

The Use of Modern Digital Technologies for the Development of the Educational Environment in the System for Ensuring the Sustainable Development of the Region



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ABSTRACT

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The main purpose of the article is to determine the features of the use of modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region. As a result of the study, the main stages in the process of activating and intensifying the use of modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region were systematized and formed. To achieve the goals set in the research system, both general theoretical methods and specific modeling methods, such as the schematic modeling method, were used. This method made it possible to visually depict the algorithm for achieving the ultimate goal of the study. The study has its limitations; in the course of the study, the process of ensuring the sustainable development of the region was studied only in the context of the development of the educational environment and its digitalization and modernization. Given that sustainable development is a complex concept and includes many elements, the authors plan to study this topic in further research.

1. INTRODUCTION

The modern development of society is characterized by an increase in the dynamism of all actions of human life and an increase in the dependence on interpersonal interaction with the introduction of digital technologies in all areas of activity. In a short time, they have significantly changed our way of life, in which signs of the digital economy are becoming more and more evident every day.

Sustainable development involves not only the competent, rational use of natural resources by current generations but also measures to preserve the environment for the sake of the life of future generations. Therefore, an important point of education for sustainable development is the practical implementation of the laid foundations of sustainability, the provision of early action to address environmental problems, as well as the problems of sustainable economic and social development.

In the UNECE Strategy for Education for Sustainable Development, the overarching goal of the SRF is that all people should have the knowledge and skills to enable them to contribute to a process of sustainable development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Education should enable individuals and societies to work towards sustainable

development. Its goal is for people to be more informed, moral, responsible, and demanding.

Constancy includes the idea of maintaining a high level of socio-economic development of countries that is, preserving their material and resource, as well as spiritual capital. The social component of sustainability is aimed at maintaining the stability of social and cultural systems and implementing a policy of peace and non-violence. Therefore, the basis of education for sustainable development is the study of social, economic, and psychological prerequisites for conflicts and their prevention, instilling in children a culture of partnership and cooperation, mutual respect, and tolerance.

The idea of sustainable development is based on the recognition of a person as the main value. Therefore, it is important to respect human rights, and educate the child in a culture of society, which implies knowledge of one's rights and obligations, an active public position, the ability to reasonably defending one's opinion, conscious and responsible involvement in public affairs, including those focused on solving environmental and socio-economic problems.

The globalization of the world economy, politics, and culture became the main issue of the development of world civilization at the beginning of the new millennium. Modern education is also involved in the process of globalization with its positive and negative impacts.

The current stage of development of the education system reflects the needs of the world community, generated by the process of globalization of the world economy. The world educational space, which until recently was a collection of separate national education systems, is gradually turning into an integral system of world education.

The impact of globalization on the educational environment implies the process of expanding the scope of activities of universities beyond the boundaries of their national educational system, the development of international educational and scientific relations, bringing the activities of the university in line with international standards, which contributes to the formation of favorable conditions for ensuring high quality education.

The negative side of globalization on education is the transformation of the traditional system of national education, which found itself in the conditions of choosing new social and educational values and attitudes and manifested itself in the following consequences:

- a significant outflow of Russian applicants and some students from national universities;
- dumping cost of education (at least for the first time);
- the outflow of qualified teachers and promising young graduates from national universities;
- the transformation of a significant part of national universities in fact into branches of foreign universities, providing primary higher education.

In the global educational space, the use of digital teaching aids has become commonplace in the last century. These are interactive whiteboards and panels, document cameras, digital microscopes and telescopes, 3D printers, and digital laboratories. Such digital equipment can be connected to a computer on which software is installed that helps the teacher organize the educational process. This equipment has replaced analogy technical teaching aids and has a number of features of use. Recently, educational institutions have begun to create a modern educational space, it is being digitized.

In particular, educational institutions that implement STEM-oriented teaching methods are mainly provided with modern educational equipment, and actively use a variety of sensors, and computer boards with analogy-to-digital converters in the educational process. At the same time, most educational institutions do not have such equipment due to the lack of a centralized supply and insufficient funding for updating the material and technical equipment of classrooms for a long time.

Thus, the main purpose of the article is to determine the features of the use of modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region.

The structure of the article includes such structural elements as the introduction, which contains general theoretical information about the research topic; a review of the literature, which contains a theoretical analysis of existing literary sources that have become the basis for the study; methodology, which describes all the methods used in the research process; research results demonstrating the main basis of the research; a discussion that compares existing studies and study results; conclusions, which provide intermediate and final conclusions of the study.

The innovation of this study lies in the fact that all the recommendations and changes that were formed as a result of the study are presented in the form of a model that not only demonstrates the stage-by-stage process of achieving the goal,

but also all the elements and resources used in this process.

2. LITERATURE REVIEW

The issue of sustainable development today has become an important component of modern education. Sustainable development should be seen as a universal and necessary element of daily life and should be included in all subjects and academic disciplines. It is necessary to strengthen the relationship between the natural and social sciences by introducing interdisciplinary approaches. In education, the traditional focus on teaching individual subjects should be maintained, opening up opportunities for multilateral analysis of real-life situations. All of this will affect the structure of curricula and teaching methods and will require teachers to abandon the role of only information carriers, and students - from the role of only consumers of information [1].

According to modern scientific views [2], sustainability requires an education concept that aims at an integrated and dynamic approach that takes into account the importance of critical thinking, social learning, and participation in society. That is why education for sustainable development intertwines economic, social, and environmental aspects. More broadly, ethics and equity are important components of education for sustainable development.

In this regard, today the issue of using modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region is a topical issue in various scientific circles.

The importance of the development of the educational environment in the context of ensuring the sustainable development of the region today is only beginning to fall on different groups of scientists [3-5], in their opinion, the very essence of education in the system for ensuring the sustainable development of the region can be defined as a form of educational activity aimed at introducing the ideas, principles, and values of sustainable development into training and education with the aim of creating a culture of thrifty and responsible attitude to the natural and social environment. This is a modern approach to the organization of the educational process, including informing members of society about the main problems of sustainable development, the formation of a worldview based on the principles of constancy, and the reorientation of learning to transfer knowledge to establish a dialogue.

According to a number of authors [6, 7], one of the main tasks of modernizing the education system and the educational environment is to create conditions for quality education. It is the implementation of measures to introduce a digital educational environment that will create conditions for the formation of digital competence of a specialist, which today plays a key role in ensuring its competitive position.

A similar opinion is shared by another group of scientists [8, 9], according to which the issue of reforming the educational system in the direction of ensuring the sustainable development of not only the region but also the country involves the development and implementation of innovative educational systems and technologies. So, according to Häkkinen et al. [10], the level of implementation of the technological approach is one of the most important criteria by which the competitiveness and prestige of an educational institution are determined since educational technologies

provide consistency, focus, efficiency, and effectiveness of its activities. Thanks to the technologization of education, the motivation of participants in the educational process to learn increases, and the connection of educational material with real today's challenges is monitored.

Analyzing specialized scientific sources, we can conclude that today the issue of introducing innovative digital technologies for the development of the educational environment is a fairly relevant and well-studied topic. A large number of scientists have already proved the importance of this process both in terms of ensuring the development of the educational system and in terms of forming a competitive specialist. The issue of using modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region has been studied to a small extent. Some scientists have proved the importance and interconnection of these two processes, but none of them has formed a clear system in which it is possible to effectively implement the process of using modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region. Our study is devoted to the creation of a clear methodological approach that will allow the most effective way to implement the process of using modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region.

3. METHODOLOGY

If we consider the methods that formed the basis of our methodology, then they should be divided into two separate groups.

The first group consists of purely theoretical methods of analysis, synthesis, generalization, and systematization of the literary sources chosen by us, which are generally recognized today in scientific circles and on this topic. These general scientific methods made it possible to fully explore all the most relevant scientific achievements, systematize and generalize the knowledge gained, to draw conclusions that will later become the basis for further research.

Separately, it should be noted that in the process of research, the method of analysis and synthesis was used to select a region for which a recommendatory model will be created to enhance the use of modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region. Thus, we

have chosen the educational environment and the system of regional development of the Polish city of Rzeszow, Podkarpackie Voivodeship. The activities that we will present in the next chapter can be considered evidence-based proposals for improving the educational environment of the region.

The second group of methods is the schematic modeling method, which made it possible to visually depict the process of using modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region.

By itself, the schematic modeling method is most often used in business processes. The schematic modeling method is intended for functional modeling, according to which the system is represented as a set of interacting processes/works/functions. Such a purely functional orientation is fundamental; the functions of the system are analyzed independently of the objects they operate on. This allows us to more clearly model the logic and interaction of the organization's processes. The description of the schematic modeling method is organized as a hierarchy of ordered and interconnected diagrams, which reflects the functional structure of the object.

As a result, the use of the schematic modeling method ensures the compactness of the presentation of information, as well as maximum expressiveness, i.e. the ability to best ensure the comprehensibility of the model, the ability to visually represent all the processes associated with scientific research.

In our opinion, the significant advantages of this model make it effective in the process of visual schematization of the process of using modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region.

It should also be noted that for a better understanding of the constructed models, we used the identification method, which made it possible to determine and form symbols for each of the stages and intermediate elements of the process of achieving the final goal.

For a better understanding of the problems of the study and further determination of ways to solve the issues raised, according to the authors, an important stage of the study will be the definition of the subject and object of our model. So, according to the authors, the object of our model is the regional state structures, while the subject of the model is directly the educational environment of a particular region.

The first step in building our model is the formation of a system of nodes to achieve the goal of modeling (Figure 1).

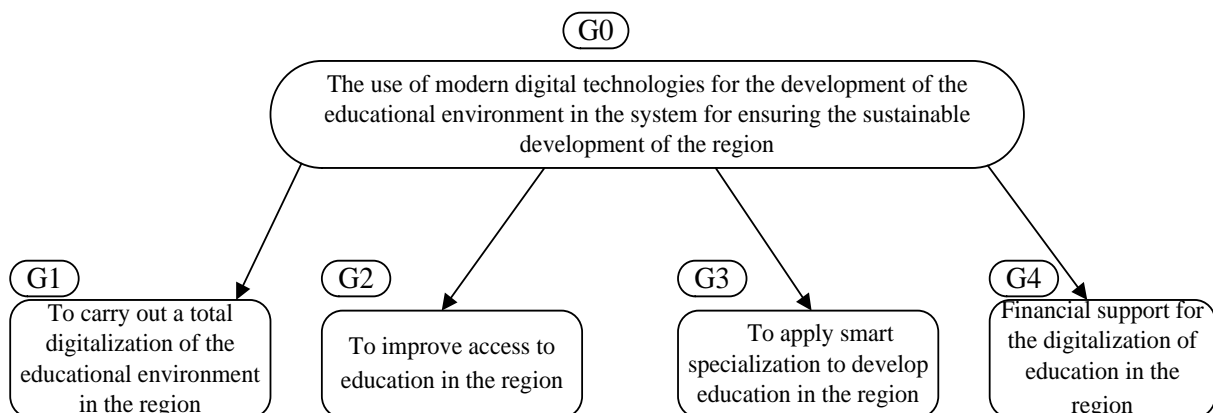


Figure 1. System of nodes to achieve the goal of modeling

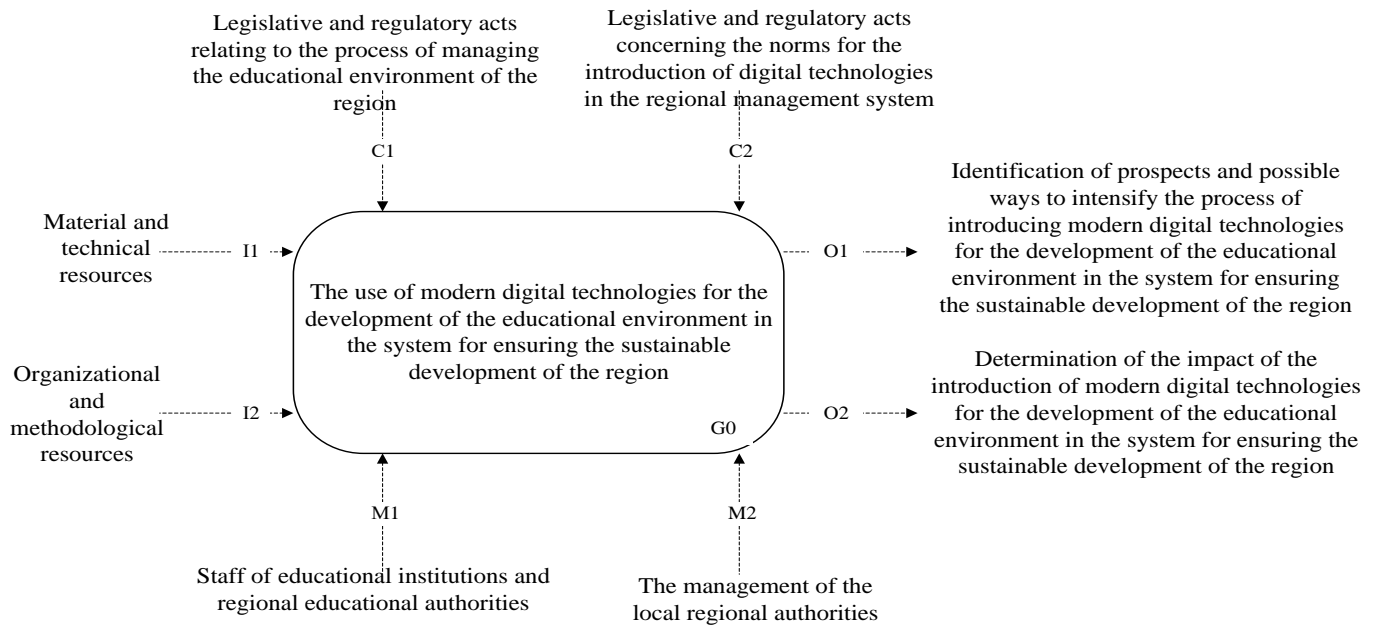


Figure 2. Key elements to achieve the goal of modeling

This system of nodes for achieving the goal of modeling allows seeing the primary structure of the process of the final goal in the form of systematization of the entire array of actions in 4 stages (G_1 - G_4).

The next step in the schematic modeling method is to identify and graph the key elements to achieve the modeling goal (Figure 2).

So, in Figure 2 we can see that in order to achieve the goal of G_0 set by the authors, we need the presence of a number of parts. For better understanding and clarity, these elements have been designated by us in the form of letters.

As we can see in Figure 2, in order to achieve the final goal, the authors, the following key elements have been identified:

"I" (inputs) denote those elements that must exist in the system of the educational environment and regional authorities for the successful implementation of our model.

"M" (mechanisms) reflects the main set of elements of influence on the process and its transition from one state to another.

"C" (control), these elements also indicate the systems that are responsible for monitoring the success of the goal.

"O" (outputs), these elements denote the desired results expected at the final stage of the implementation of this model.

Thus, in this section, we have depicted the basic elements of the schematic modeling method. In the next section, with the help of these systems of drawings, we will form the main model for achieving the final goal.

4. RESULTS OF RESEARCH

The next step of our research will be the construction of the main modular model for achieving goal G_0 (Figure 3).

As can be seen from Figure 3, this model synthesizes all the above figures and depicts the process of achieving goal G_0 in a complex way.

For a better understanding of each process (G_1 - G_4), consider each of them:

G_1 -To carry out a total digitalization of the educational

environment in the region. Digital transformation is a big challenge and at the same time a big opportunity for the educational environment. Those who use it will be able to significantly increase their competitiveness, attract additional resources, upgrade their IT infrastructure, improve the quality of education, make it accessible and capable of providing professional growth, and allow them to successfully move up the career ladder due to the focus on individualization and flexibility of educational process. The traditional model of the educational environment cannot compete with the challenges facing higher education: lifelong learning, mobility, and development of internationalization, curricular flexibility, the introduction of the IT component of the program into curricula and research studios, creative learning, 21st-century competencies, e-science, etc. Therefore, one of the main tasks of today is to ensure the digital transformation of the educational environment that will meet the requirements and opportunities of the market, and implement integration with the global information open educational space, which provides free access for all participants to the world's digital resources, and meet the educational needs of students in digital products, as well as effective e-communication and e-cooperation of all participants in the educational process.

G_2 - To improve access to education in the region. Education is one of the main resources of modern society, the progress of which is based on the development of a knowledge system. The level and quality of the education received, and the educational achievements of the population largely determine the structurally innovative opportunities for the development of the economy and many other areas important for human well-being. That is why ensuring the availability of high-quality education throughout life is a necessary prerequisite for the effective functioning and economic growth of the country.

G_3 - To apply smart specialization to develop education in the region. Improving the level and quality of the educational environment in a certain area within the framework of the concept of sustainable development is the most important, if not the main task for regional authorities, and for its

implementation in practice, all conditions must be created, all tools involved and all opportunities used. The solution to this problem depends on a significant number of factors, which include: the effectiveness of the functioning of regional authorities and the awareness of its representatives about the existing competitive advantages of the region and the possibilities for their expansion and development, the ability to determine, position, develop and use them in a timely manner for the purpose of social economic and innovative growth of the region. At the same time, the implementation of such a scenario is possible only based on a close mutually beneficial relationship between all areas of the region's economy and all participants in the regional economy, which can be ensured through the introduction of a regional management tool that is new to the world economy reasonable or intellectual specialization.

G₄ - Financial support for the digitalization of education in

the region. In the context of globalization, the introduction of information and communication technologies in educational processes makes it possible to provide new opportunities for updating the content of education and methods of teaching disciplines and disseminating knowledge, individualizing education, expanding access to educational resources, realizing the possibility of learning without restrictions on spatial and temporal characteristics with a minimum margin from the performance of professional duties. At the same time, the key role is the financial support of local governments for the full provision of the educational environment with material and technical support.

The reach sublevel of stage G₁ (To carry out a total digitalization of the educational environment in the region) of the main modular model to achieve the goal G₀ is shown in Figure 4.

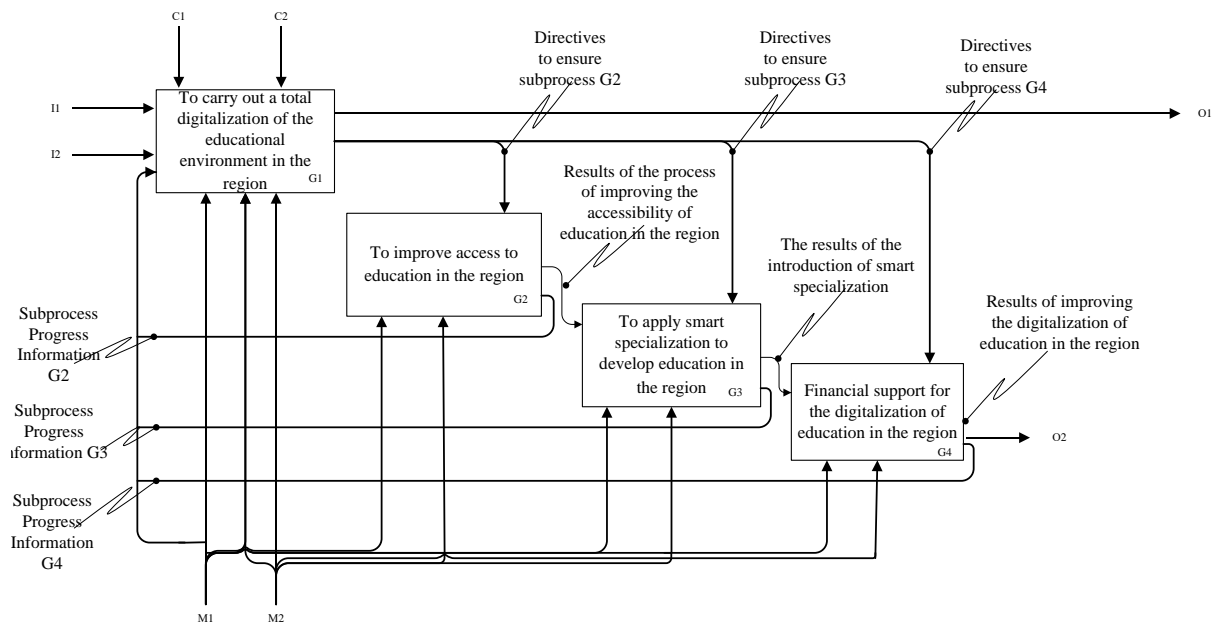


Figure 3. The main modular model for achieving the goal G₀

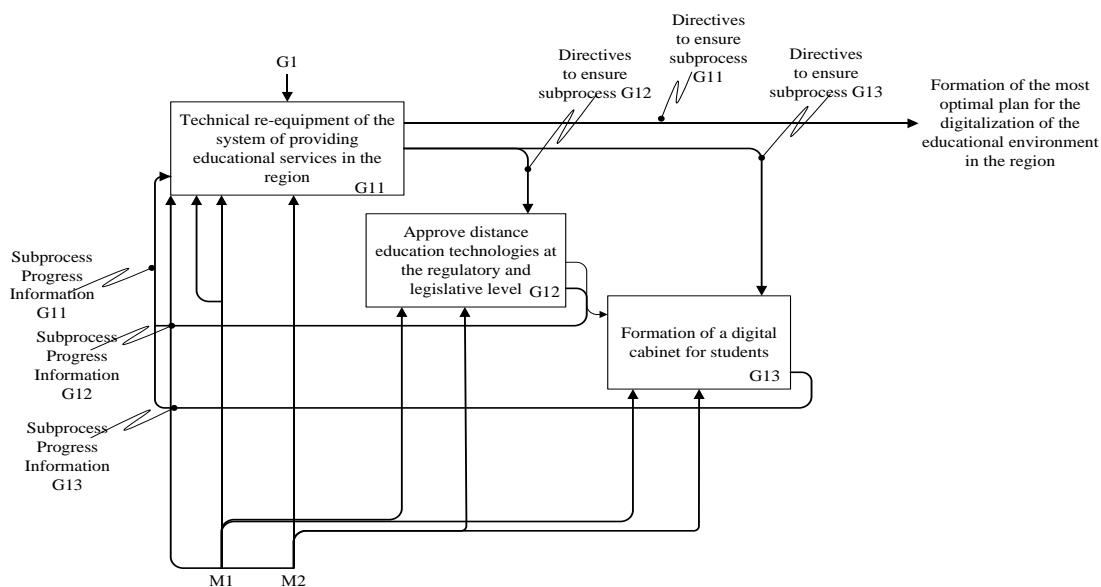


Figure 4. The reach sublevel of stage G₁ of the main modular model to achieve the goal G₀

Therefore, to achieve G_1 (To carry out a total digitalization of the educational environment in the region) it is necessary:

G_{11} – Technical re-equipment of the system of providing educational services in the region. To date, not all systems and objects of the educational environment have in their arsenal all the technical equipment they need. In this regard, the main task of the regional authorities is to form a system for re-equipping the elements of the educational environment with new materials and technical equipment.

G_{12} – Approve distance education technologies at the regulatory and legislative levels. A full-fledged process of digitalization of the learning environment in the region is simply impossible without a stable and comprehensive regulatory framework that would regulate this process, regulate the introduction of local adjustments and determine the measure and scope of the legitimacy of the process of digitalization of the learning environment.

G_{13} – Formation of a digital cabinet for students. A student's digital cabinet is an important condition for his successful learning. And this applies to both teaching at the school level and teaching at the level of a higher educational institution. The formation of an individual study room will allow not only constant monitoring of a successful student but also provides him with the opportunity for prompt and unhindered access to educational materials, tests, and other elements of distance learning.

Ultimately, it should be noted that the model we have formed using the schematic modeling method today is mainly theoretical. The primary goal of this stage of the study is the formation of a clear and systematic model, the main advantages of which are its flexibility, multi-vector nature, the possibility of forming sublevels, and the possibility of making local changes that did not affect the base model. According to the authors, it is these key characteristics that are especially important in the process of intensifying and enhancing the use of modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region. In further studies, the authors intend to expand and correct this model in accordance with the results of its practical use.

5. DISCUSSIONS

Discussing the results of our study, the section should pay attention to how our study differs from similar studies. Undoubtedly, the topic we have chosen is relevant and has been studied by many scientists, given this, we cannot cover the entire set of scientific views on this topic, but we will try to give a number of the most significant comparisons.

Considering the difference between our studies and existing ones, it should be noted that today a large number of scientists are studying the essence of introducing modern digital technologies into the education system and the educational environment.

The issue of the importance of developing the educational environment for activating the process of sustainable development was raised in the works of Sellar and Lingard [11] and Kauko and Wermke [12]. At the same time, they limited themselves only to proving such importance, without giving any real advice on the implementation of this process. In our study, a clear methodology has been formed for the process of using modern digital technologies for the development of the educational environment in the system for

ensuring the sustainable development of the region.

So, Kryshtanovych et al. [13] Harris and Jones [14] in their works emphasize that the education system simply cannot exist without the introduction of information and communication technologies and emphasize the importance of a rapid reform of the educational environment towards technologization. Despite the fact that we generally agree with this thesis, in the works of these scientists, the modernization of the educational environment is considered separately from other spheres of life. Our study allows us to trace the relationship between the development of modern digital technologies for the development of the educational environment and the process of ensuring the sustainable development of the region.

The work of Kolgatin et al. [15, 16] also deals with the use of modern digital technologies for the development of the educational environment, but these studies are limited to a dry statement of facts about the positive consequences that arise already at the end of this complex and practically difficult process. Our study offers a well-formed methodology, which, due to its flexibility, can be used in different realities of the life of the region.

In the work of Pedro et al. [17, 18], a certain algorithm was also formed to facilitate the process of introducing modern digital technologies for the development of the educational environment, but this system is static and does not take into account modern trends in the field of digital educational technologies. Our study differs from the fact that our methodology is not tied to specific information and communication technologies; it makes it possible to structure the general view of the process of using modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region.

Thus, despite the fact that our model is purely theoretical and recommendatory in nature, this model is distinguished by its flexibility and the possibility of local changes, without changing the fundamental structure, which will greatly facilitate its use and adaptation to the changing realities of the life of the region.

6. CONCLUSIONS

Summarizing the analysis of the process of using modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region and making intermediate and final conclusions, it should be noted that, a feature of education for sustainable development is that it covers the environmental, economic and social issues of education and upbringing from the point of view of the formation of a new system of value orientations and behavior patterns of the younger generation and society as a whole. It significantly complements and expands the scope of environmental education, and allows all aspects of educational activities to be developed in the context of sustainable development, the diversity of topics of which requires the use of complex processing and allows you to create a systemic mechanism for transforming meaningful life priorities at the individual level, and therefore ensure the leading function of education in modeling social processes. Particular attention should be paid to the practical implementation of sustainable development models, the formation of appropriate norms of behavior and lifestyles, an

active public position on the implementation of the idea of constancy in the everyday experience of children and adults. Ukraine needs a future responsible and strategically thinking young generation. This need must be met primarily through education through the creation of advanced education schools for sustainable development, and the development of value orientations in children that meet the needs of sustainable development as personally important and expedient.

In the context of economic development, rapid change in technology, and a new quality of society, modern education is based on high-tech teaching aids and is characterized by significant mobility, versatility, and fundamentality. The traditional role of the educator is changing. The teacher must introduce modern trends in education, be able to choose and use the latest pedagogical and information and communication technologies for teaching students; organize cooperation and communication between the participants of the educational process; design electronic resources and educational electronic environment, be an assistant for students, understand well and take into account in the educational process their needs and characteristics, cognitive learning styles, new services, and tools for effective cooperation, communication not only during classroom learning but also remotely.

As a result of the study, the main stages of the process of using modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region were formed. To achieve the goals set for the study, both general theoretical methods and specific modeling method, such as the schematic modeling method, were used. This method made it possible to visualize the algorithm for achieving the ultimate goal of the study, such as activating the process of using modern digital technologies for the development of the educational environment in the system for ensuring the sustainable development of the region. The study has a limitation; In the course of the study, the process of ensuring the sustainable development of the region was studied only in the context of the development of the educational environment, its digitalization, and modernization. Considering that sustainable development is a complex concept and includes many elements, the authors plan to explore this topic in further research.

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