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The Content-Structure Model of Students' Artistic Self-Development Through the Use of Information and Communications Technology

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Abstract. *The economic and political changes that take place in the society, the integration processes deepening day by day, the growing business competition in the labor market are making the requirements to pre-graduates much stricter. Therefore, there is a growing need to train well-educated, intelligent, creative, highly qualified specialists who are well-versed in information technology and aware of the latest scientific novelties. The aim of our investigation is to form a structure-content model of students' artistic self-development based on their use of information and communications technology, theoretical and methodological substantiation of its implementation, identification of practical methods. The scientific novelty of research: the theoretical platforms, contents, and methods were identified, which will make artistic self-development of students through their use of information and communications technology more efficient. As a result, the content-structure model was developed, the indicators and marks were determined, and its genuineness was verified experimentally. The experiment was conducted at Abai Kazakh National Pedagogical University. The pedagogic experiment involved 280 students. The practical importance of the research: we can use the content-structure model of artistic self-development of the trained students using the information and communications technology in the integrated pedagogical process.*

Keywords: student, information and communications technology, artistic self-development, content-structure model.

Introduction

The fact that the society becomes information-based is expediting our country's involvement in global information-related processes. Nowadays, it is impossible for a person to be mobile, successful in something, take independent decisions without mastering information technology. Information and communications technology saves time, facilitates obtaining information and remote learning. In this regard, the use of information in all aspects of human activities, mainly pedagogical, is increasing rapidly.

"The Content-Structure Model of Students' Artistic Self-Development Through the Use of Information and Communications Technology," *Astra Salvensis*, VI (2018), no. 12, p. 363-383

The fact that common people still do not use information and communications technology to a full extent has been largely discussed and reflected in numerous publications lately. In this connection, we can see that introducing information and communications technology in the education system has objective as well as subjective pretexts. The objective reasons are high criteria set for education, the significance of utilizing new technology, and the modernization of the education system as a whole. As for subjective reasons, contemporary students and teachers are more peculiar. They are pragmatists, aim at reaching a result quickly. It is conspicuous that information technology is an indispensable tool in this regard.

Information has become a strategic resource that identifies the development level of a country and establishment of information culture, that is processing and transferring information is deemed to be an essential condition of civilized development.

The pioneers who initiated the ideas of developing the information society as one of the rules of general development of the civilization were such scholars as D. Bell and V. Inozemtsev¹, E. Toffler and H. Toffler², Y. Masuda³, etc.

The main trends, contents of knowledge computerization, psychological-pedagogical bases of utilizing it, training of school as well as university teachers to use information and communications technology were addressed in the publications by G.K. Nurgalieva⁴, S.S. Kunanbayeva⁵, B.B. Baimuhanova and I.J. Yesenghabylov⁶, E. Medeuov and B. Bekzatov⁷, D.M. Jusibalieva⁸, etc.

¹ D. Bell, V. Inozemtsev, *The epoch of dissociation*, Moscow, Center for Investigation of Post-Industrial Community, 2007. Cf. Dmitrii V. Enygin, Nataliia Iu. Fominykh, Anastasiia V. Bubenchikova, Joseba Inaki Arregi-Orue, Rakhila Aubakirova, "To the Definition of the Notion „Multicultural Educational Environment,” in *Astra Salvensis*, VI (2018), no. 11, p. p. 601.

² E. Toffler, H. Toffler, *Revolutionary Wealth*, Moscow, AST, 2007.

³ Y. Masuda, *The Information Society as Postindustrial Society*, Washington, World Future Soc, 1999.

⁴ G.K. Nurgalieva, *Pedagogical technologies of computerization of education*, Almaty, Alem, 2002.

⁵ S.S. Kunanbayeva, *Formation of information-education environment in the university education*, Almaty, RCIP, 2006.

⁶ B.B. Baimukhanov, I.J. Yesenghabylov, "Utilization of information and communications technology in education", in *The Scientific Magazine of the Ministry of Science and Education "Ult Taghymy"*, I (2012), pp. 226-229. Yulia N. Ebzeeva, Irina S. Karabulatova, Dmitry A. Nakisbaev, "The Problems of Transformation of the Personal Identity in a Modern Migrant," in *Astra Salvensis*, VI (2018), no. 11, p.729.

⁷ E. Medeuov, B. Bekzatov, "Advancement of computerization of education processes at the high school", in *High School of Kazakhstan*, IV-V (2001), p. 38-40.

⁸ D.M. Jusibalieva, *Theoretical bases of establishment of information culture of students in the context of remote education*, Doctoral thesis, Almaty, 1997.

Altynbek K. MOSHKALOV, Bagdat M. BAIMUKHANBETOV,
Aigerim M. BAIKULOVA, Almas K. ANARBAYEV, Abilkasim Z.
IBRAYEV

Despite the variety of the above-mentioned research works, it has been identified that the problem of using information and communications technology by students for their creative self-development has never been addressed in a separate research.

In the course of scrutinizing academic and theoretical references on the subject matter, the following has been identified:

There is a high demand for highly qualified, dynamic, and confident specialists capable of developing themselves, involving themselves in creative art. Hence, students need to self-develop; however, the conditions provided for that are poor.

We found out that there were controversies between the prevailing practice of providing students with knowledge, qualification, and skills at universities and the necessity to build an information environment, which would intensify their self-education and self-development.

The mentioned controversies urged us to determine the theoretical and methodological basics of artistic self-development of an individual, determine didactical approaches, and develop a model of such an approach.

Materials and methods

Research methods

The methods used include: the theoretical method (modelling a scientific forecast of research); the empirical method (analyzing creative works of students; questionnaires (author's questionnaire); conversation; observation, analysis, and summary of the experiments for establishing artistic activities of students while using information technology); mathematical and statistical processing of the results obtained in the course of the research.

Experimental base of the research

280 students studying in the Physics and Mathematics and Pedagogy and Psychology Faculties of the Abai Kazakh National Pedagogical University took part in the research.

Stages of investigation

The research consisted of three stages:

– First, we determined the topic of research work and provided theoretical analyses of philosophical, pedagogical, psychological, scientific-technical publications related to the subject matter of research. Besides, we determined the scientific apparatus of the research and prepared experimental materials pertaining to the subject matter.

– To investigate theoretical matters, we made a structural model of the students' artistic self-development based on the use of information and communications technology; prepared a special course program was prepared; conducted experimental works.

– Finally, we analyzed the results achieved in the course of the experiment.

Results

Structure and content of the model

Developing professional as well as personal qualities of students was set as the strategic objective of the structural model of students' artistic self-development through the use of information and communications technology.

As a matter of fact, the main goal of the contemporary education system is to prepare competitive specialists. Artistic pedagogy was selected as the conceptual basis of our model; its methodological basics were defined.

As it is depicted in the model, to achieve the research objective, everything, including the purpose of research, identification of platforms for solving issues, contents, methodological approaches, forms of organization of teaching, assessing and achieving the final result, was arranged in close interconnection.

The education process, according to psychologists, should be directed at developing the individual and his abilities. Therefore, we defined the content components of students' artistic self-development in the structure-content model of artistic self-development through the use of information and communications technology.

The content components were studied in three vectors: *the theoretical component; the technological component; and the result component.*

1. The theoretical component was implemented through the content of a special course composed of three sections, prepared during the study. They are: introduction to the theory of the individual; the ICT tool of self-development.

2. The psychological aspects of an individual and his self-development in the technological component, the capacity of information and communications technology were studied.

3. The result component included monitoring the students' artistic self-development.

Information and communications technology was designated as the tool of implementing the above-mentioned components. Enhancement of the level of students' artistic self-development was selected as the final

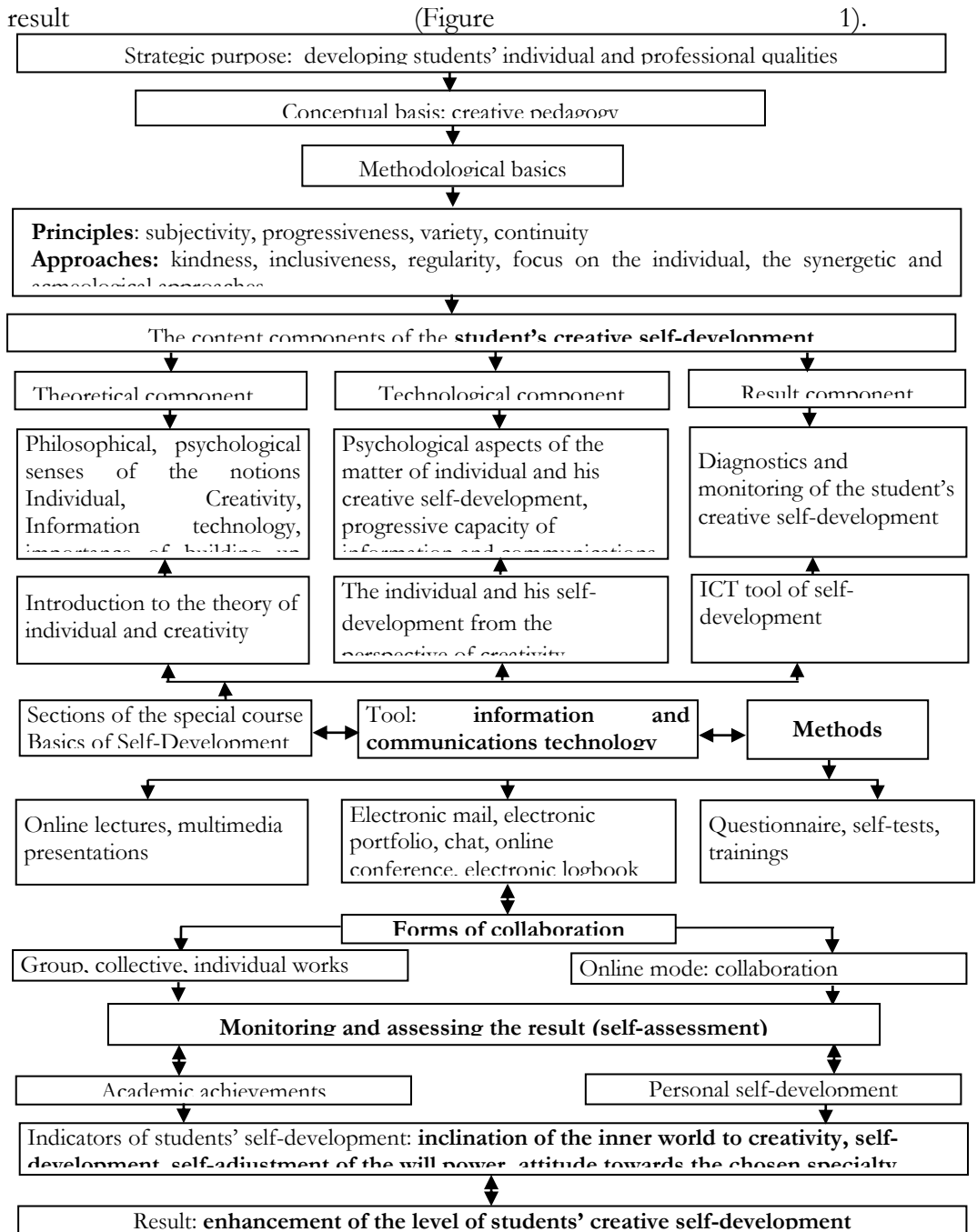


Figure 1. The structure-content model of students' artistic self-development based on their use of information and communications technology

The self-development of students while using the elaborated model was defined by the below indices and dimensions. The components, indicators, and dimensions of students' artistic self-development determined

"The Content-Structure Model of Students' Artistic Self-Development Through the Use of Information and Communications Technology," *Astra Salvensis*, VI (2018), no. 12, p. 363-383

in the course of investigating the issue of concern of our research facilitate the research result assessment and their argumentation substantiation.

Our research consists of 6 measurements and 9 indicators, consistent with motivational, content, and action components (Table 1).

Table 1. Students' self-creative development of components, performance criteria.

| Components | Dimensions | Indicators |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | 2 | 3 |
| Motivational | - Attempts to develop their skills through information and communications technology - Interest in computer-aided and mathematical modeling | - Information and communications technology to the innovative activities - Information systems, modeling, computer simulation on motivation - Search for applying multimedia technology |
| Content | - Theoretical knowledge of the students' "personality", "development", "self-development" - Knowledge of the theoretical basic principles of information and communications technology - Ability to use ICT for self-education | - Theoretical knowledge of the students' "personality and its development", "creativity" - Information and communications technology competence - Availability of information and communications technology |
| Action | - Ability to accumulate new knowledge by using information and communications technology | - Ability to act based on information technology - Self-development through ICT - Formation of the fondness for the chosen profession |

The above-mentioned conclusions related to students' artistic self-development through their use of information and communications technology were taken as the guidance during the practical experimental work.

Stages of the model implementation

The experimental works were implemented as per the below scheme (Figure 2).

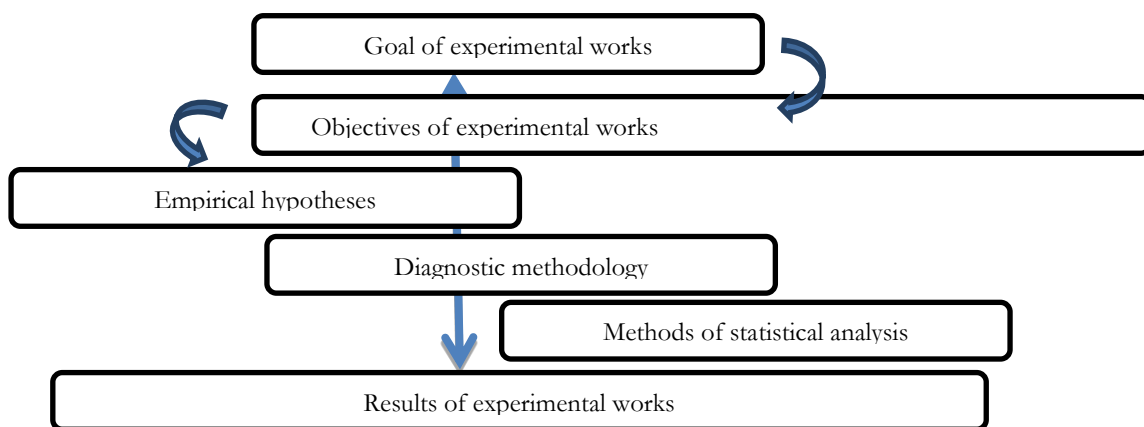


Figure 2. Scheme of conducting experimental works

Altynbek K. MOSHKALOV, Bagdat M. BAIMUKHANBETOV,
Aigerim M. BAIKULOVA, Almas K. ANARBAYEV, Abilkasim Z.
IBRAYEV

Identifying stage

The aim of the experiment is to determine the level of students' knowledge and ways of self-development in higher education institutions using information and communication technology in the educational process.

This section contains the process and results of the revealing experiment. The objectives of the revealing experiment are as follows:

- To identify the exact state of students' self-development, creativity prior to the experiment, the influence of information technology on their development, their relevance to the students' future specialty.

The following methods were chosen to achieve the set objectives:

- General knowledge about information and communications technology.
- Diagnostics of implementing the need for self-development.
- Assessment of the capabilities of self-development.

Prior to the questionnaire, we divided the students selected for the experiment into two groups. They are the observing group and the identifying group. Both observing and identifying groups took part in the first questionnaire equally.

Alongside with defining the students' awareness of information and communications technology, the diagnostics of implementing the need for self-development was performed, and the students were surveyed to assess their capabilities of self-development in the form of questionnaires. Those questionnaires let us define the level of the students' self-development based on their use of information and communications technology in the education process.

140 students participated in the authors' questionnaire *General Knowledge of Information and Communications Technology*, in which students of the Physics and Mathematics Faculty took part (hereinafter in figures, it is referred to as PMF). The questionnaire included 15 questions, and each question had three answer options. The answers were evaluated by levels 1, 2, 3. For example, 14–17 points mean a “very low” awareness level of information and communications technology of the student, while 40–42 points mean “the highest” level.

We deem their answer, which is read as “information and communications technology broadens my horizons”, implies “information and communications technology helps me get to know myself better.”

Those who think that information and communications technology has an impact on boosting the education quality at universities...

Those who are satisfied with the quality of using information and communications technology in the education process... Do you have access to pedagogical information online at your university? Are you satisfied with the quality of using information and communications technology during

"The Content-Structure Model of Students' Artistic Self-Development Through the Use of Information and Communications Technology," *Astra Salvensis*, VI (2018), no. 12, p. 363-383

classes by teachers? Are you computer-savvy? Do you use ready-made electronic products (e-encyclopedias, e-guide books, e-dictionaries, e-books, etc.)? Is it better to read conventional books rather than electronic ones?

Out of 140 students who participated in the questionnaire *General Knowledge about Information and Communications Technology*, 70 students were in the observing group while the remaining 70 students took part in the *experimental group*. Of the observing group, 6% showed the "average," 16% "slightly higher than average," 37% "higher than average," 31% "high," and 10% "very high" levels. As for the experimental group, 7% demonstrated the "average," 14% "slightly higher than average," 40% "higher than average," 28% "high," 11% "very high" levels. The diagram in Figure 3 illustrates those figures.

140 students of the Pedagogy and Psychology Faculty participated in the questionnaire *General Knowledge about Information and Communications Technology* (hereinafter, in figures referred to as PPF). Of them, 70 were in the *observing group* whereas the other 70 were in the *experimental group*. Out of the observing group, 38% showed the "average," 11% "slightly higher than average," 25% "higher than average," 21% "high," 5% "very high" level. Of the experimental group, 33% showed the "average," 19% "slightly higher than average," 25% "higher than average," 17% "high," and 6% "very high" level. The diagram in Figure 4 illustrates those figures.

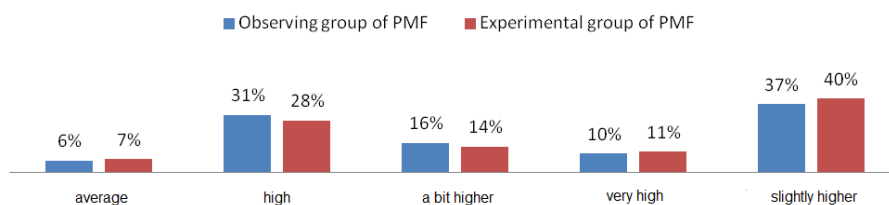


Figure 3. Figures defining the level of general knowledge of students of the Physics-Mathematics Faculty during the educating experiment.

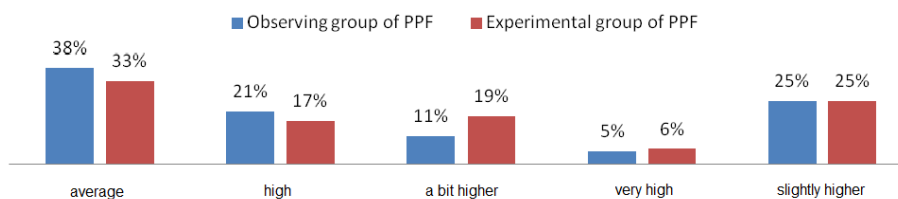


Figure 4. Figures defining the level of general knowledge by students of the Pedagogy and Psychology Faculty during the educating experiment.

Comparing results of the mentioned two faculties, we found that the students of the Physics and Mathematics Faculty had a better general knowledge of information and communications technology than the students of the Psychology and Pedagogy Faculty. We think it is because of

Altynbek K. MOSHKALOV, Bagdat M. BAIMUKHANBETOV,
 Aigerim M. BAIKULOVA, Almas K. ANARBAYEV, Abilkasim Z.
 IBRAYEV

more presence of information technologies and other special disciplines in the Physics and Mathematics Faculty.

The next questionnaire is called *Diagnostics of Implementing the Need for Self-Development*. The questionnaire consists of 16 questions. If a student scores in the questionnaire 55 and more points, it shows his activeness to self-develop, 36 to 54 points certify that his self-development system is not established, 15 to 35 points show that his self-development stage stopped.

Out of 140 students of the Physics and Mathematics Faculty who participated in the questionnaire *General Knowledge about Information and Communications Technology*, 70 students were in the observing group, while the remaining 70 students took part as the *experimental group*. Of the *observing group*, 46% showed their pro-activeness to self-development, 54% showed that their self-development system is not yet formed. As for the *experimental group*, 49% of them showed their pro-activeness to self-development, 51% showed that their self-development system is not yet formed. The diagram in Figure 5 illustrates those figures.

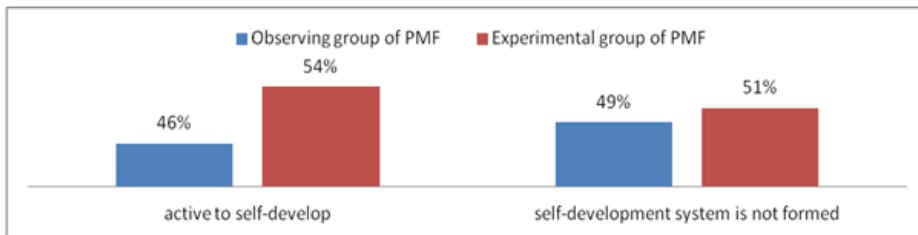


Figure 5. Figures defining level of implementation of the need of students of the Physics and Mathematics faculty for self-development during the educating experiment.

Out of 140 students of the Pedagogy and Psychology Faculty who participated in the questionnaire *Diagnostics of Implementation of the Need for Self-Development*, 70 students were in the observing group, while the remaining 70 students took part as the *experimental group*. Out of the *observing group*, 56% showed their pro-activeness to self-development, 44% showed that their self-development system is not yet formed. As for the *experimental group*, 58% of them showed their pro-activeness to self-development, 42% showed that their self-development system is not yet formed. The diagram in Figure 6 illustrates those figures.

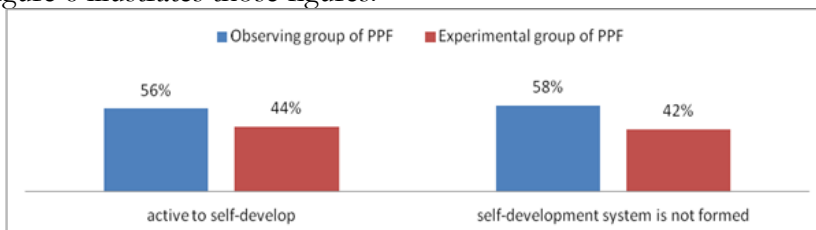


Figure 6. Figures defining the level of implementation of the need of students of the Pedagogy and Psychology Faculty for self-development during the controlling and educating experiment.

"The Content-Structure Model of Students' Artistic Self-Development Through the Use of Information and Communications Technology," *Astra Salvensis*, VI (2018), no. 12, p. 363-383

The questionnaire results showed that the pro-activeness of students of the faculty "Pedagogy and psychology" to self-develop is high.

The next questionnaire is aimed at identifying the levels of "assessing the capacity of self-development." This questionnaire consists of 18 questions. If a student gains 18-25 points upon completion of the questionnaire, it certifies that he acquires a "very low" level, 51-54 correspond to "the highest level."

The results of the students of the Physics and Mathematics Faculty in the questionnaire *Assessing the Capacity of Self-Development* are as follows: out of 140 students, 70 took part as the observing group, while the remaining 70 took part as the *experimental group*. Out of the observing group, 18% showed a "low" level, 25% "higher than average," 20% "high," 37% "average" level. Of the experimental group, 20% showed a "low" level, 20% "higher than average," 18% "high," 42% "average" level. The diagram in Figure 7 illustrates those figures.

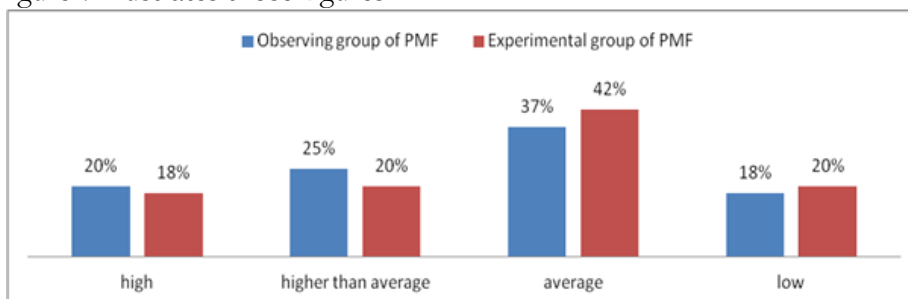


Figure 7. Figures defining the assessment of the self-development capacity of students of the Physics and Mathematics Faculty during the educating experiment.

Out of 140 students of the Pedagogy and Psychology Faculty who participated in the questionnaire *Assessing Self-Development Capacity*, 70 students were in the observing group, while the remaining 70 students took part as the *experimental group*. Out of the observing group, 15% showed the "low," 30% "higher than average," 25% "high," 30% "average" levels. Of the experimental group, 20% showed the "low," 20% "higher than average," 18% "high," 42% "average" levels. The results are illustrated in the diagram below.

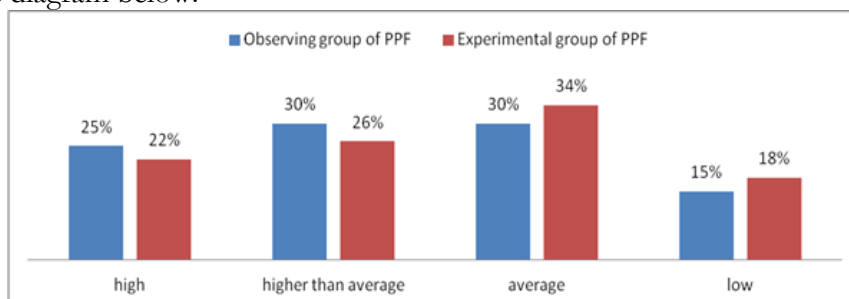


Figure 8. Figures defining the assessment of the self-development capacity of students of the Pedagogy and Psychology Faculty during the educating experiment.

Altynbek K. MOSHKALOV, Bagdat M. BAIMUKHANBETOV,
Aigerim M. BAIKULOVA, Almas K. ANARBAYEV, Abilkasim Z.
IBRAYEV

As it is illustrated in the figures, the self-development abilities of students of the two faculties are average, judging by the results of all questionnaires.

The results of the educating experiment show that the general idea of students of both faculties about “self-development” and “creativity” is miniscule, their level of acquiring mechanisms of self-development is low, and their skills to assess their abilities is not adequately formed. It brought up the need to give the students a theoretical knowledge and cement their knowledge with practical activities. In the next section of the article, we expounded the activities performed during the forming stage of the experimental work and provided the results.

Formation stage

The model efficiency was verified based on the educating experiment. The educating experiment had the following objectives:

- complement the theoretical knowledge required for students’ artistic self-development;
- use all the capacity of information and communications technology during education process at universities;
- prepare suggestions after summing up the educating experiment results.

The special course program on the Basics of Self-Development topic was elaborated in the course of the educating experiment and tested. *The course purpose:* Create conditions for students to acquire mechanisms of artistic self-development by using information technology.

The content of the *Basics of Self-Development* course is made up of the theoretical and applicable parts as given below:

Theoretical contents:

- theories of personality and creativity;
- significance and meaning of building up a personality;
- essence of self-development and its components;
- use of ICT in education.

Applied part of the course:

- information technology, standard software, special software, demonstration of the use of software tools’ capacity to accomplish different level tasks of the specialty;
- electronic mail, electronic portfolio;
- substantiation of the ICT capacity to boost the education quality (electronic textbooks, interactive board, independent works of students).

As a result of teaching the prepared Basics of Self-Development course, they will acquire:

- theoretical notion of matters like students’ self-development and individuality through information technology, “constituent parts

"The Content-Structure Model of Students' Artistic Self-Development Through the Use of Information and Communications Technology," *Astra Salvensis*, VI (2018), no. 12, p. 363-383

of the self-development system," "position of information and communications technology in the education system and students' potential in self-development";

- knowledge about names and importance of the main computer components, their functions and interconnection;
- skills of preparing and using demonstrative materials (graphics, demo slides, video clips, animations, interactive tasks) with the help of computer environment;
- competence in using internet, establishing business ties via electronic mail;
- skills of using widely spread information transferring tools to store teaching data; multimedia materials.

This course training program is based on the didactic principles of the formation of information culture and the need to establish a close link between the teaching tools, the content of teaching, and the importance of teaching the future course of professional activity of students.

The thematic content of the Basics of Self-Development course are as follows: 1) The notion of "person". 2) Psychology of the personality. Personality and its development. 3) The notion of "self-development". 4) Self-development units (self-awareness, self-discipline, self-actualization, self-improvement, self-education, self-understanding, self-governance, and self-assessment). 5) Creativity of a person's self-development. Concepts of the Creative Theory. 7) Training service organization using information and communication technology. 8) The role of information and communication technology in the education system. 9) Information and communication technology: students' potential of self-development. 10) Creating an electronic portfolio as a means of students' self-development. 11) Multimedia presentation as a means of students' self-development. 12) E-mail as a means of students' self-development. 13) Computer diagnostics of students' self-development.

During the course, all information and communication technology methods were applied to meet all contemporary requirements.

The first, second, and third parts of the program were explained in the form of online lectures, sharing, and forums on topics such as Personality Psychology, Personality and its Development. These methods have greatly contributed to the development of students' managerial skills, emotions, speech culture, knotting, and solicitation.

The self-development concept of the course program, self-development units (self-awareness, self-assessment, etc.) were used in the fourth and fifth topics, methods of critical thinking, reflection, self-regulation, correction, development of fondness for the profession.

The sixth topic of the program was the use of electronic textbooks, such as *Organization of Information and Communications Technology Training*". Electronic textbooks are educational, control, modeling, testing,

Altynbek K. MOSHKALOV, Bagdat M. BAIMUKHANBETOV,
Aigerim M. BAIKULOVA, Almas K. ANARBAYEV, Abilkasim Z.
IBRAYEV

etc. sets of programs, based on computer technology, covering the main scientific content of the subject. An electronic textbook provides more effective features than common textbooks. The use of electronic textbooks in any lesson not only increases the cognitive activity of students, but also creates a system of logical thinking and creativity. The main purpose of e-learning is continuous and complete monitoring of the learning process, as well as the development of information search skills and the benefits of this method to students: self-learning through distance learning, enhancing cognitive activity, improving the quality of education, and achievement of functional literacy.

The seventh topic of the course program was a teleconference on the Role of Information and Communications Technology in the Education System topic. The newsgroup, called on the Internet and distributed to different computers, is called the Teleconference. The work in the teleconference mode is organized with Server, the specialized software. It is launched by either sending the News – Read News command from the Internet Explorer window or clicking the News button. The teleconference software in Windows XP is Internet News, and in Windows XP is Outlook Explorer. For example, depending on the same topic, a dispatched information group arrives at the server and distributes it to "nearby" servers. This is how they spread information. For this reason, the data sent from one server to the whole world quickly disappears. It can be read and answered, as well as organized for a discussion.

Teleconferencing is very helpful in establishing relationships and sharing international culture using logical thinking, goals, objectives, and the ability to formulate the subject and scientific views.

The eighth subject of the Information and Communications Technology: Student's Potential of Self-Development program was used in electronic journals. Students were asked to create electronic psychological and pedagogical journals. They familiarized themselves with magazine sections, topics, interviewers, and summarized materials in magazines. The work interested the students greatly. The method allows developing the critical thinking of students, learning creative ways to work and search independently, creating a talent.

The method of creating an electronic portfolio on the ninth topic of the Creating an Electronic Portfolio: the Means of Students' Self-Development course program was used. The main purpose of the electronic portfolio is to analyze the professional growth of students, their professional outcomes and achievements. At the same time, the students' self-education, education, creativity, and accumulation of results in their own knowledge were encouraged. The overall portfolio can also be viewed as students' personal documents. Implementation of the electronic portfolio method has helped each student monitor the individual path of their professional development, demonstrate fully the results of his/her

"The Content-Structure Model of Students' Artistic Self-Development Through the Use of Information and Communications Technology," *Astra Salvensis*, VI (2018), no. 12, p. 363-383

education, share valuable experience, help future professional skills and increase the student's performance. In addition, creating an electronic portfolio helps students develop their interest, critical thinking, reasoning, decision-making, analysis, and compilation, thus improving the quality of knowledge and self-regulation.

The tenth topic of the course program is Multimedia Presentation as a Tool for Student's Self-Development, which is used in the practice of multimedia presentations. Multimedia presentations provide the opportunity to adapt flexibly to the modern requirements, taking into account students' needs and learning specifics. Properly and correctly used multimedia tutorials make it much easier for students to learn the subject content. The use of multimedia technology makes it possible to point out the capabilities of the training software, including slideshow presentation, enhance the teaching efficiency. Also, the method of multimedia presentations greatly contributes to the development of students' creative thinking, design-based self-education, self-improvement, and depth of thinking.

E-mail communication was used for the eleventh element of the E-mail as the Student's Self-Development Tool course. E-mail is one of the most frequently used features of the Internet. Every day millions of messages worldwide are sent and received. Anyone who has access to the Internet can send and receive messages that are known as e-mail.

At present, e-mail is widely used in everyday life and educational process. It is a communication tool that allows at least two subscribers to share information. The most significant feature of email is its speed. E-mail speed is the same as the speed of a phone, but it does not have to be the same for both parties at the same time. E-mail can contain text, graphic information, sounds, software, etc. as well as information types.

The e-mail system consists of three parts:

- the user agent allows each customer to read and create new information;
- the send agent delivers data from one computer to another;
- the send agent moves data into the recipient's mailbox.

This method develops creativity based on students' interaction, communication skills through communication, (dialogue) literacy, information exchange, and joint projects.

The twelfth program, Computer Diagnostics of the Student's Self-Development, was used for chat, website development and use.

The Internet Chat application is an online chat with real-time chat rooms. Conversations typically interact with the keyboard on their computers, and after a few seconds the interlocutors will be shown on the monitor, and they will be able to chat in the same way.

Altynbek K. MOSHKALOV, Bagdat M. BAIMUKHANBETOV,
Aigerim M. BAIKULOVA, Almas K. ANARBAYEV, Abilkasim Z.
IBRAYEV

Website is a small model of the world. While in the past, a website was created by a single person, the webmaster, nowadays several websites are created.

Internet technology develops in the following directions:

- Web technology
- Website creation economics
- Web design and web marketing
- Human resources and more

Website development consists of several stages:

- Planning
- Development of elements
- Program
- Testing
- Publication
- Advertising
- Control

By creating chats and websites, students can contribute to the development of autonomy, ideas, research culture, and innovation.

All the opportunities of the information and communication technology have been fully utilized in its implementation. In particular, lectures and workshops on the use of electronic textbooks, multimedia presentations.

Lecture is an organizational form of teaching, which is a regular part of the lecturer's report on verbal lessons. It is mostly used in traditional teaching. Opponents of traditional lectures at a university point to the vulnerabilities of this teaching method. Basically, lectures adapt to other people's attitudes, which affects the students' individual work, not all students perceive the lecturer's material. At present, this is one of the most popular views.

We used lecture information in our practical work. For this purpose, an electronic textbook containing all topics was used.

This program, the function of which is implementation of the structure-content model of the student's self-development through the use of information and communications technology, is needed during training students at universities, for performing different activities by using information technologies during the education process:

–provide students with the theoretical knowledge about new information technology, their purposes, principles, forms of teaching and learning under the conditions of computerization of education, methods of teaching;

–establish pedagogical knowledge and competence in teaching and using information technology;

"The Content-Structure Model of Students' Artistic Self-Development Through the Use of Information and Communications Technology," *Astra Salvensis*, VI (2018), no. 12, p. 363-383

–facilitate the establishment of creative activities like progressiveness (developing students' creativeness, their researching skills).

Control stage

Upon the educating experiment completion, additional diagnostics were performed to the students of the concerned faculties. The final part of the program was a questionnaire of students of the Physics and Mathematics faculty, as well as Pedagogy and Psychology faculty. The following scores were obtained as a result of the questionnaire. Particularly, the following questionnaires were answered once again: Students' General Knowledge on Information and Communications Technology, Diagnostics of Self-Development and Future Professional Level, Diagnostics of the Fulfillment of the Need for Self-Development, Diagnostics for Assessing Self-Development Capabilities, Self-Expression Ability of a Person. Their results accounted for the result of the experiment.

The overall results of the work performed in the Physics and Mathematics, Pedagogy and Psychology faculties is shown in Figure 9.

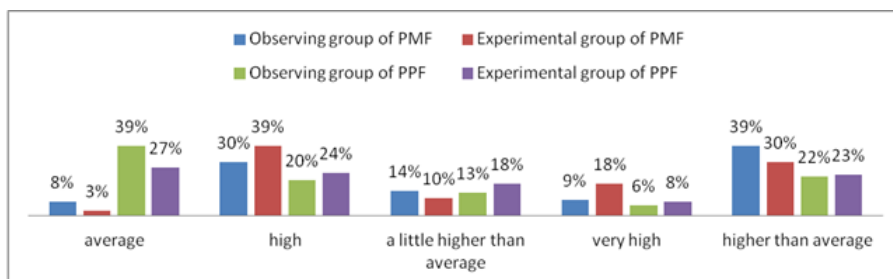


Figure 9. Results of the educating experiment at the Physics and Mathematics, Pedagogy and Psychology faculties.

It is obvious that the result of students of the Physics and Mathematics, Pedagogy and Psychology faculties is higher than the result of the questionnaire before the course. It demonstrates the usefulness of the *Basics of Self-Development* course for the students.

The next questionnaire is a methodology called *Diagnostics of Implementation of the Need for Self-Development*. The questionnaire consists of 16 questions. If the gained score is 55 or more, it shows the pro-activeness to self-development, a score between 36 and 54 certifies that the self-development system has not been established, while a score from 15 to 35 evidences that the self-development stage has stopped.

The general experiment conducted to the students who answered the questionnaire *Diagnostics of Implementation of the Need for Self-Development*, provided in the Physics and Mathematics, Pedagogy and Psychology faculties, is illustrated by Figure 10 below.

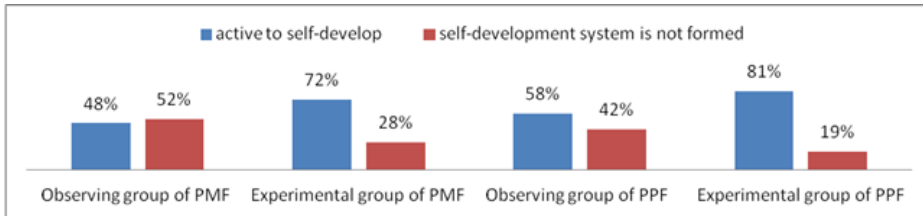


Figure 10. Results and indices of defining the implementation of the need of students of the Physics and Mathematics, Pedagogy and Psychology faculties for self-development in the course of the educating experiment.

We can notice that the knowledge of the students of the Physics and Mathematics, Psychology and Pedagogy faculties in that sphere has advanced, if we compare the two mentioned results.

Out of the two faculties, 140 students took part in this questionnaire as well; their score is shown below. *Of the observing group*, the level of 16% was “low,” 24% “higher than average,” 21% “high,” 39% “average.” As for the *experimental group*, the level of 13% was “low,” 28% “higher than average,” 24% “high,” 35% “average.” They are shown in the below diagram.

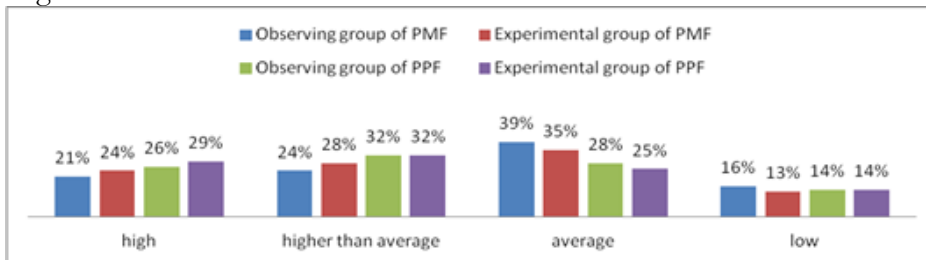


Figure 11. The diagram showing the indicators, which define the assessment of self-development abilities of students of the Physics and Mathematics, Pedagogy and Psychology faculties during the educating experiment.

After completion of the *Basics of Self-Development* course, the scores of students of the Physics and Mathematics, Pedagogy and Psychology faculties gained in the educating experiment were summed up as follows (Figures 12, 13).

As is demonstrated in figures, the capabilities of the two faculties to self-develop increased according to the results of the questionnaire. These indicators demonstrate the efficiency of the mentioned course work.

During the course, the indicators of student’s self-development levels were determined practically and verified. The levels of students’ self-development were assigned according to the credit system of education. Pre-experimental and post-experimental levels of students’ self-development were compared, and the effectiveness of the Basics of Self-Development course was identified. As the outcome of the practical experiment shows in the table and diagram, the number of students whose formation level was low reduced from 41.3% down to 11%, and for students with the average level from 43% to 34.7%, while for students who reached a high level, it increased from 24% to 46%.

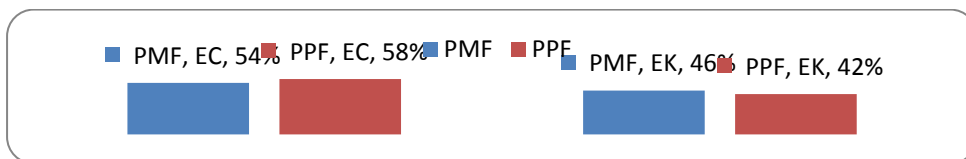


Figure 12. Average scores of students of the Physics and Mathematics, Pedagogy and Psychology faculties before and after the general course.

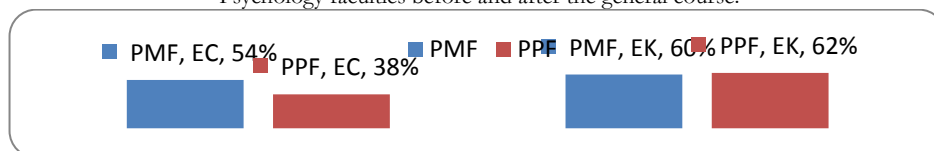


Figure 13. High scores of students of the Physics and Mathematics, Pedagogy and Psychology faculties before and after the general course.

In addition, the result attained by the faculty students participating in surveys, such as the General Knowledge about Information Technology, *Diagnostics of Implementation of the Need for Self-Development*, Assessment of Capacity of Self-Development, has increased.

A comparison of the results of the experiment work and purpose of the research proved the correctness of suggested principles and hypotheses.

According to this, the following conclusions were made:

–A self-creative student based on the use of information and communication technology, first of all, masters the theoretical basics of self-development, theory and practice of creative activity, their role in human development, the origins of human creativity and ways and mechanisms of their further development, obtains the knowledge of the essence of self-concept and their combinations; understands the laws of information processes; organizes the search and selection of information necessary to solve a particular problem; has the skills of completeness, sufficiency, appraisal, presentation, processing, etc.; has the knowledge of the basics of computer literacy; understands that computers, information technology, etc. are the key to solving the most pressing problems in human life, and identifies their advantages and drawbacks; is able to apply his knowledge in practice, professional activity, solve any issues, etc., acquires skills and qualifications.

–The practical experimental work program of students' self-development with the use of information and communication technology by students of higher education institutions has shown that they have the potential to solve the tasks they are facing.

–The wide use of the following types of electronic teaching aids, multimedia, Internet technology within special courses develops students' managerial abilities, emotional background, speech culture, logic, logical thinking, purposefulness, forms their scientific views, relations, ensures an exchange of international culture, self-education through the fulfillment of

Altynbek K. MOSHKALOV, Bagdat M. BAIMUKHANBETOV,
Aigerim M. BAIKULOVA, Almas K. ANARBAYEV, Abilkasim Z.

IBRAYEV

creative thinking; distance learning improves the quality of education to improve the current activity, develops functional literacy, critical thinking, creative, self-learning ways to search, gifted, talented, self-expression, such as aesthetic taste, promotes the formation of positive qualities, enhancing the self-creative development of the personality;

–As a result of organizing the special course content to meet the professional needs of future professionals, the attitude of students to the teaching profession has changed and increased their love.

All the above-mentioned qualities are intrinsic to a person who develops himself from the standpoint of creativity. It means that the goals set before the research have been achieved.

Discussion

With the view of the scaling up consumption and use of information and communications technology and long-term assurance of the country's competitive position, we are tasked to expedite implementing information and communications technology in the education system. Currently, the combined, that is to say, traditional and electronic learning is being tested. According to international research⁹, it is predicted that the combined education system will prevail in future.

Particularly, the American sociologist D. Bell and V. Inozemtsev¹⁰ put forth the idea of forming a post-industrial state in book "The coming of post-industrial society: A venture of social forecasting," published in 1973. We can also mention, in this connection, the theses of the American futurists E. Toffler and H. Toffler¹¹ Japanese sociologist and futurist Y. Masuda¹².

In general, the term "Information technology" emerged in science in 1940-1950's, in the early XX century, American didacticians associated it with such concepts as "instruction media," "teaching machines," programmed instruction.

The process of computerizing the knowledge, its main directions, and future aim at systematizing objectives, contents, principles and psychological-pedagogical basics of training future specialists to provide them with information and communications technology and establish a system of education quality assessment. For example, the scholar

⁹ J. Watson, *Nursing: The Philosophy and Science of Caring*, Boulder, University Press of Colorado, 2008.

¹⁰ D. Bell, V. Inozemtsev, *The epoch of dissociation*, Moscow, Center for Investigation of Post-Industrial Community, 2007; Olga Budzinskaya, "Competitiveness of Russian Education in the World Educational Environment," in *Astra Salvensis*, VI (2018), no. 11, p. 565.

¹¹ E. Toffler, H. Toffler, *Revolutionary Wealth*, Moscow, AST, 2007.

¹² Y. Masuda, *The Information Society as Postindustrial Society*, Washington, World Future Soc, 1999.

"The Content-Structure Model of Students' Artistic Self-Development Through the Use of Information and Communications Technology," *Astra Salvensis*, VI (2018), no. 12, p. 363-383

E.Y. Bidaibekov¹³ shared his viewpoint in this regard, "Information technology is a unit of technical equipment and methods integrated in a technological streak, which ensures activities like gathering, storing, processing, issuing, and disseminating information through the use of information resources".

K.M. Berkinbayev and B.D. Sydyqov¹⁴ expressed their viewpoints in their publications. They said, "Information technology is a unit of technical equipment and methods integrated in a technological streak which ensures activities like gathering, storing, processing, issuing, and disseminating information through the use of information resources," while "computerization of the society is a socioeconomic and scientific-technical process organized to facilitate the exercising of rights of citizens, governmental bodies and organizations, NGO's, satisfy their demand for information through establishing and using various information resources. The mentioned opinions emphasize the importance of using ICT and developing individuals.

S.M. Kenesbayev¹⁵, concluding that "Computerization of education is a process of using information and communications technology in the theory and practice of education at maximum and utilizing it so as to be able to implement psychological, pedagogical goals of education and teaching," investigating the pedagogical basics of training future teachers to use information technology in higher pedagogical knowledge teaching, theoretically substantiating the readiness of a future teacher to use new information technology in education, proposed the concept "teacher's readiness" for using new information technology and several levels of readiness for pedagogical duties.

D.M. Jusibalieva¹⁶ explained in her research devoted to theoretical basics of establishing an IT culture of students in distance learning as follows: "...student's IT culture is a component of a contemporary specialist's model, person's integrated education".

The researcher A.B. Medeshova¹⁷ proposed pedagogy and methodology of primary education, elective course programs on pedagogy, psychology, physics, and informatics, and emphasized the need to provide

¹³ E.Y. Bidaibekov, "Matters of training future teachers in computerization sphere", in *Pedagogy and Psychology*, III-IV (2012), p. 221-231.

¹⁴ K.M. Berkinbayev, B.D. Sydyqov, "Pedagogical technology of teaching informatics disciplines", in *School of Kazakhstan*, XI (2006), p. 33-35.

¹⁵ S.M. Kenesbayev, *Pedagogical basics of training future teachers to be able to use new information technologies*, Doctoral abstract thesis, Turkistan, 2006.

¹⁶ D.M. Jusibalieva, "Application of remote education technologies at the university: problems and prospective", in *Periodical of Ablai Khan Kazakh University of International Relations and World Languages: "Pedagogical Sciences" ser.*, I (2012), p. 16-20.

¹⁷ A.B. Medeshova, *Pedagogical conditions of development of studying skills through information technologies*, Ph.D thesis, Atyrau, 2006.

Altynbek K. MOSHKALOV, Bagdat M. BAIMUKHANBETOV,
Aigerim M. BAIKULOVA, Almas K. ANARBAYEV, Abilkasim Z.
IBRAYEV

electronic textbooks based on information technology and a methodology to use them efficiently. N.G. Daumov¹⁸ showed ways to develop researching skills through internet for students, A.H. Qasymov¹⁹ proposed to establish an information culture of college students through content-wise integration of courses.

L.P. Abisheva²⁰ (2007) scrutinized the theoretical basics of individualizing the studying activities of university students by means of computers and revealed the didactical capacities. She suggested the software that individualizes students' studying activities by means of computers and multi-level as well as multi-variant tasking system.

Having analyzed works of the above-mentioned scholars, we have been convinced in pursuing an absolutely new line of research.

Conclusion

In our research, we have analyzed scientific works, developed and tested a structure-content model, which will make students' artistic self-development through the use of information and communications technology more efficient.

Our research, dedicated to students' artistic self-development through their use of information and communications technology, embraced the theoretical, methodological, technological aspects. The obtained results have proven the correctness of samples motivating students' artistic self-development through their use of information and communications technology.

¹⁸ N.G. Daumov, *Developing researching activities of students in the process of the education computerization*, Ph.D thesis, Almaty, 2003.

¹⁹ A.H. Qasymov, *Pedagogical conditions of integrating knowledge of college students through new information technologie*, Ph.D thesis, Atyrau, 2007.

²⁰ L.P. Abisheva, *Individualization of studying activities of university students by means of computers*, Ph.D thesis, Turkistan, 2007.

"The Content-Structure Model of Students' Artistic Self-Development
Through the Use of Information and Communications Technology," *Astra
Salvensis*, VI (2018), no. 12, p. 363-383