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INTEGRATION OF THE UNIVERSITY STUDENTS' KNOWLEDGE THROUGH NEW INFORMATION TECHNOLOGIES

Abstract: The article touches upon the ways of implementing the integration of the university students' knowledge through new information technologies, the content and methodology of integrating the knowledge of students based on the use of new information technologies in the educational process of the university, and as well as the results of specially organized practical-experimental work. The authors conducted research to integrate the improvement of the quality of education through information technologies. The purpose of the research is to justify theoretically the integration of university students' knowledge through new information technologies and to prove its effectiveness in practice.

Pedagogical aspects of the modeling process, stages of pedagogical modeling are presented in the article. The article also presents the methodological, procedural (technological) and instrumental levels of the model, its purpose, monitoring of the formation of necessary competencies, as well as the result. The model shows the logical-structural nature of the implementation of integration of the university students' knowledge through new information technologies, the rules, principles, and conditions of competence formation. Students can master the integrated educational material through new information technology equipment, understanding the importance of digested knowledge, it is determined that one can use it independently as needed, and it is proven that the quality of individual education is at a high level.

The study touches upon the process of integrating the knowledge of university students using the concepts of "The use of new information technologies", "Integration through new information technologies", and formed a reference of the scientific and methodological basis for the integration of students' knowledge through new information technologies. From scientific point of view, the methodological basis for the development of integrated programs and projects in general education and special disciplines, including the specifics of the information technology, has revealed the decisions of the task.

Keywords: information technology, educational process, integration, scientific research, pedagogy, knowledge.

Introduction

The future of modern education is determined by the development process of society, the desire for scientific integration of knowledge, the various origins of the accumulated and constantly growing amount of information in society. Current reconstructions in society, new strategic orientations in economic development, the openness of society, its rapid informatization and development radically changed the requirements for distant education. Authors are convinced that being a leading country in a developing society depends on qualified IT specialists.

The effectiveness of the informatization process directly depends on the development of the processes of creating and using an electronic information resource. The organization of educational activities of the university using electronic information resources involves the use of the latest pedagogical technologies that stimulate the development of the internal reserves of each student and at the same time contribute to the formation of the social qualities of students, that is, the use of new information technologies for learning which allows to solve didactic problems controlling the learning process.

Organization of the educational process at the university using new information technology contains two closely interconnected components. Firstly, great possibilities of modern information technologies are incomparable with previously used technical teaching tools, didactic material, which can and should be implemented in the educational process. Secondly, the widespread use of computers in the educational process depends on the training of personnel at the level of modern requirements. Therefore, the study and use of information and computer technology in the educational process is the most important component of students' preparation for further work.

Accelerating the economy is based on a digitization tool for product quality modernization, so increasing the prestige of higher education is one of the most important tasks of today's education system. For example, according to the data of the direction “Digital Kazakhstan”of the state program “Information Kazakhstan”, the content of information technology services in 2022 reached 70%, the share of services in the market reached 32.5%. The contents of the university have sufficient use in the optimization of the educational process, introducing new subjects that cover the latest achievements of science. In the study we use methods of adaptation of interactive technologies to the university system, methods based on integration of the educational process. Integration of the educational process is being realized by changing technical, software, information (content) and methodological conditions.

As stated in the state program for the development of education in the Republic of Kazakhstan for the years 2020-2025, integration and globalization are going on simultaneously, the quality and level of education in higher educational institutions are comprehensively raised, new technologies of teaching and education are used daily and only teachers who know how to use information technologies in their work will be fruitful (Government of the RK, 2019).

Modern science and industry are simultaneously developing in the direction of specialization and integration. In the form of activities related to their profession, there is a growing need for specialists in a wide range of fields capable to mobilize and use the knowledge gained from various fields of science (Government of the RK, 2010). In the training of such specialists the main attention is paid to the development of systematic thinking, the ability to see the object in the unity of multifaceted connections (Billett, 2015).

The importance of the results of integrated knowledge, general scientific ideas, methodological principles, and the method of systematic analysis has increased in modern society, so teaching students of scientific integration products has become one of the main tasks of higher educational institutions (Davletova et al., 2021). From this point of view, implementation of interdisciplinary integration in the education system is an urgent problem. Because it contributes to the increase of its efficiency by combining all the structural elements of the educational process — the content, forms, and technology of education into one whole (Davletova et al., 2021).

Interdisciplinary integration ensures the assimilation of knowledge, the formation of business skills and abilities in a certain system, contributes to the active thinking activity, the combination of students' theoretical knowledge with educational and production activities. The implementation of interdisciplinary integration allows them to expand the professional training of qualified specialists and train them in a group of related professions (Yerzhanova rt al., 2021). The research also touches upon the cases of persons who have mastered several

professions, acquire new knowledge, establish a connection between previously acquired and new knowledge, and use integrated knowledge in professional activity (Medeshova et al., 2022). Scientific, including scientific-pedagogical literature has a certain amount of experience in studying the problem of integration. It means that it has become the leading law of development of educational theory and practice.

Such scientists as Kurmangaliyeva (2016), Chebanov (2016), Dakhin (2010), Kudryavtseva (2014) considered the importance of information in modern higher education in the country and the ways to integrate the knowledge of university students through new information technologies.

In general, the problem of integration is considered to be a complex branch in pedagogic science that is considered from the philosophical, psychological, didactic and methodological aspects. In our research we focused on each of these areas separately. Since analysis of research sources is a necessary condition for any research to achieve its goal, researches related to integration processes have also been analyzed.

"Integration" means creating a whole and inseparably connected whole. There are many definitions of this concept in modern literature. The article also considers the general scientific meaning of the concept of integration and its interrelationship with other related philosophical concepts. Integration (Lat. integratio - restoration, integer - whole) is a system theory concept that expresses the state of connection of individual differentiated parts with the whole, and the process leading to this connection. Let's focus more on the object of integration - knowledge, and what should be understood by the integration of knowledge. Information about the world and people finds its expression in social experience and becomes the content of knowledge in an adapted form. These characteristics can be considered within the framework of system-complex approaches, and we can talk about the emergence of a new quality of the whole from dialectically connected parts (knowledge, structure, methods of action), and these characteristics involve integration (Klimenko, 2005).

Research methodology and methods

The purpose of the study: theoretical substantiation of integration of university students' knowledge through information technologies and prove its effectiveness.

Scientific forecast of the research: If the university's educational process is efficiently used, the knowledge of students will achieve the integrated new quality results, as the use of new information technologies will contribute to the development of students' information competencies.

Objectives of the study:

- to determine the theoretical foundations of new information technologies in the integration of knowledge of the educational system of the university;
- to identify and develop a structural model of pedagogical conditions for integration of university students' knowledge through information technologies;
- to develop methods for integration of university students' knowledge through information technologies and check the effectiveness of experimental experiments;
- to introduce scientific and methodological recommendations for the integration of students' knowledge through information technology.

Methodological and theoretical foundations of the study: theory of dialectical cognition, the principle of dialectical interaction of theory and practice in scientific knowledge; philosophical rules on the general communication and interdependence of this phenomena; basic rules of methodology of pedagogy and research methods; theoretical concepts of integration theory, system theory, didactic systems, the essence of cybernetic and systematic points of view, the essence of new learning information technology and the ability to use them in the educational process.

Sources of research: studies of philosophers about knowledge, personality, education; State standard for higher education, basic curriculum, personal experience of the university.

Research methods include theoretical analysis of psychological, pedagogical, philosophical, methodological literature on the research problem, study of pedagogical publications and regulatory documents, advanced pedagogical practices, comparative analysis, questionnaires, design of didactic models, computer programs for the educational process, statistical analysis, conducting practical and experimental work, evaluating, processing, summarizing its results. In our work we consider the category of knowledge taking into account the above mentioned components of human experience, because the integration of knowledge becomes a new structure of information about the surrounding world, integrated methods of action, object and tool of action; evaluation of the existing reality and the qualitative level of the relationship. Therefore, we understand the integration of knowledge in terms of competence that is knowledge, methods of action, value relationship to reality and experience (Mukhametzyanova, 2002).

For these purposes the following means of information technologies are used in the university educational process: providing textbooks and other printed material; sending the studied materials on computer telecommunications; discussions and seminars conducted through computer telecommunications; modern applied programs (Word, Excel, PowerPoint, Access); Internet, including email; bilateral video television conferences; electronic information resources.

The main stages of the study: at the first stage (2010-2012) an analysis of scientific works on the integration of education and the use of new information technology were collected. On the basis of the analysis, the new information technology has the opportunity to integrate students' knowledge. Theoretical, educational and methodological documents, best practices and scientific equipment were identified in connection with integration of students and informatization of education.

In the second stage (2012-2016), experimental work on the use of information technology in the educational process was carried out and its' pedagogical conditions were identified, a structural model has been developed and tested. Integrated curricula and projects were developed and implemented in the educational process of the university.

In the third stage (2016-2022) concrete conclusions on the basis of experimental work have been made. The methodological effectiveness of the work was checked and the results were included in practice, recommendations have been prepared.

Scientific novelty and theoretical significance of the research:

- The process of integration of university students' knowledge was theoretically justified in terms of the use of information technology;
- the concept of "integration of university students' knowledge through information technology" was identified;
- scientific and methodological basis for the integration of university students' knowledge through information technology was developed;
- the specifics of the information technology, the methodological basis for the development of integrated programs and projects of general education were identified.

Practical significance of work:

- integrated programs have been developed and implemented in practice, which will allow the university's educational process to implement the integration of knowledge in general and special disciplines;
- projects were developed and tested as a result of integrating students' knowledge.

The hypothesis of the study is to determine the essence and content of the implementation of knowledge through new information technologies and the structure of projects for the integration of students' knowledge through new information technologies, the creation of its

criteria. The scientific and methodological effectiveness of integration of students' knowledge through the use of new information technologies has been proven.

The current transformations in society have radically changed the requirements for new strategic guidelines in the development of the economy, its operational information and rapid development. In order to form the competencies of graduates, the need to develop the ability to integrate knowledge is determined. Researchers consider the integration, synthesis and analysis of knowledge as one of the most important issues in the process of mastering the content of education. The research studies the conditions to establish relations between previous and new knowledge, the use of integrated knowledge in professional activities.

Today university successfully uses various modern software products. For processing and preparing text documents and in the preparation of various types of reports, performances at scientific and practical conferences, text editors are widely used. MS Excel electric tables allow prepare curricula, various types of digital college reports, graphs, diagrams. In the computer class of the university one has the ability to use electronic resources at various stages of the lesson: when presenting new material - visualization of knowledge using the PowerPoint program; conducting virtual laboratory work using training programs; consolidation of the stated material using a variety of training programs and laboratory work; system of monitoring and testing of students' knowledge using control programs; when conducting integrated lessons according to the project method, the result of which will be the creation of Web - pages, conducting television conferences.

The use of information technology for the organization of the educational process significantly expand the possibilities of presenting educational information, can significantly increase students' motivation for learning, involve students in the educational process, increase the possibilities of setting educational tasks and managing the process of solving them, and also allow us to qualitatively change the control of students. One of the advantages of using the electronic information resource is the increased interest of students in the discipline taught, because it has high visibility, in it one can use animations, videos, sound support, additional material and more.

Today's competitive society is a self-learning society. Education in such a society is very important, because it includes all elements of independent education it is aimed not only at the cognitive form of the educational process, but also at the effective organization of the individual activities of the participants. In such a society new information and communication technologies based on information-space means of communication and information processing are forming a screen culture. Information technology can not only provide diversity and clarity of information, but also form information competence in various spheres of activity, such as industrial, scientific, management, organization, education (Meshcheryakov & Zemlyansky, 2009).

The frequently used term "new information technology" (NIT) is not far from a scientific point of view because its meaning is connected with current historical data, and the content of this term may change gradually. In the scientific and scientific-methodological literature it is observed that the concept of "new information technology" has not yet been properly formed, therefore, taking into account the fact that modern technologies are constantly updated in accordance with changes in society, focusing on the concept of "new information technologies" and differentiating the definitions given to it, we consider new information technologies and information software as the use of equipment and the implementation of the educational process of the university (Nekrasova, 2016).

The object of research: university educational process.

The subject of research is the integration of students' knowledge using new information technologies in the educational process of the university;

Research hypothesis: the meaning and substantive nature of the implementation of the integration of the university students' knowledge through new information technologies;

1) pedagogic conditions, structural model and its dimensions and indicators for the integration of students' knowledge through new information technologies;

2) content and structure of projects for integration of the university students' knowledge; effectiveness of integration of students' knowledge using new information technologies from a scientific and methodological points of view.

The process of integrating the university students' knowledge in our research work has been theoretically justified in terms of the use of new information technologies:

- a definition was given to the concept of "University students' knowledge through new information technologies";

- a scientific and methodological basis for the integration of students' knowledge through new information technologies was developed;

Taking into account the specifics of the information technology used the methodological basis for the development of integrated programs and projects of general education and projects were developed.

Education in the current competitive society is very important, because it includes all elements of independent learning and aimed at effective organization of personal identity. New information and communication technologies are based on communication and information processing. Information technologies can not only ensure the diversity and clarity of information, but also form information competence in various fields of activity such as industrial, scientific, management, organization, education.

Thus, today's information society has a priority to use information technology and digitization than other learning technologies. In order to use information technology (IT) in education, it is necessary to understand the terms in relation to it. Until now the processing of information is not provided as a whole interrelated approach; the general theory of information technology, the basic concept of information technology is detected. Use of information design and software in the educational programs, consulting systems of automation programs, expert-consulting systems, information and methodological software systems of the educational base will be of great importance in integration of students' knowledge.

The basic criteria assessment formulating the expected results in the course of study in higher education is a process based on comparing students' achievements. Preliminary identified assessment criteria for all participants of the educational process in accordance with the goals and content of education are the ability to understand and explain the use of materials with correct information, forecasting or interpretation of information, methods of collecting and processing of statistical data such as "Algorithm", "Information Security", "Online Security", "Plagiarism", "Web page", "Web server", "Website", "Web browser", "URL", "IP-address", "Domain name"; methods of presentation and measurement, the main technical means of storage, processing and transmission of information storage, purpose and principles of organization and operation of computer networks, purpose and classification of PC software; methods and tools for computerization of information models, basics of programming, stages of development of computer technology, types of information threats, as well as information protection tools.

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The following levels of mastering the study material are based on assessment:

1) education;
2) understanding;
3) use;
4) analysis;
5) synthesis;
6) assessment.

The criteria for formation of the educational environment include a group of facts. This criteria allows to study the educational environment in the professional training of students. When describing the environment of the vocational education, we focus on its description and parameters connected with the criteria for formal education: to incorporate all subjects, objects and processes of education aimed at the interaction of all educational entities in higher training.

Thus, we have identified two groups of criteria: a) facting criteria for the quality of the effectiveness of pedagogical conditions; b) criteria for introducing the technology for integration of education in vocational training. The teachers have been offered to introduce independently the practical technologies presented in the study. In order to show the most complete results, participants of the experiment were divided into groups at the next stage of work.

With the implementation of the information system training it is possible to solve effectively the objectives of the formation of students' competencies. For example, one can highlight the experience of developing generalized ways to find out the ways for a solution of certain problems, to increase the basic concepts of the topic and strengthen the evidence of systematic analysis, its concepts and phenomena. Thus, the integration of university students' knowledge through information technologies means applied computer programs, general education and knowledge of professional and special subjects, formation of information competence.

Discussion and results

Currently new requirements for people's knowledge and labor skills were presented in the country within the implementation of the state program "Digital Kazakhstan". One of the objectives of this program is to increase digital literacy in the field of higher education. Development of digital education and the level of training of future specialists are aimed at reducing the differences between different regions. In the future education should provide equal access to educational products for students and teachers regardless of where they live. In this case digitization can completely change the education industry. Thus, it is estimated that teachers remain mainly the leader and organizer of the educational process. Digital education is a new system of education using information and communication technologies in the joint use of information, open educational resources, interaction and cooperation for continuous development of the student's competence and skills.

Preference will be given to the areas of informatization of education, such as the use of information design, information software in the integration of university students' knowledge; educational programs, consulting orientation systems, system of automation of educational programs; expert-consulting system, information and methodological software systems of the educational base; a set of applied software and manuals aimed at studying various subjects.

This will allow future professionals to fulfill effectively the tasks that the world needs to enter the entire educational space of leading countries.

The development of digital technologies, the rate of information exchange between the structures of modern society has increased the speed of learning and reduces research time. Further development of science is impossible without innovative changes in education. The current educational environment has changed significantly, electronic libraries, virtual laboratory works, mobile phones have appeared on the Internet in each student. Digital technologies entering educational institutions have a significant position among the factors that form the study, search, interest of each student, the formation of general research potential and its further development. Therefore, the research potential of university graduates is one of the most important characteristics of assessing the quality of education. It includes information (digital) technologies - modern innovative technologies or integration, modern educational environment and methods. Further development of higher education is one of the ambitions to train students and ensure their level of computer and information technologies in a large-scale process.

It is possible to solve effectively the objectives of the formation of students' competencies with the help of the implementation of the information system training. For example one can highlight the experience of developing generalized ways to find out a solution of certain problems, to increase the basic concepts of the topic and strengthen the evidence of systematic analysis and conclusions among its concepts and phenomena. This training environment is performed by an automatic information system and the connection between the elements is carried out in several modes. The consistency of the location of the material depends on the logic of the subject read. The advantages of such a system are as follows: an interactive whiteboard can provide a student with the additional information in the framework of the material under consideration and systematization of integrated knowledge (Amrenova, 2013).

Thus, the integration of university students through new information technologies is the general education, generalized knowledge of information in general professional and special disciplines, the formation of information competence of students' independent learning.

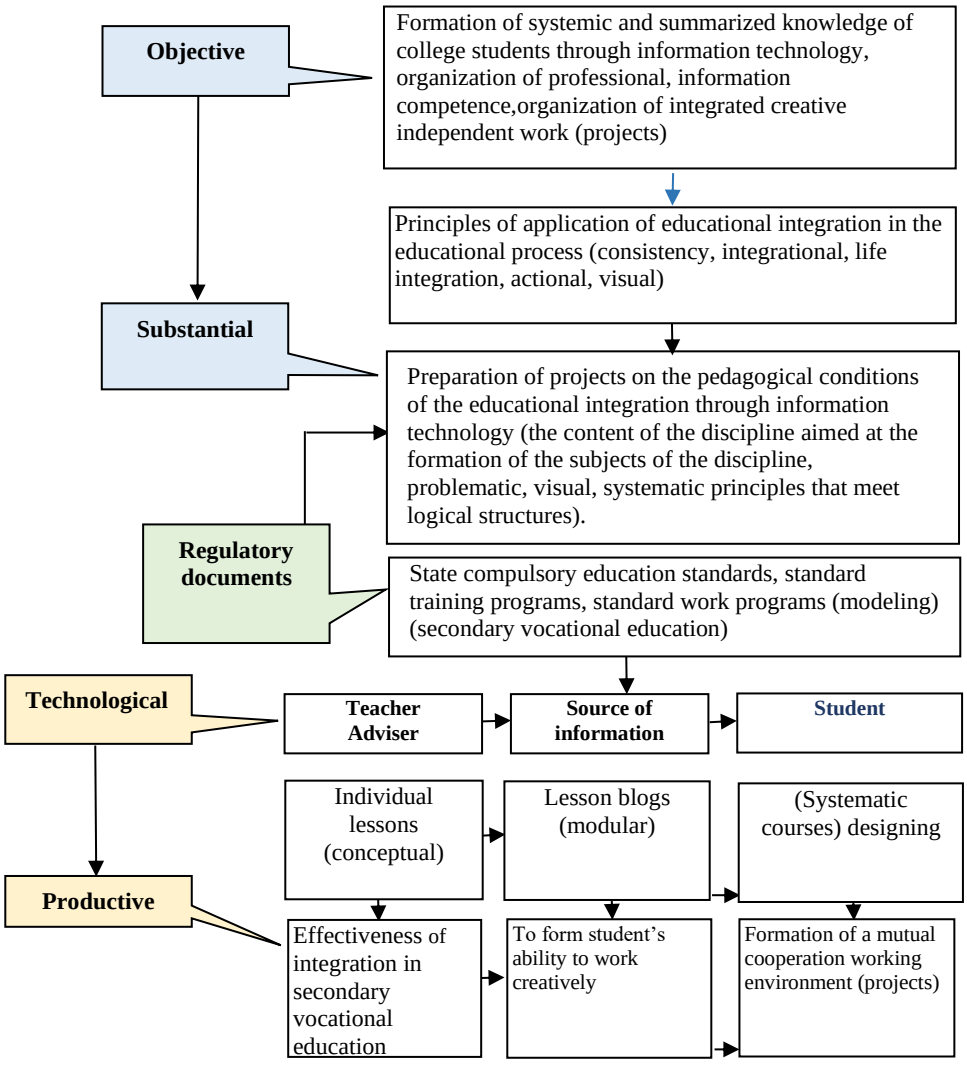
Effectiveness of integration of the university students' knowledge has been implemented on the basis of the following pedagogical conditions:

- taking into account the degree of readiness of teachers and students in the process of integration;
- taking into account the level of knowledge technology of students in accordance with the educational task;
- the integration of knowledge, the information technology can be processed only when the activity and behavior of students, self-knowledge, selection improving the creative level, mutual cooperation in the implementation of the conditions for the formation of the work environment.

The study developed a structural model for integration of the university students' knowledge through information technology based on theoretical bases and the aforesaid conditions (Figure 1).

Figure 1

Logical and structural model of integration training on the basis of new information technology



The first block is determined by the objectives of the study. The purpose of the development of university students' knowledge is carried out through the organization of systematic and summarized knowledge, formation of information competence, creative work (projects). Integration of the university students' knowledge depends on the acquisition of new information technologies. The content of knowledge mastered is provided in integrated curricula.

The scientific and theoretical foundations of achieving the goal, i.e. pedagogical principles and conditions of integration of knowledge, regulatory and methodological documents are provided in the second block. The integration of amendments to the student's actions and the characteristics of the implementation of students' knowledge through new information technology are carried out in the third block of the proposed model.

Teachers and students' interaction techniques, methods and forms of organization of students' learning interactive methods are considered by the methods of educational techniques used at the university. The fourth blog of the educational process will reveal the efficiency side of achieving the goal. The result is the solution of the set goal. Thus, the level of effective

integration in higher education, the formation of information competence of students, formation of creative independence of university students, the level of mutual cooperation is determined. In the integration of knowledge a problematic approach to integrating the concepts within a particular subject means if integration is covered by several topics and correspond to the problem-term approach to integration (Medeshova, 2024).

Block-modular approach requires the creation of an integrated block of various subjects. The choice of these views is determined by taking into account the specifics of integrated subjects, the specific problem and the level of training of students. This block is determined by problematic and thematic, problematic and course, block-modular criteria for integration of students' knowledge. Integration of concepts within a problematic and thematic size consists of understanding the relationship between subjects, understanding the relationship between problem-term individual disciplines, theoretical - practical substantiation, desiring, valuable orientation and competence.

At the highest level a university student understands any professional transactions, able to substantiate any action based on the competitive approach and able to work on a computer, search for professional information, use his knowledge in everyday life.

At the average level a university student can explain the meaning of some, sometimes most of the tasks in the framework of integration of the subjects in case if it is clearly defined; the integrated issue can be made in an unprocessed manner, in case of accumulated manner in a computer.

At a low level a university student understands the issue in terms of integration in a single subject, performs an action in the course of the same subject, does not justify its creative activities, does not guide the integrated tasks, and able to perform only personal unregistered operations.

The effectiveness of the integration of university students through new information technologies was investigated through experimenting with three stages. The research was conducted at the Zhangir khan West Kazakhstan Agrarian and technical University.

Table 1

Measurements, indicators and levels of integration of educational knowledge of university students through new information technologies

Measurements	Indicators	Levels		
		High	Average	Low
Problem-thematic	Information and competence level, integration of concepts within the same subject	Knows how to search and use professional information	Can integrate the information in terms of individualities	Understands the integration between the concepts and understanding in one subject area under the guidance of a teacher
Problem–course	Be able to understand integration knowledge among individual subjects, be able to use in their own theoretical and practical work	Fulfills any professional transactions integrating theoretical and practical knowledge	Understands the meaning of most of the tasks on the basis of integration of individual subjects, explaining the action to be performed as part of the integrated subjects.	Does the action in the version without thinking, but cannot justify his own creative activity

Block-modular	Passion, value orientation, trust, friendly relations	Can use integrated information in the professional field, act on an integrated basis and can work with friends in cooperation	The integration problem is solved in an unproceted state, able to perform a creative task together with friends on the computer	Cannot guide the integrated semantic structure of the task, it tends to perform only ready-made instructions in group work

The effectiveness of the integration of university students through new information technologies has been tested through a three-stage experimentation: identification experiment (2010-2012), formation experiment (2012-2016), final experiment (2016-2022).

In order to determine the level of readiness of university students during the experimental work, their educational activities were carried out on the basis of tests and tasks, surveys, conversations, interviews, classes in computer labs. According to the results of experiments, in the educational process of the university most teachers showed that they support integration of knowledge (92.4%), including 48.6% of them using integration often enough. During the survey only 26.3% of the university teachers showed that they use the integration of knowledge outside of classes, mainly during internships.

During the experiment it turned out that all teachers face the following difficulties: the lack of readiness and manuals (32.6%), lack of ready-made exercises and control tasks (48.2%), limitations of the possibility of using ready-to-use visuals, to increase the time of training (28%), non-compliance of programs (8.6%), high intensity of the lesson (3.8%), insufficient competence in other subject areas (3.8%). 82.6% of teachers do not use computer technology, about 55.2% have no adequate skills in their work, and 40.6% consider the lack of the necessary program, 25.6% have no access to the computer. According to the results of these indicators, pedagogical conditions for integration of the knowledge of university students through new information technologies were specified, a structural model was established, developed and identified methods and effective ways to implement it.

Experiment was conducted at the Zhangir khan West Kazakhstan Agrarian and technical University to integrate general education and special disciplines in the specialty “Information systems". An example of a problem-thematic approach to the conceptual integration of content was developed. As the course is considered as individual parts of the basics of computer science, the integration of knowledge was carried out through new information technologies.

Integration program on economic information processed courses was made up to create an integrated block of various disciplines included in the creation of the integration of students in various disciplines, the basics of this specialty and the provision of information and maintaining the information of the automated system. We described new information technologies that can be used effectively to integrate knowledge of university students. These technologies were used to assess the effectiveness of the learning process in terms of improving the integration of educational technologies in several common areas, including the integration of knowledge at the university and the integration of language skills of students (Davletova, 2018).

Students of this specialty took an active part in the preparation of projects, and each member of the group chose a suitable period. Finally, all collected data were analyzed, the program was created and the results were checked. The projects performed in the groups were discussed at the end of the term. This allowed students to identify vulnerabilities and work hard to work competitive. At first, students who have mastered the design worse were able to demonstrate their professional modular skills on subsequent topics, experimented in practice.

During the experiment business games were used to hold information technology. After all, the business games allowed to carry out simultaneously each type of action as an integrated

form of work, i.e. thinking, practical self-esteem, communicative activities were carried out. The content of students' knowledge helped to simulate the whole real life, taking into account the duties of learning through information technology, allowed to simulate the whole real life, as well as their self-determination, active interaction with other participants.

On the basis of the aforesaid, we can conclude the following: there were some changes in the work of the teacher in the implementation of knowledge integration using information technologies; the content of education (information services), the form of stimulating and monitoring of lessons (organizational activities), the interaction between the teacher and student (communication services) are being changed. There are new opportunities to analyze the results of the learning activity (progressive services). The new situation requires the teacher's performance; the purpose of integration on the basis of new information technologies requires the methodological support of the educational process and the attendance of qualification training courses by the teachers.

The high level of integration of knowledge at the university allowed develop creative abilities of students and existing methods of actions in solving new problems; be able to see the structure of the object; and to see the new activity of the object other than traditional. While implementing the tasks from 100 students only 5% achieved the high score, and the lowest group with an average of 50% (55% - in experimental groups, 45% - in the control group).

Students' independent work was organized on the basis of automated interactive communication through information technologies. Here the student reads the e-learning material, completes the task and immediately sees his results. And the use of new information technology allowed students to feel as an individual and increase responsibility. Also, interactive communication has proved that the importance of prescribed lessons is beneficial for both teachers and students. When interactive communication is not implemented, information technology was used as a means of demonstration, a visual aid. Thus, the possibility of integrating knowledge through new information technologies was determined and made sure that it will give a positive result.

According to this logical structure a special course was held at the university. Here students attended (theoretical training - 22 hours, laboratory classes - 18 hours) a special course called "Automated system of processing and use of economic information". The special course program was conducted in "Information systems" group (Table 2).

Table 2

Thematic program of a special course "Automated system of processing and use of economic information"

№	Name of sections and themes	Number of hours		
		Total	Theoretical classes	Laboratory classes
1	Introduction	2	2	-
2	Part I. Creating computer networks and information support			
3	1.1 Theme. Computable networks	4	2	2
4	1.2 Theme. Computable networks technique. Classification and coding of economic information	6	4	2
5	Part II. Database user information systems			
6	2.1 Theme. Simulation of database	6	2	4
7	2.2 Theme. Database architecture and requirements for them	4	2	2
8	2.3 Theme. Relevant database models	6	4	2
9	2.4 Theme. Designing a relevant database	4	2	2

10	Part III. Intellectual support of the management decision. "Client - server" architectural informatization systems			
11	3.1 Theme. Technology of automation of enterprise management	4	2	2
12	3.2 Theme. Description and structural language of SOLSERVER	4	2	2
13	Total	40	22	18

A special course curriculum was developed in accordance with the system "Technology - Science - Society". For example, the section "Intellectual Support" for university students is the logical structure of the course, including the section "Intellectual Support of Management" as a technological, scientific and social part. Technological part includes: 1. Objects of computer system. 2. New information technology. 3. Multimedia technologies. Scientific part includes: 1. Relationship of IT science and its relationship with other sciences. 2. Informatization of the education system. Information culture. The social and personal part identifies the social components of teaching influencing a person in an information society: 1. Educational aspects and developing creativity. Distance learning (Table 3).

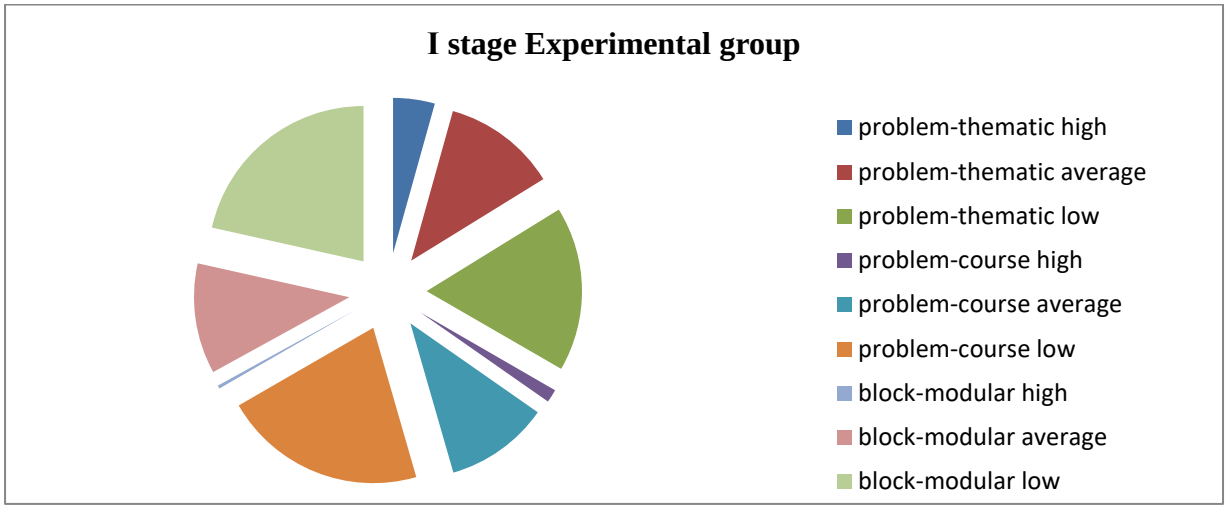
Table 3

Indicators of information technology for integration of the university students' knowledge

	Level	I stage		II stage		III stage	
		Experimental group	Control group	Experimental group	Control group	Experimental group	Control group
Problem - thematic	High	13	3	13,1	1	34,2	1
	Average	35,6	31,3	56,7	42,5	55,8	49
	Low	51,4	65,7	30,2	56,5	10	50
Problem – course	High	4,1	2,5	4,4	4,9	10,7	3
	Average	32,5	27,8	47,4	44,9	70,3	44,5
	Lo w	63,4	69,7	48,2	50,2	19	52,5
Block - modular	High	1	1	3,7	1	9	1
	Average	34,5	40	40	41	45	41,3
	Low	64,5	59	56,3	58	46	57,5

In order to create an integrated block of various disciplines included in the content of education, program-course integration program have been prepared for the students of 2 specialties studying the basics of marketing and basic economics in the market or / and maintaining information on automated systems. It is shown in Figure 2.

Figure 2
Indicator of the program for integration of the university students' knowledge



In the design method to provide information technology we need to work with independent electronic texts; to scan textual and graphic information; to analyze and summarize the information collected, to prepare and demonstrate the presentations.

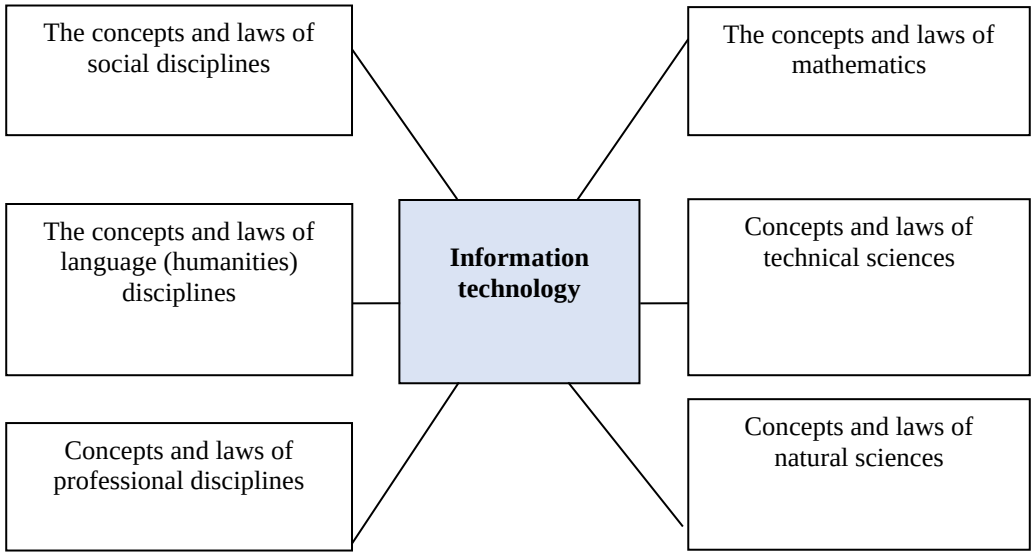
We described new information technologies that can be used effectively to integrate the university students' knowledge. These technologies were used to assess the effectiveness of the learning process in terms of improving the integration of educational technologies and the processes in several common areas, including the integration of knowledge and language skills of students at the university.

Then we considered the implementation of levels of conceptual, modular, expanded and operational integration on the structural model we offer in many universities. For example, information technology is based on computer science so we have made sure that it will be possible to integrate other sciences.

As shown in Figure 3, the integration of computer science through information technology is integrated with processing, storage of information with the help of Computer science, Technical sciences and Mathematics. Similarly, our research has proved that we can use information technology and all computer capabilities in teaching other scientific techniques. In particular, MathCad, AutoCAD, Education software is often used in the issuance of mathematical problems and considered as a part of Mathematics. This opens the way for students to use time and organize their work properly, to expand their range of knowledge.

Figure 3

Opportunity to integrate the basics of science through information technology



We have used great opportunities of business games in our practical experiment. After all, business game allowed carry out simultaneously each type of action as an integrated form of work, i.e. thinking, practice, self-esteem, communication, etc. The content of students helped to model simultaneously the tasks of various disciplines, including the current real-life situations, as well as full assessment of all the qualities of the person, its self-determination, active relations with other participants.

Conclusion

Theoretical research and the results of experimental work allow draw the following conclusions:

- philosophical, pedagogical and psychological approaches to the optimization of the educational process of the university are based on the system of complexity, competence, action of operational comments through new information technologies;
- "Integration of the university students' knowledge through new information technologies" is the application of knowledge in professional and special disciplines, the formation of information competence;
- the structural model of integrating the knowledge of university students using new information technologies is developed based on the conditions of self-summing and increasing the creative level of students and taking into account the degree of readiness of teachers and students for the integration process taking into account the students' level of information technology;
- methodological basis for the development of integrated programs of general education and special disciplines have been developed taking into account the specifics of the new information technology;
- projects have been developed and tested to integrate students' knowledge in general education, professional and special disciplines.

Currently, information technologies are widely used to organize the educational, research and managerial process of the university, which main characteristics are the possibility of differentiation and individualization of learning, as well as the possibility of developing creative cognitive activity of students. The integration of information technology in the formation of IT competencies increases the overall level of the educational process, enhances

the motivation of learning and cognitive activity of students constantly supports teachers in a state of creative search for didactic innovations. Information technologies in education are gradually turning from a tool for learning into a powerful means of developing the entire educational complex of the university.

During the information technologies era the methods of education and upbringing were subjected to significant changes. With the emergence of a computer, the implementation of many processes in human life is fast, reliable and effective. Currently, the terms such as "Electronic textbook", "Electronic government", "Digital Technology", "Education Integration", "Information Technology", and "Digitalization" are widely used in the educational process. The modern education system should not only give knowledge to the audience, but also use advanced information technologies in the educational process.

Summarizing the basis of theoretical principles and experimental work, the following recommendations were made:

- in addition to the use of new information technologies in the university educational process, the formation of information competence should be carried out;
- the results of the work should be used in the development of a new standard of higher education;
- the results of the work should be used to form information competence;
- in order to integrate students' knowledge, the methodology for the use of new information technology should be introduced to other universities;
- special courses should be conducted in order to increase the professional skills of students.

The article considered the questions related to the possibility and need for the integration of information technologies into the educational process of the university, changes in content, methods and organizational forms of training using information technologies, as well as the formation of computer literacy skills. It analyzed difficulties in the integration and development of modern information technologies in the university educational system. This is primarily due to the fact that when using information technologies for each subject area of the educational process, it can coincide or differ significantly in individual components. For the successful integration of information and communication technologies, it was necessary to maximize the extension in the free access of open educational resources. The solution to this problem was due to the setting of several problems. The first task was related to the creation of tools to support the needs of the educational process. The second task was the development and creation of educational material in which, in addition to information filling (lecture material), it is important to provide students with laboratory work and tasks for teaching students to practical skills.

Based on the above, we came to the following conclusions: in the implementation of knowledge integration through the use of new information technology, there were some changes in the teacher's activities. The content of education (informative service), the classroom and extra-curricular, motivation and control activities (organizational activities), relationship between the teacher and the student (communication services) have changed.

As a result of our research new opportunities were created to analyze the results of educational activities (progressive services). In this case the teacher's performance in the framework of new information technology, the methodological support of the learning process requires the appropriate level of training. In particular, the general methodological issue of integration of students' knowledge depends on the level of academic areas. Thus, we have made sure that the integration process is one of the main conditions for the effectiveness of the process of readiness to use the teacher's computer technology.

The results of the experimental work for integration of university students' knowledge through new information technologies have learned that students can learn the integrated

educational material through new information technology equipment, understand the importance of education and can use it independently. Computer software products assembled during the experimental work have brought significant changes in the organization of the university educational process.

Integration of students' knowledge through new information technologies resulted to learn how to search for additional information when preparing for lessons, to prepare visual aids and tasks, to follow time saving, to evaluate objectively students' knowledge, to acquire information competence, to plan their skills and coordinate one's behavior, to work independently and in pairs. Students' independent work was organized on the basis of interactive communication through information technology.

Therefore, it is impossible to cover deeply all areas of the issue studied. In improving the educational process of the university, we offered a possible option to address the problem, such as the use of information technology, as integrating the knowledge of students. In our research, we believe that the identified aspects can be the basis for the study of issues of training in the field of general education, high schools in order to implement these problems.

The results of the study show that the student can read the e-learning material, complete the task and read it immediately. The use of new information technologies has allowed students to feel themselves as individuals and increase responsibility. The importance of interactive lessons has been beneficial for both teachers and students. In case when interactive communication was not available, information technology was used as a means of demonstration or a visual aid. Thus, the possibility of integrating knowledge through new information technologies was determined and made sure that it will give a positive result.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

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