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SMART EDUCATION AS A PARADIGM EDUCATIONAL MODEL

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The article considers the basic principles of Smart education. The key concepts of Smart education are analyzed. The goal of modern Smart education is determined – the development of skills in the digital society, necessary for the successful professional activity of specialists; ensuring an environment that creates competitive specialists due to the high-level development of skills and knowledge of modern society. The main points of the "smart" concept, which involves the creation of an intellectual environment, are considered. The positions that unite the educational process in the Smart environment are shown. This work focuses on finding ways to use and implement modern gadgets in the educational process. In addition, attention is focused on the need to use Smart technologies as a means of integrating various educational programs into the education system. The author identifies three main dimensions of Smart education. The article is devoted to the study of mobile learning as a new technology for informatization of education. The main features of mobile learning are highlighted.

The focus of the study is on the advantages and disadvantages of mobile learning. Attention is paid to the methods of implementing information and communication technologies in the educational environment. The main components of Smart Education are investigated. The reason for the need to implement Smart Education is proven. It is emphasized that Smart Education involves the development of a wide range of skills necessary for learning/teaching.

Keywords: *Smart Education, Smart technologies, e-learning, m-learning, educational environment, technological environment, information and communication technologies.*

SMART-ОСВІТА ЯК ПАРАДИГМАЛЬНА ОСВІТНЯ МОДЕЛЬ

О. Е. Можаровська

У статті розглядаються основні принципи Smart-освіти. Аналізуються ключові поняття Smart-освіти. Визначена мета Smart-освіти сучасності – розвиток навичок в умовах цифрового суспільства, необхідних для успішної професійної діяльності фахівців; забезпечення середовища, що створює конкурентоспроможних фахівців завдяки високому рівню розвитку навичок та знань сучасного суспільства. Розглянуто основні моменти концепції "смарт", яка передбачає створення інтелектуального середовища. Показано позиції, що об'єднують освітній процес у Smart-середовищі. Дана робота фокусується на пошуку способів використання та впровадження сучасних гаджетів у навчальний процес. Крім того,

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акцентується увага на необхідності використання Smart-технологій, як засобу інтегрування різноманітних навчальних програм у систему освіти. Автором виділено три основні виміри Smart-освіти.

Стаття присвячена дослідженню мобільного навчання як нової технології інформатизації освіти. Виокремлено основні особливості мобільного навчання. У фокусі дослідження – переваги та недоліки мобільного навчання. Приділено увагу способам впровадження інфомаційно-комунікаційних технологій в освітнє середовище. Досліджуються основні компоненти Smart Education. Доведено причину необхідності впровадження Smart-навчання. Підкреслюється, що Smart-навчання передбачає розвиток широкого спектру навичок, необхідних для вивчення/викладання.

Ключові слова: *Smart-освіта, Smart-технології, електронне навчання, мобільне навчання, освітнє середовище, технологічне середовище, інформаційно-комунікаційні технології.*

Introduction of the issue. The intensive development of information and communication technologies (ICT), the introduction of e-learning into traditional education have gradually led the education system to smart education. To date, there is no clear concept of smart education, and the paradigm in education is only being formed, that is, technological, organizational, pedagogical solutions that contain a certain innovative potential. Currently, the concept of "smart" is popular. The consideration of the smart structure concept took place in the context of aerospace technologies. The main feature of "smart" structures is the response to the environment and changes in it using touches, signals, communications and other integrated elements.

The main goal of the development in the education system is to ensure the availability of quality educational services for citizens, regardless of their place of residence, health status, socio-economic status of the family, which will give them the opportunity to get a profession and worthily realize themselves. Distance education and e-learning E-learning have given rise to a new global phenomenon - smart education. And we are talking not so much about technology, but about a new philosophy of education – Smart Education. What is Smart Education? Smart-education using innovative tools (tablets, smartphones, digital content, etc.). Students have access to paperless educational materials that are on the server in the cloud system. Smart learning is an opportunity to listen, complete assignments, anywhere and on anything, on a computer, laptop, smartphone, and also study collectively. The use of the latest Smart technologies (webinars, blogs, twitter, video and audio podcasts) in asynchronous and online modes in the learning process increasingly complements traditional teaching methods, increases students' motivation to study, makes them take a fresh look at the subjects being studied, thus revealing their intellectual and creative potential.

Current state of the issue. The study of theoretical foundations and practical recommendations for the use of Smart Technologies is covered in the works of famous scientists: R. Gurevich [1], M. Kademiya [1], L. Shevchenko [11], V. Umanets [11], R. Medvedev [11] and others. Current scientific research highlights various aspects of educational technologization: the introduction of Smart Technologies into educational processes (N. Aharkova, Emeka Joshua Chukwuemeka [2], A. Kushnir [3], O. Mozharovska [5], I. Slobodyanyuk, O. Tarasova, A. Tverdokhlib, S. Yakubov, Ya. Yakinin, etc.); the organization of Smart education (C. Chou, B. Gros, H. Peng, J. Putra, B. Putro, Sarah R. Lambert [8], J. Spector, Stephan Vincent-Lancrin [10], Y. Su, C. Tsa, etc.); the use of Smart complexes and their elements in education (R. Gurevich [1], O. Humennyi, M. Kademiya [1], A. Kononenko, G. Kosenko, S. Maslich, S. Natroshvili [7], O. Prokhorchuk, Z. Shatska [7], etc.).

The scientific novelty of the study is due to the author's approach to the issues of

using Smart Technologies in teaching foreign languages at agrarian universities.

The article is aimed at considering the concept of "smart education", the principles of its construction, implementation and impact on the quality of training of future specialists.

Results and discussion. The concept of a smart structure was first mentioned in the context of aerospace technologies, the creation of which was supported by three trends: the transition to new materials, the use of new material properties, and advances in electronics and information technology. The main function of smart structures is to respond to the environment and changes in it in a predictable (specific) way through sensors, signals, communications, and other elements integrated into it. Smart structures are capable of not only supporting or resisting mechanical loads, but can also reduce vibration, mitigate acoustic noise, monitor the integrity of the structure itself during operation and over its service life, and change the shape of structure elements or mechanical properties under the influence of external stimuli. The concept of smart structure includes the concept of smart materials. It is noted that "smart materials" can exhibit the "smart" property only in interaction with the external environment of the system. Smart materials are characterized by the ability to automatically recognize changes in the external environment and respond to them with a given action. Thus, "smart" is a property of a system or process that manifests itself in interaction with the environment and gives the system and/or process the ability to:

• immediately respond to changes in the external environment;

• adapt to changing conditions;

• independent development and self-control;

• effectively achieve results.

The key to the "smart" property is the ability to interact with the environment and adapt to it. This property has an independent meaning and can be applied to such categories as city, university, education, society and many others. Forty years ago, when this property was identified, the level of technological development did not allow achieving this property in most systems or processes. However, modern advances in ICT make it possible to build highly complex systems, such as a smart city. Why are all these specific properties denoted by the word "smart"? The literal translation of the word "smart" is "intelligent". However, in English there are at least two other commonly used words denoting a sign of possessing intelligence – "clever" and "intelligent". Of all three words denoting the mind, the word "intelligent" has the deepest meaning. It denotes the ability to draw deep conclusions, as well as some initial (inborn, inherent) ability to think and behave rationally. At the same time, "smart" is a more "superficial" concept, sometimes even used with a sarcastic connotation. Smart here not only denotes the ability to perform intellectual actions, but also external beauty, which is why the concept of smart works so well in relation to various gadgets: it expresses the idea of the connection between aesthetics, ergonomics and intelligent functions [2]. At the same time, perceiving smart technologies as something "intelligent", we expect them to imitate intelligent behavior. Accordingly, from smart technology, we expect the ability to perform some intelligent functions along with ease of use. Due to this, artificial intelligence systems and smart technologies cannot be identified.

The concept of smart education is flexible and involves a large number of sources and maximum diversity of media. Smart education can be easily managed provided that the learning process is flexible, integrated, and constantly fed by external sources. The use of new technologies labeled "smart" or their intelligent use cannot determine the nature of the new education system. Let us list the technological solutions for education that are considered "smart": "smart" boards, "smart" projectors, software for creating and implementing educational content that is interactive and communicative, as well as social

media and data mining used in "smart" education.

The paradigm of higher and secondary education development around the world has changed, which is associated with the emergence of massive open online courses (MOOCS). They are large-scale interactive educational courses that are openly available on the Internet. The project was developed by scientists from Stanford University and represents a set of courses that the developers have made practically-oriented. They are characterized by: productive teamwork, project implementation, strengthening ties between members of the working group, a new ranking system and responsibility of each participant for completing common tasks, the absence of tests. All these innovations should motivate students to study and help them successfully master a holistic course. The first project provided for 40 free courses in 12 different languages. Among the project partners are France, Italy, Lithuania, the Netherlands, Portugal, Spain, Great Britain, and Turkey.

Smart education is an educational paradigm that underlies a new type of education system [1]. In this regard, it is necessary to develop interactive forms of additional training. Modern online training should include conducting optional interactive courses both in the mode of direct Internet communication between the teacher and students, and in the form of specially developed interactive training programs. Smart education should provide the opportunity to use the advantages of the global information society to ensure educational needs and interests. It is necessary to intensively introduce innovative methods, solutions and tools into the domestic education system, including distance learning and online learning, accessible to all, to change the focus and emphasis of the curricula of secondary and higher education, including programs for teaching practical skills and obtaining practical qualifications.

We define the main principles of smart education:

1. *Using relevant information curricula to solve educational tasks*. The speed and volume of information flows in the world and professional activities are rapidly growing. Educational materials must be supplemented with information in real time to solve practical tasks, to work in a real situation.

2. *Organizing independent educational, research and project activities of students*. This principle is key in preparing specialists for creative search for solutions to practical tasks, independent information and research activities.

3. *Implementing the educational process in a distributed learning environment*. The educational environment today is not limited to a campus or a distance learning system (LMS). The learning process should be continuous, including learning in a professional environment using professional activities.

4. *Interaction of students with the professional community*. The professional environment is important in the educational process. The use of ICT in the educational process provides the opportunity for all participants in this process to work in professional environments on the creation of software products, participate in telecommunication projects, etc. The mission of an educational institution is to provide educational services in accordance with the needs and abilities of students.

5. *Flexible educational trajectories, individualization of learning*. Learning is carried out not only by students, but also by working people who want to gain knowledge, carry out their own retraining or advanced training. The task of educational institutions is to provide educational services in accordance with the needs of everyone who wants to learn.

6. The diversity of educational activities requires *providing everyone with the opportunity to study any educational programs and courses in accordance with the capabilities of this institution, their own health, material and technical base, and social conditions*.

By the dimensions of smart education we mean the main aspects, thanks to which the education system of the new type should function. Each such aspect exists only in close connection with others and allows us to say that this education system implements the paradigm of smart education. It is proposed to highlight three main dimensions of smart education: technological, organizational and pedagogical.

The **technological** dimension of smart education is based on information smart technologies. The properties of these technologies are interactivity, the ability to intelligently analyze data, the ability to personalize data, create, in fact, a virtual personality of the user. Technologies do not depend on the platform and localization of the user, various cross-platform technologies for synchronizing content on various devices and in different operating systems, etc. are actively developing. Various multimedia capabilities can also be used in the educational process, allowing you to create a variety of educational content. Smart technologies, on the one hand, are designed to make the "effect of presence" of the student the same as in traditional education, on the other hand, they allow to significantly speed up the exchange of content, change its quality, allow to enter into a greater number of "horizontal" communication links and generally significantly speed up and simplify the process of communication between participants in the educational process. Smart learning technologies are "seamless" technologies that allow to integrate various systems based on flexible standards.

The **organizational** dimension of smart education is based on the effective use of smart technologies from an organizational point of view. Educational programs, according to the concept of smart education, should be formed based on the possibility of "fine" profiling of education. In the formation of the educational program, the individual educational trajectory of each student (which requires the analysis of a large amount of data and is impossible without the use of data mining, big data, etc.) and the possibility of integrating various educational programs should be taken into account. It is assumed that educational programs should comply with the principle of lifelong learning, that is, allow not only integration between educational programs within the same training area (different profiles), but also allow the possibility of taking into account, for example, university education courses in corporate training or, conversely, additional practical courses can be integrated into the overall system. All this should be subject to legal regulation. Particular attention should be paid to the management of educational content and educational resources in smart education. It is planned that electronic educational materials will be regularly adjusted by teachers, supplemented with "fresh" information from professional websites and blogs. This means that students will be able to study relevant material, become professionals who know the current level of development of professional activity. To achieve such an effect, it is necessary to implement academic knowledge management, which should ensure maximum flexibility in the development and use of educational content in the educational process.

The **pedagogical** dimension of smart education is a set of educational results (training and upbringing) and pedagogical methods and technologies necessary to achieve them. Based on these methods and technologies, teaching aids are formed, included in the organizational structure of smart education and using specialized information smart technologies. A special role in the system of smart education results is given to cognitive competence. It is proposed to recognize cognitive-complex thinking as a general feature of cognitive competence. Such thinking implies the ability to see a complex structure of phenomena, to perceive not only one cause of any phenomenon, but a complex of causes, to give a balanced assessment, to see alternatives, to avoid an unambiguous binary choice. This is precisely the kind of

thinking that is necessary in modern society, in which, fortunately, it is impossible to form a single, correct system of ideas about the world.

Smart technologies, on the one hand, are capable of creating a "presence effect", on the other hand, they can significantly accelerate the exchange of content, change its quality, and communication capabilities between participants in the educational process [3]. The organizational component of smart education is based on the effective use of smart technologies. Educational programs should be formed on the basis of educational specialization, taking into account individual learning trajectories and the possibility of integrating different educational programs, taking into account the fact that educational programs must comply with the principle of continuous education (lifelong learning).

Special attention is required for the management of educational content and educational resources in smart education. For this purpose, it is necessary to constantly adjust educational resources, supplementing them with information from websites and blogs, web quests, etc. This also requires the introduction of managerial academic knowledge that will ensure flexibility in the development and use of educational content [6].

A special role in the system of smart education results is given to cognitive competence, when the ability to see the complexity of phenomena, a comprehensive view of problems, the causes of certain phenomena, see alternatives, give one's own assessment, defend one's own point of view is formed. This gives everyone a chance to form their own view of the world.

The use of the Smart Education ideology in the educational process today requires serious pedagogical reflection and the implementation of new pedagogical developments that allow intensifying the educational process and improving its quality. It is necessary to review the existing organizational forms of education: to increase independent individual and group work of students, the number of creative and research projects [5]. To this end, Vinnytsia National Agrarian University is developing a program of comprehensive pedagogical support for the process of introducing ICT into the educational environment in the following areas:

- specifics of intercultural communication of tutor-student and tutor-teacher interaction in an electronically neutral environment;
- organization of students' independent work using ICT tools;
- modern ICT as a means of creative development of students' personality;
- use of ICT in the formation of students' professional competence;
- the use of ICT in the development of professional competences of specialists, improving their qualifications;
- opportunities of the educational environment in the development of students;
- specifics of intercultural communication;
- student self-realization in the information space of the college using ICT;
- designing electronic educational resources and teaching and learning materials for use in smart education.

The model of the new Smart society implies the creation of an intelligent, high-tech, comfortable human environment with the help of modern information and organizational systems. Ukraine is among the world leaders in the availability of educational services at all levels of the national education system, the main goal of which is to achieve quality education. Changes in the social environment are closely related to the change in technological trends at different stages:

- Stage 1 – pre-industrial society, in which there was a human organization of communication based on analog thinking;
- Stage 2 – information society with a computer organization of communication based on digital thinking;

- Stage 3 – creative society with a social organization of communication and hybrid thinking.

Modern society of the 21st century is at the stage of technological paradigm shift. Information technologies that defined the image and essence of the 20th century are giving way to Smart technologies that open a new path of development – Smart economy, Smart education, Smart society. Changes in the learning environment: transition to a wireless network, distribution of smart terminals, progression of Smart devices, expansion of Smart works (mobile office) – this is a new quality of society in which the combination of technical means, services and the Internet used by trained people leads to qualitative changes in the interaction of subjects that allow obtaining new effects – social, economic and other advantages for a better life. The key aspects of modern Smart learning are the creation of a flexible and open learning environment: use of gadgets, open educational resources, management systems. The structural part of the implementation of this idea is the introduction of Smart training into the system of teaching staff advanced training. The prerequisites and the main reason for the relevance of the introduction of Smart training are: 1) Technological factors that provide new means and technologies for training in a modern infocommunication environment; 2) Social factors, including the need of society for a new quality of educational services; 3) Economic factors lie in the fact that education has always made a significant contribution to the development of macroeconomics. Let us define Smart education as an educational system that provides, on the basis of the Internet, interaction with the environment and the process of training and education for the acquisition of the necessary knowledge, skills, abilities and competencies by citizens. Smart education should provide the opportunity to use the advantages of the global information society to meet citizens' educational needs and interests.

Let us formulate the basic principles of smart education:

1. Using up-to-date information in the educational program to solve educational problems. The speed and volume of information flow in education and any professional activity is rapidly increasing. Existing educational materials must be supplemented with information received in real time to prepare students to solve practical problems, to work in a real situation, and not on training examples and models.
2. Organization of independent cognitive, research, project activities of students. This principle is key in the preparation of specialists ready for a creative search for solutions to professional problems, independent information and research activities.
3. Implementation of the educational process in a distributed learning environment. The educational environment is now not limited to the territory of a school, university or the distance learning system (LMS). The learning process must be continuous, including training in a professional environment, using the tools of professional activity.
4. Interaction of users with the professional community. The professional environment is considered not only as a customer for the training of specialists, but also becomes an active participant in the educational process. ICT provides users with new opportunities to participate in the work of professional communities, observe how professionals solve problems.
5. Flexible educational trajectories, individualization of training. The sphere of education is significantly expanding due to the involvement of working citizens in the education system, frequent changes in the type of professional activity, and intensive development of technology.
6. The diversity of educational activities requires providing students with broad opportunities to study educational programs and courses, use tools in the educational process, in accordance with

their health capabilities, material and social conditions.

The idea that smart education is an integral part of modern society has already become, in fact, self-evident. The main approaches that position smart education as a special and new type of education can be divided into three types: 1) technological, which assumes that the main difference is in the technologies used. 2) organizational, which assumes that the organization of the educational process itself determines what type of education we have. 3) pedagogical, focused on the form of presentation of the material, the skills being formed, and the learning outcomes. These types of approaches, in general, correspond to what is conveniently designated by the concept of "smart education dimensions". This concept can be defined as essential aspects of smart education that participate in the formation of its integral system and are impossible without each other.

The technological (ICT) dimension of smart education emphasizes that the development of technologies in itself inevitably leads to changes in the field of education, which fall under the concept of smart. Another important point is the ability of modern ICT to personalize data, to create, in fact, a virtual personality of the user, to which offers automatically focused as a result of search queries are oriented, primarily in the field of marketing and advertising. Smart technologies do not depend on the platform and localization of the user, various cross-platform technologies for synchronizing content on various devices and in different operating systems, etc. are actively developing. Various multimedia capabilities can also be used in the educational process, allowing the creation of diverse educational content. From a technological point of view, it is easy to trace the difference between smart education and, first of all, traditional education and, somewhat more difficultly, from e-learning, which also uses ICT technologies. Traditional learning, which primarily means the "face to face" learning process, includes the use of certain multimedia content, but its use is limited, includes only auxiliary technologies, the main learning process takes place in the form of face-to-face classes, trainings, lectures, practical, laboratory work – depending on the level and direction of training. Smart technologies, on the one hand, are designed to make the "effect of presence" of the student the same as in traditional learning, on the other hand, they allow you to significantly speed up the exchange of content, change its quality, allow you to enter into a greater number of "horizontal" communication links and generally significantly speed up and simplify the process of communication between participants in the educational process, who do not need to wait for a "face-to-face" meeting to enter into communication and work together with any content. Traditional education systems using information and communication technologies (ICT) are quite "closed", they do not always allow you to integrate various tools. While smart learning technologies are "seamless" technologies that allow the integration of various systems based on flexible standards. Thus, the main characteristics that ICT used in smart learning must meet are "seamlessness" – ensuring compatibility between software developed for different operating systems, independence from time and place, mobility, ubiquity, continuity, ensuring ease of access to educational information, autonomy of the teacher and student through the use of mobile devices for access to educational information.

The Smart education system includes several main components, namely: – educational programs of various levels and focus; – educational standards and requirements; – rules for organizing the educational process, which are regulated by the regulatory and legal framework; – forms of organizing training (targeted organization of content, teaching aids and methods); – successive forms of obtaining education; – a network of educational institutions and scientific organizations implementing educational programs of various levels and focus; – bodies implementing management in the field of

education, and institutions and organizations subordinate to them; – types of educational resources. To create a smart education system, all these components of the education system must obey the general principles that, in fact, make education smart.

Educational programs, according to the concept of smart education, should be formed based on the possibility of "fine" profiling of training. In the formation of the educational program, the individual educational trajectory of each student and the possibility of integrating various educational programs should be taken into account [4]. It is assumed that educational programs should comply with the principle of lifelong learning, that is, allow not only integration between educational programs within the framework of one area of training (different profiles), but also allow the possibility of taking into account, for example, additional practical courses that can be integrated into the general system. All this should have normative and legal regulation.

Particular attention should be paid to the management of educational content and educational resources in smart education. In the smart environment, it is planned that electronic educational materials will be regularly adjusted by teachers, supplemented with "fresh" information from professional sites and blogs. This means that students will be able to study relevant material, become professionals who know the current level of development of professional activity. To achieve this effect, it is necessary to implement academic knowledge management. Academic knowledge management should ensure maximum flexibility in the development and use of educational content in the educational process. The required level of flexibility can be achieved by developing a scheme of educational content that could be filled or updated by the teacher or student independently.

Both technological and organizational aspects of smart education are necessary, in fact, for the formation of the third aspect of smart education, the system of relevant cognitive competencies, the general cognitive competence of students, i.e. the pedagogical dimension. In the system of personal competencies, we assign a central place to cognitive competencies, since the education system itself is primarily aimed at developing these competencies. Nevertheless, the development of cognitive abilities is impossible without the development of other aspects of personality. It is necessary to understand that modern society, which is defined as a smart society, an information society, a society in which a largely new project of a knowledge society must be implemented, assumes that those methods of working with information and knowledge that were less in demand at previous stages of social development will be most in demand. For example, the skills of mechanical memorization, which were extremely important in the non-literate era, are gradually losing their significance in modern society, when access to huge amounts of information can be freely obtained within a few seconds. Also, with the development of technology, various mechanical, routine cognitive procedures, such as, for example, solving mathematical problems, are losing their significance. Thus, it is necessary to formulate requirements for what cognitive abilities, which are part of the cognitive competence of students, need to be developed. The question also arises of how to form basic cognitive skills, which are largely mechanical, so that cognitive development does not end with their formation. It is proposed to designate cognitively complex thinking as a general feature of cognitive competence. Such thinking presupposes the ability to see a complex structure of phenomena, to perceive not only one cause of a phenomenon, but a complex of causes, to give a balanced assessment, to see alternatives, to avoid an unambiguous binary choice. This way of thinking is necessary in modern society, in which, fortunately, it is impossible to form the only correct system of ideas about the world. Greater advantage is given to those knowledge systems that are capable of

adapting to changes, reducing the complexity of reality to an acceptable level, and for this, according to the cybernetic principle of necessary diversity transferred to the cognitive sphere, they themselves should have internal complexity and heterogeneity. The uncertainty of the conditions in which a modern person finds himself, the rapid change of technological and social conditions, the emergence of new opportunities requires the actualization of a set of cognitive abilities, for the formation of which it is necessary to change the education system in accordance with the smart education paradigm. Automation of certain intellectual processes and functions assumes a special value of that, what cannot be algorithmized, a unique, non-trivial view of things, the ability to form one's own view in the process of communication, etc.

Only the use of new technologies with the prefix "smart" or implying their "smart" application cannot determine the nature of the new type of education. If we analyze various technological solutions for the field of education that are positioned as smart, we can list the following: smart boards, smart textbooks, smart projectors, software for creating and distributing educational content that is interactive and communicative. A number of other technologies, primarily various types of social media and Data Mining technologies are also used in the smart education segment. Smart technologies are a "visualization" of intelligent systems; we can say that they are born at the intersection of the disciplines of Artificial Intelligence and Human-computer Interaction. Consequently, their "smartness" is subject to the same limitations that underlie intelligent systems. These limitations include the algorithmic nature of work, which, even in the case when the system is "learning" (if it is not a neurocomputer system), limits the ways of its learning. Intelligent systems automate routine actions to search and systematize information, but, of course, do not perform those "spontaneous" intellectual functions that require human intelligence. They "speed up" its work, but not the actions of any smart system require correct organizational decisions and non-trivial intellectual procedures, at the same time, they contribute to the creation of special organizational structures that become the basis of smart education.

Smart as a property that allows an object or process to instantly adapt to changes in the environment is becoming the most in demand in modern social development and, especially, in education. The formation of a new concept of smart education is based on the achievements of infocommunication technologies that allow achieving new economic and social effects in the education system and obtaining new efficiency. The gradual formation of the smart education paradigm is evidenced by the holding of regular seminars, conferences on the topic of smart education and smart learning, both in person and online in Ukraine.

It should be emphasized that education is a process that is implemented in the interests of an individual, family, society and the state. Recent studies show that under the pressure of the widespread distribution of ICT, the identity of an individual, family and society is being transformed. Thus, the property of "smart" is necessary for the development of education that meets the expectations and needs of an individual and society, taking into account changes in the economy, production technologies and science. So, let us formulate a definition of the concept of "smart education", in which we will try to capture its basic properties. Smart education is an educational paradigm that underlies a new type of education system and is based on the use of smart information technologies. The implementation of the smart education paradigm is aimed at forming the process of training and education for the acquisition of knowledge, skills, abilities and competencies necessary for flexible and adaptive interaction with the changing social, economic and technological

environment. Smart education should provide an opportunity to use the advantages of the global information society to meet educational needs and interests.

Based on existing experience, it can be said that in English language lessons, the use of an interactive whiteboard provides the opportunity to organize work with different texts, compare descriptions and reasoning, clearly show the structure of reasoning, together compose an argument in English, edit a text with shortcomings. All students are involved in the work on mobile phones with a Wi-Fi connection; to translate text from one language to another, they work with the Google online translator. The main thing in smart education is the maximum availability of knowledge, quickly and easily adjusting to the level and needs of the listener using mobile devices. Mobile devices are a range of devices that include smartphones, laptops, tablets, e-books, phones, netbooks. Organizing training in a lesson using a mobile device is a rather difficult task that hides many pitfalls. For example, which mobile applications to use in the lesson, at what stages it is advisable to use.

During the global pandemic and the realities of the war with Russia, new types of education, different from the traditional one, have appeared in the educational process of Ukraine. These include distance learning, e-learning, as well as a relatively new technology called mobile learning. M-learning, as our foreign representatives call it, is a modern technology that organizes the learning process using mobile devices. It is known that computers and the Internet have become integral tools, technologies are becoming easily adaptable, more efficient and high-quality, which gives huge privileges for increasing access to information communication technologies, in particular on the Internet. High-speed development of modern technology, fierce competition between global manufacturers, all this made it possible to obtain modern communicators (iPhones) and mobile devices that are much more powerful and productive than computers of the mid-90s. The use of this enormous potential of mobile devices, in our opinion, is one of the key areas for improving the informatization of education in Ukraine.

The main features of mobile learning: continuity of learning, students can study at any time convenient for them; accessibility of the educational process, in this case, people with disabilities can study using mobile devices; the Internet provides an opportunity to get all the necessary information; human productivity; individualization of training and orientation to the student, there is an opportunity to choose the content of training taking into account their interests and difficulties. Today, mobile learning can be easily combined with other types of training, providing effective learning conditions for students. M-learning uses such mobile communication devices as cell phones, smartphones, communicators (iPhone), various portable mobile devices, devices for electronic games, laptops, tablet computers (IPad), etc. An important factor is the ability to transfer information material to each other using mail, agents, as well as receiving the necessary assistance in solving problems during training (reference books, forums, chats). Modern development tools make it possible to implement any electronic manuals on topics of interest. For example, you can install digital educational resources on various disciplines on mobile devices. The ability to place audio, video material, animation clips, drawings, adding formulas, all this makes the creation of electronic training programs for mobile phones universal and adaptable to absolutely any area. Due to this, the creation and development of electronic training programs for mobile phones is also a priority in the informatization of education. Today, thanks to the possibilities of mobile learning, each student can have immediate access to all necessary resources, complete all assignments, conduct self-control at any time convenient for him. All this allows students to think independently, search

for the necessary information, process it, identify the problem, analyze the experience and knowledge gained, increase the motivation of the student and develop skills for continuous education, which also meets the modern concept of the educational process.

Table 1

Advantages and Disadvantages of Mobile Learning

Benefits in Mobile Learning	**Problems and challenges in mobile learning**
the ability to use cutting-edge technology in teaching; the ability to use lightweight, compact, portable devices in teaching; mobile learning is well suited for a wide variety of learning activities, as well as for use in blended learning; mobile technologies can be used to provide quality support for learning in any format; mobile learning can be a good support tool when teaching people with special needs; mobile learning is well suited for young people; can significantly reduce costs; enables new ways of developing educational content; provides continuous, targeted support for learning; allows you to create an interesting, engaging, and convenient learning experience.	**Technical problems:** small screens and keys on mobile devices; problems with Internet access; the fact that mobile devices operate only on batteries; the amount of memory available on mobile devices; information security issues; lack of uniform standards in connection with mobile platforms, device characteristics; the need to rework conventional electronic content for mobile devices; risks associated with the loss of a mobile device. **Social and educational problems:** Not all students can afford a suitable mobile device; problems with assessment of learning outcomes; problems with security of educational content; too fast development of mobile technologies; lack of development of pedagogical theory for mobile learning; conceptual differences between e-learning and mobile learning; problems with security of personal information; need for constant updates; mixing of private life and work/study

In any case, there is a lot that can be done in the mobile learning format. It should never be understood as simply delivering regular e-learning courses to mobile devices – this is also done sometimes, but the effectiveness of such training is low. For mobile learning to be truly successful, the training content must either be specifically created for this format or carefully adapted. And, if done correctly, mobile learning can be a great tool for delivering training content, conducting collaboration, improving corporate communications, conducting surveys, testing and evaluating performance, providing tools to support productivity, sharing knowledge, blended learning, distributing podcasts, and much more.

Tablets allow students to access an interactive and motivating environment where the teacher can use visual and audio elements along with active learning. Effective involvement of students in the learning process, providing additional incentives and improving their learning skills. The touch interface is user-friendly, simple and understandable for both students and teachers, which is very important, for example, for involving both the oldest teachers and the youngest students in the learning process. Compared to classic laptops, a tablet is much more intuitive to use. The mobility and portability of a tablet allows students to be more active in the classroom, which in turn makes the content of educational materials much easier to remember. Tablets are as interesting to children as any electronic device. The corresponding applications allow you to focus the child's attention on almost any aspect of learning. These can be simple mathematical exercises, listening to

stories, learning the alphabet, which are especially effective in a game form. The audio-visual functionality of a tablet (camera, microphone, speakers) can be used in the most creative way in the classroom, especially with the appropriate applications. Tablets themselves encourage creativity - there are hundreds of free or accessible applications that allow students to develop and create drawing, composition, and video editing skills. Tablets are simply irreplaceable when teaching reading skills. Using applications with text markers allows learners to develop and improve reading skills with virtually no teacher involvement.

Technical limitations related to multitasking restrictions can cause minor problems or interrupt the learning process. Battery life can also cause problems in class – for example, if one of the students suddenly runs out of battery during a group lesson. Cost of a tablet: Despite their availability, tablets are still quite expensive devices and require significant expenses from the school or university budget. Training of teaching staff to work with a tablet may require not only additional costs, but also significant adjustments to the curriculum. Insufficient number of teaching aids with tablet support. When making decisions on the use of computers, tablets or other technical teaching aids, one simple rule should be followed: it is not the device that teaches, but the teacher. A gadget only helps and makes the learning process more effective and interesting. Their main potential is easy adaptation to the curriculum and the possibility of its use by the teacher in the classroom. Thus, the introduction of mobile learning into the everyday educational process allows students to expand the scope of the educational process and move freely anywhere without interrupting their learning, and also provides an opportunity for learning for people with disabilities. It is worth noting the effective interaction of participants in the educational process when exchanging educational materials thanks to modern wireless technologies. Thus, the high efficiency and expediency of using mobile learning in the educational process is obvious.

The accumulated experience of work on the effective organization of educational activities using interactive Smart technologies of training in the system of advanced training of teaching staff allowed us to conclude that organizational forms and methods of training in the educational process of training teachers must meet didactic requirements.

Conclusions and research perspectives. As we can see, the use of ideal smart education in the educational process requires serious pedagogical reflection and the implementation of pedagogical developments that will allow us to intensify the educational process and improve its quality, and this requires a review of existing organizational forms of educational work, etc.

So, smart education is now forming a paradigm in education. The "smart" component defines the properties of a system or process that arise when interacting with the environment, responding to changes and adaptation in the education system. Smart Education is an education system that is the basis of a new education system that provides for the adaptive implementation of the educational process, which uses smart information technologies. The use of modern ICT requires a change in the educational paradigm: a transition from traditional learning to e-learning, and from it to Smart Education. This process involves the creation of a virtual learning environment, the use of interactive ICT, regular content updates and monitoring the quality of education.

Smart technologies have great potential to become a priority production technology that ensures the economic development of society. A distinctive feature of smart technologies is their ability to instantly respond to changes in the external environment. In the context of dynamically developing technologies and the information environment, the number of environmental factors and the rate of their change are constantly

increasing. Thus, the "smart" property becomes in demand in the management of many processes and systems, including education. The need to form a smart education concept is confirmed by the development of ICT and the educational environment, and transformations in society. At present, there is a growing gap between the potential for using ICT, the readiness of students to use ICT in the educational process, and their implementation in professional education. Technological, economic and social factors determine the need to create a smart education concept. The key element of the smart education concept is smart learning, which is impossible without the accumulated experience of the e-learning system (ELS).

We see prospects for further research in studying the process of implementing the smart education paradigm aimed at acquiring knowledge, skills and abilities in interaction with a changing social, economic and technological environment, which is based on technological, organizational and pedagogical components.

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