter various difficulties when introducing this approach.

At present, software tools such as Articulate, iSpring, and Adobe Captivate are widely employed in the educational process [3]. These programs offer capabilities for creating interactive learning materials, developing electronic textbooks, and organizing distance learning. Nevertheless, the effective use of

such software requires educators to receive specialized training and to have access to appropriate methodological support.

Research indicates that the following problems are observed in the process of implementing integrative software in many higher education institutions: inadequate digital literacy among educators, a shortage of methodological manuals, imperfect technical infrastructure, and poorly adapted curricula [4]. Resolving these challenges is the key to improving educational quality and successfully advancing digitalization.

LITERATURE REVIEW

A number of studies on integrative education have been conducted in Uzbekistan. In their research, M. Ochilov et al. [6] examined interdisciplinary integration in the educational process, emphasizing the importance of the integrative approach for the development of students' critical thinking. Sh. Abdullayeva [7], in her dissertation, analyzed methodological challenges involved in integrating information technologies into the educational process and substantiated the necessity of continuous professional development for educators.

In their collaborative work, N. Muslimov and U.

Usmonbaeva [8] developed a methodology for implementing a system of integrative modules in vocational education. The researchers experimentally confirmed the effectiveness of the integrative approach in the formation of professional competencies. R. Djurayev's monograph [9] presents the theoretical foundations of educational technology design, providing a detailed analysis of the didactic potential of integrative technologies.

B. Zakirova [10] developed a methodology for creating and applying digital educational resources in higher education. The author identified the primary challenges encountered in developing digital content and proposed practical recommendations for overcoming them.

Issues of integrative education have also been extensively studied in international research. J. Beane [11] developed the theoretical foundations of integrative curriculum, defining integration as 'the meaningful connection of various fields of knowledge.' R.M. Clark and S.C. Andrews [12] experimentally demonstrated the positive effect of integrative teaching methods on student achievement.

M. Bower [13] proposed the application of design thinking to educational technology planning, arguing that accounting for user needs is the primary factor for success in technology implementation. C. Pappas [14] analyzed the use of integrative software in eLearning and evaluated its didactic potential.

A. Khalil et al. [15] identified the following conditions for the successful implementation of integrative software in the educational process: continuous professional development for educators, institutional support, adequate technical infrastructure, and the availability of methodological resources. L. Puente-dura [16] classified the levels of technology integration into education through the SAMR model, which is of considerable importance for evaluating the effectiveness of integrative software application.

METHODOLOGY

The study employed a combination of theoretical and empirical methods. Theoretical methods included a review and analysis of scientific and methodological literature related to the topic, a systemic approach, comparative analysis, and synthesis. Empirical methods comprised observation, survey, interview, pedagogical

experiment, and mathematical-statistical analysis.

The pedagogical experiment was conducted during the 2024–2025 academic year at three higher education institutions in Tashkent. A total of 240 students participated in the experiment: 120 constituted the experimental group and 120 the control group. The experimental group utilized interactive learning materials developed with integrative software (primarily Articulate Storyline 360), while the control group was taught using traditional instructional methods.

Throughout the experiment, measurements were carried out according to the following criteria: level of knowledge acquisition, student motivation, attitudes toward interactive materials, and independent learning skills. The measurement results were analyzed on the basis of qualitative and quantitative indicators.

The pedagogical experiment was conducted in three stages:

The first stage (preparatory): identification of experiment participants, administration of diagnostic tests, and development of learning materials based on integrative software.

The second stage (main): organization of the educational process in the experimental and control groups, administration of interim assessments, and documentation of methodological problems encountered by educators.

The third stage (final): administration of final tests, collection of feedback through surveys, and statistical analysis of results.

For the purpose of identifying methodological challenges in the implementation of integrative software, a survey was conducted among 85 educators and 240 students. The survey consisted of two parts: the first addressed experience with integrative software, while the second focused on encountered challenges and ways to overcome them. The results were processed and analyzed using SPSS software.

RESULTS

The results of the pedagogical experiment demonstrated the positive impact of integrative software on the educational process. The initial diagnostic test scores of the experimental and control groups were nearly identical (experimental group:

62.4%; control group: 61.8%). According to the final test results, the level of knowledge acquisition in the experimental group reached 78.6%, compared to 68.2% in the control group (Table 1).

Table 1

Indicator	Experimental Group	Control Group	Difference
Pre-test	62.4%	61.8%	+0.6%
Post-test	78.6%	68.2%	+10.4%
Growth Dynamics	+16.2%	+6.4%	+9.8%

The calculated results using Student's t-test ($t = 2.87$; $p < 0.05$) confirmed that the difference between the experimental and control groups was statistically significant. This provides evidence that integrative software exerts a positive influence on the educational process.

The survey conducted among educators made it possible to identify the primary challenges encountered in the implementation of integrative software. The responses of the 85 educators who participated in the survey are presented in Table 2.

Table 2

No.	Problem Type	Percentage
1	Insufficient technical knowledge and skills	72.9%
2	Lack of methodological manuals	68.2%
3	Insufficient time	64.7%
4	Imperfect technical infrastructure	58.8%
5	High cost of software	54.1%
6	Unadapted curricula	48.2%
7	Lack of administrative support	41.2%
8	Scarcity of content in the Uzbek language	37.6%

According to the data in Table 2, the most frequently encountered challenge is insufficient technical knowledge and skills (72.9%), indicating that educators have not received specialized training in working with integrative software. The second most common problem is the lack of methodological manuals (68.2%), reflecting the scarcity of relevant methodological literature in the Uzbek language.

The survey conducted among students in the experimental group also yielded important findings. Among the students, 84.2% rated learning materials created using integrative software as more convenient than traditional materials. Some 78.3% noted that interactive assignments enhanced the effectiveness of knowledge acquisition. At the same time, 31.7% reported encountering technical problems (slow internet connection, outdated devices).

During the experiment, 12 interactive modules were developed using Articulate Storyline 360. The modules incorporated the following elements: interactive slides, video tutorials, simulations, branching scenarios, and formative assessments. A total of 67.1% of educators

noted that the interface of Articulate software was relatively user-friendly, while 32.9% reported difficulties at the initial stage. The main difficulties cited included the creation of complex interactive elements, localization issues, and the configuration of SCORM packages.

The research findings indicated that, in order to effectively use Articulate software, educators should complete a specialized training course of at least 40–60 hours and acquire practical skills. Furthermore, mentoring support from experienced specialists is of critical importance at the initial stage.

CONCLUSIONS AND RECOMMENDATIONS

Based on the research findings, the following conclusions were reached:

First, integrative software significantly enhances the effectiveness of the educational process. The pedagogical experiment results demonstrated that the level of knowledge acquisition in the experimental group—where integrative software was employed—was 10.4 percentage points higher than in the control

group (78.6% versus 68.2%).

Second, the most frequently encountered challenges in implementing integrative software are: insufficient technical knowledge and skills among educators (72.9%), a shortage of methodological manuals (68.2%), and limited time resources (64.7%).

Third, modern authoring tools such as Articulate Storyline 360 offer extensive capabilities for creating interactive learning materials; however, their effective use requires specialized training for educators.

Fourth, students rate learning materials created with integrative software highly (84.2% positive evaluations), confirming the necessity of broad implementation of such technologies.

Based on the research findings, the following practical recommendations have been developed:

It is necessary to improve the professional development system for educators. It is advisable to organize specialized short-term courses (40–60 hours) on integrative software at higher education institutions. The courses should incorporate practical exercises alongside theoretical content.

Methodological support must be strengthened. It is recommended to develop methodological manuals, video tutorials, and collections of sample projects on the use of integrative software in the Uzbek language.

Technical infrastructure requires development. Higher education institutions should ensure the availability of modern computer labs, high-speed internet connectivity, and access to cloud services.

Institutional support must be reinforced. It is advisable for institutional leadership to implement systems to incentivize educators' innovative activities through both material and non-material forms of support.

Curricula need to be adapted. It is necessary to introduce appropriate amendments to academic plans and syllabi to accommodate integrative technologies, and to achieve optimal distribution of contact hours and independent study time.

In conclusion, the implementation of integrative software in the educational process constitutes an important factor for improving the quality of education. Through the gradual resolution of the identified methodological challenges and the implementation of the recommended measures, the effective application

of integrative educational technologies can be achieved.

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