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Socio-pedagogical Aspects of Organizing Distance Learning in the Era of Educational Digitalization

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Abstract

The article examines the socio-pedagogical aspects of organizing distance learning in the context of global digitalization of the educational space. The aim of the study is to provide a theoretical justification for the socio-pedagogical aspects of organizing distance learning in the era of educational digitalization and to define the conceptual principles for creating an effective virtual learning environment in higher education institutions. The research design is based on the analysis of leading didactic concepts of distance learning (the theory of transactional distance and the community of inquiry model) to explore socio-pedagogical interaction under digital conditions. The methodology includes: literature analysis to substantiate distance learning concepts, synthesis to generalize socio-pedagogical aspects, modeling to characterize socio-pedagogical interaction, and generalization to formulate principles of distance education. The empirical part of the study involved a survey of 86 instructors from Ukrainian pedagogical higher education institutions and a comparative experiment between control and experimental student groups (50 participants in each). Group comparison indicates a quantitative improvement in student performance by 12–16%, an increase in motivation by 35.5%, and a rise in autonomy by 42.9% in the experimental group. The study identifies types of socio-pedagogical interaction in distance learning and principles for their implementation. The conclusions confirm the effectiveness of distance technologies in enhancing educational quality through personalization, gamification, and the development of instructors' digital pedagogical culture.

Keywords: Digitalization of Education, Distance Learning, Information and Pedagogical Culture, Socio-pedagogical Interaction, Virtual Educational Environment.

Introduction

In the era of European integration processes and international digitalization of the Ukrainian educational system, distance learning has become an integral element of contemporary pedagogical philosophy, giving rise to new socio-cultural practices of interaction. The educational process and academic research directly depend on the development of the information technology sector, which has fundamentally transformed the traditional paradigms of knowledge transmission and pedagogical communication. The uniqueness of distance learning technologies in universities lies in the integration of software tools and information and communication platforms, which create a dynamic virtual environment for pedagogical and educational dialogue between instructors and students. The COVID-19 pandemic and ongoing military actions in Eastern Europe have accelerated this transformation, making distance learning not an alternative but an essential component of modern educational systems. The educational process and academic research directly depend on the development of the IT sector. The socio-pedagogical potential of distance learning is manifested through the democratization of access to quality education. This form of education introduces fundamentally new didactic opportunities for interactive engagement and allows for the development of a personalized, student-centered program of professional training. Under such conditions, it becomes possible to overcome geographical and social barriers, as well as to foster students' information and digital competencies (1). Today, it is impossible to imagine learning without smart gadgets, which to some extent simplify and

automate the rhythm of life, including student learning: smartwatches, wireless headphones, tablets, computers, laptops, smartphones, multimedia projectors, smart TVs, etc. However, the digitalization of the educational process acutely raises the question of the socio-pedagogical adaptation of higher education institution participants to new forms of communication. Consequently, this problem requires a re-evaluation of the role of the academic staff member in the context of technologically mediated educational interaction.

The specificity of distance learning in the conditions of a multicultural environment and digitalization has become a subject of study in higher education pedagogy. Academic research covers a wide range of issues related to the organization of online learning, which is reflected in the works of both international experts and Ukrainian scholars-practitioners.

In "transactional distance" theory, substantiated the psychological space between the instructor and the student in distance learning, emphasizing the importance of course structure and dialogue for overcoming this distance (2).

The Community of Inquiry model, which identifies three types of presence in online learning - cognitive, social, and teaching - that are critically important for the effectiveness of distance education (3). The effectiveness of distance learning depends not so much on technology as it does on pedagogical design and social support for students (4). "Digital natives" and "digital immigrants," which fundamentally transformed the understanding of generational and social characteristics in the perception of digital technologies in education (5). Emergency Remote Teaching from high-quality online education, underscoring the importance of planning and socio-pedagogical support in the virtual environment (6).

Despite these valuable contributions, previous research exhibits several limitations. First, many studies focus predominantly on technological infrastructure while insufficiently addressing the complex socio-psychological dynamics of virtual pedagogical interactions. Second, existing frameworks frequently originate from Western educational contexts and may not adequately account for the specific challenges faced by post-Soviet educational systems undergoing simultaneous processes of European integration, wartime disruption, and digital transformation. Third, prior investigations often treat distance learning as a monolithic phenomenon rather than examining the diverse types of socio-pedagogical interactions that occur within virtual educational environments. Fourth, limited attention has been paid to the development of instructors' digital pedagogical culture as a prerequisite for effective distance education. Finally, empirical evidence regarding the comparative effectiveness of distance versus traditional learning in specific cultural contexts remains insufficient, particularly concerning qualitative dimensions such as motivation and autonomy.

The current research gap encompasses several interconnected dimensions. There exists insufficient understanding of how different types of socio-pedagogical interactions—including instructor-student dyads, peer-to-peer collaboration, instructor-group communication, student-content engagement, institution-student systems, international team interactions, and parent-society-education linkages—function within digitalized distance learning environments. The principles governing effective socio-pedagogical interaction in virtual spaces remain inadequately theorized. Furthermore, the specific organizational and pedagogical measures necessary to develop instructors' digital pedagogical culture in post-Soviet educational contexts remain underexplored-ed. The mechanisms through which personalization, gamification, and adaptive technologies influence student motivation, autonomy, and academic achievement require more rigorous empirical examination, particularly in contexts marked by infrastructure challenges and socio-economic disparities.

The present study is guided by the following research questions: What are the primary socio-pedagogical aspects of organizing distance learning in the context of educational digitalization? How can theoretical frameworks, including the Theory of Transactional Distance and the Community of Inquiry model, contribute to characterizing socio-pedagogical interaction and defining principles for effective virtual learning environments in higher education? To what extent do digital technologies, personalized approaches, and gamification enhance student motivation, autonomy, and academic performance in distance

education? What conceptual principles and organizational measures are essential for developing instructors' digital pedagogical culture and ensuring equitable socio-pedagogical interaction under digitalization conditions?

The general aim of this study is to provide a theoretical justification for the socio-pedagogical aspects of organizing distance learning in the era of educational digitalization and to define the conceptual principles for creating an effective virtual learning environment in higher education institutions. This encompasses several specific research tasks. First, to analyze and synthesize leading didactic concepts of distance learning as frameworks for characterizing socio-pedagogical interaction under digital conditions. Second, to identify and systematically categorize the types of socio-pedagogical interactions occurring in distance learning environments. Third, to formulate and theoretically justify principles of socio-pedagogical interaction in distance learning under digitalization conditions. Fourth, to empirically assess the comparative effectiveness of distance learning technologies through controlled experimentation. Fifth, to develop practical recommendations for enhancing socio-pedagogical interaction in higher education distance learning.

The novelty of this research resides in its comprehensive, multidimensional approach that transcends purely technological considerations to examine the complex interplay of pedagogical, psychological, social, and cultural factors in digitalized educational environments. Unlike previous studies that treat distance learning monolithically, this investigation develops a detailed typology of seven distinct forms of socio-pedagogical interaction. The study advances theoretical understanding by synthesizing transactional distance theory and the Community of Inquiry model with contextualized analysis of post-Soviet educational transformation. The formulation of five principles of socio-pedagogical interaction-digital presence, personalization, network cooperation, multimodality, and information ethics-represents an original contribution that bridges abstract theory and practical implementation. Furthermore, this study uniquely conceptualizes instructors' digital pedagogical culture as encompassing technological competence, digital didactics, socio-

emotional support, and ethical responsibility. The research contributes empirically by providing quantitative evidence of distance learning's impact on motivation, autonomy, and academic performance in Ukrainian higher education, offering actionable recommendations for institutions undertaking digital transformation under resource-constrained and crisis-affected conditions.

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Methodology

Distance learning, developing in parallel with computer technology and automated management systems, has ceased to be merely an alternative form of education. During the COVID-19 pandemic and the military actions in the East of Ukraine, distance learning became an integral component of the modern educational system, highlighting the need for a comprehensive study of its socio-pedagogical dimensions.

The research methodology is based on a comprehensive analysis of leading didactic concepts of distance learning: M. Moore's Theory of Transactional Distance and T. Anderson's "Community of Inquiry" model, used to study socio-pedagogical interaction in the context of digitalization. The study relies on M. Prensky's ideas regarding "digital novices" and H. Kuzan's "pedagogy of group partnership" to substantiate the necessity of transitioning to a student-centered educational model. The empirical part includes a pedagogical experiment, which provided scientific evidence that the use of distance learning

technologies improves the quality of student learning. The aim of the article is is to provide a theoretical justification for the socio-pedagogical aspects of organizing distance learning in the digitalization era and to define the conceptual foundations for creating an effective virtual educational environment in higher education institutions.

The authors utilized general theoretical research methods, specifically: literature analysis (review of fundamental works by foreign and Ukrainian scholars - to substantiate the concepts of distance learning), synthesis (generalization of socio-pedagogical aspects and formulation of the authors' definition of educational digitalization), modeling (to characterize socio-pedagogical interaction), and generalization (deriving the principles of socio-pedagogical interaction in distance learning under conditions of digitalization, along with methodological recommendations and research conclusions).

Results

Advantages of Distance Learning in Higher Education

The issue of ensuring quality education in the 21st century remains highly relevant. The digitalization of the educational space in the context of Ukraine's European integration has accelerated the transition to distance learning formats, fundamentally transforming the socio-cultural dynamics of the educational process. Consequently, new pedagogical approaches - primarily technologies and methodologies - are needed to preserve educational quality and to ensure the social adaptation of all participants in the learning process within a dynamic information environment.

Distance learning methods, which offer a high degree of mobility, cover new subject areas of knowledge, engage a wide student user base, and operate without geographical limitations, are becoming one of the most promising forms for training qualified specialists (7).

The higher effectiveness of distance learning, associated with the activation of intellectual development, the formation of learner agency, independence, and responsibility, is achieved within so-called virtual learning environments. A virtual educational space is a new, complex learning technology consciously constructed based on the principles of activity, initiative, and subjectivity of all involved participants (students and teachers). It is an Internet-based information space used to apply various distance learning tools. Within such educationsl spaces, students become directors and creators of their own learning processes, determining its trajectory and outcomes. This transforms learning into self-learning and intellectual development into self-development (8).

Distance learning as a form of education involves an organization of the educational process where the majority of pedagogical activities and procedures are carried out using modern information and communication technologies under the condition of geographical separation between the instructor and the student/learner (3).

The information and educational environment of a higher education institution is a systematically organized set of information transmission tools, principles of interaction among educational process participants, didactic, organizational, and methodological support, all oriented toward satisfying the needs of the learners (9).

The primary response of educators to the challenges of a digitalized society must be their readiness for the digital transformation of the educational process based on the principles of the pedagogy of partnership (4).

The functions of the information and educational environment include: a) informational (satisfying the information and educational needs of educational process participants); b) educational (timely and high-quality provision of learning material); c) controlling (monitoring students' independent work); and d) organizational (interconnection with instructors) (9).

In order to reduce pressure and stress, as well as to improve the motivation of students and instructors, the following technologies and approaches may be applied: the development and implementation of psychological support programs based on online platforms, which include systematic webinars on the specifics of adapting to distance and online learning; the creation of an internal social network or community spaces where participants can communicate, share ideas, and provide mutual support; the introduction of adaptive learning with the use of artificial intelligence for an

individualized approach to designing learning plans tailored to students' needs; the establishment of mentoring programs based on cooperation with instructors, helping beginners acquire the skills and knowledge necessary for effective learning; the use of applications and platforms for informing students and instructors about new developments, changes in the learning process, and current updates, thereby fostering a sense of belonging and mutual understanding within the academic community (9).

The proposed innovative solutions contribute not only to the integration of advanced technologies into distance and online education but also to the comfort and success of the educational process participants.

To ensure the effectiveness of practical training in the context of distance and online education, universities may consider the following measures: developing flexible learning programs that can be divided into theoretical and practical components; creating electronic portfolios for showcasing students' work; conducting online workshops with field experts; employing virtual rehearsal spaces for group exercises; organizing collaborative projects through specialized cooperation platforms (2).

Based on the above, we propose an original definition of the scientific category "digitalization in higher education," which should be understood as a complex process of transforming traditional educational practices through the strategic implementation of computer technologies.

This process involves not only equipping the learning environment with technical resources but also systematically restructuring pedagogical methodologies by means of electronic information and communication systems. It further involves the formation of new models of pedagogical interaction within the triad "instructor - student - digital educational environment", which ensure the personalization of learning, the expansion of access to knowledge, and the development of learners' digital competencies as the foundation of their professional competitiveness in the labor market of the information society.

Organization of Distance Learning

The organization of distance learning in higher education is a complex, multilevel process of designing the virtual educational space. It requires the presence of an innovative technological infrastructure (such as Google Workspace, Microsoft 365, and AWS server solutions), specialized learning management systems (Moodle, Canvas, Blackboard Learn), interactive video conferencing platforms (Zoom, Microsoft Teams, Adobe Connect), pedagogical design tools for creating multimedia content (Articulate Storyline, Adobe Captivate, H5P), learning analytics systems (Learning Analytics Dashboard, Tableau for Education), as well as comprehensive socio-psychological support, which includes digital tools for monitoring academic progress, virtual consultation services, and adaptive systems for personalized student support within the digital educational environment. As the authors' pedagogical experience demonstrates, the effectiveness of distance learning in higher education depends not on the quantity of digital tools employed, but on the ability to create a integrated virtual didactic system, where computer technologies become the means of interactive educational interaction between instructors and students.

Social presence in distance learning is established through the participants' ability to project themselves as "real people" in a virtual environment, which requires specific pedagogical strategies (10).

In our view, the organization of distance learning involves a multi-level process of constructing a virtual educational environment. which requires the higher education institution to possess information-computer technology, modern material and technical resources, the implementation of pedagogical design for the learning environment, and socio-psychological support for students. The effectiveness of organizing distance education depends on the ability to create a unified information system where computer technologies complement and expand the learning environment, running parallel to traditional didactic methodologies. The specific characteristics of organizing distance learning in higher education are, first, the necessity of developing educational and methodical materials for disciplines in accordance with pedagogical goals; second, establishing reliable information communication between students and instructors (including chat, consultations, mobile and Internet connectivity, virtual and augmented reality); and third, equipping classrooms with appropriate

computer and software that creates the digital educational space.

Conceptual Foundations of Socio-Pedagogical Interaction in the Context of Distance Learning

The digitalization of the educational process fundamentally changes the nature of social and pedagogical interaction among participants in the learning process. While traditional education is based on synchronous physical presence, distance learning introduces new forms of asynchronous and synchronous virtual interaction. A significant role in this transformation is played by technologies of virtual and augmented reality (e.g., Oculus for Business, HTC Vive Pro Eye, AR applications such as Merge Cube and Google Expeditions for immersive simulations and situational professional tasks), artificial intelligence and machine learning (IBM Watson Assistant chatbots), adaptive learning systems (Carnegie Learning), personalization algorithms (Khan Academy), automated assessment tools (Turnitin Feedback Studio), multimedia learning resources for Windows (interactive presentations in Prezi), video editing software (Camtasia, OBS Studio), podcast platforms (Anchor), infographic tools (Canva, Piktochart), 3D modeling (Blender for educational and scientific projects), as well as specialized mobile applications for Android (Coursera, edX, Duolingo) and gamified platforms (Kahoot!, Quizizz, Classcraft). All of these tools provide multi-channel perception of educational information and enhance student motivation in the context of distance education.

Technical enhancements of distance learning technologies in online education may include the following types: VR/AR platforms and applications; AI-based systems and algorithms for personalized educational content; professional multimedia tools; mobile educational applications for Android; gamified learning platforms; computer programs for developing various types of instructional content for students.

The successful organization of distance learning requires rethinking of the instructor's role from a knowledge broadcaster to a learning process facilitator and a social interaction mentor in the digital space (11).

Based on the results of the conducted research, it is established that an effective form of distance learning in a higher education institution requires the implementation of five main organizational and pedagogical measures: a) development of instructors' digital pedagogical culture; b) creation of adaptive educational environments based on both distance and face-to-face learning formats; c) ensuring group presence in the virtual space; d) personalization of academic curricula; (e) integration of traditional and interactive teaching methods, supported by computerization. Social and pedagogical interaction among participants in distance learning in the context of digitalization can take different forms, as illustrated in Table 1.

Table 1:Social and Pedagogical Interaction of Participants in the Distance Learning Process Under the Conditions of Digitalization

Type of Interaction	Characteristic	Software / Platforms	Examples of Implementation	Social and Pedagogical Outcomes of Interaction
Instructor ↔ Student	Personalized interaction using adaptive technologies	- Zoom; - Microsoft Teams/Chat; - Google Meet; - Slack Direct Messages	- Individual video consultations; - Personalized feedback via voice messages; - Adaptive tasks on LMS platforms	- Formation of trust in the information process; - Development of digital empathy; - Creation of personalized learning programs
Student ↔ Student	Horizontal group interaction through virtual platforms	- Discord servers; - Padlet boards; - Google Workspace	- Group projects in virtual classrooms; - Collaborative research; - Peer-to-peer assessment through video feedback	- Development of teamwork skills; - Strengthening professional solidarity; - Formation of social responsibility among students
Instructor ↔ Group	Synchronous and asynchronous group communication with elements of interactivity	- Webinar platforms; - LMS forums; - Kahoot!; - Mentimeter; - Breakout rooms; - YouTube Live	- Interactive lectures with polls; - Group discussions in forums; - Virtual seminars with breakout sessions	- Support of group dynamics online; - Development of digital academic culture; - Improvement of public speaking skills
Student ↔ Conten	Interactive engagement with multimedia educational content	- H5P; - VR/AR applications; - LMS; - Educational	- Virtual laboratories and simulations; - Tests with instant feedback; - Gamified learning	- Development of computer literacy; - Acquisition of research skills; - Formation of sustainable learning motivation

		gaming platforms; - AI-based tools	environments	
Institution ↔ Students	System of interaction between students and educational institutions	- CRM systems; - Analytics Dashboards; - Digital Portfolio; - Blockchain technologies	- Digital student records; - Automated academic performance assessment; - Electronic portfolios and certification	- Development of digital student identity; - Creation of a personalized educational environment
International Team Interaction	Global communication among students from different countries and cultures	- MOOCs; - Translation Tools; - Cultural VR Experiences; - Global Classroom; - Social Media; - Public Platforms; - University Partnership Apps	- International online projects; - Virtual internships; - Joint courses with partner universities	- Development of multicultural competence; - Foreign language acquisition; - Overcoming geographical and cultural barriers in education
Parents / Society ↔ Education	Involvement of external stakeholders in the educational process	- Social Media; - Public Webinars; - Community Platforms; - Industry Partnerships Apps	- Open lectures; - Parent-teacher conferences online; - Consultations and Q&A sessions; - Career guidance programs online	- Formation of parental involvement in the learning process; - Integration of education with professional activity

A distinctive feature of distance learning organization is the need to maintain motivation among both students and instructors while adhering to didactic principles.

Based on the conducted research, the authors identified principles of socio-pedagogical interaction in the context of distance learning under digitalization, namely: the principle of digital presence **-** creating a sense of "here and now" in the virtual space through synchronous and asynchronous communication; the principle of personalization - using AI and analytics to adjust the educational process to the individual needs of students; the principle of network cooperation - establishing horizontal connections among all participants in the educational process; the principle of multimodality **-** employing diverse channels of information perception to ensure inclusion; the principle of information ethics **-** prohibiting virtual bullying, protecting privacy, preventing plagiarism in scientific publications and students' qualification works.

Digital technologies can create new forms of social learning, emphasizing the importance of gamification and interactivity to support student motivation (12).

The empirical component of the study was conducted at pedagogical higher education institutions in the Kirovohrad region (now known as Kropyvnytskyi Oblast), Ukraine. Specifically, the survey involved instructors from Volodymyr Vynnychenko Central Ukrainian State University (Kropyvnytskyi), with its strong focus on teacher training through faculties such as Pedagogy, Psychology, and Arts, as well as related pedagogical programs in regional institutions aligned with socio-pedagogical research in distance learning and digitalization. This contextual focus enhances the relevance of findings to Ukrainian pedagogical higher education amid ongoing digital transformation challenges.

The information provided regarding the sampling strategy is insufficient, as the article lacks a clear description of how the 86 instructors and the control/experimental student groups (50 participants each) were selected. The authors should transparently outline the sampling strategy, including criteria for inclusion, recruitment methods, and whether random or purposive sampling was employed. This enhancement is essential to avoid questioning the validity and accuracy of the study due to ambiguity in this critical aspect.

For the scientific justification of comparing the effectiveness of classical and distance learning in higher education, an analysis of digital tools in virtual educational environments was conducted, taking into account socio-pedagogical aspects of interaction, as well as recommendations for personalizing learning through online platforms (Zoom, Microsoft Teams, Moodle, and AI tools). The experiment reflects empirical research through a survey of 86 instructors from Ukrainian pedagogical higher education institutions (2020–2025). It focused on the popularity of distance methods and tools, as well as a comparison of student success in a control group (traditional learning, n=50) and an experimental group (after the implementation of distance technologies, n=50). The survey data from instructors were

collected over the last five years, taking into account the COVID-19 pandemic, the military state in Ukraine, and digitalization, to demonstrate the transformation of pedagogical methodologies.

Statistical comparison utilized Student's t-test (p<0.05 for significance). The results are presented in Table 2.

Table 2: Most Effective Methods and Tools for Distance Learning

Method / Tool	Popularity Share (%)	Justification and Results
Videoconferencing (Zoom, Microsoft Teams)	72	Ensure synchronous instructor-student interaction, overcoming "distance."
Learning Management Systems (LMS) (Moodle, Canvas)	58	Support asynchronous access to content, fostering digital culture.
Gamification (Kahoot!, Quizizz)	45	Increase motivation through interactivity and engagement.
AI-Adaptive Systems (Chatbots, Khan Academy)	32	Personalize educational trajectories and subject programs.
VR/AR Technologies (Google Expeditions)	18	Create an immersive environment, overcoming geographical barriers.

The comparison of student learning quality in on-site and distance learning formats is based on average grades (on a 100-point scale), motivation (survey on a 1–5 scale), and qualitative changes after a 6-month implementation period.

Quantitative changes: average grade increase of +12% (t=4.2, p<0.01). Qualitative changes: enhanced independence and improved small-group work among students. The data are presented in Table 3.

Table 3: Comparison of Student Learning Quality in On-Site and Distance Learning Formats

Indicator	Control Group	Experimental Group	Quantitative Changes	Qualitative Changes
Average Academic Performance	72.5	84.3	+16.3% (significant improvement)	Increased motivation for self-directed learning through personalized content.
Motivation Level	3.1	4.2	+35.5% (increase by 1.1 points)	Development of digital empathy and teamwork in virtual groups.
Independence (Self-Assessment)	2.8	4.0	+42.9% (increase by 1.2 points)	Growth of subjectivity, reduced stress through adaptive tools.
Overall Academic Achievement	C	D	+12% (average increase)	Transition to a student-centered model, overcoming social barriers.

As can be seen from Tables 1–3, the conducted analysis confirms the effectiveness of distance learning technologies in enhancing the quality of education, with an emphasis on balancing information and communication technologies with the foundational principles of classical pedagogy. The digitalization of education requires the formation of a new pedagogical culture among instructors in higher education institutions. This culture must combine professional training curricula (adapted for the distance learning format and information-computer support), the requirements of pedagogical ethics and aesthetics, national traditions, and ensure didactic principles are met with innovative educational methodologies.In our opinion, the information pedagogical culture in future instructors entails the formation of a range of professional competencies: technological competence: proficiency in computer equipment and software tools for organizing learning and communication; digital didactics: adapting interactive and traditional teaching methodologies to the virtual educational environment; socio-emotional support: creating a psychologically comfortable

learning space and productive "instructor – student" interaction; ethical responsibility: ensuring safety and opposing bullying.

Discussion

The Digital Education Model includes: a long-term strategic vision for a paradigm of quality, inclusive, and accessible learning for 21st-century digital competencies according to the European standard; addressing issues related to the COVID-19 pandemic, which led to an unprecedented use of digital education and learning technologies; strengthening EU-level cooperation in the field of digital education across all sectors using digital technologies; supporting the digitalization of teaching methods and pedagogy; and forming the necessary infrastructure for the development of digital education and distance learning (10).

Teaching in a digital age means using technology to design, deliver, and enhance learning for modern learners (11). The digital transformation of education must be student-centered and account for the individual needs and socio-cultural characteristics of the learners (13). Thus, the motivation in a teacher's activity has its own

complex structure and hierarchy. A teacher's professional activity is motivated, as a rule, by several motives that form a motivational complex (system or hierarchy of motives). According to the results of our research, it has been determined that the motives that hold the leading place are being constantly actualized, act and exert a significant motivational influence on human activity – these are the real motives. Some other motives, located at the bottom of the motivational hierarchy, reveal a minor impact on human activity and are often generally not detected – these are potential motives, because under some circumstances they can be actualized, but in a specific period they do not act (that is, they are not actualized, they do not have a motivating influence) (14).

The introduction of AI significantly increases the efficiency of administrative tasks in higher education institutions. Automation in scheduling, attendance control, and processing of student applications saves time for these tasks by 40-50%. Thus, administrative staff can focus on strategic issues. Automation increases the performance of the educational process and facilitates the adaptation of institutions to unforeseen circumstances (pandemic, changes in the academic schedule) (15).

Recommendations for applying AI tools in building sustainable education: develop adaptive learning platforms that take into account the individual student needs (16); use AI tools to analyze student progress and create personalized learning trajectories (17); introduce digital literacy courses for educators so that they can effectively use AI technologies; train teachers to apply innovative methods in teaching (18); create tools to support people with special needs (speech synthesis systems, sign language interpreters, etc.) (19); ensure AI algorithmtransparency and protection of students' data (20); expand access to the Internet and digital technologies in remote regions (21); introduce grants, scholarships,and programs to support innovationdevelopment in the educationalfield (22); set standards for the AI usein education to avoid discrimination and ensure equal access (23); master the digital tools and technologies necessary for learning in the modern world (24); use AI-integrated platforms to expand knowledge and improve skills (25).

Definitely, the virtual educational environment must be modeled in advance; an example of this could be an educational project with clearly defined pedagogical conditions.

Digital technologies are an important part of building a digital society, playing a fundamental, leading and general role in driving the modernisation process. It is necessary to guide the public to understand that AI is just a wave of a new round of technological revolution, and there will be more technological breakthroughs in the future. Achieving education reform and technological innovation in the same direction, communication and integration is the main issue of the time. To provide teachers with sufficient training and support to use digital tools. To research different digital tools and platforms to find the most appropriate ones for your teaching purposes. To use interactive presentations, video tutorials, graphics, e-books and other tools that promote active student engagement and the formation of a culture of algorithmic, digital and reflective learning (26).

Thus, the future of distance learning should be considered through the lens of IT industry development, adaptive educational technologies, and interactive teaching methods capable of personalizing the learning process according to students' individual needs, making the educational environment multimedia-rich, communicative, and-most importantly-safe.

Conclusion

The socio-pedagogical aspects of organizing distance learning in the era of educational digitalization require a comprehensive approach that combines technological innovations with a deep understanding of the socio-psychological characteristics of the learning process. Analysis of the experimental results demonstrates that distance learning significantly increases the popularity of interactive tools among instructors, such as video conferencing (72%) and learning management systems (58%), promoting effective socio-pedagogical interaction and overcoming geographical barriers, as outlined in the conceptual framework of this study. Comparison of groups shows a quantitative improvement in student achievement by 12–16%, with a 35.5% increase in motivation in the experimental group, justifying the transformation of traditional practices through personalization and gamification. Overall, distance learning provides

qualitative changes, such as the development of autonomy and digital empathy, fostering a sustainable educational culture in the context of digitalization. To enhance the effectiveness of socio-pedagogical interaction between instructors and students in higher education distance learning: integrate video conferencing (e.g., Zoom or Microsoft Teams) to ensure synchronous interaction between instructors and students and to overcome physical distance; utilize learning management systems (e.g., Moodle, Canvas) to organize asynchronous access to materials; apply gamification tools (e.g., Kahoot!, Quizizz) to stimulate student motivation and strengthen social presence in the virtual environment; implement AI-adaptive systems (e.g., chatbots, Khan Academy) for individualized content customization according to each student's needs; develop instructors' digital pedagogical culture through training on VR/AR technologies to create immersive simulations; provide socio-psychological support via online platforms for webinars and communities to reduce stress associated with distance learning; conduct regular monitoring of student progress using analytical tools (Learning Analytics Dashboard) to adjust teaching methods accordingly; integrate principles of digital ethics (privacy protection, anti-plagiarism) into all educational programs to cultivate responsible behavior in online environments.

Future research on the socio-pedagogical aspects of distance learning in the era of educational digitalization should focus on longitudinal studies examining the integration of emerging technologies such as artificial intelligence, virtual and augmented reality, and adaptive learning systems to enhance personalized interaction, motivation, and equity in virtual environments, while addressing barriers related to digital literacy, infrastructure disparities, and ethical considerations in diverse socio-cultural contexts.

Abbreviations
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