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DIDACTIC POTENTIAL OF DIGITAL TECHNOLOGIES IN PRIMARY EDUCATION: INDIVIDUALIZATION OF LEARNING AND INTERACTIVITY

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Abstract. This article provides a scientific and methodological analysis of the didactic potential of digital technologies in primary education, with particular emphasis on individualizing learning and organizing pupils' interactive engagement. It substantiates that the integration of digital technologies into the educational process should not be limited to the use of technical tools; rather, it entails transformations in the content of education, teaching methods, pupil activities, feedback mechanisms, and assessment practices. The study employs theoretical analysis, comparative analysis, generalization, and modelling methods. The didactic potential of digital technologies is examined in the context of primary education, focusing on visualization, interactivity, individualization of learning, immediate feedback, creative engagement, and the promotion of reflection. The findings indicate that the effectiveness of digital tools is determined not by their mere availability but by their selection in accordance with didactic objectives, adaptation to pupils' age-related and individual characteristics, and pedagogically sound integration with traditional teaching methods. The article also proposes a staged model of digital didactic activities for primary education.

Keywords: primary education, digital technologies, digital didactics, didactic potential, individualization of learning, interactivity, digital learning, interactive tasks, multimedia, immediate feedback, reflection.

INTRODUCTION.

In contemporary education, the use of digital technologies is emerging not merely as the application of technical tools but as an important didactic factor contributing to the improvement of educational content, forms, and methods. The increasing flow of information and the expansion of digital resources require teachers to select technological tools in accordance with educational objectives and integrate them effectively into the teaching and learning process. According to J.A. Matkarimov, digital technologies make it possible to organize interactive learning, develop pupils' thinking skills, and consolidate their knowledge.

The use of digital technologies in primary education requires consideration of pupils' age-related and individual characteristics, since this is the period during which perception, attention, memory, and independent learning skills are actively developing. Therefore, the didactic effectiveness of digital tools is determined not by their technological sophistication but by the

extent to which they promote pupil engagement, individualize the learning process, and facilitate knowledge acquisition and consolidation. If digital technology is used solely as a means of presenting ready-made information, it may not lead to any significant changes in the content of instruction or pupils' cognitive activity. Conversely, the didactic value of the digital environment increases when it enables tasks to be adapted to pupils' abilities, encourages independent exploration, and provides immediate feedback. Accordingly, investigating the didactic potential of digital technologies in primary education through the principles of individualization and interactivity constitutes a relevant scientific and methodological problem.

AIM AND OBJECTIVES OF THE STUDY.

The aim of this study is to identify the didactic potential of digital technologies in primary education, provide a scientific and methodological justification of their role in individualizing learning and ensuring interactivity, and explore their practical application.

To achieve this aim, the following objectives were established: to clarify the content of the concepts of digital technology and digital didactics; to systematize the main didactic opportunities offered by digital tools in primary education; to identify the didactic relationship between individualization and interactivity; to analyse findings reported in existing studies; to determine the methodological conditions for the effective use of digital technologies; and to develop a practical model for primary education.

RESEARCH METHODOLOGY.

The methodological foundations of the study are based on the principles of organizing education around pupil activity, individualization, interactivity, and the integration of digital tools in accordance with didactic objectives. The research employed theoretical analysis of pedagogical and methodological literature, comparison of the opportunities offered by digital and traditional education, generalization of scholarly perspectives, and systematization of the identified didactic opportunities.

Studies devoted to the use of interactive methods in primary education have also demonstrated the application of theoretical analysis, observation, comparison, and experimental research methods. These studies report that lessons incorporating interactive methods have a positive influence on pupils' knowledge acquisition, engagement, and communication skills. At the same time, sources addressing digital technologies emphasize that their effectiveness in education depends on their pedagogically appropriate application.

LITERATURE REVIEW.

Research on the role of digital technologies in education has examined their potential from various perspectives. In his scientific article entitled The Use of Digital Technologies in Education, J.A.Matkarimov discusses the application of digital technologies, online platforms, virtual laboratories, software, and interactive learning materials in the modern education system. [1,pp.26–28]. It is important to note that digital technologies can contribute to the development of pupils' thinking skills, the consolidation of knowledge, and the enrichment of the educational process through innovative approaches.

The same source provides a broader overview of the educational opportunities offered by digital technologies. It notes that interactive whiteboards, digital simulators, educational games, and visualization tools facilitate the explanation of complex concepts, while digital libraries expand access to educational resources. Furthermore, it highlights the potential of artificial intelligence to assess pupils' levels of knowledge and develop learning programmes tailored to their individual needs.

In the study by A. Kholnozarova, a teacher at General Secondary School No. 11 in Gulistan, the use of interactive methods and innovative approaches in digital learning environments is examined. [2,pp.8–16]. The author analyses such approaches as the flipped classroom, case study, virtual reality, and artificial intelligence. The study substantiates that digital environments can expand opportunities for applying interactive methods, encourage pupils to engage actively in the learning process, and provide immediate feedback. In particular, the flipped classroom model enables pupils to study digital materials independently before lessons, thereby allowing more classroom time to be devoted to analysing problems and carrying out practical activities. In addition, the study highlights that artificial intelligence-based adaptive learning can analyse pupils' behaviour, errors, and learning progress, thereby making it possible to adapt learning materials and support to their individual needs.

Studies directly related to primary education have also demonstrated the influence of interactive methods on pupil engagement, independent thinking, and knowledge acquisition.

The literature review indicates that although the individual opportunities offered by digital technologies and interactive teaching methods have been sufficiently explored, the systematic examination of their didactic potential in primary education through the integration of individualization and interactivity requires further development as a distinct methodological framework. In this article, digital technologies are therefore analysed not merely as tools but as didactic factors that transform pupils' learning activities.

DIDACTIC POTENTIAL OF DIGITAL TECHNOLOGIES IN PRIMARY EDUCATION.

Visualization and multimodality. The visual presentation of learning materials is particularly important in primary education. This is because young learners often understand and retain information more effectively not only through verbal explanations but also through observation, listening, comparison, and practical activities. Digital technologies enhance this process by enabling texts to be presented in combination with images, audio, video, animation, and interactive elements.

For example, when studying a literary text in a reading literacy lesson, pupils may first read the text, then examine an image corresponding to its content, and, where necessary, listen to its audio version. In this case, the digital tool does not replace the literary text; rather, it creates an additional didactic channel that facilitates comprehension. The use of visual materials through digital technologies can simplify the explanation of complex concepts, while interactive tools can engage pupils more actively in classroom activities.

Interactivity: transforming pupils into active participants. The second important didactic opportunity offered by digital technologies is their ability to increase pupils' active participation in the learning process. In a conventional electronic presentation, pupils mainly receive ready-made information. In an interactive digital task, however, they make choices, provide answers, identify their mistakes, repeat activities, and monitor their own performance.

In primary school, this mechanism can be applied through tasks such as classifying words into parts of speech, matching pictures, reconstructing sentences, arranging events in chronological order, and solving mathematical problems.

Research on interactive teaching methods has reported increased pupil engagement, greater willingness to answer questions independently, and improved ability to justify their opinions. The digital environment makes it possible to enrich such activities through immediate tasks and feedback mechanisms.

Individualization of learning. One of the most important aspects of this topic is the individualization of learning. A class may consist of 25–30 pupils; however, their levels of knowledge, task completion rates, and learning difficulties are not identical. Although assigning the same task to all pupils may be convenient for the teacher in a traditional lesson, this approach may not adequately address the individual needs of every learner from a didactic perspective.

Digital technologies make it possible to partially overcome this challenge. For example, tasks related to the same topic can be organized at three levels: Level A – basic tasks; Level B – tasks of moderate complexity; and Level C – advanced creative tasks. The learning topic remains the same, while the type and complexity of the activities are adjusted to pupils' abilities. An important aspect of individualization is that pupils are not separated from the common learning topic; instead, they are guided towards the same educational objective through tasks of varying levels of complexity. [8,pp. 125–127.].

Sources indicate that digital technologies make it possible to develop learning programmes tailored to pupils' needs, abilities, and interests. In artificial intelligence-based adaptive learning, pupils' errors and learning progress can be analysed to recommend appropriate materials and support. In this regard, AI-based adaptive learning can be considered one of the important emerging directions of digital didactics.

Immediate feedback. In traditional lessons, pupils' completed tasks are usually checked by the teacher, and errors are addressed at a later stage. Digital tasks, however, make it possible to display results immediately.

For example, a pupil may complete ten tasks, and the system may indicate that eight answers are correct and two are incorrect. Nevertheless, from a didactic perspective, simply displaying a score of eight points is insufficient. What matters most is that pupils understand where they made mistakes and have an opportunity to correct them.

Pupils' creative digital activities.Limiting digital learning to the presentation of ready-made materials restricts its potential. Pupils can also participate in digital environments as creators of educational products.

For example, primary school pupils can create digital comics based on literary works, short audio stories, illustrated narratives, electronic presentations, character maps, sequences of events, and alternative endings to stories.

In this process, pupils do not merely consume ready-made information; they process it and transform it into new products. Consequently, the digital tool becomes not simply a device for delivering knowledge but a didactic environment that encourages and supports pupils' creativity.

Reflection and self-assessment.Another important opportunity offered by digital technologies is the creation of conditions in which pupils can review and evaluate their own learning activities. At the end of a lesson, pupils may be asked the following questions: What did I learn today? Which task was difficult for me? Which task did I find interesting? In which area do I need further assistance?

This process can be organized through a simple electronic survey, emojis, short responses, or digital reflection cards. The significance of such activities lies in encouraging pupils to analyse their learning experiences in relation to their own progress rather than relying exclusively on external assessment.

SYSTEMATIZING THE DIDACTIC POTENTIAL OF DIGITAL TECHNOLOGIES. Based on the above analysis, the following stages of using digital technologies in primary education are proposed:

Stage 1 – Visual introduction. Presentation of learning content through text, images, audio, and video.

Stage 2 – Interactive engagement. Activities involving questioning, selecting, arranging, and matching.

Stage 3 – Diagnostics. Identifying pupils' performance and their ability to complete the assigned tasks.

Stage 4 – Individualization. Providing tasks that correspond to pupils' individual abilities and learning needs.

Stage 5 – Immediate feedback. Presenting results, identifying errors, providing explanations, and enabling pupils to repeat tasks.

Stage 6 – Creative production. Creating digital stories, comics, presentations, or other creative products.

Stage 7 – Reflection. Encouraging pupils to reflect on their learning through the statements: "I have learned – I found difficult – I need to practise further."

The main feature of this model is that technology is not treated as an isolated element of a lesson but is integrated into the entire learning cycle.

RESULTS.

The findings obtained through the comparative analysis of the sources indicate that the didactic value of digital technologies is determined not by their technical capabilities alone but by their relevance to educational objectives and pupils' age-related characteristics.

Digital tools enhance interactivity in education and transform pupils from passive recipients of ready-made information into active participants who independently complete tasks and work on

correcting their mistakes. In particular, visualization, immediate feedback, and individualized approaches offered by adaptive systems make it possible to adjust learning materials in accordance with pupils' learning progress.

However, it would be incorrect to attribute positive learning outcomes automatically to the use of any digital tool. If digital technologies are employed merely as mechanical substitutes for traditional teaching methods, they may fail to produce the expected results. Therefore, the effectiveness of digital learning depends on the integration of technology, teaching methods, pedagogical objectives, and pupils' individual characteristics. When developing primary education methodologies, priority should be given to designing pupils' practical learning activities rather than simply selecting technical tools.

DISCUSSION.

Approaching the use of digital technologies in primary education from the perspective that "digital tools are better than traditional tools" is not scientifically sufficient. The key issue is to determine which didactic task can be organized more effectively through a particular digital capability.

For example, presenting an ordinary text in electronic format may represent a technological innovation, but its didactic potential remains limited. If pupils are given the opportunity to listen to an audio version, analyse images, answer questions, arrange events in chronological order, and create their own endings based on the same text, the digital environment considerably enriches their learning activities. From this perspective, digital didactics should be based not on the principle of "more technology" but on the principle of "technology used appropriately to achieve educational objectives".

Another important aspect is that traditional and digital education should not be viewed as opposing approaches. Research indicates that digital technologies should complement traditional teaching methods and be integrated with them. Other sources addressing digital education also emphasize the need to maintain an optimal balance between digital tools and traditional teaching methods.

This is particularly important in primary education. The learning activities of young pupils should not be limited to screen-based interaction. Digital tasks need to be combined with reading books, writing, discussions, hands-on exercises, and activities involving real-world objects.

CONCLUSION.

The use of digital technologies in primary education goes beyond the technical modernization of the learning process and creates opportunities to reconsider its didactic structure. The theoretical and comparative analysis conducted in this study identified the main didactic opportunities of digital technologies in primary education as visualization, interactivity, individualization of learning, immediate feedback, creative engagement, and reflection.

Each of these opportunities acquires greater methodological value when considered not as an isolated tool but as an interconnected component of a unified didactic process. In particular, interactivity and individualization emerge as two of the most important directions for the development of digital learning in primary education. This is because pupils actively engage in

learning tasks while the tasks themselves can be adapted to their levels of knowledge and individual needs.

Furthermore, the principal criterion for using digital technologies should not be the technological sophistication of a tool but its appropriateness for achieving specific didactic objectives. Each digital tool should be evaluated in terms of what it teaches pupils, which aspects of their learning activities it activates, and how it contributes to improving educational outcomes.

The following methodological conditions can be identified for the development of digital didactics in primary education: selecting digital tools in accordance with educational objectives; taking pupils' age-related and individual characteristics into account; integrating digital and traditional learning activities; organizing immediate feedback; transforming pupils from passive consumers of ready-made information into active participants and creative learners; and continuously developing teachers' digital and pedagogical competencies.

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