

Methods and Approaches of Pedagogical Diagnostics in Online and Hybrid Education

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Article information: Manuscript received: 28 Mar 2025; Accepted: 29 Apr 2025; Published: 31 May 2025

Abstract: This article discusses the relevance of pedagogical diagnostics in online and hybrid education, with a focus on modern assessment approaches and the use of digital tools. The role of digital diagnostics in improving learning outcomes is analyzed.

Keys words: online education, hybrid learning, diagnostics, assessment, platform, artificial intelligence, formative evaluation, monitoring, testing, knowledge control.

Introduction

In recent years, as a result of the rapid penetration of digital technologies into the field of education, online and hybrid forms of education have become widespread. In such conditions, pedagogical diagnostics are becoming increasingly relevant as a means of identifying students' knowledge, skills and competencies, monitoring development dynamics, and forming an individual approach. Due to the limited possibilities of traditional assessment methods in distance and hybrid classes, teachers are trying to organize effective diagnostics using digital platforms, testing systems, and artificial intelligence technologies.

Research methodology

The main goal of this study is to conduct an in-depth study of the pedagogical diagnostics process in online and hybrid education, analyze existing methods and approaches, and determine their impact on the quality and effectiveness of education. To achieve this goal, scientific research was conducted using various methodological approaches. First of all, a theoretical-analytical approach was chosen to deepen the theoretical foundations of the study. Through this approach, previously conducted scientific research, textbooks, monographs, articles, dissertations and other scientific sources in the field of pedagogical diagnostics were carefully studied. In particular, the experience of foreign and local educators in this area, their methodological approaches, assessment criteria, and achievements in the use of modern technologies were deeply analyzed. As a result of the study of theoretical literature, the general concept, main directions, methods and mechanisms of practical application of pedagogical diagnostics in online and hybrid education were clarified. The study also widely used the method of comparative analysis based on theoretical analysis. Through this method, the diagnostic methods used in the traditional education system were compared with the assessment approaches in online and hybrid education. As a result of the comparative analysis, the advantages, disadvantages, opportunities and limitations of assessment through digital means were identified. The impact of various diagnostic formats on students' learning, motivation and reflexive thinking was also analyzed. This approach revealed the different aspects of diagnostic processes conducted using digital learning tools from traditional assessment.

Another important aspect of the study is practical work based on empirical observation. In this direction, the diagnostic practice carried out through digital platforms in the real learning process was studied. In particular, it was observed how students are assessed on platforms such as Google Classroom, Quizizz, Edmodo, Moodle, and what conveniences and difficulties diagnostic tools create for them. During the observation, teachers' approaches to assessment, the scope of use of technological capabilities in assessment, and methodological approaches were analyzed in depth. Also, conclusions were drawn based on practical observation about students' attitudes towards online assessment, the level of objectivity of their knowledge, and the reflection and self-assessment skills they are developing.

During the study, the assessment practice carried out in schools and higher education institutions was also studied. In this process, practical experiences were analyzed and teachers' views on various methodological approaches, assessment formats, and diagnostic analysis methods were studied. In particular, the specific features of the hybrid form of education introduced in the post-pandemic period, the role and importance of remote assessment in the teaching process, and the monitoring of students through digital tests, formative assessment, and interactive tasks were studied. Based on the results of the experiment, the advantages of online assessment tools were highlighted, such as real-time assessment, automatic determination of results, and the possibility of forming a personal approach. At the same time, a number of limitations were identified - technical problems, low digital literacy, and subjectivity in assessment.

In general, a comprehensive analysis of pedagogical diagnostics in online and hybrid education was carried out through the methodological approaches used in the research process. The results of the research, which combined theoretical knowledge with empirical observation, allowed for comprehensive coverage of the topic. Each method serves in its own way to identify important information, clarify problems, assess the effectiveness of approaches, and draw conclusions.

Analysis of the literature on the topic.

Many domestic and foreign scientists have conducted scientific research on pedagogical diagnostics, and theoretical and practical aspects in this area have been deeply analyzed. Diagnostic issues are becoming increasingly relevant, especially in modern education. Pedagogical diagnostics allows the teacher to determine the level of students' knowledge, to base their assessment on objective criteria, to observe the individuality and dynamics of students' development. Theoretical foundations are of great importance in this process, and the analysis of scientific literature determines the methodological foundation of diagnostic activities.

The main theoretical approaches to pedagogical diagnostics have been developed by Russian scientists. In particular, N E Shchurkova in her research has shown the psychological and pedagogical foundations of pedagogical assessment. She emphasizes that in the assessment process it is necessary to take into account not only the measurement of knowledge, but also the personal development of the student, his interests and participation in the activity. V V Serikov developed a person-oriented approach to diagnostic activities, which emphasized that through this approach it is possible to form the student's self-awareness, independent thinking and self-control skills. Yu K Babansky noted that diagnostics has a special place in the management system of the educational process and proposed differential methods of assessment in this regard. Uzbek scientists also pay great attention to the issues of pedagogical diagnostics. In particular, A Khamroyev is conducting scientific developments on improving assessment criteria in modern education, determining the place of digital technologies and monitoring students' cognitive activity. M Omonov has deeply studied digital pedagogical technologies and their integration into the educational process. In particular, the scientific work of Z A Rakhimova occupies an important place in this area. In her scientific article "Digital technologies and assessment systems in education", modern approaches to pedagogical diagnostics are studied, in particular, the effectiveness of digital assessment tools, their integration into the educational process, the choice of platforms and practical manifestations of formative assessment are covered in detail. In this article, the author touches on the possibilities of determining the quality of education through online tests, interactive tasks, and diagnostic tools based on artificial intelligence. At the same time, the importance of technological approaches in ensuring transparency and objectivity in assessment is also indicated.

Internationally, the issues of pedagogical diagnostics and hybrid education are reflected in many scientific sources. In particular, the Blended Learning model developed by Garrison and Vaughan in 2008 serves as an important theoretical basis in this regard. In this model, it is considered important to combine traditional and online learning elements in the process of organizing hybrid education, use them in the right proportion, and activate students. The role of pedagogical diagnostics is highlighted within the model, recognizing the need for formative assessment to improve the quality of education through regular feedback and continuous monitoring of educational effectiveness. The importance of digital assessment tools is also emphasized in the recommendations of international organizations such as UNESCO and OECD. These organizations advocate the need to use technologies in education not only to make the teaching, but also the assessment process interactive, person-oriented and adaptive. It should be noted that in modern literature, pedagogical diagnostics is interpreted not only as a means of assessing students, but also as a means of developing them. This, in turn, enriches the content and technological foundations of the formation of the diagnostic process with new approaches.

In general, the analysis of the literature on the subject shows that today the field of pedagogical diagnostics is developing in accordance with the changing educational environment. In particular, the introduction of digital technologies has brought new opportunities to the diagnostic process, such as interactivity, flexibility, real-time monitoring. At the same time, the scientific literature emphasizes the need to strengthen the person-oriented and formative characteristics of assessment. A general analysis of domestic and foreign studies shows that in the context of online and hybrid education, the diagnostic process should be carried out taking into account the personal needs of the student. Therefore, it is necessary to develop methodological recommendations in a manner that combines scientific approaches with modern technologies.

Analysis and results.

Based on the observations and analyses conducted, it was found that pedagogical diagnostics in the context of online and hybrid education is fundamentally different from traditional approaches. These differences are clearly manifested in the active use of digital tools and artificial intelligence technologies in the diagnostic process. In particular, the interactivity of education and the focus on an individual approach require a review of diagnostic methods. Therefore, today, formative assessment occupies an important place among diagnostic methods. This approach is aimed at continuously determining the level of knowledge of students during the learning process. This method creates the opportunity to provide feedback in real time. Teachers organize quick tests, mini-surveys and exercises through platforms such as Google Forms, Quizizz, Edmodo. These serve not only to assess students' knowledge, but also to develop their skills such as independent thinking, analytical approach and quick decisionmaking.

In addition, summative assessment methods are used at important stages of the educational process. This method allows you to get a clear idea of the overall mastery of students based on the results of the final assessment. Summative assessment is carried out through systems such as Moodle LearningApps Testportali.uz. These platforms allow you to structure test questions in various forms. As a result, the teacher has the opportunity to deeply analyze the level of knowledge of each student. In particular, the automatic processing of test results and the availability of convenient tools for statistical analysis increase the effectiveness of assessment.

In recent years, special attention has been paid to adaptive testing methods in pedagogical diagnostics. These methods provide an individual approach based on algorithms developed on the basis of artificial intelligence. Through adaptive tests, the complexity of the next questions is automatically changed depending on the student's previous answers. This allows for a more accurate assessment of student knowledge. For example, such approaches are widely used through the Khan Academy platform.

Through adaptive testing, gaps in students' knowledge are identified and appropriate recommendations are developed to fill them.

Methods such as reflection and self-assessment are also widely used in the digital diagnostic process. These methods serve to analyze the results of students' self-assessment and develop skills for self-improvement. Using tools such as Jamboard Padlet and Google Jamboard, students express their thoughts and feelings at the end of the lesson. This approach forms students as active participants. These approaches also strengthen the ability to think independently and a sense of responsibility.

Monitoring and control analysis are an important part of diagnostic activities. Teachers analyze the learning activity of each student or class based on previously obtained diagnostic data. This allows them to identify individual weaknesses of students and plan lessons tailored to them. Corrective work is carried out based on the results of monitoring. Through this method, the quality of education remains under constant control.

In general, the diagnostic process is significantly interactive based on modern educational technologies, and this plays an important role in increasing the effectiveness of communication between teachers and students.

Conclusions and suggestions.

The above analysis shows that in the conditions of online and hybrid education, pedagogical diagnostics does not lose its relevance, but is enriched with new forms and approaches. In such conditions, diagnostics are becoming not only an assessment tool, but also a powerful factor stimulating the personal development of students. In particular, diagnostic methods based on digital technologies create the opportunity to effectively manage the educational process and constantly monitor the level of students' mastery. In this regard, it is considered appropriate to put forward the following suggestions.

First of all, it is necessary to increase the digital literacy of teachers. Because the effective use of diagnostic tools directly depends on the technological skills of teachers. This can be done through special trainings, seminars and distance courses. The next important aspect is the wider implementation of formative assessment methods. This method serves to determine the level of knowledge of students at each stage of the lesson process. The use of diagnostic tools integrated into educational platforms also increases efficiency. For example, tools such as tests, analytical reports, and automatic monitoring systems simplify the learning process and ensure objectivity.

It is also necessary to develop and implement a digital assessment methodology for each subject teacher. Such a methodology should be tailored to the knowledge indicators of students. This will create a single system of diagnostic approaches across disciplines. Another important aspect is the establishment of a digital monitoring system for student activity. Through this system, a progress map of each student is created and he is provided with education based on an individual approach.

In general, pedagogical diagnostics in online and hybrid education serves as a tool for improving teacher activity. This is of great importance in increasing educational efficiency. Therefore, pedagogical diagnostics should be established in a methodologically sound manner and enriched with technological capabilities.

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