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Innovative and cultural transformations of educational environment of the future: digitalization, barriers for traditional learning

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Abstract: The purpose of the article is to characterize innovative and cultural transformations of the educational environment on the principles of digitalization and the existing barriers. The objectives of the study were to find out the use of digital tools and to outline the barriers hindering their implementation; to describe the efficient algorithm of implementation of innovative and cultural transformations. Within the framework of research, one analyzed 31 works devoted to the problems of transformations of educational environment and its digitalization from 2018 to 2022. As a result, theoretical research is linked to 5 articles. 4 articles described the prospects of future development of education under digital changes, and 6 studies were oriented towards the impact of COVID on digitalization. Also, the course of transformations in developed (USA, Finland, Norway, and Turkey) and

developing countries (Ukraine, Pakistan, India, Bangladesh, Indonesia, Thailand, China) was analyzed. A systematic literature review and synthesis of conceptual research results on the problem were used. The case study to describe the peculiarities of implementation of digital technologies and to identify barriers of traditional learning within the educational process was carried out. To collect and process the data an interviewing, a pedagogical observation, an in-depth review, an open-ended survey, and methods of statistical analysis were used. The results evaluated that all the participants of the survey consider digitalization an effective innovative transformation and both teachers and learners have similar preference in using various digital tools. Also, the study revealed that teachers and learners face a number of barriers that complicate the educational process. To enhance the efficiency of educational environment and to achieve pedagogical intentions one outlined the measures to remove the barriers identified. The study showed that a barrier-free digital educational environment could enhance the efficiency of education of the future where learners will be prepared to various challenges of information society.

Keywords: digitalization, educational environment, transformation, mode, barrriers.

Introduction

Education has always been a key determinant of stable society development, and the efficiency of education system ensuring remains an important issue. German pedagogue and education theorist F. Froebel admits that there are epochs when education has become the core concept of community interests. Definitely, one lives in the age when people have placed their great hopes on education. But each historical period imposes different requirements or social challenges (Dar, 2018). And certainly, today's reality brings new challenges for reformists, educators, or scientists that must be constantly taken into consideration and trigger effective transformations as education is oriented towards adequate and flexible development. Only if distinguishing education as the priority for future enhancement, it may lead to positive changes and modernization within the educational environment which will be able to combine harmoniously innovations and remove existing barriers of traditional learning.

Transformations of educational environment provide great opportunities to enhance the efficiency of education. Simultaneously, these transformations require significant changes within the organization of learning and removal of existing barriers since they hinder the development of methodological approaches and the implementation of innovative technologies or tools. Modern educational environment allows teachers to generate and transfer new knowledge, to form readiness to study under the circumstances affecting the educational process.

Under conditions of global threats and related large-scale changes, education faces new challenges that require rapid responses and transformations of all its components. The emergency switching to online learning caused by the COVID-19 pandemic and the deterioration of security conditions are a direct reflection of this new configuration of educational environment.

Development of digital economics as a strategic priority is oriented towards facilitation of digital technologies in different spheres of community. The new generation training for digital economics in general and preparation of every learner to act within the digital society in particular have become the key tasks of modern education.

The digitalization of educational environment is complicated, multidimensional, and long-term process related to change of objectives, content, organizational forms and methods of educational process. At the same time, digitalization leads to qualitative modifications and involves using innovative

digital technologies for gradual transition to person-centered and result-oriented educational environment.

Therefore, the primary target of education of the future refers to the change of conventional educational paradigm into progressive cultural one that implements innovative development using wide-spreading digital technologies. As a result, the education focuses on mechanisms of self-actualization, self-development, self-protection, self-regulation, self-education and adaptation to innovations among new generations. It also reverses the negative trends within the educational environment of the future. In order to achieve this, it is necessary to outline innovative and cultural transformations of educational environment of the future considering digitalization and the necessity to remove barriers of traditional learning.

Research Problem

Education environment is changing due to rapid digital transformations and in this digital transition, education is gradually transforming as well (Akour & Alenezi, 2022), refocusing on different cultural values and cultivating cognitive, interpersonal, and intrapersonal skills among learners (Reimers, 2020). Consequently, educational environment of the future should be adapted according upcoming transformations and use them to enhance the efficiency of education.

Therefore, the analysis of innovative and cultural transformations including digitalization is very important as these transformations can be applied within the framework of changing educational environment. In addition, it is essential to elaborate the measures for removal of barriers of traditional learning in order to enhance the efficiency of education in future and prepare the today's learners to future challenges.

Research Focus

A transformation is understood as a long-term and quality process of adaptation to changes and implementation of innovations (Reimers, 2020, Lata Narayan & Shailashri, 2021, Leal Filho et al., 2018). At the same time, a transformation means the reason for converting and reforming the education system (Reimers, 2020, Qutoshi, 2021). According to Leal Filho et al. (2018) and García-Morales (2021), a transformation is an objective process under the existing conditions of development. In the context of education, transformation is the creative implementation of innovative achievements within the educational environment. Positive transformations are usually well-organized and result-oriented. Also, they have value and motivation orientation (Akour & Alenezi, 2022, Batchenko, 2020). Therefore, transformation of the educational environment concerns structural and quality change in order to implement essential innovations.

The modernization of education and application of fundamental transformations for the future are actively discussed. Modernization of education is not about education as an amount of knowledge, it's about the way people are educated. Moreover, it brings to a new level of innovative skills for teachers and students (Armila et al., 2022). Digitalization is a priority direction of modernization transformations; it is often called unavoidable process within the educational environment that will certainly intensify in future (García-Morales, 2021, Balyer & Öz, 2018). It is important to consider them while preparing action plans or strategic vision of education system development.

Digitalization of educational environment is a pervasive phenomenon (Gopal, 2020) that means extensive use of digital technologies (Armila et al., 2022, Islam & Jahan, 2018) that, in return, form a meaningful approach to significant changes in education (Pu, 2022). According to Anggraini & Handayani

dan (2021), digitalization deals with implementation of digital technologies to modernize and maximize the educational process. At the same time, in education digitalization refers to distant and algorithm-based application (Armila et al., 2022). In some findings it is called pedagogical revolution (Gopal, 2020). These definitions testify that digitalization of education environment is widely applicable within the educational environment and it will only accelerate.

Today, the knowledge transfer and acquisition, formation of skills and abilities is effectuated through computer and network; learning material requires to use new methods, forms, and instruments of formation of knowledge and skills that are appropriate for the current and, obviously, for the future educational environment (Anggraini & Handayani dan, 2021). Digitalization changes the principles of organization and structure of educational environment. It is very much in need for the development of new courses and educational materials, continuous improvement and modification of teaching methods.

The digitalization as an innovative transformation encourages simplification of educational process making it more flexible (Balyer & Öz, 2018) and adaptive to modern realities and contributes to building of good professionals from today's learners (Pu, 2022). At the same time, digitalization is believed to enhance the quality of education (Armila et al., 2022). Digital technologies allow increasing the learning outcomes, collect data on teaching efficiently. Due to digitalization new possibilities arise; they go beyond traditional learning and help to remove the barriers that complicate the educational process (Islam & Jahan, 2018). This quality helps not only to enhance the efficiency of educational process but rapidly solve the problems within the educational environment.

Also, digitalization of educational environment causes mobility, continuity, and individualization of educational process (Balyer & Öz, 2018) and an educational institution converts into a space for innovations (Lata Narayan & Shailashri, 2021). It is necessary to admit that digitalization affects and changes educational content management, teaching methods, instruments and technologies, organizational forms and cognitive activity of learners. It suggests a combination of individual and group work, unlimited time for learning that create favorable environment for feedback and development of personalized learning plans (Ugur, 2020). Some scholars emphasize that digitalization is closely connected with the use of information and communication technologies (ICT) (Ali et al., 2022) or virtual classroom (Soodtoetong & Rattanasiriwongwut, 2022). These characters of digitalization signals constantly change and take place in developing countries more deeply and intensively as they had to improve not only content or methodical base but IT infrastructure.

The digitalization suggests a fundamentally new format of educational environment that provides easy and accessible services and platforms for more efficient interaction of all participants of educational process, enhancement of its transparency (Anggraini & Handayani dan, 2021). To understand the nature of digitalization better, it is necessary to outline its modes within the educational environment. Jakoet-Salie, & Ramalobe (2022) claim that digital educational environment exists in three different modes: in-class mode with the use of ICT, mediated learning, blended learning, and fully online mode (Table 1). The transition to blended learning or fully online mode was mostly affected by the pandemic and the current period is called post-COVID stage of education transformation (Meshram, 2020, Zhao & Watterston, 2021) that means we will see even more changes and modification in future.

Table 1

Modes of digital educational environment

Mode	Description

In-class mode with the use of ICT or simplified mode	Refers to instruction in the classroom and suggests using of different ICT to present new material, perform reproductive and productive tasks, and assess learning outcomes.
Mediated learning	Involves training in the classroom but requires extensive use of digital tools including web pages, electronic schedule, and digital dissemination of material, online quizzes and streaming videos.
Blended learning	Blends online and face-to-face training. Suggests delivering lectures and some discussions online but seminars or panel discussion are organized in the form of face-to-face meeting.
Fully online mode	All activities take place online including discussions, seminars, assessment sessions and delivering presentations.

Source: Jakoet-Salie & Ramalobe (2022)

The use of different modes testifies that there are different approaches to educational process organization and building of educational environment. The application of certain mode depends on various factors like learning objectives, external conditions, existing resources and readiness of educational environment. Teaches may practice different modes in specific situation. Depending on learners' needs a teacher may also mix them during the learning period. Obviously, certain mode demands the implementation of specific instructional techniques, the use of technical aids, and support services. Each mode imposes the requirement to teachers and educational institutions. According Haleem et al. (2022), main requirements to organize efficient digital educational environment include: creation of learning resources and digital platforms that support interactive multimedia content available for teachers and learners; development and implementation of innovative multimedia and computer-based educational instruments to build digital educational environment (multimedia classrooms, laboratories, integrated groups, mixed learning groups, etc.); development of blended or fully online learning with the use of cognitive and multimedia technologies. Sinku (2021) also adds the importance of online curriculum management systems use. The implementation of ICT and technological infrastructure encourages further development of innovations and intensification of organization, structural, cultural, educational and methodological changes within the educational environment (Iswari, 2019). Digital technologies possess a significant didactic potential (Ugur, 2020), that simplify the search for information, its personalization or orientation towards learners' needs, interactivity, multimedia, specific cultural features. Such innovations create the situation of comfort and remove barriers. Therefore, the digitalization of educational environment is caused by the necessity of extensive use of innovative technologies, new requirements for forming key competencies of future professionals and upbringing of new digital generation with special social and psychological characteristic and cultural profile. Petersen & Bartel (2022) found that cultural transformations affect instructional and management approaches within the education al environment and contribute to the overall success of new era of education.

At the same time, digitalization of education promotes sociotechnnological cultural transformations, sociocultural and socioeconomic modernization (Armila et al., 2022) as well as organizational-culture change (Briody et al., 2021) within the society and educational process in particular. Digital transformations of educational environment require development of a high-

performing digital education ecosystem and the improvement of digital skills and competencies among the participants of educational process (Stanković, 2021).

At the same time, implementation of innovative and digital technologies may face a number of certain barriers. They include the following categories: vision or clarity, strategy and policy including the absence of action plan, recourses like experts, funds and time, insufficient leadership, low level of digital skills and knowledge of instructors and learners, poor IT infrastructure and IT support service, low adaptability to innovation, poor resistance to change, inadequate government and economic measures (Aditya, 2021). According to Latifah, Budiyanto, & Saputro (2022) cultural barriers should be separately identified and they affect instructional techniques, leadership of educational process, management of educational institution, and, in fact, change educational environment building its new framework. Besides, Erstad et al. (2021) claim that overcoming of barriers of digital educational environment require an immediate improvement of two components – logistics and content.

Due to a well-organized and barrier-less innovative environment, the education is getting more available and comfortable; it also requires lower financial costs, time and human resources (Lata Narayan & Shailashri, 2021, Jakoet-Salie & Ramalobe, 2022). It is not only important to use innovative technologies and digital instruments but to choose the most appropriate ones, combine them and manage to make the educational process more efficient.

Research Aim and Research Questions

The purpose of the article is to characterize innovative and cultural transformations of the educational environment of the future on the principles of digitalization and the necessity to remove barriers of traditional learning.

The article objectives are the following:

- to carry out an open survey among teachers and learners to find out the use of digital tools within the educational environment peculiarities;
- to outline the barriers typical for traditional learning and hindering the implementation of digital tools;
- to describe the efficient algorithm of implementation of innovative and cultural transformations within the educational environment of the future considering objective advantages of digitalization and barriers of traditional learning.

Research Methodology

General Background

To conduct the research, a number of theoretical methods like systematic literature review, synthesis of conceptual research results on the problem of innovative tendencies in education, modernization of educational process and digitalization of educational environment) were used. As well

a case study in order to analyze the problem of implementation of digital technologies and to identify barriers of traditional learning within the educational process was carried out. To collect and process the data one used the following methods: interviewing, pedagogical observation, and in-depth review, open-ended survey among teachers and learners, and methods of statistical analysis.

Sample / Participants / Group

In the study wee involved 72 teachers and 118 learners of different educational institutions from different regions of the country during 2021-2022 academic years. The survey was conducted through online forms. All the participants agreed to fill in the forms voluntarily and they were explained about the study aim, its procedures and stages. The teachers and learners answered independently; they did not discuss their answers with each other. When the data processing was finalized, they were informed about the results.

Instrument and Procedures

All the participants of the study (both teachers and learners) interacted within the educational environment. The teachers were responsible for the implementation of digital tools and enhancement the efficiency of digital educational environment. Also, teachers and learners were asked about the barriers hindering the efficiency of learning. The survey was organized with the use of online forms with open-ended questions.

The respondents were interviewed in order to obtain relevant information on the research and to outline the limits of the pedagogical problem. First of all, the questions covered the principles of implementation of digital educational environment, the main digital tools used within the educational process and the barriers hindering the learning achievements. The form included the following questions:

- Do you agree that digitalization is important requirement of modern educational environment?
- Do you find digitalization advantageous?
- What advantages of digitalization can you name? (Provide at least three advantages)
- What mode of digital educational environment do you experience? (e.g., in-class mode with the use of ICT or simplified mode, mediated learning, blended learning, fully online mode, or none of these and prefer traditional instruction)
- What digital tools do you prefer?
- How often do you use digital tools?
- Why do you use digital tools and technologies (e.g., for presenting information, for assessment, for self-study, for preparation of initiative projects)?
- How do you assess the efficiency of educational process you interact in?
- What barriers do you face? (Name at least three barriers)
- What improvements would you recommend to enhance the efficiency of educational process?
- What type of educational environment do you prefer: innovative or traditional?
- Do you agree with the statement that digital tools will only extend in future? If yes, why?
- What level of digital competency do you possess in your opinion? Do you regularly work on its enhancement?

Data Analysis

Having analyzed the obtained data, one outlined the peculiarities of the use of digital tools within the educational environment; the barriers hindering the implementation of digital tools were outlined

and the efficient algorithm of implementation of innovative and cultural transformations within the educational environment that can be applicable for the future was described. The findings of the case study are presented in Research Results and Discussion parts of the article.

Research Results

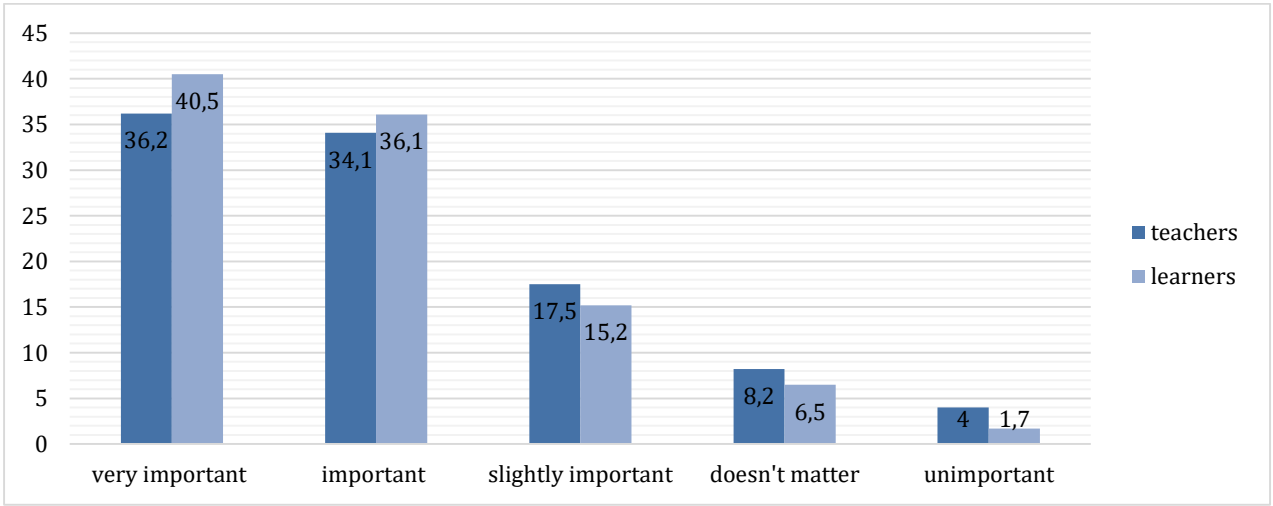
The findings showed that both teachers and learners consider digitalization as an effective innovative transformation and agree that it will extend in future. Figure 1 shows the attitudes of participants to digitalization.

Thus, the findings show that most of respondents assess digitalization positively. 36,2 % of teachers consider digitalization very important and unavoidable and 34,1 % think it is important and enhances the quality of educational process. It is necessary to admit that 8,2 % of instructors do not care about the advancement of digitalization and they are sure digital technologies do not change the educational process. And a very small number of teachers (4 %) think that digitalization is unimportant and it will complicate the learning. The results suggest that educational environment transformations under conditions of digitalization are a topical issue of pedagogical science and it will remain the same in future.

To compare, slightly more learners (40,5 %) agree that digitalization is very important and 36,1 % consider it important process. At the same time, 6,5 % and 1,7 % of young learners think digitalization doesn't matter or is unimportant respectively. These figures show that young population is aware about digital transformation within the society and educational environment in particular and consider changes objective phenomenon.

Figure 1

The significance of digitalization of educational environment according to teachers and learners



Source: based on survey data analysis

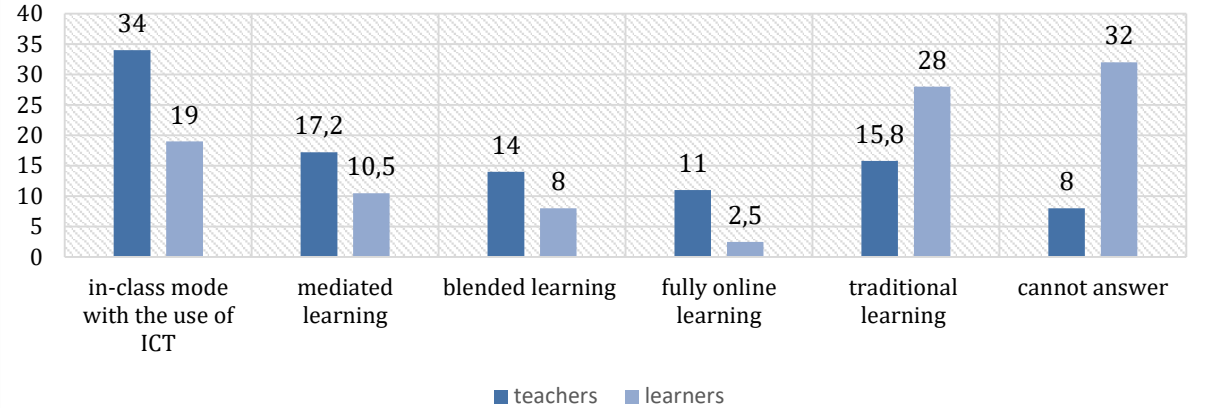
Also, one found that teachers differentiate the modes of digital educational environment to some extend and use all of them. Figure 2 shows the percentage of teachers organizing digital educational environment.

The results showed that most of teachers (34 %) prefer to work in simplified digital environment that suggests instruction in the classroom and periodical use of ICT. 17,2 % of teachers prefer to work in mediated mode. A sufficient large number of teachers (15,8 %) work in traditional mode that requires improvement of their digital skills. At the same time, it is very difficult for learners to differentiate mode

of digital educational environment and explain the difference between them. Most of young people (32 %) couldn't explain clearly their learning experience which means they have insufficient level of digital competency. 28 % think of learners think they study in traditional educational environment. And only 2,5 % of learners assess fully online mode of digital educational environment positively.

Figure 2

The use of different modes of digital educational environment among teachers and learners

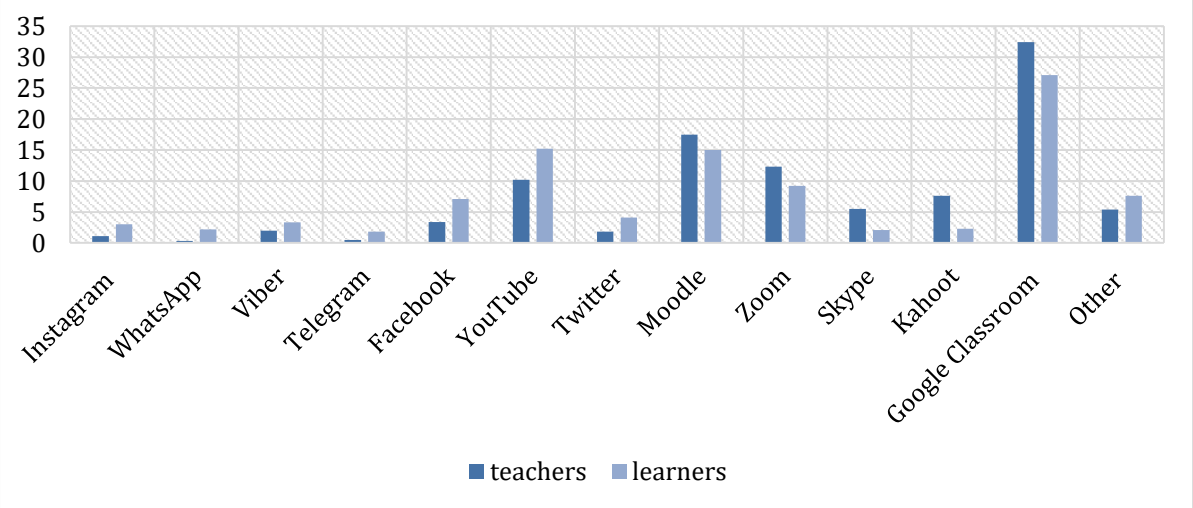


Source: based on survey data analysis

As well, one found what digital tools are used most of all. Figure 3 shows the percentage of teachers and learners using or preferring the specific digital tool.

Figure 3

The use of digital tools among teachers and learners



Source: based on survey data analysis

The findings showed that teachers consider the following digital tools easy and simple to use: Google Classroom (32,4 %), Moodle (17,5 %), YouTube (10,2 %), Zoom (12,3 %) and Kahoot (7,6 %) the most. At the same time teachers almost do not use social networks for teaching. Learners have the highest indices towards the following digital tools: Google Classroom (27,1 %), YouTube (15,5 %), Moodle (15 %), Zoom (9,2 %), and Facebook (7,1 %). Interestingly, learners prefer using social networks for learning

more. They use Facebook and Twitter for searching additional information when preparing project. Also, they use messenger to conduct short quizzes and interact with working group.

One of the questions in the form concerned the barriers hindering the educational process. Table 2 demonstrates the analysis of barriers based on the answers of teachers and learners. The results prove that most teachers face a number of barriers and think it is necessary to overcome or prevent them in order to make the educational environment more efficient. One found that the following barriers are the most significant ones: bad digital infrastructure (46,7 %), digital tools are difficult to use for very younger learners (38,3 %), time-consuming tasks (37,6 %), and low information literacy (28,1 %). Learners also may face barriers and they show poorer learning outcomes when they study in the educational environment with barriers. We compared their answers and found that learners think that the following barriers hinder the efficiency of educational process the most: lack of collaboration (67,2 %), low level of digital competency (60,3 %), inappropriate teaching methods used (53,2 %), time consuming tasks (50,4 %), lack of practice during online lessons (48,2 %), bad digital infrastructure (34,5 %).

Table 2

Barriers hindering implementation of innovative and cultural transformations

Barriers	% of the total number of teachers	% of the total number of learners
Poor digital infrastructure	46,7	34,5
Low information literacy	28,1	35,8
Time consuming tasks	37,6	50,4
Low level of digital competency	27,4	60,3
Lack of necessary scientific and methodical literature	18,3	2,4
Inappropriate teaching methods used	12,4	53,2
Low motivation	4,5	29,0
Lack of practice during online lessons	19,4	48,2
Lack of collaboration	23,1	67,2
Do not consider the needs of learners	2,3	6,8
Poor Internet connection	19,2	13,5
Bad or unclear instruction	8,1	27,3
Difficult to assess the participation	19,5	17,3
Absence of guidance on digital educational environment	21,6	1,2
Necessity to combine many materials	20,3	26,4
Difficult to manage the classroom	18,5	13,7

Lack of digitalized teaching resources (like textbooks or manuals etc.)	11,0	19,6
Difficult to select and sort information	13,7	28,5
Do not use social networks or apps for learning	1,2	40,0
Difficult to undergo tests or quizzes	2,3	32,1
Difficult to use for very young learners	38,3	2,1
Takes long time to study new tool	25,1	18,0
Requires psychological readiness to work through computer	20,5	21,6
Changes relations between teacher and learners	23,8	14,5
Breaks social links in the classroom	18,7	20,1
Lower learning outcomes	18,3	24,7
Difficult to participate in interactive activities and games	27,5	32,6

Source: based on survey data analysis

Discussion

The systemic literature review and the case study conducted among teachers and learners of different educational institutions show that the focus of deep and efficient changes within the educational environment depends on the stage of its development and external conditions. The current educational environment requires innovative and cultural transformations through implementation of digitalization and modernization of traditional learning and immediate overcoming of existing barriers to make the educational process easy, interesting, highly-motivating, and efficient for all the participants.

One found that innovative and cultural transformations of educational environment include solving the specific barriers hindering the educational process and complicating the interaction between the teachers and students. The findings of case study conducted among teachers and learners facing current transformations allow us to outline the measures to solve the barriers identified. Table 3 shows the list of barriers described and the measures recommended to use in order to overcome barriers.

Table 3

Barriers hindering implementation of innovative and cultural transformations and the measures to overcome them

Barriers	Measures to overcome barriers
Bad digital infrastructure Poor Internet connection	Installation and use of computer equipment, networking vehicles and support systems, information terminals, pedagogical and methodical techniques, and provide qualified technical maintenance of equipment;

	Providing the authorized access to information and communication instruments for distance learning.
Low information literacy Difficult to select and sort information	Formation of information literacy as an ability to select and sort information.
Low level of digital competency	Formation of understanding among the participants of educational process the principles of digitalization and its advantages within the educational environment as an innovative transformation; Formation readiness of students to study using digital tools and formation their digital competence.
Lack of necessary scientific and methodical literature Absence of guidance on digital educational environment	Methodical support of young teachers.
Low motivation Time consuming tasks	Enhancement of motivation to learning through digital tools and building of individual learning trajectory.
Lack of collaboration Lack of practice during online lessons	Unlocking the pedagogical potential of teachers, implementation of variety form of teaching like individual work and teamwork as well as innovative teaching methods including game-based approach.
Difficult to assess the participation Difficult to undergo tests or quizzes	Improvement of assessment techniques and methods on the principles of transparency and objectivity including automated testing and self-assessment techniques.
Difficult to manage the classroom Do not consider the needs of learners Difficult to use for very young learners Takes long time to study new tool Inappropriate teaching methods used Bad or unclear instruction	Development of flexible curriculum and leaving the possibility for administration and teaching staff to make changes in content and methods according to learners' academic and professional needs.
Lack of digitalized teaching resources (like textbooks or manuals etc.) Necessity to combine many materials	Promotion of positive sociotechnnological cultural transformations as well as sociocultural and socioeconomic modernization.
Do not use social networks or apps for learning	Development of self-education skills among learners.

Requires psychological readiness to work through computer	Development awareness to work with digital tools.
Changes relations between teacher and learners	Formation of partner relations between teachers and learners on the principles of mutual trust, interest, desire to experience exchange, motivation to self-development and self-actualization, person-centered approach in teaching.
Breaks social links in the classroom	Maintenance of effective feedback to learners that contributes to learning and achievement and helps to overcome psychological difficulties of digitalization like fear, uncertainty, shyness during online presentations, etc.
Lower learning outcomes	Development of creativity through digital technologies and tools, orientation towards project-based technology (preparation of reports, presentations, video, etc.).
Difficult to participate in interactive activities and games	Use of different modes of digital educational environment, maintenance of asynchronous and synchronous interaction; Use a variety of communications means integrated in the leaning management system Moodle or Google Classroom, e-mail, messengers, videoconferencing, forums and chats, and presentations with real-time feedback.

Source: based on survey data analysis

One agrees with Qutoshi (2021) that development of digital technologies and learning instruments and searching for the new ones demands understanding the peculiarities of digital transformation of educational environment, the needs for digitalization and specification of behaviour of today's learners. As a result, the digitalization of educational environment, on the one hand, provides great opportunities for enhancement the efficiency of quality of education, and on the other hand, requires fundamental changes of methodological approaches to organization of learning and using of new technological instruments.

According to this research findings, the digitalization of educational environment is aimed at achievement of learning outcomes using a wide range of digital instruments including social networks, online courses, artificial intelligence methods, virtual reality tools, broadband access and mobile Internet, online curriculum management, learning management systems, and work with big data. In addition, digital educational environment can be organized through in-class mode with the use of variety ICT, mediated learning, blended learning, and fully online mode.

On the basis of given observations in this area as well as findings of Ugur (2020), Bygstad et al. (2022) and Jackson (2019) give the possibility to assert that innovative and cultural transformations within the efficient digital educational environment require a whole set of measures. They include development of digital infrastructure within educational institution to ensure maximum access of all the participants of educational process to digital technologies; development and dissemination of new

learning forms and technologies within the digital educational environment that is based upon synthesis of new digital tools, digital sources, platforms and apps; introduction of organizational, technological and infrastructural preconditions to achieve necessary transformations of educational environment; development and implementation of new digital educational content; gamification of educational process and extensive use of didactic games, digital resources and simulators or virtual laboratories on the principles of benefiting from visualization of technologies and augmented reality; expansion of the range of Massive Open Online Courses (MOOCs), course websites and library systems; advancement of distance learning; use of social networks and messengers within the educational process; development, testing and implementation of new platform solutions and learning management systems that contribute to mastering of educational programs.

The most important task of modern education is permanent upgrading of content, instruments, technologies of learning and methodology. Also, we can claim that digital educational environment should possess two components to be effective and to be able to overcome barriers. They are logistics and content. The content of educational environment during digital transformation does not have significant differences from the traditional content. It features mainly the methods of working with content or the principles of collaborative and person-centered learning with the use of digital instruments. The logistics involves management of transfer and acquisition of knowledge; it also contributes to generation of new information employing digital instruments.

One insists that development of innovative teaching methods using Internet resources stimulates, motivates, and provides the high level of personification of educational environment. Also, it completely changes instructional techniques and educational leadership. Learners can be involved in individual work, teamwork, project-based activities, participate in virtual lectures, panel discussions, sessions, and materials exchange. They also study through peer-learning and cross-learning models that improve their soft skills and forms readiness to perform in the digital surrounding.

Moreover, innovative transformations provide flexible access to educational environment and help to overcome traditional barriers. Learners can proceed in self-paced courses and choose what platforms to use. That is why it is easier to adapt educational materials to learners, their professional and academic needs. At the same time, cultural transformations contribute to improvements within educational management, form participants' positive attitudes to digitalization and socioeconomic modernizations.

Thus, an efficient digital educational environment is the well-organized and didactic system of instruments oriented towards realization of educational content and creation of conditions for personality development and creative self-actualization, upbringing of national and universal human values, creation of the possibilities for youth to obtain qualitative education, training them to new conditions of information society and adjustment to use of innovative techniques and teaching technologies, democratization of education, and life-long education.

The principles of innovative and cultural transformations within the educational environment considering objective advantages of digitalization and barriers of traditional learning must be implemented in future to enhance the efficiency of education.

Conclusions and Implications

The study evaluated the importance of educational environment transformations due to the peculiarities of educational process organization, external conditions of information society and requirements to learners' readiness. The main objective of education of the future is believed to change the conventional educational paradigm into a progressive cultural one that implements wide-spreading digital technologies. Transformations of educational environment provide great opportunities to enhance

the efficiency of education but they require significant changes and removal of the barriers since the latter ones hinder the methodology development and innovative technologies implementation. Transformation refers to a long-term objective and quality process of adaptation to changes and implementation of innovations.

The digitalization directly deals with the implementation of innovative technologies to modernize and maximize the educational process. Due to digitalization; educational environment goes beyond traditional learning and aims to remove the existing barriers. Moreover, digitalization suggests a fundamentally new format of educational environment where digital technologies provide more efficient interaction between all participants of educational process; also, these technologies enhance the transparency of educational process.

The findings show that digital educational environment exists in three different modes: in-class mode with the use of ICT, mediated learning, blended learning, and fully online mode. Each of these modes is used under specific conditions and requires different digital technologies. At the same time, it faces barriers hindering the efficiency of educational process and affecting the learning outcomes adversely.

To conclude, the innovative and cultural transformation contributing to creation of efficient digital educational environment require specific measures including the development of digital infrastructure, the dissemination of new learning forms and technologies, the implementation of new digital educational content, the enhancement of gamification and extensive use of didactic games. Similarly, it needs to possess appropriate digital resources and simulators as well as new platform solutions and learning management systems.

Besides, innovative and cultural transformations of educational environment there is a need of solving the specific barriers hindering the educational process and complicating the interaction between the teachers and students. The systematic literature review and the findings of case study allowed outlining the measures to solve the identified barriers.

Therefore, an efficient educational environment should be well-organized and a didactic system of digital instruments should be favorable for the realization of educational content, for the creation of specific conditions for personality development, upbringing of the youth on national and universal human values, for the democratization of education, and life-long education extension. Innovative and cultural transformations within the educational environment must consider the objective advantages of digitalization. In addition, they must be applied on the principles of overcoming the barriers typical for traditional learning and complicating digital educational environment. These transformations will help to create an efficient educational environment of the future where learners will be prepared to various challenges of information society.

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