

The Aspects of Smart Education in The World

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Abstract

The author examines smart education and its basic principles in this article. The author also shows that smart education is a learning process in which technology innovations and Internet resources are used globally. After all, it allows students to gain professional competence based on a systematic multivariate vision and study of disciplines, taking into account their multidimensional and continuous content updating. The author shows the concept of smart education. It is the creation of an intellectual environment, the continuous development of competencies of participants in the educational process, including formal and informal learning processes based on innovative technologies. Thus, the introduction of smart technologies in education will lead to the transition from the old system of reproductive knowledge to a new, creative form of learning using innovative methods and will provide the necessary knowledge and skills which will be necessary for the student in the future. The author also notes that education based on three educational activities, namely, arithmetic, reading, and writing, transforms into education which improves the following seven skills: creativity and innovation; communication; cross-cultural understanding; collaboration and leadership; critical thinking and problem solving; ICT literacy; career and life skills. These are seven skills and abilities of smart education in the 21st century. In this case, smart education assumes that the teacher should use technological innovations and Internet resources. Thus, smart education provides new opportunities for teachers to share experiences and ideas, do more research activities, personalize the course of study depending on its tasks and the competence of the listener, and save time.

Keywords: smart education, e-Learning, technology, student, teacher.

Introduction

A man of the 21st century is associated with mass computerization and the Internet. After all, a man creates an incredible amount of advanced computer technologies which have greatly facilitated his/her life. More and more material and technical values have gained distinction and affected the educational process. Of course, the appearance of the World Wide Web has made its adjustments to change the learning

concept. In such a way, education becomes more accessible with the development of technologies such as YouTube, Cloud technologies, distance learning forms, Facebook, Twitter, blogging, Google, and so on. One can study through the Internet worldwide and at any time. People can choose the field of knowledge, including non-professional, and immerse themselves in it as much as they are interested. A significant factor is the free-of-charge basis of many resources. As a result, smart education was set up in the 21st century. Therefore, smart education is an educational process that uses technological innovations and Internet resources. It allows students to gain professional competence based on a systematic multidimensional vision and study of disciplines, taking into account their multidimensional and continuous updating of content.

Literature review

Many scientists studied the necessity for introducing innovative technologies in the educational process. The starting points of this topic we can find in the works of classical scholars such as Karl Jaspers *Man in the Modern Age* (Routledge Revivals) (1922), Martin Heidegger *The Question concerning Technology* (1954), Oswald Spengler *Man and Technique* (1931) and others. Today they have been further developed in the researches of Ukrainian and foreign scientists. The problem's relevance is also proved by a large number of publications and studies on the topic of domestic and foreign scientists, including Musienko O. & Zelinska O. (2013), Hoel T. & Mason J. (2018), etc.

Globalization requires a combination of national and global values in the field of education, changing directions and principles of education. An important aspect is the adaptation of such innovations globally. It is observed in the book *The meaning and predict of Smart Learning, Smart Learning Korea Proceeding* by D. Gwak (2010). D. Gwak begins to pay attention to the realities of modern education to prove that the teacher has ceased to be the primary source of information. In the knowledge society, the knowledge itself can be obtained from anywhere, i.e., from books, magazines, radio, television, the Internet. The flow of knowledge is gaining enormous proportions, striking with increasing availability, pressing on an all-encompassing scale. The vast amounts of existing information, its daily growth, the diverse and disparate system of storing and disseminating knowledge, the lack of unified access to the flow of information create diverse and growing problems that hinder their effective use.

Hwang G-J. (2014) in his work *Definition, framework and research issues of smart learning environments – A context-aware ubiquitous learning perspective* presents

the phenomenon of Smart-society, generated by the evolutionary progress which has taken place through the deployment of the information revolution, actualizes new approaches to human interaction and education.

Zhiting Zhu & Peter Riezebos (2016b) show that a man of smart society is an image used to capture the diversity of historical and cultural traditions and innovations, activity factors and spiritual aspirations, worldview paradigms involved in active processes of existence in correlations with socio-cultural human activity in the paper *Introducing the smart education framework: Core elements for successful learning in a digital world*. Moreover, the other work, *A research framework of smart education* by Zhiting Zhu & Peter Riezebos (2016a), demonstrates a four-tier framework of smart education and ten key features of smart learning environments, which give knowledge and skills of the 21st century learning for students. In addition, they state that the smart education framework consists of individual-based personalized learning, mass-based generative learning, group-based collaborative learning, and class-based differentiated instruction.

It shows that education as an activity must be flexible, i.e., transformations are constantly taking place by introducing new components, new methods, and technologies of teaching and communication. Therefore, there should be radical semantic changes in the modern educational system of most countries around the world, making it different and better.

Aim of the study

This study proposes a new framework in education: smart education. Thus, this paper aims to implement a comprehensive analysis of smart education, its basic principles and identify the definition of smart education and the teacher's role in the smart learning environments in the world.

Methodology

The methodological framework for studying smart education is based on modern ideas about education. In particular, interdisciplinary and transdisciplinary approaches have been used. It was possible to involve traditional and new methods and principles in the analysis of education. Among the classical approaches to scientific knowledge, the principles of consistency, integrity, objectivity, historicity, and development have been applied. Among the nonclassical approaches, such

methods as deconstruction and genealogy, which allowed to reveal at a deeper level the essence of the processes in education in modern society, should be mentioned. Also, general scientific methods such as analysis, synthesis, abstraction, comparison, systematization have been widely used.

The definition of smart education

Each of us is surrounded by a "smart home" every day; we build "smart cities" which need to be adapted to the needs of people and make our lives better and more comfortable. Hence, the transition to smart education is a requirement of the time, simultaneously the condition and opportunity of social development. What do we mean by the term smart education? Many scholars have proposed definitions of smart education in their studies. For example, Jae Hyeong Park et al. (2013: p.323) has defined *smart education* as an intelligent, tailored instruction-learning supporting system, in which the demands of the 21st-century information technology society are met with changes in the overall education system such as pedagogy, curriculum, assessment, and teacher. It combines human-centered social learning and adaptive learning based on the best network communication environment. Other scientists Kim, Song, & Yoon (2011: p.5) consider that smart learning, which combines the advantages of social learning and ubiquitous learning, is a learner-centric and service-oriented educational paradigm, rather than one just focused on utilizing devices. Furthermore, Middleton (2015: p.18), in his work *Smart learning: Teaching and learning with smartphones and tablets in post compulsory education*, identifies the learner-centric aspects of smart learning and how it benefits from smart technologies. However, the scientific leader of the school "Education in the Information Society," Tikhomirov (2015), explains this term as a new property that characterizes the Internet integration in this object of two or more elements that were not previously combined.

As we have seen, this term has many meanings. Therefore, before defining smart education, we will figure out the meaning of smart and education. First of all, we turn to the first word, "smart". The word "smart" has an English origin and translates as intelligent or technological. Another definition of *smart* is an acronym from the initial components in words such as self-directed, motivated, adaptive, resource-enriched, technology. Moreover, Michail N. Giannakos et al. (2016: p.3) define smart as a new notion coined to describe technological, economic, and social developments enabled by technologies that rely on sensors, big data, open data, new ways of connectivity, and exchange of information. In other words, smart refers to

intelligence for students using hardware (e.g., smartphones, laptops, tablets, desktops, etc.).

It is also necessary to consider the meaning of "education." Professor Zhu (2016a: p.10) of East China Normal University states that education is acquiring new knowledge and skills where new information and impressions influence existing knowledge, skills, and behavior. More specifically, it is claimed to be the act of acquiring new, or modifying and reinforcing, existing knowledge, behaviors, skills, values, or preferences and may involve synthesizing different types of information.

Thus, smart education is the application for educational purposes of smartphones, tablets, interactive whiteboards – smart boards, other devices with access to the Internet, and various training programs and applications. However, more important is creating an integrated intellectual virtual environment for learning with educational content being developed and improved by all participants of the learning process.

The concept of smart education

According to Gwak (2010: p.6), a concept of smart education as follows: first, it is focused on learners and content more than on devices; second, it is effective, intelligent, tailored learning based on advanced IT infrastructure. As a result, the concept of smart education is a key component of the future education, i.e., the expansion of time, space, teaching methods and teaching materials for a large number of sources and, of course, a huge variety of multimedia materials such as audio, video, graphics. These technologies can be easily arranged in accordance with the requirements and levels of students. All this means that there is a transition from education focused on three educational activities, namely arithmetic, reading, writing, to education which improves the following seven skills (7 C's) in the 21st century such as:

- creativity and innovation;
- communication;
- cross-cultural understanding;
- collaboration and leadership;
- critical thinking and problem solving;
- ICT literacy;
- career and life skills.

Thus, smart education is a study based on the use of an interactive educational

environment. The goal of smart education is to provide future professionals with the necessary skills to implement successful professional activities in a digital society and a well-developed economy. It provides an opportunity for students to learn using electronic education complex (learning, teaching, professional development, educational leading, etc.) which contains lecture and laboratory materials, materials for testing, references for the course of study, questions for the final examination, the ability to view the work of students who have completed course from previous years. Moreover, the concept of smart education is to create an intellectual environment for the continuous development of the competencies of the participants in the educational process, including formal and informal learning processes based on advanced technology.

Smart education framework

The key to understanding smart education is the wide availability of knowledge. As a result of the introduction of smart education, students will be able to freely receive the necessary information and increase the level of using innovative technologies, which in turn will be able to meet the growing demands of students as much as possible, create a stable motivation for gaining knowledge, point out the importance of learning and further self-education for a successful future and growth.

Within the framework of smart education, a new discipline will acquire new qualities, which must simultaneously provide the quality of training and motivate the student to study, including multimedia fragments and external electronic resources. At the same time, reading the textbook should take no more than 20-30% of the time. The exact requirements should be met by smart textbooks, which should be developed based on the use of technological innovations and Internet resources. Technological requirements for the creation of a smart textbook include the use of cloud technologies, the expansion of multimedia tools, and the interactivity of educational tools, automatic filtering by level of material development (knowledge rating), group work of collaborators and readers on the Internet, creating content through the student's personal cabinet.

In addition, smart education for its development contains specific tasks. These are such tasks as developing and implementing electronic textbooks, strengthening education in the field of ICT ethics for solving ICT-related social problems, the foundation of educational services, and improving teachers' skills to apply smart education widely. Thus, smart technologies will form new requirements for the teachers who should be well-informed in their professional field and have a wide variety of worldviews. Furthermore, the teachers should use different technologies

to work with their students and create online classes or electronic evaluation systems of knowledge. In addition, the teachers should widely use educational resources for public purposes, etc. Besides, smart education is considered to be easy to manage. The educational institution can manage it through the flexibility of the educational process. It is internal management. Furthermore, there is external management, and it is constantly fed by external sources (Semenikhina, 2013). Indubitably, smart approaches must not provide ready-made knowledge but create conditions that will enable students to acquire skills and personal experience. Therefore, these strategies help every student gain the basic knowledge and professional skills he/she needs. Moreover, students gain them anytime and anywhere to further use in the future. Furthermore, they will become competitive in their field of activity.

Basic principles of smart education

There are the following basic principles of smart education:

- *Using up-to-date curriculum information to learning objectives* – The speed and volume of information flow in the world. Moreover, professional activity is growing rapidly. Teaching materials should be supplemented with real-time information to solve practical problems, to work in a real-life situation.
- *Organization of independent cognitive, research and project activities of students* – This principle is key in preparing professionals for the creative search for practical problems, independent information, and research.
- *Implementation of the educational process in a distributed learning environment* – The learning environment is not currently limited to the university's territory or distance learning system. The learning process must be continuous, including training in a professional environment using professional tools.
- *Flexible educational trajectories, individualized learning* – Education is provided not only by students but also by working citizens who want to gain knowledge, carry out their own retraining or advanced training. The task of the educational institution is to provide educational services to meet the needs of everyone who wants to study.

- *Student interaction with the professional community* – The professional environment is essential in the educational process. The use of ICT in the educational process enables all its participants to work in professional environments, create software products, participate in telecommunications projects, and more. According to the needs and capabilities of students, the university's task is to provide educational services.
- *Multifaceted educational activities* – According to the institution's capacity, their own health, laboratories, and social conditions, these activities provide extensive opportunities for all who want to study in any educational program and course.

Teacher and smart education

The creation and use of multimedia facilities are transformed into the virtual plane by introducing information and communication technologies in the educational process. E-Learning and multimedia technologies activate the cognitive process and allow the visualization of the educational material. In classes, the teachers use collaborative student work, joint work of students and using multimedia presentations for projects, etc. Working with Google forms allows the teachers to conduct surveys and develop tests. In addition, students use electronic libraries to share educational materials both in the classroom and at home. New opportunities for students are opened with the use of distance learning forms.

The learning process becomes exciting and modern when the teachers continuously update educational content and attract the students to its development. According to Musienko et al. (2013), on the one hand, smart education opens up new challenges for teachers. They should be professionals in their professional field and have smart innovations in educational and scientific activities. Teachers should have the widest variety of multimedia (audio, video) and the ability to use different technologies for working with students. On the other hand, smart education opens up fresh opportunities for teachers: to share experiences and ideas, do more research activities, personalize the course of study depending on its tasks and the competence of the listener, and save time. Thus, a teacher of smart education is a person who is represented on the Internet through the presentation of courses; check of tasks; correspondence; video and web conferencing; video-lectures; distance learning; virtualization of scientific research, etc.

Student-teacher interaction in Smart learning environments

A study Standards for smart education – towards a development framework by Tore Hoel et al. (2018) has determined that the teacher plays a role as an instructional designer in a smart education environment, who is responsible for selecting proper instructional models, developing course materials, designing learning activities, and choosing appropriate technologies to facilitate learning (Tore Hoel et al., 2018). Thus, the teacher's role changed in the 21st century. A standard lecture, written under dictation, reduces the motivation to study because any information can be found on the Internet. So, lecturers should give students a unique experience that they cannot get otherwise. The format of the classical lecture should shift towards consultation, dialogue, discussion, and so on.

The effectiveness of the dialogue between teacher and students is determined by the course's content, the factors of the environment; language dialogue; means of communication. A common form of communication in smart learning environments is an internal didactic conversation, which can achieve high-quality assimilation of the material. The indirect nature of communication in the "teacher-student" system ensures ongoing, dynamic communication at a distance. However, this communication cannot wholly compensate for the lack of "live" communication. Indirectness of communication in smart education is manifested in the need for additional internal (mental) and external (mechanical) actions defined by the logic "man-computer." It is also different from "live" communication forms of presentation of information, types of speech activity (e.g., writing, reading, etc.). Moreover, it sometimes delays the message-exchange time (e.g., detention which depends on the mode of communication – "on-line" or "off-line").

There are almost all traditional ways of interaction between teachers and students in Smart learning environments. Modern telecommunication facilities provide students with the same educational opportunities as traditional learning and expand them substantially. The features of smart learning can be determined, taking into account the following factors:

- learning material;
- diagnostic material;
- visual material;
- teacher's questions for students;
- teacher's careful explanation of the material;

- students' abilities to ask questions;
- student testing.

In smart learning environments, the following forms of interaction are implemented:

- 1) student-learning material. It provides interaction of the student with the content of the proposed learning materials;
- 2) student-teacher. After receiving materials, teachers help students to master them. Teachers also stimulate students in learning and motivate them;
- 3) student-student. This interaction promotes the formation and development of communication skills and provides examples of learning tasks. It takes place via e-mail, web-conference, etc.

Therefore, according to Zhu et al. (2016b), the teacher is the central pillar of learning. Students are increasingly considered autonomous in their learning (self-directed, proactive learners) in technology-facilitated environments, but their knowledge building and skill development still rely heavily on guidance and stimulation via a professional guide (Zhu et al., 2016b).

Conclusion

This paper presents smart education as education of the future, which provides new opportunities for teachers, students, and anyone interested in learning. Interactive technologies help the student, who collaborates with the software system, selects and analyzes the information which he/she needs. In addition to the above, smart education has such fundamental principles as using up-to-date curriculum information; organization of independent cognitive, research, and project activities of students; implementation of the educational process in a distributed learning environment; student interaction with the professional community; multifaceted educational activities. Smart education expands and updates the teacher's role, making him/her a mentor-counselor, coordinating the cognitive process, constantly improving the material being taught, and enhancing creativity and qualifications. New opportunities are opened: teachers have an online connection with students; use innovative teaching materials; can make the most of different types of multimedia; apply new educational technologies using information and communication technologies; personalize the program of discipline depending on the tasks and competencies of the students; create information exchange networks and establish

cooperation between higher education institutions; increase the volume of independent and group performance; form a combined real and virtual space. Thus, the introduction of smart technologies in education will lead to the transition from the old system of reproductive knowledge to a new creative form of learning using innovative methods and will provide the necessary knowledge and skills which will be crucial for the student in the future.

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