



ANALYSIS OF THE STATE OF PEDAGOGICAL WORKERS TRAINING TO USE SMART TECHNOLOGIES IN THE EDUCATIONAL PROCESS

Mykola Pryhodii,

DSc in Education, Professor, Head of the Electronic Learning Resources Laboratory of the Institute of Vocational Education and Training of NAES of Ukraine
<http://orcid.org/0000-0001-5351-0002>. ResearcherID: F-7366-2019
e-mail: prygodii@ukr.net

Abstract. The article presents the characteristics of micro and macro levels of perception of SMART education. It is determined that SMART education is a purposeful cognitive activity of people for acquiring knowledge, skills and abilities, or their improvement using an integrated virtual environment for learning with educational content being developed, improved by all participants in the educational process. The content of the notion "SMART-complex" is defined as an interconnected set of normative and educational-methodical materials existing in the educational and educational environment of an educational institution and necessary for the effective formation of competencies as a programmed result of mastering the discipline. It is substantiated that this educational complex should be constructed on the basis of SMART-management. Based on the analysis, it is suggested: S (specification) – in accordance with the educational-professional program, clearly identify the professional and general competencies that need to be formed within the discipline and specify the program learning outcomes; M (measurability) – measure the result of the educational process on the basis of the existing knowledge and skills, the work performed (the creation of a material or ideal object); A (approachability) – to create a content library for educational discipline, a system of tasks for students in order to form individual trajectories for studying discipline, introduce elements of distance learning; R (relevance) – to reduce the time for the mastering of "secondary" information, to strengthen practical training in laboratories and workshops, to specify the content of training on the basis of a practice-oriented approach; T (time constraints) – set up intermediate stages of performance and protection of works, change time characteristics taking into account individual aspirations of students. It is revealed that due to the use of SMART-complexes, operational intervention in the structure of the work program with the consideration of the individual characteristics of participants in the educational process becomes possible. At the expense of what is achieved: improving the quality of methodological provision of the educational process; timely correction and improvement of educational and methodological materials; activating independent work of students on the basis of rationalization of time to study discipline.

Keywords: *SMART technology, SMART education, SMART complex, pedagogical worker, professional education.*

Introduction. The modern educational system is at a new stage in its development. For Ukrainian scientists, it was a challenge of time to ensure that the educational system conforms to the world economic and educational trends in order to meet the requirements of modern man, industry, employers and the state. The updating of a person-centered approach in education leads to a revision of the fundamental

principles of learning. It becomes clear that it is necessary to abandon the impersonal attitude of students, to consider the study group / class as an integral unit and the transition to personalization of training, when each subject develops his own training program taking into account his individual peculiarities, which can be changed considering the changes of learning priorities and accomplished goals.

The introduction of information and communication technologies in the educational process promotes the wide application of the elements of distance learning. In particular, there is an increase in attention to the acquisition of theoretical material on a distance basis, with the strengthening of the practice-oriented approach. In the educational system, there are also ongoing searches for approaches to developing new-generation textbooks that could realize the full potential of modern technology and the global network.

It should be emphasized that more and more attention is attracted to a new generation of young people, whose children and adolescents have undergone in completely different conditions than previous generations. They are actively involved in virtual reality, which, in turn, leads to a transformation of the perception of the traditional educational process. These transformations in human life, caused by the active use of modern information and communication technologies, led to the need to find a new approach to the education of the information society. In particular, the issue of the introduction of SMART-education was actual. The theoretical foundations of this problem are only being built up, therefore, scientists have not yet formulated a unified approach. Let's analyze the main ones.

Materials. In Ukraine, July 12, 2012, the Order of the Ministry of Education, Science and Youth of Ukraine No. 812 was adopted on the approval of the Concept of the pilot project "Learning – SMART Training", the main principle of which is "smart learning". It was supposed to encourage the use of up-to-date teaching methods using modern computer technology, teacher training and the use of their own technological resources in the educational process. The project was designed for 2012-2013.

So, the first approach to smart education is revealed on the basis of the translation of the word "Smart" as a clever one.

For example, L. Didenko and V. Kondrashova-Didenko (2016), analyzing the foundations of SMART-education, emphasize that the term "SMART", by its ambiguity, sets new characteristics of SMART-education: 1) intelligence; 2) virtue; 3) wisdom; 4) fronesis (practical wisdom).

In this context, SMART-education, or wise learning, is seen as a flexible learning in the interactive educational environment with content from around the world that is freely accessible. The basis of SMART education is the broad availability of knowledge.

The second approach is defined by the mnemonic acronym used in management and project management to determine goals and assign tasks. For example, L. Korsunskaya (2013), analyzing the Korean concept of Smart Education, states that it involves flexible and

active learning in an open information space, and the term SMART is an acronym for learning Self-directed, Motivated, Adaptive, Resource-enriched, with Technology embedded. Instead, A. Zavrashin (2015) indicates that the foundation of SMART education consists of five principles: the specification of the purpose of learning (Specific); clear definition of tools and methods for measuring learning outcomes (Measurable); obligation of the final result in each task (Attainable); the relevance of the tasks and their professional orientation (Relevant); determination of the time frames for achieving the goal (Time-bound). It should be emphasized that, regardless of the approach to understanding the concept of "Smart / SMART-education" (word or abbreviation), its content is reduced to learning in the interactive educational space with the help of world-wide content that is freely accessible (Yermoshenko, 2016).

The level of perception of SMART education is also relevant, namely:

✓ at the micro level – SMART-education involves the use of technological innovations and the Internet, enabling students to acquire professional knowledge, skills and abilities on the basis of systematic and multidimensional vision and study of disciplines, taking into account the multidimensional and continuous updating of the content of learning (Semenikhina, 2013);

✓ at the macro level, SMART-education is a combination of educational institutions, teachers and students for the purpose of implementation joint educational activities on the Internet on the basis of common educational and scientific standards, the unified vision of the directions of education development in a modern society (M. Kolotylo, 2016).

Therefore, SMART-education is a purposeful cognitive activity of people for acquiring knowledge, skills and abilities or their improvement using an integrated virtual environment for learning with educational content, that is developed, improved by all participants in the educational process.

The purpose of the article is to analyze the training of pedagogical staff to use SMART-technologies in the educational process.

Research methods: analysis, synthesis – in order to determine the state and the level of development of the problem under study; generalization – to formulate conclusions and recommendations on the readiness of lecturers to use SMART-technologies; diagnostic (questionnaire, conversation) – for studying the information about the readiness of pedagogical staff to use SMART-technologies in the educational process.

Results and discussions. Traditionally, in the educational institutions, the development of educational and methodological disciplines is carried

out to ensure the systematic organization of the educational process. Educational-methodical complex of discipline is a set of normative and educational-methodical materials that are necessary for the effective implementation by students of the curriculum work program (Teaching and Methodological Complex of the Discipline, 2019). The main purpose of the creation of educational-methodical complexes is the organization and methodological support of students independent work for preparation for training classes of all their kinds, for conducting coursework, laboratory works, etc. (Regulations on educational and methodical complex of educational discipline, 2017). It can be stated that the teaching-methodical complex is used for defining goals, setting objectives and outlining effective ways to achieve the goals of the educational process in a specific discipline.

Management of educational activities is carried out through familiarization of students with: 1) working curriculum of discipline; 2) a summary of the lectures on the discipline; 3) methodical instructions (recommendations) for conducting laboratory, practical and seminar sessions; 4) the topics of term papers (projects), homework, etc., and methodical instructions (recommendations) regarding their implementation (if it is provided by the program); 5) methodical developments on the organization of independent work of students in the discipline (schedule, methodological recommendations, etc.); 6) individual tasks; 7) means of diagnostics from the discipline (exam papers, questions to the modular (stage-by-stage) control, test complex).

In fact, in the presence there is a clear plan of action with specific goals and objectives, the implementation of which leads to the result – enrollment of credits (hours) allocated for the study of the discipline. It should be emphasized that, regardless of the media on which the teaching-methodical complex is located (electronic or paper), the result is important – the formed competence of the future professional activity.

In accordance with the competence approach in education, as stated in the Laws of Ukraine: "On Education" (2017), "On Higher Education" (2014), "On Professional (Vocational) Education" (1998); According to the Resolution of the Cabinet of Ministers of Ukraine "On the National Framework of Qualifications" (2011), the educational process is aimed at the development of competences that are clearly outlined in the educational-professional program.

Educational disciplines and different practices are introduced in order not to master the fundamentals of science, but foresee the achievement of a certain programmed learning result, which is manifested in the competencies that students must master. Thus, the

content, forms and means of learning may and must vary taking into account student's individual training. Under such conditions, the teaching-methodical complex as a set of regulatory documents is a certain deterrent to the professional development of future specialists.

In order to solve this problem, the Laboratory of Electronic Educational Resources of the Institute of Vocational Education of the National Academy of Sciences of Ukraine launched a research work on the topic "Methodical bases for the development of SMART-complexes for the training of skilled workers in the agrarian, construction and engineering sectors". The problem of research is to create within the educational and informational environment institutions of vocational (vocational and technical) education (hereinafter: IV(VT)E) an unified system of normative and teaching materials necessary for the effective mastering of educational disciplines. A key element of such a system will be a training and methodological complex, built on the principles of SMART-management.

On the basis of the analysis, the following positions are proposed:

S (specification) – in accordance with the educational-professional program, clearly identify the professional and general competencies that need to be formed within the discipline and specify the program learning outcomes;

M (measurability) – measure the result of the educational process based on the knowledge and skills, work done (to analyze the creation of material or ideal objects);

A (attainability) – to create a content library for the educational discipline, a system of tasks for students in order to formulate individual trajectories for studying the discipline, introduce elements of distance learning;

R (relevance) – to reduce the time for the mastering of "secondary" information, to strengthen practical training in laboratories and workshops, to specify the content of training on the basis of a practice-oriented approach;

T (time-bound) – set up intermediate stages of performance and protection of works, change time characteristics taking into account individual aspirations of students.

Thus, the SMART-complex is an interconnected set of normative and teaching-methodological materials that exist in the information and educational environment of the educational institution and are necessary for the effective formation of competencies as a programmed result of mastering the discipline.

Thanks to the use of SMART-complexes, operational intervention in the structure of the work

program can be made considering the individual characteristics of participants in the educational process, which results in: improving the quality of methodological provision of the educational process; timely correction and improvement of educational and methodological materials; enhancing the independent work of students on the basis of streamlining time to study the discipline.

For the development of SMART-complexes for the training of future skilled workers in IV(VT)E, the level of readiness of the teaching staff as well as the level of their awareness with SMART-technologies was carried out. During the study, lecturers (117 persons) were asked questions to determine the effectiveness of using SMART-technologies in the educational process, the quality of existing electronic educational resources, identifying factors for creating new and improving existing SMART-complexes, identifying the reasons that hinder their introduction into the educational process (Fig. 1).

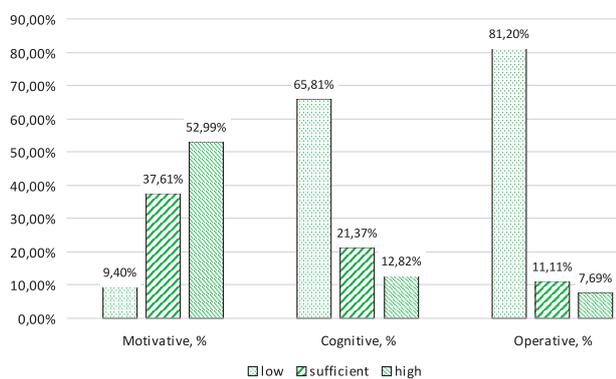


Fig. 1. Readiness of lecturers of IV (VT) E to develop SMART-complexes

The analysis of the data obtained during the questioning of pedagogical workers made it possible to conclude that their readiness (based on the motivational component) to develop SMART-complexes in IV(VT)E is rather high. The lowest level

List of references

- Діденко, Л. В. та Кондрашова-Діденко, В. І., 2016. Smart-освіта: основи. В: *Smart-освіта: ресурси та перспективи: матеріали міжнар. наук.-метод. конф.* Київ, Україна, 23 Листопад 2016. Київ: Київський нац. торг.-екон. ун-т, с. 37-40.
- Єрмошенко, А. та Єрмошенко, Л., 2016. Сутність та пріоритети Smart-освіти. В: *Smart-освіта: ресурси та перспективи: матеріали міжнар. наук.-метод. конф.* Київ, Україна, 23 Листопад 2016. Київ: Київський нац. торг.-екон. ун-т, с. 43-45.
- Завражин, А., 2015. SMART и новые подходы в современном образовании. *Мир образования – образование в мире*, 58, с. 59-65.
- Колотило, М., 2016. Smart-освіта: теоретичний, методичний та технологічний виміри. В: *Smart-освіта: ресурси та перспективи: матеріали міжнар. наук.-метод. конф.* Київ, Україна, 23 Листопад 2016. Київ: Київський нац. торг.-екон. ун-т, с. 47-50.
- Корсунська, Л. М., 2013. Корейська концепція smart-освіти: загальне навчання, цифрові підручники і smart-школи. *Освіта та розвиток обдарованої особистості*, 11, с. 77-80.

is noted for the operational and cognitive component of readiness, for the development of which it is necessary to intensify the activities of teaching staff, aimed at the student-recipient in the use of SMART-complexes in the educational process.

The average readiness of the teaching staff of IV(VT)E for the development of SMART-complexes is due to the fact that they do not possess the necessary technologies and do not have a clear algorithm of interaction with students within the educational and informational environment of the educational institution. Many lecturers believe that they need to be competent only in the subject field. It is possible to change this position by providing pedagogical workers with more information about the benefits of SMART-complexes and having formed the need for them to apply ICT (motivation component of readiness), which will serve as a platform for obtaining relevant competencies and meaningful practical application of theoretical knowledge about SMART-complexes (operational and cognitive components of readiness).

Conclusions. The existence of the problem of lack of organizational and methodological materials (theoretical, practical, test) in IV(VT)E based on the principles of interactivity and ensuring the proper quality of classroom and independent work of students as future skilled workers of the digital society has been proved. It was found that most of the polled lecturers do not understand how the SMART-complex of academic discipline can promote the quality of teaching disciplines. At the same time, the experiment showed that the majority of surveyed pedagogical workers recognize the prospects of using SMART-technologies to expand the lesson information base. The main difficulties in designing the SMART-complex of educational discipline lecturers mostly consider the lack of methodology and standards for its creation.

Prospects for further research are grounded in the methodology for the development of SMART-complexes for the training of skilled workers in IV(VT)E.

Навчально-методичний комплекс дисципліни (НМКД), 2019. Наукова бібліотека. *Таврійський державний агротехнологічний університету*, [online] Available at: <<http://www.tsatu.edu.ua/biblioteka/elektronna-biblioteka/navchalno-metodychnyjkompleks-dyscypliny-nmkd/>> [Accessed 25 March 2019].

Положення про навчально-методичний комплекс навчальної дисципліни, 2017. *Система менеджменту якості*, [online] Available at: <<http://ian.nau.edu.ua/wp-content/uploads/2017/03/Polozhennya-NMKnavchalnoyi-distsiplini.pdf>> [Accessed 25 March 2019].

Семеніхіна, О. В., 2013 Нові парадигми у сфері освіти в умовах переходу до smart-суспільства. *Науковий вісник Донбасу*, 3, [online] Available at: <http://nbuv.gov.ua/UJRN/nvd_2013_3_22> [Accessed 25 March 2019].

Translated & Transliterated

Didenko, L. V. ta Kondrashova-Didenko, V. I., 2016. *Smart-osvita: osnovy [Smart-education: fundamentals]. V: Smart-osvita: resursy ta perspektyvy [Smart-education: resources and prospects]: materialy mizhnar. nauk.-metod. konf.* Kyiv, Ukraina, 23 Lystopad 2016. Kyiv: Kyivskiy nats. torh.-ekon. un-t, s. 37-40, [in Ukrainian].

Yermoshenko, A. ta Yermoshenko, L., 2016. Sutnist ta piorytety Smart-osvity [Essence and priorities of Smart education]. V: *Smart-osvita: resursy ta perspektyvy [Smart-education: resources and prospects]: materialy mizhnar. nauk.-metod. konf.* Kyiv, Ukraina, 23 Lystopad 2016. Kyiv: Kyivskiy nats. torh.-ekon. un-t, s. 43-45, [in Ukrainian].

Zavrazhin, A., 2015 SMART i novye podhody v sovremennom obrazovanii [SMART and new approaches in modern education]. *Mir obrazovaniya – obrazovanie v mire [The world of education – education in the world]*. 58, s. 59-65, [in Russian].

Kolotylo, M., 2016. Smart-osvita: teoretychni, metodychni ta tekhnolohichni vymiry [Smart-education: theoretical, methodological and technological dimensions]. V: *Smart-osvita: resursy ta perspektyvy [Smart-education: resources and prospects]: materialy mizhnar. nauk.-metod. konf.* Kyiv, Ukraina, 23 Lystopad 2016. Kyiv: Kyivskiy nats. torh.-ekon. un-t, s. 47-50, [in Ukrainian].

Korsunskaya, L. M., 2013. Koreiska kontsepsiia smart-osvity: zahalne navchannia, tsyfrovi pidruchnyky i smart-shkoly [Korean concept of smart-education: general education, digital textbooks and smart-schools]. *Osvita ta rozvytok obdarovanoi osobystosti [Education and development of gifted personality]*, 11, s. 77-80, [in Ukrainian].

Navchalno-metodychni kompleks dystsypliny (NMKD) [Educational and methodical complex of discipline (EMCD)], 2019. *Naukova biblioteka. Tavriiskiy derzhavnyi ahrotekhnolohichniy universytety [Scientific Library. Tavriya State Agrotechnological Universities]*, [online] Available at: <<http://www.tsatu.edu.ua/biblioteka/elektronna-biblioteka/navchalno-metodychnyjkompleks-dyscypliny-nmkd/>> [Accessed 25 March 2019], [in Ukrainian].

Polozhennia pro navchalno-metodychni kompleks navchalnoi dystsypliny [Regulations on educational and methodical complex of educational discipline], 2017. *Systema menedzhmentu yakosti [Quality management system]*, [online] Available at: <<http://ian.nau.edu.ua/wp-content/uploads/2017/03/Polozhennya-NMKnavchalnoyi-distsiplini.pdf>> [Accessed 25 March 2019], [in Ukrainian].

Semenikhina, O. V., 2013. Novi paradyhmy u sferi osvity v umovakh perekhodu do smart-suspilstva [New paradigms in education in the transition to the smart society]. *Naukovyi visnyk Donbasu [Scientific Bulletin Donbass]*, 3. [online] Available at: <http://nbuv.gov.ua/UJRN/nvd_2013_3_22> [Accessed 25 March 2019], [in Ukrainian].

УДК 378:37.015]:004:SMART

Аналіз стану підготовки педагогічних працівників до використання SMART-технологій в освітньому процесі

Микола Пригодій,

доктор педагогічних наук, професор, завідувач лабораторії електронних навчальних ресурсів Інституту професійно-технічної освіти НАПН України

Реферат. У статті наведено характеристики мікро– та макrorівнів сприйняття SMART-освіти. Визначено, що SMART-освіта є цілеспрямованою пізнавальною діяльністю людей з отримання знань, умінь та навичок, або їх вдосконалення з використанням інтегрованого віртуального середовища для навчання з освітнім контентом, що розробляється і вдосконалюється всіма учасниками освітнього процесу. Зміст поняття "SMART-комплекс" визначено як взаємозв'язана сукупність нормативних та навчально-методичних матеріалів, що існують в інформаційно-освітньому середовищі закладу освіти та необхідні для ефективного формування компетентностей як програ-

мованого результату засвоєння освітньої дисципліни. Обґрунтовано, що даний навчально-методичний комплекс повинен бути побудований на засадах SMART-управління. На основі проведеного аналізу запропоновано: відповідно до освітньо-професійної програми, чітко визначити фахові та загальні компетентності, що їх необхідно сформулювати в межах дисципліни, та конкретизувати програмні результати навчання – конкретизація (S); виміряти результати освітнього процесу на основі сформованих знань і вмінь – вимірюваність (M); створити контент-бібліотеку з дисципліни, систему завдань для студентів з метою формування індивідуальних траєкторій вивчення дисципліни, запровадити елементи дистанційного навчання – досяжність (A); зменшити час на засвоєння "другорядної" інформації, посилити практичну підготовку в лабораторіях та майстернях, конкретизувати зміст навчання на засадах практико-орієнтованого підходу – актуальність (R); встановлювати проміжні етапи виконання та захисту робіт, змінювати часові характеристики з урахуванням індивідуальних прагнень студентів – обмеження в часі (T). З'ясовано, що завдяки використанню SMART-комплексів стає можливим оперативне втручання у структуру робочої програми з урахуванням індивідуальних особливостей учасників освітнього процесу, в результаті чого досягається: підвищення якості його методичного забезпечення. своєчасне коригування та вдосконалення навчально-методичних матеріалів; активізація самостійної роботи студентів на базі раціоналізації часу на вивчення дисципліни.

Ключові слова: *SMART-технології, SMART-освіта, SMART-комплекс, педагогічний працівник, професійна освіта.*

Received: 09 April 2019

Accepted: 19 May 2019