

Psychological and Pedagogical Features the Use of Digital Technology in a Blended Learning Environment

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Summary

The article highlights the problems of the digitalization of the educational process, which affect the pedagogical cluster and are of a psychological nature. The authors investigate the transformational changes in education in general and the individual beliefs of each subject of the educational process, caused by both the change in the format of learning (distance, mixed), and the use of new technologies (digital, communication). The purpose of the article is to identify the strategic trend of the educational process, which is a synergistic combination of pedagogical methodology and psychological practice and avoiding dialectical opposition of these components of the educational space. At the same time, it should be noted that the introduction of digital technologies in the educational process allows for short-term difficulties, which is a usual phenomenon for innovations in the educational sphere. Consequently, there is a need to differentiate the fundamental problems and temporary shortcomings that are inherent in the new format of learning (pedagogical features). Based on the awareness of this classification, it is necessary to develop psychological techniques that will prevent a negative reaction to the new models of learning and contribute to a painless moral and spiritual adaptation to the realities of the present (psychological characteristics). The methods used in the study are divided into two main groups: general-scientific, which investigates the pedagogical component (synergetic, analysis, structural and typological methods), and general-scientific, which are characterized by psychological direction (dialectics, observation, and comparative analysis). With the help of methods disclosed psychological and pedagogical features of the process of digitalization of education in a mixed learning environment. The result of the study is to develop and carry out methodological constants that will contribute to the synergy for

the new pedagogical components (digital technology) and the psychological disposition to their proper use (awareness of the effectiveness of new technologies). So, the digitalization of education has demonstrated its relevance and effectiveness in the pedagogical dimension in the organization of blended and distance learning under the constraints of the COVID-19 pandemic. The task of the psychological cluster is to substantiate the positive aspects of the digitalization of the educational process.

Keywords:

digitalization of education, blended learning, digital technology, learning process, pandemic education.

1. Introduction

The educational process at the beginning of the XXI century was significantly influenced by the introduction of electronic forms of education. Information and communication technologies literally permeated the educational space both in terms of information (educational and pedagogical materials) and in terms of communication (psychological characteristics of communication between the teacher and the student in the absence of direct communication).

Let us note that the process of digitalization in education, despite all its exclusivity and innovation, took place exclusively in an evolutionary course. The introduction of new technologies was gradual, deliberate, and in some cases cautious. This state of affairs was fully

consistent with the conservative foundations of education, which were traditional and immutable for this sphere of public activity. The algorithm for the introduction of the latest digital parts in the educational process is described in Fig. 1: application of technological innovation in other areas of social activity with the identification of its positive and negative manifestations; gradual introduction of the new digital resource into the educational process with constant monitoring of its effectiveness in the realities of education; approval of the new technological sample in the educational environment as a working element of the educational cluster.

The practical platform for the implementation of digital transformation was also important. The distance or online format of the learning process was the optimal solution for testing the effectiveness of new information and communication technologies. Naturally, digital resources were also actively used in the traditional form of education. However, it is much easier to identify their advantages and disadvantages in online learning (Osadchyi & Serdiuk, 2019).

The situation changed dramatically with the onset of the COVID-19 pandemic. The steady gradual process of digital renewal of the educational space was replaced by a rapid uncertain application of online learning due to quarantine restrictions. Very soon e-learning turned from an alternative or auxiliary to the only possible one. There was a need to provide and support this type of learning activity. Here digital resources came to the fore. INTERNET resources, online learning platforms, mobile format, messengers, mobile applications, social networks - this is by no means a complete list of the elements of digital potential realized in education (Osadchyi et. al., 2020).

The complete transition to a distance format revealed all the shortcomings associated with the use of digital potential. Of course, the urgent and complete transition from the traditional to the distance form of learning could not go without difficulty. After a certain period of adaptation to the new pandemic realities, the blended learning model is gradually being applied. We are talking about three main modifications of this format: a combination of distance and classroom instruction using digital technology as the dominant element for the first variation and as a supporting resource for the second model; distance learning, most of the components of which are provided by digital resources, while certain elements are achieved through direct communication between tutor and student; traditional classroom teaching, which involves the active use of digital potential and the replacement of the teacher's function with the functionality of digital tools.

Each of these formats implies appropriate teaching and learning support. In a general sense, the more blended learning shifts toward the distance model, the greater the

share of digital support is required. Consequently, the teaching and learning arsenal is created according to the algorithm inherent in digital resources, which take away a share of the active activity of the teacher. With the increase in the share of classroom "live" learning, the role of the teacher is actualized, using primarily pedagogical skill, activating the digital format exclusively as a reinforcing factor. At the same time, "technical mastery of technological resources does not guarantee effective learning. For a fruitful implementation of ICT in the classroom, learning strategies and skills are needed." (Mena et al., 2018).

Thus, we note one of the key constants of the implementation of digital technology in a blended learning environment - dynamism. This feature has been significantly actualized in the context of the uncertainty of the realities of the pandemic world. The need for shifting teaching and learning priorities is constant and fleeting. This is why there is a need to develop universal teaching and learning materials that will be equally effective in different formats of blended learning. The main problem of modern education is developing an effective algorithm, according to which it is possible to plan the use of both pedagogical activities in traditional teaching and learning content in e-learning. Under such conditions, the transition between the formats of blended learning will be fast and acceptable for the education system. Digital technologies act only as a tool that can be changed, updated, improved. This will allow providing quality educational services even in conditions of the impossibility of full-fledged provision of digital technologies (Osadchyi et. al., 2020).

In addition to the pedagogical features that have received new opportunities for development and implementation, the role of psychological support for blended learning has intensified. Psychological justification of the features of distance learning is considered in several aspects: full distance learning, which implies the absence of direct communication between the student and the teacher and the implementation of communication exclusively through digital resources; blended learning with elements of the online format, the feature of which is psychological preparedness for constant and rapid change of the model of the learning process without loss of quality indicators of education; potential online learning, which implies psychological resilience to possible changes in the learning process and the transition to online educational services.

With the beginning of the pandemic, there has been a complete transition to e-learning, which has caused certain crises in the educational environment. If previously it was a question of psychological support, now there was a need for psychological support. The domestic educational government agency (Ministry of Education and Science of Ukraine, 2020) defines such tasks that face blended learning: continuous support of teachers and students at all

levels (both educational and methodological support and moral and psychological support are provided); monitoring activity on the platform (conducted to assess the quality of educational services in the new format); timely response to critical situations of both technical and organizational nature (identifying problems with access to distance learning format and difficulties with the use of digital technologies in the educational space); renewal and optimization (provides for mobility and dynamism of the processes of digitalization of education, which are manifested in the changes and transformations of the learning process).

2. Literature Review

Analyzing the source base to the problems of digitalization of education and blended learning, one aspect is obvious, which is the differentiation of understanding of the application of these elements before and after the pandemic realities. In the literature on the psychological and pedagogical features of digital technology applications in education, there is a clear distinction between the fundamental understanding of pre-pandemic and post-pandemic digitalization implementation in education. In the pre-pandemic period, digital transformation in education was seen as a relevant, but an alternative option for the organization of the educational process. The specifics of the use of digital technology in the educational process were covered (Dziuban et al., 2018), (Hrastinski, 2019), (Mena et al., 2018).

After the introduction of restrictive quarantine measures and the introduction of distance learning, digital technologies have turned from auxiliary variations in the organization of the educational process into the mainstream. Consequently, scientific research on the digitalization of education, in addition to the pedagogical cluster, began to explore the psychological aspects of this process. Undoubtedly, the educational sphere is experiencing crisis phenomena associated with complete unpreparedness for the full transition to the distance learning format. Consequently, the need for psychological support of these transformations is actualized. In the scientific papers covering the digital transformation in education after 2019, there is almost everywhere a statement about the impact of the COVID-19 pandemic: (Ashraf et al., 2021; Pinto & Leite, 2020; Hazelkorn & Locke, 2021; Chiu, 2021; Limniou et al., 2021; Zhang, 2021).

Blended learning has become a certain intermediate option, contributing to the adaptation to the new realities of the organization of the educational process. Psychological and pedagogical features of blended

learning can be found in the works of (Adel & Dayan, 2021), (Zelenskyi et al., 2020).

3. Materials and Methods

The methodology, which would be an effective tool for the study of psycho-pedagogical features of the digitalization of education, should include components that have applications in education as well as in psychology. At the same time, general scientific methods have specific and different applications in separate scientific clusters. In particular, using the method of analysis, in the psychological section, its comparative aspect was used, while in the pedagogical manifestation, the logical dimension of the analysis was applied more. The same situation is with the use of scientific and philosophical methods. In particular, the dialectical method was used to psychologically justify the impact of digital technology on the individual qualities of the applicant for education. The synergetic methodology is more acceptable for the development of a unified strategy for the implementation of digital technologies in the educational space.

4. Results

The introduction of digital technologies in the educational process has several components: pedagogical, psychological, axiological, methodological, technical, organizational, and others. The integration of information and communication technologies into the educational environment began, in fact, with the emergence of these technologies. Scientific and technological progress in the digitalization cluster has expanded the number of technical means that are used in the educational space and their qualitative characteristics to a significant scale. Until 2020, a period of pandemic spread, digital transformation was considered mainly in the organizational and pedagogical dimensions. After the introduction of quarantine measures and the prevention of face-to-face education, the positioning of information and communication technologies in the education system also changed dramatically. Digitalization received an expanded pedagogical characteristic (both organizationally and methodologically).

In the practical-commonplace dimension, digital technologies are implemented in blended learning in a specific, teacher-created, or organization-created course (Zelenskyi et al., 2020). This course has the same components as the corresponding counterpart of face-to-face learning. Note that the purpose of the online format of the learning process is to ensure the quality of educational services. Consequently, work programs are adapted to new forms of their implementation thanks to digital means. Among the components of the educational process that require priority updating in the context of digitalization:

lecture courses that are delivered in recordings or online through platforms that can provide presentation and retrieval of information; practical classes, providing for the formation of appropriate learning outcomes and ensuring the necessary professional competencies for the applicant of education; knowledge control, providing for the organization of an adequate system of current and final assessment in conditions of online learning.

The cluster of individual student independent work has undergone somewhat less change compared to previous years, because even before those students were fully using digital technology in the self-organized aspects of learning. The main changes have occurred at the level: mentor-apprentice, primarily in the creation of educational content and the conditions of its delivery to the student or pupil. If previously the communication component of the use of digital technology was in the foreground in the interaction between teacher and student, then we are talking about the full coverage of horizontal relations between the subjects of the educational environment.

The mentor generates learning resources using a digital format. The applicant receives the necessary educational materials also using the digital potential. The first and main condition for the effectiveness of this model of educational cooperation is the presence of appropriate skills and abilities to work in the digital field. Note that we are not talking about the banal possession of computer resources or orientation in the functionality of numerous messengers or mobile applications. Digital skills for teachers imply the ability to organize (choosing the best electronic platforms) and conduct (presenting theoretical, practical, and controlling methodological materials to students) the learning process. Digital skills for applicants to educational levels provide the opportunity to obtain the appropriate professional knowledge, skills, and abilities. At the same time, an interesting point is that the very organization of the educational process thanks to digital technologies forms the specified Digital skills for both teachers and students directly in the course of training without spending time and money on special courses to acquire these skills.

Pedagogically, any learning format is primarily a mechanism (Dziuban et. al., 2018). Mechanisms that ensure quality learning outcomes are relevant and valid for both traditional and online learning. The primary setting for blended learning is accessed. Undoubtedly, in distance and blended learning, the problem of access to the learning process and the availability of educational content is more acute. The fact is that the instructor has to organize the learning process, and students can integrate into a new structural unit. Unlike the classroom, the digital site has a different specific application in education. Information and communication technologies define the learning content. For the past two years, the proliferation of any format of learning that uses a distance element has been through

information and communication technology. Blended learning has become a generalizing term that combines traditional classroom and electronic distance learning. At the same time, blended learning can mean a combination of teaching methods and pedagogical approaches (Hrastinski, 2019). It should be noted that in all definitions of blended learning, technological innovation is key to this variation. E-learning as one element of blended learning is only implemented on digital platforms. Pedagogical features are also supplied in part by digital technologies (even without the active participation of the teacher, who creates the course and then passively leads it, allowing students to implement it on their own).

The pandemic has changed the traditional development scenarios of all areas of public activity. Business projects have suffered the greatest losses, and education has suffered certain crises related to the introduction of online mode and the impossibility of classroom instruction (Zhang, 2021). To the list of common usage came the newest constants specific to the pedagogical cluster. Among them is flexibility in students' learning behavior. Note that this constant should not be torn between pedagogical and psychological dimensions but should be characterized in their synergistic interaction. Flexibility in this case implies adaptation to technological innovations in education.

Characterization of the features of the use of digital technology has quite a few unclear aspects. Lazar et. al., (2020) carried out a comparative characterization of the level of perception of traditional and distance learning. For the traditional format, a key feature that was highlighted was consistency. Educational applicants perceived the tutor and materials offered for learning in the traditional dimension. Digital technology was characterized by a constant change in mentoring roles, which was reflected in worse student perception of the mentoring model. At the same time, researchers note that reactions to the learning material presented are many times sharper in the digital learning environment. This is due to the variety and richness of learning content, which is presented through information and communication resources. For a complete understanding, we should add to the obtained results of the study the reverse side of such scientific research when the level of perception is demonstrated by the tutor.

Consequently, we state the differences in the perception of the fundamental components of the educational process organized in the traditional and distance format. The blended learning model allows us to avoid the disadvantages and apply the advantages of the learning process, which boils down to: optimizing the role of the tutor and increasing the level of perception of the organizer of the educational process and translator of educational content; increase the level of perception of the training information resource through the synergy of teaching skills and the latest digital technologies.

Consider the characteristics of the teacher and digital learning support (Chiu, 2021). Research data have revealed a consistent trend towards a lack of support for educational aspirants when pedagogical problems arise. as an example, let us model two situations where a single-type format is not sufficient to provide quality educational service and there is a need to actualize blended learning with the active use of digital technology: situation when mentor support cannot provide the student's aspiration because they use different forms of learning materials (the instructor is focused on basic research, and the student uses data from electronic sites in real-time); situation when digital technology support can cover learning outcomes at logical-reproductive level, but cannot evaluate student's abstract judgment, his moral-psychological attitude to the formation of individual competencies.

Adel & Dayan (2021) also point out that the best way to organize learning in the volatile environment associated with the COVID-19 pandemic is to use a blended learning model with as many digital resources as possible. In such an environment, the learning process would be organized on the principle of knowledge acquisition based on relevant source materials that are delivered in real-time electronic formats. This will lead to the modernization of education and the use of relevant learning content. At the same time, traditional training will allow the mentor to perform a certain stabilizing function in the format of direct communication with the student. It consists of a full advisory component, which greatly increases its effectiveness with live communication. Also with blended learning, the fairness of assessment is increased, as there is an opportunity to avoid attempts of disadvantaged student behavior and teacher bias.

It is now proposed to conceptualize the dimensions of digital pedagogy (Väättäjä & Ruokamo, 2018) as a new form of the pedagogical cluster (see Figure 1).

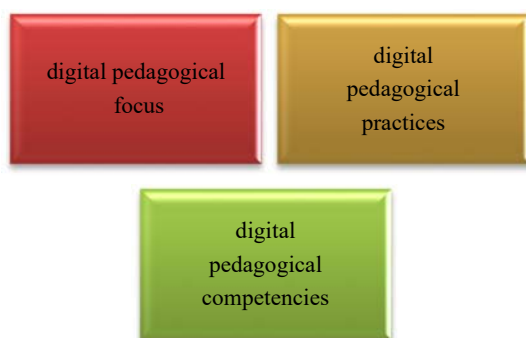


Fig. 1. Measuring digital pedagogy

“The use of technology integrates institutionally supported platforms (e.g., Moodle and Blackboard) and commercial platforms (e.g., Google Education)” (Pinto & Leite, 2020).

The variety of online platforms provides one of the main requirements for the organization of the educational process - accessibility of education. This is how the mobility constant of blended learning is actualized. The very essence and format of blended learning involve the provision of educational services regardless of socio-cultural circumstances that may hinder this process.

Blended learning mobility involves the organization of the learning process in the absence or reduction of physical communication between the teacher and the student, as well as attendance in the classroom. A condition of learning process mobility is a full and comprehensive teaching and learning support. The teacher should not have to worry about the online platform in which the training will take place, and the student should have full access to this platform. Under such conditions, the role of organizational and technical support of the learning process is actualized. This mission is entrusted to the relevant structures of the educational institution, which undertakes to provide access to all subjects of an educational activity to the use of educational and methodological content. Consequently, the introduction and approval of blended learning require the transformation and organizational structure of educational institutions, as there is an urgent need for qualified personnel with information and computer skills, who can ensure the use of digital technologies in the learning process. This is important because it is not the instructor's job to select or technical specifications of an online platform. The teacher's job is not to choose the design or format of the learning platform, but to fill that resource with appropriate and relevant teaching and learning materials.

Blended learning requires new approaches in the psychological characterization of students. It has been noted that students with high levels of self-regulation and self-organization were able to maintain focus and engagement in the absence of classroom instruction (Limniou et al., 2021). Minimizing instructional leadership requires the actualization of another constant: self-organization. The modern world is gradually changing the linear approach to considering and solving problems in most spheres of social activity. Such transformations are carried out due to self-organization and interdisciplinarity as key characteristics of synergetic methodology. This format has already shown success and effectiveness in business models. Blended and distance learning has accelerated the demand for self-organizing dimensions in the educational space.

A group of researchers (Ashraf et al., 2021) focused on the psychological features of blended learning, pointing out the problems that arise for students on this basis. First of all, it is about the inability of the teacher to provide psychological support to the student in the presence of difficulties in the absence of live communication. The

digital format of learning eliminates the moral and spiritual component, reducing the entire learning process to the presentation of materials, a set of tasks, and a system of evaluation. Such algorithms exclude the moral side of learning, although among the competencies necessary for applicants of the educational level the spiritual component has a place.

Technology has revolutionized the field of education. Apart from the pedagogical features, which are certainly fundamental the use of technology has made the process of teaching and learning even more enjoyable (Rajav & Nagasubramani, 2018). The transfer of knowledge becomes very easy and comfortable, which leads to the activation of the mind, which tends to work faster. Psychologically, one is tuned into the belief that any knowledge is within one's power. In the absence of individual qualities, this mission is provided with the help of information and communication resources.

5. CONCLUSION

Consequently, the further development of education is possible with the flexibility and dynamism of this sphere of social activity. Responding to the realities of modern socio-cultural space in education should move from the mode of stating to the format of application of adequate pedagogical and psychological methods. Mixed learning is now the most appropriate format for organizing the educational process. Guidelines produced by blended learning combine effective organizational solutions to ensure the quality of the educational process under difficult conditions of uncertainty and axiological priorities, which act as a stabilizing factor in the value dimension. The readiness of teaching materials for use both in classroom and distance learning conditions is combined with the psychological stability of all subjects of the educational process to changes in the organization of learning. This synergy is ensured by the following constants (see Fig. 2):

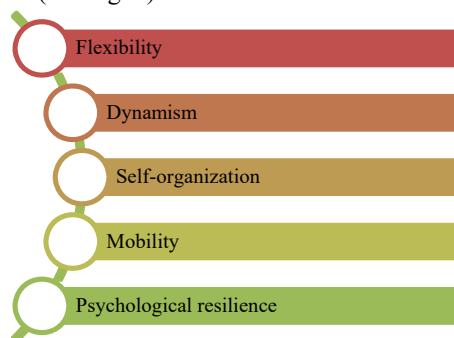


Fig. 2. Constants of psychological and pedagogical adaptation to the process of digitalization of education

As we can see, the pedagogical component significantly dominates, playing a dominant role in adapting to blended learning. This is understandable, since the key characteristics that are important for the organization of the learning process, above all, have a pedagogical essence. The psychological cluster here acts as a supporting element, providing resilience to change and forming an adequate perception of the realities. The task of the education system today is to achieve synergistic interaction between pedagogical support and psychological support. This will allow the implementation of digital technology in a blended learning environment, ensuring the maintenance of high indicators of quality education. Psychological and pedagogical characteristics determine the strategy for the development of digital transformation in the context of different models of the learning organization.

Digitalization of the educational space is an integral part of the modern educational process. The formation of digital skills, as well as the acquisition of hard skills and soft skills through digital learning technologies, is in demand in the modern socio-cultural space, as this model allows for synergy between educational and professional qualifications.

6. Discussion

To date, the most pressing issue is the role of digital technology in the learning process. Two points of view require analysis and the development of a common strategic understanding of the prospects for further digitalization of the educational process: first, digital technologies are viewed as platforms capable of fully embracing the entire learning process and ensuring its effectiveness; second, information and communication technologies are viewed as a resource that provides (optimizes, enriches, improves) the transformation of the traditional educational process without changing its foundations.

Consequently, the psychological and pedagogical characteristics of digital transformation in education are the main assessment and analytical resource to understand the pedagogical nature (in its positive and negative manifestations) and psychological features of blended learning.

Hazelkorn & Locke (2021) note that “blended learning is dead, long lives blended learning!” - this paraphrased motto of the famous expression vividly demonstrates the prospects of blended learning format is becoming increasingly relevant in today's socio-cultural space. At present, the debate about the feasibility of using blended learning is no longer relevant. Distance format in whole or in part has already shown itself as a relevant

pedagogical model in terms of pandemic constraints. Consequently, there is a need to justify the psychological and pedagogical characteristics of blended learning. Digital technologies play a key role in this process, as they partially assume the functions of “teacher” and “classroom”.

The role of the teacher largely depends on his or her pedagogical skills. In blended learning, the teacher's shortcomings are not masked but are more likely to manifest themselves. Therefore, a special role should be given to improving the qualifications of the teaching staff, improving their skills in terms of organizing the learning process electronically. The role of the classroom assumes a full arsenal of educational and methodological support for the training of educational aspirants. Blended learning transfers part of this arsenal from the traditional classroom to an electronic resource with the same pedagogical potential. However, the problem is to organize students' work in the new environment at the proper level. It should be understood that lecture material or test tasks are the same. Only the format of presenting learning content varies. This awareness of the blended learning model will allow you to discard the psychological stress on the electronic format and distance learning.

If you build the model of blended learning on the constants of flexibility, mobility, dynamism, and self-limitation, this format will be effective from the pedagogical cluster and acceptable in the psychological understanding.

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