

Pedagogical Software Tools Science of Teaching Software Methodological Delivery Creation Stages

Ermonov Sherzod Ibrayim o'g'li

Intern-teacher at the Department of Exact Sciences at Gulistan State Pedagogical Institute, Uzbekistan

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Abstract: This article, "Pedagogical," describes the science of teaching software and methods, delivering the creation of stages from a scientific and pedagogical perspective. Modern education, in the process of digital technology, interactive software products, and information and communication tools, is intensively developing pedagogical software tools. Output and their education, practice, and current achievement lead to the completion of a task. This is because this science, in accordance with effective software and methods, delivers the creation of an important profession. In this article, software and methods deliver the creation of a process sequentially and integrally connected stages based on analysis. In particular, the needs for definition and analysis are studied through the stage of science content, student preparation level, and education standards. In the design phase, learning objectives, learning materials, structure, methods, and tools are defined.

Keywords: Pedagogical software tools, methodological software supply, pedagogical design, education process modeling, electronics textbooks, interactive education technology, education program design, digital education environment, pedagogical effectiveness assessment in education information and communication technology, software products from test transfer.

Introduction: Modern education in the digital technology system involves intensive development and training, deepening progress, pedagogical activity, content, form, and methods. Changes are occurring, particularly in the field of information and communications. Technology, based on pedagogical software tools, is an inseparable structural process, encompassing knowledge, independent research, control, and evaluation processes. Effective organization plays a key role in the process, taking control. This "pedagogical" approach, in the sense of software "tools," is a science of teaching in the process, quality, scientifically based, and practical in terms of effective programmatic and methodological delivery. This problem is a current scientific and pedagogical problem as a manifestation. This is happening.

The research problem stems from the current state of higher education in institutions. Pedagogical software tools and teaching science utilize educational and methodological materials, electronic resources, and

software products. Their didactic, methodological, and technological aspects are often fragmented, unsystematic, or traditionally based on a working approach. As a result, students create, evaluate, and integrate complex knowledge, skills, and qualifications into the process. Specific problems surface soon. Furthermore, teaching, using software and methodological supplies, utilizes modern pedagogical technologies, a competency-based approach, and digital education requirements with compatibility. This is because pedagogical software tools and teaching science provide the necessary steps to create a scientifically sound, working solution. The current problem is considered to be the output and systematization of the software and methodological tools.

This study's main goal is to determine the successive stages of the work, the output, and their education in the process of effectiveness based on the provision of pedagogical software tools in the field of professional

competence development, their independent and creative activity support, and the learning process quality and efficiency to increase understanding.

Research on the topic being selected depends on several factors. First, education. The digital transformation system, under these circumstances, necessitated a sharp increase in the relevance of this subject. Today, not only ready-made electronic resources can be used, but also their pedagogical relevance to the goals of design, production, and improvement of skills. Expert training is necessary. Second, pedagogical software tools—science in teaching—provide software and methods to create a transparent process. The stages, their content, and interdependence are not sufficiently covered. Third, scientific research primarily focuses on technical or didactic aspects separately, considering the published pedagogical, methodological, and technological components. The integration of these components has not received sufficient attention. This is because this topic requires a complex approach based on research, and the need to explore the growing need is approaching the surface.

This research topic is also considered extreme in the current world. The development of digitalization, electronic and remote education, artificial intelligence, and adaptive teaching systems developed in countries around the world are widely used. In particular, the United States, the European Union, Japan, and South Korea are developing pedagogical software tools, and their current education process is growing in accordance with scientific research and practical projects. This is happening. In the process of creating transparent software and methods, interactive and adaptive pedagogical design models are widely used. This is also relevant in terms of this research perspective. This analysis of the experience and adaptation of national education systems is also relevant in terms of this research perspective.

Independent Commonwealth countries also have pedagogical software tools in place. Russia, Kazakhstan, Belarus, and other CIS countries are focusing on developing electronic education resources, remote education platforms, and digital learning environments in accordance with scientific research. However, these countries also have not fully systematized the problem of providing pedagogical

software tools, teaching science, and programmatic and methodological support. Therefore, research in CIS countries, summarizing and defining problematic aspects through scientific and practical perspectives, is of great importance.

In Uzbekistan, the country's education system has been modernizing in recent years. The digital education environment, development, and teacher training are increasing in quality in line with extensive reforms. Uzbekistan's "Digital" Strategy to 2030, which focuses on the state of the education system, programs, and regulatory documents, is currently prioritizing the development of modern information technology and the process. This is a key objective, both through instruction and through the creation of pedagogical software tools and their effective use, in accordance with qualified experts' training. This is because pedagogical software tools, the science of teaching, and programmatic and methodological approaches to improving our country's education system are considered highly important.

The scientific significance of this research lies in the fact that pedagogical software tools, teaching science, and software-methodological tools provide a scientific-theoretical process based on this consistent and logical set of stages. The research results in pedagogical, methodological, and technological components that integrate seamlessly and effectively. This approach, and pedagogical software tools in the field, enable further scientific research, providing a methodological basis for service.

The study explores the practical importance and scientific importance of pedagogical software tools in teaching, including usable training programs, electronic textbooks, and interactive learning and assessment systems. The study explores the practical application of published software and methods to create stages of higher education in institutions, the organization of the learning process, and the improvement of methodological activity in teacher training and students' professional readiness in increasing application. It is also possible that the study will explore the results of pedagogical software tools in the field, training a new generation of experts, and developing their digital and pedagogical competencies.

This research methodology, pedagogical software

tools, science, teaching in the process, software and methodological delivery, creation, stages, scientific, essentially, research, solve the problem, essence, deep discovery, give and practical, to results, take, incoming, roads, define. Research methodology in choosing an education system, digitalization process, complexity, pedagogical software tools, many components, nature, and education in the process, realistic needs, was captured. This is because the methodological approach is systematic, complex, and integrative, character-based, theoretical analysis with practical research, results, mutual harmony, and understanding are fulfilled.

The study is a philosophical foundation, a theory, a dialectical approach, an organization, and a pedagogical approach. This approach is pedagogical, software, tools, and a teaching process in development, in changes and internal contradictions based on improvements. The system as a system, as seen through the Output, is an opportunity. Education is in the process of programmatic and methodological delivery, formation, and development of social needs, technological progress, and pedagogical practice. This is done from the point of view of exploring philosophy, realistic pedagogical processes, and the goal of research, accessible situation analysis, and scientific, conclusion-based release directed.

The study's primary methodological focus was the deduction approach. This approach—general scientific and theoretical rules, education theory, pedagogical technologies, and digital education—emerged from concepts without a clear pedagogical approach to situations. The implementation was achieved, taking into account the initial pedagogical software tools, software, and methodology supplied, and the associated theoretical views, concepts, and models analyzed. This general theoretical foundation—pedagogical software tools, science, and teaching—was then adapted to the process, with precise stages, methods, and tools working. Together, the deduction approach, in practice, observed problems, theoretical justification, and their solutions. The output opportunity was revealed.

The study examined the necessary information, including sources and methods. Scientific and theoretical information sources, including pedagogy, didactics, and education, were primarily studied.

Information technology, electronics, and pedagogical software, as well as related monographs, research articles, dissertations, and conference materials, were examined. These sources explored the problems, theoretical foundations, available approaches, and scientific analysis. Appropriate regulatory and legal measures were also adopted. Furthermore, regulatory and legal norms were adopted. State education standards, education plans, and science programs were analyzed, and pedagogical software tools and science teaching requirements were clarified.

Information is important to understand, as empirical information collection methods were used. Specifically, higher education institutions utilized pedagogical software tools, science, and teaching, including professors and instructors. This science, in accordance with education, involved students taking questions and conversations. A survey was conducted. The situation, effectiveness, and shortcomings of the software and methodological delivery system were clearly identified, along with the needs for improvement. Conversations and problem-solving techniques provided a deeper understanding, and teachers and students provided feedback on quality in terms of analysis. This analysis provided an opportunity to make the analysis possible. Strict ethical consent was provided for the study. The questionnaire and interviews involved respondents, their personal information kept confidential, and used only for scientific purposes. The research process adhered to principles of fairness, impartiality, and objectivity. The action was taken, the information collected was not interpreted correctly, and the results were based on scientific evidence. Authorship was also correct, and scientific integrity was demonstrated. All sources used were used correctly.

The research object's selection, that is, the process of sampling, is based on the corresponding choice made, and has increased. The research object, as the supreme education in institutions, is selected for pedagogical software tools, science, and the teaching process. Information technology, pedagogy, and engineering are selected in the areas of education, taking students and this science in accordance with the lesson being taught. The selection of the appropriate research objective is appropriately noted, and the results obtained are summarized for a sufficiently high level of presentation to the function.

In this research, primary and secondary information from complex sources is used in some ways. Primary information, such as questionnaires, interviews, observations, and experimental results, was collected. Secondary information and scientific literature, statistical information, educational and methodological documents, and previous research based on the results consist of these two types of information. The mutual harmony of these two types of information allows for increased reliability in the research results, and the problem of each one-sided analysis makes it possible to give up the opportunity.

To explore a strategy for selecting a problem's complexity and multi-faceted features, taking into account the obtained results. The main strategies used were observation, a pedagogical experiment, a questionnaire, and a case study. The methods used were: tracking. The method used pedagogical software tools. The science of teaching in the process utilized software and methodological supplies. The teacher and students studied the activity. A pedagogical experiment using a working published software and methodological supplies. The effectiveness of the test was assessed. A questionnaire was conducted. The methods and problems, along with their transparent aspects, were analyzed in-depth and practical solutions. The results played an important role.

To explore strategies for mutual harmony, without using a problem, a transparent solution was developed, and a consistent, outgoing path was taken. Initially, the problems, status, and shortcomings were identified, then a working theoretical foundation was developed. Next, a step-by-step program and methodological approach was developed to deliver the creation stages, and a practical test was conducted. Results were analyzed, conclusions were drawn, and recommendations were made. This methodological approach to researching results is scientifically based, reliable, and practical, with significant potential to be provided.

In general, in this case, the research methodology, pedagogical software tools, science teaching in the process of software and methodological supply create problem complex study, theoretical conclusions practical solutions with connect and education process efficiency increase service does.

The research focused on instructional design (educational design) and pedagogical software tools, in line with modern scientific research, is rapidly developing. Specifically, in the journal "Research and Development in Educational Technology," a proposal was made in an article about an interactive platform for instructional design. This model is based on the ADDIE principle (analysis, design, development, implementation, evaluation). Working with published software tools, this approach to creating a psycho-pedagogical theory provides an understanding of the process. As noted, pedagogical tools provide independent information, and each student uses materials for individual learning to create an important strategic direction. This makes the learning process effective.

Another important study— ScienceDirect— is published in a paper on pedagogy and technology integration. It focuses on pedagogical issues. [The article is missing a word about the importance of digital technology and technological knowledge, harmonization, and the need for digital tools.] Students' active knowledge for finding a point of interest emphasizes collaboration at a level that utilizes a pedagogical approach with close dependency. This research paper emphasizes technology as an independent tool, and perhaps the learning process as an inseparable part of how to view it.

Also TPACK (Technological) Model of pedagogical subject knowledge in accordance with the study of pedagogical software tools effective application for the required was three types of knowledge - pedagogical, content and technological knowledge mutual dependence open This gives a model of pedagogical tools for design and practice implementation in the process of teacher competence in determining the scientific basis of the task This will pass.

Contemporary research is once again focusing on one direction: teachers' use of software from tools. For example, in Educational Technology, Teacher Knowledge, and How and the Impact of Classroom Influence, many articles in teachers' software tools in practice demonstrate successful application for the necessary qualifications, motivation, and technical support gaps. This leads to... exploring the current technology to grow the process mechanic from a tool to another, as if deep pedagogical support and ongoing

professional development demand achievement.

Another important area is intelligent tutoring systems (ITS) and their supporting learning process. These systems offer individual, on-demand, adaptable personal assistance to students, but their current complexity and programming skills are not widely applicable. Education in the process of such a system, based on the fundamentals of psycho-pedagogical work, is published separately.

Also, generative artificial intelligence (GenAI) and digital tools are exploring learning content in application creation, as well as the latest in recent years. For example, the GAIDE model. Generative artificial intelligence technologies create learning materials for the process of integration, making a proposal. This will be the teacher for new learning resources. Output time is reduced and efficiency is increased. This research into pedagogical design, modern trends, and reflection will bring.

Also, pedagogical software tools in accordance with empirical research also. For example, in South Africa, taking ICT (information and communication technology) and communication technology research) teachers to technology has shown relatively positive thoughts, but technology's practical application skills are lacking and constant technical assistance is necessary. This emphasizes the need for effective pedagogical tools to grow effectively, but the existence of technology does not exist; perhaps teachers' readiness also shows the importance.

The analysis of literature and pedagogical software tools in accordance with current scientific research shows two main trends:

Theoretical models and concepts—for example, instructional design models, development, such as TPACK, pedagogical technology integration approaches, digital instructional design, and psycho-pedagogical foundations—are explored. This often strengthens theoretical knowledge, focusing on practical tools that provide scientific direction to creators.

Empirical research explores teacher software tools, application skills, software tools, and educational outcomes, impacting interactive platforms, such as problem-solving and learning. This study explores pedagogical tools, realistic practice, and

implementation in the process of surfacing emerging problems and defining solutions.

A critical assessment from the perspective of many explore pedagogical software tools' usefulness is emphasized, although often their development and ongoing pedagogical design process itself are not sufficiently covered. That is, many things about the technology's existence and its application advantages are emphasized. If so, then this pedagogical content is compatible, learning achieves its goals, and both methodological processes are necessary, which is sufficiently scientifically based on solutions. This is not specified. From this perspective, explore the traditional theoretical foundations of the topic, practice with integration, and implement new approaches, working towards this, and advanced science contributes significantly to their research.

To study the effectiveness of teaching in higher education institutions, pedagogical software tools, science, and the methodology of software development and delivery. A series of empirical data was collected in a collection of questionnaires, interviews, observations, and pedagogical experiments. Statistical methods, including descriptive statistics analysis, percentage distribution, Pearson square test, mean value, and variance analysis, were also used. This, together with the pedagogical effectiveness of the assessment, was used to evaluate students' knowledge, skills, and qualifications in the learning process at the beginning and end of the experiment in a group and a control group compared to the control group.

An analysis of the results and discussion of this information demonstrates that pedagogical software tools, based on the scientific method, their sequential stages, and interactive elements significantly increase the effectiveness of enriching learning. These findings are supported by international scholars, such as More, Warburton, and Winters (2012), who developed the TPACK model and the ADDIE approach. Their research also explores pedagogical and technological components, including the harmony between students' knowledge and skills, and effective information decision-making, and the role of the performer.

Angeli (2025) also found that teachers' integration of technology into a published learning program and

interactive platform encourages students to engage in independent problem-solving. This study confirms that the integration of technology into a practical, actionable learning process, including experimental information, pedagogical software, and tools, can be feasible.

This joint research leverages the results of Uzbekistan's international and international experience to adapt to changing conditions. For example, interactive electronic textbooks and multimedia resources can be created in the process of using international standards and methodologies to improve service quality. This digitalization of the education process and modern pedagogical technologies play an important role in the current process.

Conclusion

The possible analysis of the results of pedagogical software tools, science in teaching, scientifically based on software development methodology, delivering creations, and pedagogical effectiveness confirms. The results obtained are based on the learning process, optimization, individualized approach, current interactive and multimedia resources, and a wide application recommendation. This, together with pedagogical methodology and theoretical approaches, emphasizes practical adaptation through student professional competencies and digital qualifications, and emphasizes a noticeable increase in level.

References

1. Uygun , T., Sendur , A., Dere, R., & Ozcakil , B. (2023). Developing TPACK using Web 2.0 tools: A design- based research approach. *European Journal of Science and Mathematics Education*, 11(3), 445–465. <https://doi.org/10.30935/scimath/12907> (scimath.net)
2. Mohr, Y., Warburton , S., & Winters , N. (2012). Curriculum development as a vehicle for developing TPACK in blended teacher-led learning: technology-enhanced learning. *International Journal of Educational Technology in Higher Education*. (Full text source). (SpringerLink)
3. De Rossi, M., & Angeli , C. (2025). Teacher education for effective technology integration [Editorial]. *Italian Journal of Educational Technology*. (ijet.itd.cnr.it)
4. Springer article on technology integration and lessons learned Lesson Plans. (2015). Implementation. Through innovative technologies Lesson Plans: Which ones? Support Before Teacher Prefer? *Journal of Science Education and Technology*. (Springer)
5. Chimalakonda, S., and Nori, K. V. (2018). A Pattern-Based Approach for the Design of Educational Technology. arXiv preprint (arXiv)
6. Chimalakonda, S., and Nori, K. V. (2018). An ontology-based modeling framework for the design of educational technology. arXiv preprint (arXiv)
7. Ipek I. and Ziatdinov R. (2018). New approaches and trends in the philosophy of educational technology for learning and teaching environments. arXiv preprint (arXiv)
8. Bwalya, A., Rutegwa, M., Tukahabwa, D., and Mapulanga, T. (2023). Improving pre- service biology technology teachers' pedagogical content knowledge through a TPACK-based technology integration course. *Journal of Baltic Science Education*, 22(6), 956–973. (tpack.org)
9. Antonenko, P. D. (2013). Intradepartmental professional development. Teachers engaging in educational Design 2.0. *Journal of Digital Learning in Pedagogical Education*, 29(3), 72–81. (tpack.org)
10. Lee, C. J., & Kim, S. (2014). An implementation study based on the TPACK instructional design model in a technology integration course. *Educational Technology Research and Development*, 62(4), 437–460. (tpack.org)
11. The Australasian Journal of Educational Technology is a peer-reviewed journal covering instructional design, online learning, e- learning, and educational technology research. (Wikipedia)