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## СУЧАСНІ ПІДХОДИ ДО ВИВЧЕННЯ ТА ВИКОРИСТАННЯ SMART-ТЕХНОЛОГІЙ У ПІДГОТОВЦІ МАГІСТРІВ

У статті розглянуто сучасні підходи до вивчення та використання SMART-технології у підготовці магістрів. Оскільки особливе значення нині надається інтелектуальним технологіям в галузі підготовки магістрів, що спрямовані на посилення ефективності навчального процесу та підвищення якості надання освітніх послуг. SMART-освіта забезпечує нові можливості, що пов'язані із використанням технологій електронного навчання, розрахованих на віддалене навчання; надає можливість переходу з однієї платформи на іншу; забезпечує мобільність і доступність навчальної інформації; дозволяє формат автономності викладача й студентів з використанням мобільних пристроїв в навчальному процесі; уможливорює гнучкість надання освітніх послуг точки зору індивідуальних можливостей магістранта; забезпечує підтримку індивідуальних програм щодо індивідуального розвитку кожного здобувача освіти; використання новітніх мотиваційних моделей навчання; постійне урахування вимог стейкхолдерів та роботодавців щодо змісту освітніх програм. Автори розглядають також нові підходи до дослідження SMART-технологій у професійній підготовці магістрантів, до яких відносяться зокрема: трактування інформатизації освіти як важливої особливості її розвитку, що забезпечує нове світосприйняття й переорієнтування цінностей ринку праці; знання, що в інформаційному суспільстві розглядаються як товар, з розвитком Smart-освіти стають більш значимими. Вища педагогічна освіта на рівні магістратури, реагує на глобальні тенденції суспільного розвитку та готова до застосування концепції Smart-освіти,

концептуальна основа котрої включає ідеї: мобільного доступу до отримання цифрових освітніх послуг; набуття нових знань як основного шляху модернізації соціальної сфери; створення методичного SMART-супроводження та ІТ-середовища, ідентичного природньому інтелекту, що слугує основною концепції розумної освіти

**Ключові слова:** SMART-технології, використання SMART-технологій, SMART-освіта, Е-навчання, підготовка магістрів.

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**MODERN APPROACHES TO THE STUDY AND USE OF SMART-TECHNOLOGY IN THE PREPARATION OF MASTERS**

*The article examines contemporary methodologies concerning the examination and application of SMART-technology in the training of master students. Given the current emphasis on intellectual technologies within postgraduate education, the objective is to enhance the efficacy of the educational process and elevate the quality of educational services. SMART education introduces novel possibilities associated with the utilisation of E-learning technologies tailored for remote instruction. It facilitates seamless transitions between platforms, ensuring mobility and accessibility of instructional information. This approach affords instructors and students autonomy through the integration of mobile devices into the educational process. Moreover, it enables the flexible provision of educational services, aligning with the individual capacities of postgraduate students. Additionally, it supports personalised programmes for the unique development of each education applicant, incorporating contemporary motivational learning models. The constant integration of stakeholder and employer expectations into the content of educational programmes is also a fundamental aspect of this paradigm.*

**Key words:** SMART-technology, use of SMART-technology, SMART education, E-learning, training of master students.

Modern higher pedagogical education develops under the influence of trends of internationalisation, globalisation, and digitalization, which requires updating the content and process of professional training of undergraduates through the deepening of professional and pedagogical competence, provided that educational institutions are provided with the latest information technologies and the introduction of SMART technologies. Special importance is now attached to intellectual technologies in the field of master's training, aimed at strengthening the effectiveness of the educational process and improving the quality of educational services. SMART-education provides new opportunities related to the use of E-learning technologies designed for remote learning; provides the ability to move from one platform to another; provides mobility and accessibility of training information; allows the format of autonomy of the teacher and students using mobile devices in the educational process; makes possible the flexibility of providing educational services in terms of individual opportunities of the graduate student; provides support for individual programs for the individual development of each applicant for education; use of the latest motivational learning models; constant consideration of the requirements of stakeholders and employers regarding the content of educational programs.

Various aspects of the problem of research and use of SMART technologies were investigated by domestic scientists: V. Bykov (cloud computing technologies); R. Hurevych (SMART education as a new paradigm of the modern education system).

**The article is aimed** at defining the latest approaches to the justification and use of SMART technologies in the preparation of masters.

The receipt of new results from the use of digital technologies, providing teachers and students access to the constant use of technological support for the educational process, is a distinctive characteristic of the reform of higher education in the conditions of the knowledge society, according to V. Bykov, as the newest phenomenon of the civilizational development of society. As an important feature of the modern educational process, scientists determine the use of large amounts of information located in open Internet resources, respectively. SMART-society is considered a new quality of society development, where the use of technical support, the Internet, and services involves changes in the nature of interaction among all subjects of the educational process and allows you to get new educational effects. In the new conditions of the educational process, the ability to find, critically evaluate, adequately perceive, and productively use information becomes one of the most important qualities of higher education applicants. This approach is a full reflection

of the new educational paradigm, which consists in providing access to quality education to those who wish, in forming motivation for lifelong learning, which is reflected in the system of university education, and manifests itself mainly in the growth of information necessary for use in the educational process in order to ensure the principle of scientific learning and increase the requirements for the quality of education, and in the formation of professional competencies [3, p. 12].

R. Hurevych and M. Kademiia explored SMART-education as a new educational paradigm that serves as the basis for a new format of education. Scientists explain that the SMART-education paradigm is intended to help graduate students develop their professional competencies by allowing them to interact with the information and learning environment in a flexible and customised way. SMART education provides an opportunity to use the latest achievements of the global information society to meet the educational needs of undergraduates. The use of SMART technologies now determines the nature of the new format of education, subject to the availability of the necessary technological solutions, namely: SMART-projectors, SMART-boards, software for the use of educational content, as well as Social Media and Data Mining [7, p. 72].

A significant innovation in higher education, scientists recognize the transition from the concept of book learning to online learning (SMART-education), which significantly changes the role and functions of the teacher, namely, such a teacher should motivate students to study and intellectual activity for a successful career in the information society; strategically sees problems and is able to implement them; involves students to use the potential of formal and non-formal education; apply digital learning tools; personalize intellectual activity taking into account the educational needs of students; build the educational process as a study; respect students' ability to innovate, research work; improve skills and acquire new competencies; to form an individual vision and own position [11, p. 52; 2, p. 166].

New approaches to the study of SMART-technologies in the vocational training of undergraduates include the following: interpretation of the informatization of education as an important feature of its development, which provides a new worldview and reassessment of the values of the labour market; knowledge that in the information society is considered a commodity, with the development of SMART-education becoming more significant. Higher pedagogical education at the master's level responds to global social development trends and is ready to apply the concept of SMART education, the conceptual basis of which includes ideas: mobile access to digital educational services; acquisition of new knowledge as the main way of modernising the social sphere; creation of a methodological SMART-support and IT environment identical to natural intelligence, which serves as the main concept of smart education [11, p. 52; 0, p. 236].

The main characteristics of SMART-education were singled out by A. Vasylenko, who considers this new type of education an important component of the innovative development of higher education and the formation of a new educational paradigm that offers educational services of a new quality: SMART-education. The author analyses different interpretations of the "SMART" category, namely: endowed with intellectual properties, intelligent; "SMART" as a self-directed (selfdirected) and motivated (motivated) technology, equipped with technical devices (resource-enriched, technology embedded) [4, p. 26].

The purpose of SMART technologies was defined by M. Kademiia and V. Kobysia, who practice it as building an educational and informational environment that provides the necessary level of competitiveness for the future teacher due to the acquisition by students of knowledge and skills important in society of the 21st century, namely: communication and teamwork; the ability to think creatively and critically; and effectively solving problems. The cognitive process of undergraduates in the SMART environment unites: the intellectual interaction of educational applicants in the model of asynchronous and individual learning; the availability of databases of educational information, repositories, electronic and SMART manuals, and methodological materials. The authors see the SMART-education strategy as creating conditions for the creative activity of applicants for higher education [8, p. 63].

SMART-technologies in scientific foreign literature are characterised as a system of properties that allow to adapt technical devices to the needs of users, namely: SMART-backgrounds, SMART-TVs, and other means of SMART-technologies that become decisive for the development of the information educational environment [0].

The main trends in the development of the SMART-education paradigm include: intensive development of electronic education, which creates new ways and opportunities for the transfer of educational materials in electronic form; personalization of educational activities as an alternative to traditional approaches in education; creation of personal educational programs taking into account the personal capabilities of undergraduates, their intellectual abilities; introduction of game technologies to increase the cognitive activity of applicants for education; preparation of interactive textbooks supported by SMART-tools; introduction of interactive immersion technology using video games [11, p. 71].

Important for the formation of professional competence in undergraduates is to determine the main characteristics of SMART technologies, which include: seamless, providing equal opportunities to applicants regardless of the devices they use; availability, continuity, and mobility of access to information; autonomy of subjects in the educational process, which is ensured through the use of mobile devices; use of

various models of didactic interaction; measuring and monitoring the results of the educational process using indicators of relevant competencies with an emphasis on the ability of undergraduates to apply knowledge in practical activities; the use of flexible approaches to the educational activities of undergraduates, taking into account the relevant learning parameters [5, p. 66; 6, p. 28].

The formation of new approaches to the study and use of SMART-technology in the preparation of masters involves the development of specific principles of SMART-education, namely: the use in training programs of professional training of masters of the latest information necessary for the formation of professional competencies, the achievement of certain educational results and the solution of practical professional problems, because the principle of science involves the inclusion of the latest information in real time; organization of creative cognitive, project, research activities of undergraduates using SMART technologies; cooperation with stakeholders based on cooperation in the use of SMART technologies in the preparation of masters; implementation of individual educational trajectories and individual programs using E-learning tools [11, p. 74].

New approaches to the study and use of SMART technology in the preparation of masters involve the definition of a new component of this educational category. R. Hurevych and M. Kademiia, who studied the component composition of SMART education, identified the following components: pedagogical, organisational, and technological. The pedagogical component of SMART education, according to the authors, is a combination of learning outcomes and methods and technologies to achieve them. In the system of SMART-education results, the authors attach special importance to cognitive competence, which forms a systemic vision of the pedagogical problem and the ability to isolate the components of the pedagogical phenomenon. The technological component is based on SMART information tools; the authors determined their properties: the ability to analyse information, interactivity, the creation of a virtual user model, and the ability to personalise information. To create educational content in the educational process, a variety of multimedia tools are used, and with the help of SMART technologies in the educational process, the "presence effect" is created. The organizational component of SMART-education is based on the use of curricula formed taking into account the profiling of the educational process to create an individual educational trajectory of the applicant for education using integrated courses and disciplines to solve the idea of continuity of learning (life long learning). An important area of work is the replenishment of educational content, the inclusion of new information from benefits, sites, web quests [7, p. 72].

V. Osadchyi considers the complex of information and technological support for the pedagogical training of future teachers as "a mutually agreed and interconnected set of contents, forms, methods, and means of professional training of the future teacher, as well as organisational and pedagogical conditions for their implementation, aimed at information and technological support of professionally ordered actions of subjects of the educational process in the information space of the pedagogical university with the active use of information and communication technologies" [10, p. 8].

According to scientists N. Jo and D. Jung, SMART technologies provide the implementation of the educational process on the basis of the principles of controllability, flexibility, and integration with external scientific information sources. SMART technologies also provide a human-centered and subjective approach to the provision of educational services, which connects the means of intellectual information communication with the external educational space. Some foreign scholars argue that SMART education should be considered adaptive and intellectual learning aimed at developing creative thinking [0, p.14].

The basis for the development of SMART technologies, according to M. Kademiia, is the Internet, and the formation of SMART society is based on the use of the global Internet. New conditions for the development of modern society put forward new requirements for the professional training of future teachers, which can be effectively addressed through the use of SMART technologies and the acquisition of a high level of digital literacy among teachers and students, which is explained by significant progress in the development of technology, increasing the amount of scientific information, and the integration of science, education, and production in higher pedagogical education [8, p. 39].

The use of SMART technologies in the vocational training of future teachers, according to V. Kobysia, involves the use of cloud technologies. In this regard, the author notes that cloud technologies provide applicants for education and teachers with new opportunities for using the latest software tools of Internet technologies in the educational process. The scientist presents new approaches to the use of SMART technologies in the educational process, including a multi-cloud learning environment, a virtual educational environment, and a personal learning environment. Another model includes services that perform the functions of the university's information educational environment (creating personal documents, drawing up a calendar plan, providing them with general access, creating websites) [9].

According to scientists, information technologies determine the essence of the twentieth century, and in the 21st century, they are inferior to SMART technologies: SMART society, SMART economy, and SMART education. The SMART-education environment is the convergence of information technologies and Internet capabilities, respectively. The key components of the latest SMART-education are the creation of a flexible and open educational environment in higher education through the use of open educational resources and

gadgets. SMART technologies provide flexible learning in an interactive didactic environment based on world-class educational content that is freely available [9].

The modern approaches to the use of SMART technologies in the preparation of masters, according to L. Shevchenko and V. Umanets, the authors include the creation of SMART universities, which are technological and intellectual developments of electronic universities operating on the principles of E-learning. SMART technologies are used on the basis of technological innovation and the Internet, which contribute to the mastery of the master's professional competence by us through the study of professional disciplines." Studying at SMART University should be maximally included in the life of the listener, be informal, and also be based on technologies that are now familiar to everyone. To keep up with the changes, SMART universities need to meet the following requirements: flexibility, adaptability, quality indicators, and innovations.. The author refers to common SMART education management systems: Colaborator, Moodle, WebCT, Ilias, eLearning 3000, IBM Learning Space, and Webtuto. Despite the differences in functionality, interfaces, and resource requirements, these systems have a similar structure and are implemented according to the principle of modularity and the distribution of applicants for education into groups. [O, p. 49].

Based on the analysis of trends in the development of SMART-education, as well as existing SMART-technologies and E-learning systems that are integrated into the existing SMART-system, the researchers determined the main functions of the educational SMART-system, its basic structure, and its user interface, and developed a generalised algorithm for the interaction of the graduate student with the SMART-system. Important for our study of the formation of professional and pedagogical competence in master's degree students is that SMART systems are designed not only for the acquisition of pedagogical basic knowledge and professional competencies by graduate students on the basis of a systematic approach to the disciplines of the pedagogical cycle but also for the development of pedagogical abilities in master's degree students, important for solving professional problems of varying complexity. Such systems should be based on the latest information technologies using the Internet and artificial intelligence, which will allow them to create a virtual information and educational SMART environment, which includes educational depositories, SMART libraries, electronic education systems, and various trainings, which, in unity, allow them to comprehensively and effectively solve the problems of forming the professional and pedagogical competence of undergraduates. An important provision for the use of SMART technologies is that undergraduates should independently find educational information in open educational resources. The main characteristics of SMART-systems researchers believe are: a quick response to external changes and openness of the system; constant replenishment due to the introduction of new functionality; easy access to educational content; software compatibility of different operating systems; free choice of time and place; the possibility of mobile assessment and self-assessment of knowledge [3, p. 164].

**Conclusions.** SMART systems and electronic education change the conceptual model of a higher pedagogical school, especially with regard to the master's level of training. The main characteristics of the author include such trends as centralization of educational materials, appropriate preparedness of the teaching staff, mobility for each user, flexibility of approaches, and individual orientation. SMART-technologies are used to implement educational and professional programmes that include not only instrumental technologies for conducting the educational process but also innovative curricula of disciplines, methodological materials, and also individual educational trajectories of students.

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