European Journal of Research volume 9 issue 3 2024 pages 83-89
IF(Impact Factor)9 / 2024

Creating a smart educational platform that develops basic competencies of future engineers in the context of digital transformation

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Abstract: The tasks and prospects of applying smart technologies to the educational process in higher education institutions require to consider smart technologies as a means of forming the professional competencies of university students. It is necessary to analyze the technical, didactic and methodical requirements of the smart application and its electronic content in the digital educational environment from a scientific and theoretical point of view. Some teachers face difficulties in adapting to new conditions with intellectual and digital educational resources, electronic didactic materials, communication tools (social networks, chat, forum, e-mail, etc.).

Keywords: smart, smart education, smart educational technologies, smart educational platform smart learning, adaptive education.

I. INTRODUCTION

Smart society is a new stage in the development of civilization, which presents qualitatively new opportunities: the opportunity to develop new socio-economic processes for human development and discovery, in particular: education is a new technological paradigm in the world, smart life and the conditions of the whole country quickly is adaptation.

Studying the experience of countries actively implementing smart technologies shows that the implementation of the concept of smart education serves to train high-tech personnel that will ensure the rapid development of the economy. Thus, countries that promote the ideas of smart education, such as Korea and Singapore, Germany, Finland, Switzerland, and Israel, are far ahead in their technological development.

Proclaiming the concept of smart education, the Republic of Korea has successfully invested heavily in the development of human resources and research and development, and has succeeded in building an industrialized economy and a unique innovation system. Based on this, it seems appropriate to study advanced foreign concepts in the field of education, including smart education.Teaching with the help of smart technologies in the educational system is successfully implemented in many countries of Asia and Europe. Systematic use of them in the educational process serves to train personnel who are more ready for modern socio-economic conditions for the economy of the whole country.

The broader concept of smart education is described by research scientists as an educational paradigm, educational environment, educational system, educational network, educational process.The definition of smart education as a paradigm is based on defining it as a new conceptual idea of the implementation of the adaptive learning

process and the development of education based on the use of intelligent information technologies.Looking at it from the point of view of the educational environment leads to identifying the created intellectual environment as one of the main elements of smart education, along with smart students and smart pedagogy.

II.THEORY

According to the concept of smart education, modern educational content is acquiring new features.It should be free, ensure the quality of students' education and motivation to study, attract them, encourage them to creative and scientific activities. Content includes integration, that is, both multimedia fragments and external electronic resources.Educational content should include new knowledge that is constantly growing at an incredible speed, so it is necessary to move from passive content in the form of small modules of knowledge objects to active content. Content is a collection of modules that can be assembled in any sequence and posted on social media for collaborative development and sharing.One of the goals of "Smart" education is to create an environment that provides the highest level of education.

The essence of the systematic approach to defining the concept of "smart education" is to see it as a system that ensures that people acquire the necessary knowledge, skills, qualifications and competencies using the Internet, interact with the environment and the educational process.

A distinctive feature of the network approach is to consider "Smart Education" as education organized on the basis of common standards, agreements and technologies with the joint efforts of educational institutions and pedagogical staff.

The term "SMART" was first introduced in 1954 by scientist, economist, publicist, pedagogue Peter Ferdinand Drucker, in 1965 by Paul J. Meyer, and in 1981 by George T. Doran in his scientific works [4]

Smart education is a creative learning environment that combines the efforts of experts. Activating the acquisition of world-class knowledge requires the teacher to modernize the education system and solve problems in the conditions of creating a modern new Uzbekistan.

Smart education is a direction that includes the complex interdependence of all educational processes, as well as the methods and technologies used in these processes. Knowledge resources require students to work not only in groups or in an electronic environment, but also online at any time and anywhere in the world.

The main principles of organizing the educational process using smart education.

- Rapidly developing information and stable society allow to create new virtual relationships: new smart technologies based on the educational environment (computer programs, intelligent educational programs, multimedia), as well as smart devices (smart board, smart screen) and others.
- Smart technologies, smart devices, Internet resources have almost unlimited possibilities: an integrated intellectual virtual learning environment has been created for each of its members. In many countries, smart education is already a standard teaching method in the education system, but in our country, this approach to education is just beginning to appear.

Modern information and communication technologies (ICT) and Internet resources, implemented through smart education, are becoming more and more

common media today. The learning process is student-oriented and continuous, including in a professional environment using professional tools. It is necessary to acquire new knowledge for the constant change and development of students' motivation and requirements. Modern smart society and its "longlifetime" approach points to the need to teach everywhere according to the principle of "education in a convenient place for the audience", that is, it is necessary to implement the important principle of education. Internet resources are characterized by the availability of a large amount of educational Internet content for open users, the need to obtain existing information and improve knowledge. However, education itself, as an electronic program, as a purposeful process, requires educational materials, methodological complexes, is provided by smart-learning (smart learning) social-informational union, and information-communication in an integrated information environment by students, teachers, through technologies.

The next element of smart education is smart pedagogy. It consists of providing personalized services that help students to expand their opportunities, develop skills and creative thinking [1].

The next key element of smart education is a smart environment.

It is a technology-enabled learning environment that enables students to access digital resources and interact with learning systems anywhere, anytime, and proactively provide them with instructional guides, learning resources, and learning suggestions when and in the way they want [7]. Smart environment includes space, place, time, technology, devices, control and interaction. Therefore, it is one of the main elements of smart education, which allows smart students to interact with systems based on personalized learning resources and special techniques.

III. EXPERIMENTAL RESULTS

Lectures are the main method of teaching in higher education institutions, and its effective representation in a tree-based graphic structure allows to significantly improve the educational process. Creating such a structure allows you to organize your material, distinguish between main topics and subtopics, and show the connections between them. It helps students better understand and remember information because visualizing the material improves comprehension and retention.

In addition, the tree-like graphic structure allows you to organize information in a logical order, which helps to absorb knowledge more effectively.

In addition, the use of a tree-like graphic structure in lecturing allows for efficient use of the teacher's time and resources. Creating this structure takes some effort at first, but then the teacher can easily move through the material and maintain a logical sequence of presentation. This makes the work of the teacher easier and allows you to focus on the important aspects of the educational material.

Lecturing in a tree-graphic structure is an effective way to organize information and improve students' ability to understand and remember the material. The tree structure of the chart is a convenient way to visualize the connections between different topics and concepts, allowing students to easily navigate through the material being studied.

Each lecture is divided into 4 levels (1- level topic name, 2-level plans lecture, 3-level elements lecture, 4-level key words) in the form of a hierarchical tree (Fig. 1).

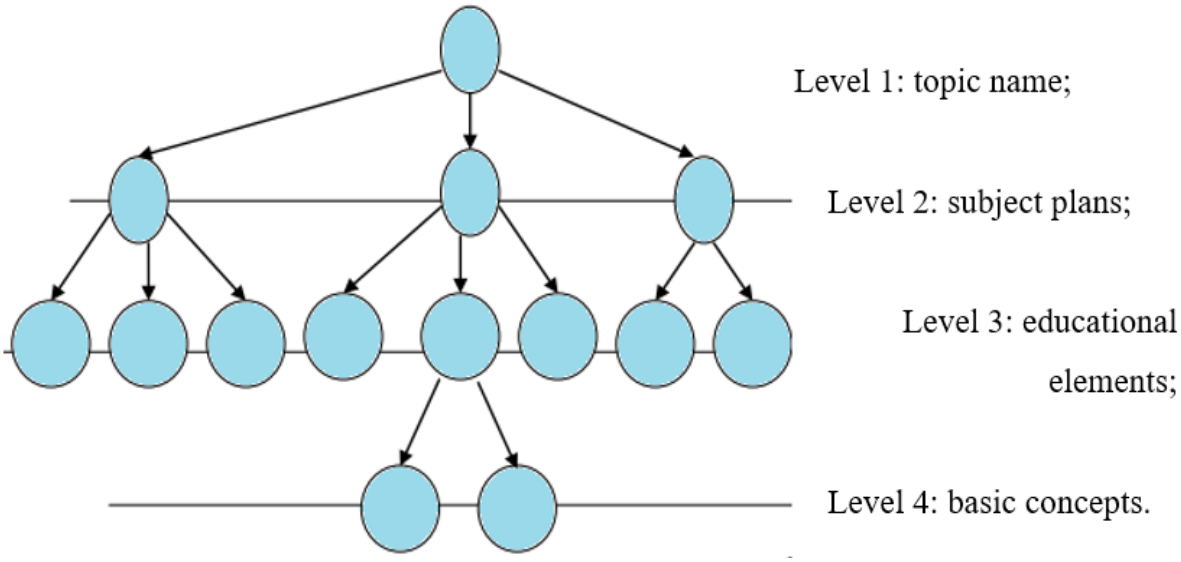

Fig.1. Lecture tree-grafic structure.

The smart pedagogue platform is built on Laravel (Laravel is an open-source PHP framework created to start producing web apps more comfortable and durable by built-in features), and the knowledge base in the program is created in the NoSql database management system. Each lecture can be entered in 4 levels on the Smart Pedagog platform, each level includes an arbitrary number of lesson plans, learning elements and basic concepts.

One of the most important areas in which artificial intelligence is used is education. Artificial intelligence-assisted teaching allows for the creation of personalized educational programs that take into account the individual needs of each student. This makes it possible to make effective use of study time and improve student performance. The amount of information and data in society is constantly growing, and it is necessary to have effective knowledge base systems for processing and using this information. Databases help to collect, store, organize and present information to users in a convenient and available form. They can also automate information processes and improve organizational efficiency.

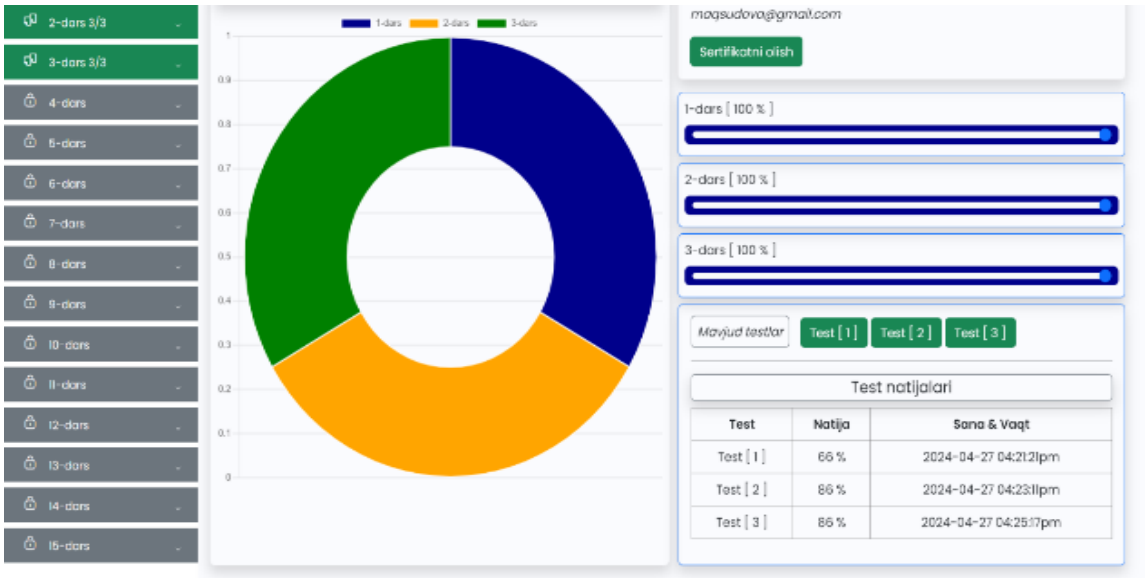

Fig.2. Lectures and adadtive test results.

Assignments are given through the Smart Pedagog program. This involves students completing practical assignments individually. During the exercises, teachers and students independently study the lecture material in depth, completed independent tasks are accepted and evaluated in the Smart-pedagog program.

The individual form of work (differing in the difficulty of implementation) is carried out in training for mastering new knowledge, doing homework and monitoring student knowledge. In this case, the student performs the task independently and there is no interaction between students. This form of education allows students to perform tasks with gamification elements.

The independent work block of the course provides the teacher with a constant opportunity to apply the knowledge gained during the lecture.

During the entire period of independent work training, teachers should be provided with computers with tasks loaded into the Smart Pedagogical program and access to the Internet. Independent work should be done individually.

Course participants should have the opportunity to discuss their ideas on the use of smart technologies while learning about "Introduction to Latex".

During the practical training phase of the program, teachers are scheduled to prepare practical work for the entire course.

The assessment component includes several organizational steps for diagnosing the readiness of future informatics teachers in the subject of introduction to Latex using the Smart software tool:

- current (remedial) diagnosis - current assessment of the future teacher's introduction to Latex, practical tasks given in the Smart Pedagogical program are sent to the teacher through the program on https://www.overleaf.com or texstudio, winedit programs;

-intermediate diagnostics- intermediate diagnostics of the future teacher's mastering of lectures on "Introduction to Latex" is carried out through interactive tasks and tests (choice of matching, gap filling, single-choice test). If gaps are identified in the future teacher's mastering of lectures from the subject "Introduction to Latex", the Smart Pedagogue program will give recommendations on which elements of the subject he has not mastered.

- final diagnostics - in the final diagnostics of the readiness of future informatics teachers for the subject of introduction to Latex by means of the Smart program, adaptive tests are used: easy, medium, difficult, i.e. 3 grade tests are used[3].

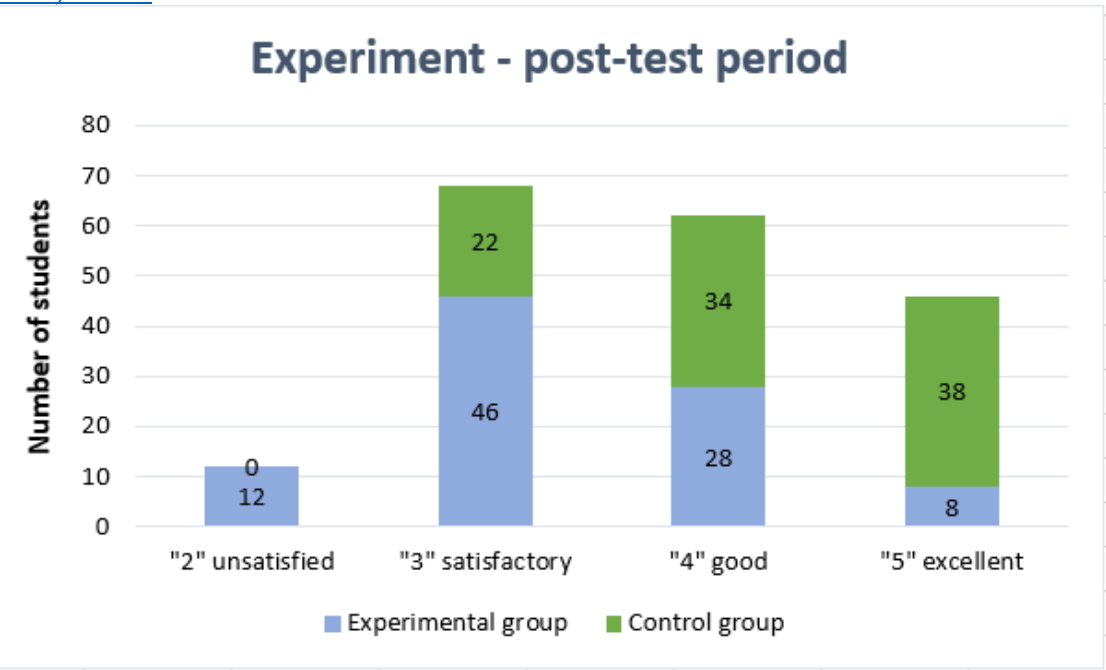

Fig.3. Diagrammatic representation of experimental results

The obtained results can show that the criterion for evaluating the effectiveness of teaching is greater than one, and the criterion for evaluating the level of knowledge is greater than zero.It is known that the learning of students in the experimental group is higher than in the control group.So, it is clear from the results of the experiment that the effectiveness of training sessions using the program has increased.Thus, the result of the statistical analysis proved that the use of the smart pedagogue program created in the teaching of "Introduction to Latex" in the educational process, the adaptive test program is effective in monitoring and evaluating students' knowledge in the credit-module system.

IV. Conclusions

The problem of improving the methodology of teaching subjects based on the smart program in higher education institutions, in particular, the problem of creating the Smart pedagogue program and developing the methodology for using it in education, was studied from a theoretical and practical point of view.A smart education model has been developed for the teaching of special subjects in higher education institutions, the effectiveness of the lecture, practical training and self-study methodology of "Introduction to Latex" through the Smart Pedagog program has been proven in pedagogical experience.Teaching students studying in higher education institutions with the help of smart technologies, smart educational model, smart pedagogue software tool, using adaptive tests to control and evaluate student knowledge allows to increase the efficiency of the educational process.

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