Embedded Selforganizing Systems

Application of the Smart Method in Teaching the Module "Scientific Education" in Students

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Abstract— **Rapidly developing computer information technology is bringing significant changes in all aspects of our daily lives. It is no secret to all of us that at present society cannot be imagined without Information Communication Technologies. In general, the development of each country can be judged by the introduction of modern information and communication technologies into the industry. The innovative activity of pedagogues is the main factor in the reform of the education system. One of the most important aspects of modern education is the achievement of the innovative character of the pedagogical activity. The more innovation there is in the pedagogical activity, the better understanding of the teacher's own experiment can be achieved. In it, the teacher participates widely in creating, applying and improving innovation as the subject and organizer of the innovation activity. They seek to analyze the content in science and the essence of changes in knowledge and traditions. This article highlights the importance of using the "mental method" in teaching the" scientific education " module in the development of innovative activities of students of higher educational institutions in an informed environment.**

Keywords-- ICT innovation, education reforms, innovative teaching, active learning, e-learning, computer-assisted learning, smart technology.

I. INTRODUCTION

In the process of informatization of education in the world, vocational education is an urgent task [1] in the direction of innovative activity of pedagogical personnel [2], the implementation of innovative educational and information and communication technologies in the educational process in higher educational institutions, the development of advanced foreign experience and targeted orientation in the modernization of the higher education system in pedagogical science [4].

Decree of PF-5847 "on approval of the concept of development of the higher education system of the Republic of Uzbekistan until 2030" [5], dated February 19, 2018 PF-5349" on measures to further improve the field of information technologies and communications " as consultants within the framework of the implementation of the tasks and functions assigned to the Ministry, state bodies and organizations, project institutes,, it is aimed at attracting specialists from leading international and foreign companies in the field of information and communication technologies, and many tasks are analyzed in it [6].

This, in turn, forms the need for improving the content of educational and methodological activities of students of the direction of vocational education in higher educational institutions, the need for innovative forms and methods of teaching, the widespread introduction of modern information and communication technologies into practice. It is also important to stimulate innovation activities, to create effective mechanisms for introducing scientific and innovation achievements into practice, to establish scientific and experimental laboratories, high-tech centers and technoparks in the presence of higher educational institutions. The above-mentioned cases are the innovation of students of the direction of vocational education in the conditions of informatization of the higher education system innovation of its students, looking at their preparation for activities as a new criterion of professional and pedagogical competence such preparation by improving the theoretical and practical foundations of preparation for activities the problem of developing an improved methodological system shows its relevance.

II. IMPLEMENTATION OF AR INTO TEACHING

The dominant direction in the development of the modern educational system is the informatization of education, this direction is characterized by the following innovative processes:

- implementation of informed educational services based on electronic and distance learning technologies;

- development of open digital educational content and software and methodological support based on interactive and multimedia technologies;

-creation of telecommunication structures (information and educational environment, educational portals). In such conditions, there is a need for teachers who are ready for innovative activities in accordance with the requirements of a modern informed society in the preparation of educators for the concept of" informed society " was first used in Japan,

which is described as follows: an informed society expresses a society in which high-quality information prevails, and the storage, distribution and use of information is carried out using modern means based on computer technology.

One of the founders of the theory of an informed society is E.Toffler characterized [7] the facets inherent in such a society by the name of the "third wave" as follows: a high level of innovation in all aspects of political and economic life; the nature of the orientation of Labor, interpersonal relations towards psychological, social and ethical goals; the influence of excess information on the culture of a person; the orientation of culture and society

The technological innovation of recent decades testifies to the fact that in the 21st century, an informed society has entered a qualitatively new stage in its development. Accordingly, at the "Big twenty" summit in Seoul in 2010 [8], a new stage of an informed society - the SMART Society stage-was shown, in which the use of high-tech technical means and the internet by people determines the new quality of interaction between citizens, public institutions, private companies and leads to an improvement in the social, economic spheres of living activity. The concept of "SMART" emphasizes a new modern stage in the development of society, based on a change in the social paradigm, the process of generalization of new ideas, knowledge and Intel Capital by people, in which they are prepared to implement and support these processes using innovative technologies.

The philosophy of the development of SMART society in Russia academician V.P.Active research is being carried out by Tikhomirov's Scientific School, where the problems of reorganization of an informed society into a SMART society are being studied in depth, and on the basis of this, e-learning technologies are gradually being developed [9, 10].

Academician A.P.Ershov [11] by describing informatization as a set of measures aimed at ensuring reliable, complete and timely full use of knowledge in all socially significant types of a person's activity, he showed that informatization of education is a means of solving pedagogical problems with the help of the use of new information technologies in the form of a lever that allows This idea has become the basis for the modern interpretation of this concept.

Thus, analyzing modern directions in the development of informatization of an informed society and education, it is envisaged that SMART education (SMART education) is "the acquisition of flexible education in an interactive teaching environment with the help of freely accessible, worldwide content." SMART education technology allows educators to generalize new knowledge and form a SMART person, so that such a person will be able to perfectly use information and communication technologies to search for information, analyze and create innovations [12].

Thus, analyzing modern directions in the development of informatization of an informed society and education, it is envisaged that SMART education (SMART education) is "the acquisition of flexible education in an interactive teaching environment with the help of freely accessible, worldwide content." SMART education technology allows educators to generalize new knowledge and form a SMART person, so that

such a person can perfectly use information and communication technologies to search for information, analyze and create innovations.

The theoretical analysis of global changes taking place in this system in the conditions of informatization of Education has distinguished the following contradictions:

-the contradiction between the changing targeted guidelines of an informed society and their corresponding reflection in the educational environment;

- the contradictions between the understanding of their tasks in the educational process by them with the changing requirements for educators, the desire to form in themselves the qualities that a modern informed society requires.

New high-tech areas in the informatization of reflective education in the concept of SMART education place high demands on the qualification of graduates ' readiness for innovative activities.

Innovative activity has significantly affected the world community in all spheres of human life and activity, including education, leading to new and higher stages of development.

In the middle of the 20th century, modern society was characterized as an information society. This indicates an increase in the role of Information Processes in all spheres of human activity, the need for information and information tools for the development, processing, storage and use of information increases.

Theoretical analysis of the literature made it possible to make a comparison, clarifying the differences in the traditional and innovative system of Education.

III.   Discussion

Tashkent University of Information Technologies named after Muhammad al-Khwarizmi, Department of "Information and Educational Technologies" in the curriculum of the subject "Scientific education" for 180 credits.

The student will be able to:

The first stage is called the innovation-adaptation stage. In the 1st and 2nd semesters of the primary school year, students are in the process of adaptation to a fan of the higher education system.

The second phase lasts for 3-4-5-6 semesters and is called innovation – user. At this stage, on the basis of disciplines, monitoring innovative information and information resources and searching for innovations; the use of modern electronic educational technologies forms knowledge, skills and competencies.

The third phase lasts 7 semesters and is called the innovation – research phase. The student realizes that he needs to actively participate in research and development, develop his creative skills and become a competitive leader by being ready for innovative activities.

The fourth stage is carried out in 8 semesters and is called innovation-fuzzy. At this stage, students are more organized independent work activities. At the second stage, students will be explained the following guidelines / recommendations:

✓   Studying the assignments carefully;
✓   Completing the task (remembering);

✓ Allowing up to 10-15 minutes' of preparation time, depending on the volume of the text,

The teacher should monitor each student through a local network or the online monitoring system. A suggested planning of a lesson using "Smart methods" and "Chalk and talk" (Table I).

TABLE I.   PLAN "CHALK AND TALK"

Stages of the lesson and timing	Type of activity	
	The teacher	The student
Organizational part 5 min	Greetings and marking attendance	Greetings.
Introduction 5 min	1.Presenting the material to be learned 2. Explaining the purpose and tasks of the teacher	1. Writing an outline of the material. 2. Listen.
The main part 55 min	1. Explaining the new topic, using presentations. 2. Assigning a task to be done in computers using "Smart method" and "Chalk and talk".	1. Listening, making notes. 2. Performing the assignment on the computer.
The closing part 15 min.	1.Summarizing the task and evaluating students. 2.Assigning home task.	1. Listening. 2. Write down the homework.

Students will be evaluated using a marking scheme, depending on how well the assignment is fulfilled. The teacher will introduce students to the evaluation criteria and procedures, for example, the answers to the questions can be evaluated using the following criteria:

- 3 points - if the full answer is provided;
- 2 points – if additions are made;
- 1 point – if the answer is incomplete;
- 0 point - if not answered. - 0 points.

If a 5-point grading system is used, the criteria can be adjusted as follows:

- 5 marks for full answer, 4 for an addition, 3 for a response close to the correct answer, 2 for non-answer, and 1 for non-participation.

The following tasks are assigned when using "Smart methods" in teaching ITE module.

Learning materials

For each of the group members:

1.1. What is the distance learning system?
1.2. What is the purpose of distance education?
1.3. Distance learning methods and the content of distance learning.

At the end of the training, the teacher evaluates students' performance, expresses their opinion and addresses them with the following questions:

✓ What did you learn from today's lesson?

✓ What did you learn?
✓ What has been new to you?
What else would you like to know?

Once each student has scores (grades), the training session will be completed.

In conclusion, the organization of the lesson through the technology of "Smart methods" and "Chalk and talk". helps ensure that the students have regular mental activity in the.

TABLE II.   TOPICS OF PRACTICAL SCIENCE LESSONS

	Practical topics	Size of lesson hours
1.	- Innovative activity of the teacher in the organization of the educational process, its content and significance;	4
2.	-Informatization of education and its innovative features;	4
3.	- Innovative educational technologies;	2
4.	-Introduction of modular learning technology based on modern ICT;	2
5.	- Smart education technologies mixed education technologies	4
6.	- Occupation of the Smart method of innovative technologies in the process of Education Management; Methodology for the creation and use of electronic educational resources on the basis of innovative technologies.	2

Within these topics (Table II), we teach students to work with big data and create comprehensible, visual graphic objects. In teacher training courses, we develop the skills of teachers to create teaching materials using these sites.

IV. METHOD

In order to prepare students for innovation in the conditions of informatization of higher education, the following recommendations have been developed as a result of experimental research:

1. Application of methods aimed at the development of innovative activity of students in the field of vocational education in pedagogical higher educational institutions.

2. Introduction of methodological developments on the application of the SMART method, SMART portfolio and in the educational process of higher educational institutions.

TABLE III.   GENERAL RESULTS OF EXPERIMENTAL HIGHER EDUCATION INSTITUTIONS

Level of Students	In experimental group n=97		Controlled group m=99	
	At the beginning of the experiment	At the end of the experiment	At the beginning of the experiment	At the end of the experiment
High	16	32	17	19

	(16,49%)	(32,99%)	(17,18%)	(19,2%)
Medium	46 (47,42%)	51 (52,58%)	43 (43,43%)	50 (50,5%)
low	35 (36,09%)	14 (14,43%)	39 (39,39%)	30 (30,3%)
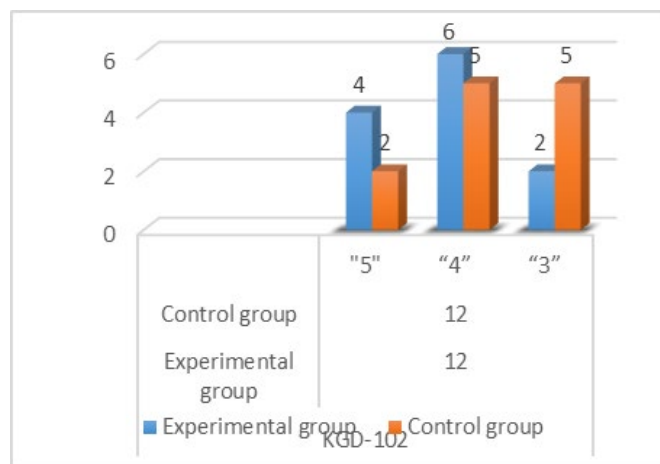
V. CONCLUSION

Based on the analysis and results of scientific and pedagogical research, the following conclusions were made:

1. At the present stage of informatization of education, SMART educational technologies have appeared, which is the result of improving traditional and electronic (e-learning) education, and the process of preparing students in the field of vocational education for innovation has been improved.

2. The analysis of the content of teaching general education and specialized subjects included in the curricula of the educational directions "5350400-Vocational education in the field of information and communication technologies" and "5111000-Vocational education (in the directions)" showed that the knowledge, skills and competencies acquired through general and specialized disciplines are important for the preparation of students to innovative activity.

3. In the formation of innovative activity of students of vocational education, the stages of innovation-adaptation, innovative user, innovative research and innovative design have been developed. This served as the basis for the development of criteria for evaluating the activities of innovative pedagogical knowledge, innovative technological skills and innovative professional competencies in determining the purpose of training and the level of knowledge of the student.

4. A methodology has been created for the development of students' innovative activities in the field of vocational education in the conditions of informatization of education by improving forms, methods and tools, enriching students' knowledge in the innovative organization of the educational process, using SMART portfolio educational technologies, the SMART method.

5. The experimental work was carried out in three stages during 2018-2019, 2019-2020, 2020-2021.

6. Testing of the methodology for the development of innovative activity of students in the field of vocational education in the conditions of informatization of education was carried out at TUIT im. Muhammad al-Khorezmi, Karshi branch of TUIT, Fergana branch of TUIT and Bukhara State University. Based on the processing of the results of experimental work using mathematical and statistical methods, the expediency of the ideas put forward in the study is substantiated, and it is proved that the innovative activity of the experimental group is 12% higher relative to the students of the control group.

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