Pedagogical Capacity of Multimedia Laboratory of Educational Resources in Specialists Training Within the Conditions of On-Line Learning

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Abstract

One of the most important directions of application of information and communication technologies in education is use of multimedia opportunities of the computer equipment. Use of multimedia training aids allows to activate training activity due to gain of visualization and the combination of logical and figurative methods of assimilation of information. Interactivity of multimedia technologies gives ample opportunities for implementation of the personal oriented training models. According to the authors, only multimedia electronic educational resources can compete with the teacher as can be carriers of informative educational interaction from all training aids existing now. The purpose of this article is consideration of capacity of multimedia laboratory of educational resources in modern process of educational activity and providing the qualitative educational multimedia content in training of specialists in the conditions of network training. Multimedia laboratory of educational resources – the prize winner of the Head of the Republic of Dagestan in the field of implementation of the innovative technologies in education. On-stage performance groups are made for implementation of this purpose: the teacher-developer, on which multimedia electronic educational resources, and technicians of laboratory are developed for development of multimedia electronic educational resources; the programmer-developer; the screen designer, etc., with accurate distinction between tasks and functions of each member of team are created. Multimedia electronic educational resources are developed by the principle of the branched computer training program and have

modular structure. The received results of data of pedagogical experiment allow to claim that use of the multimedia electronic educational resource in training of students is effective as positively influences the level of assimilation of the training material or on quality of assimilation, significantly increasing its level.

1 Introduction

Due to the mass informatization and large-scale development of information and communicative technologies in all spheres of activity, education does not stand aside in any way and assumes various innovations. Many directions of modern education are directly connected with development of information and communication technologies, the increased volume of educational and scientific content, active interaction of users in a network. Introduction of information and communication technologies in pedagogical science and practice initiated, in fact, a new stage of development of didactics of the higher school, is a significant factor of integration of Russia into the international educational space, is caused by transition of modern society to information stage of development.

The subject of network or electronic training, or still online training, is actual as in the modern world, introduction of computer technologies to educational space affects a condition of an education system and education in the Russian Federation confident steps leaves from usual to network training. Network training at the moment is one of the most dynamically developing fields of education what the international and national programs confirm. In the advanced researches, electronic training is characterized as the process of formation of knowledge, abilities, skills at interactive interaction between the teacher and the trained and interactive source of information resource reflecting all components peculiar to educational process, executed in criteria of realization of means information and computer technologies [Ponachugin, 16].

Robert I.V., Robert understands the organization of educational activity as electronic training with use of information which is stored in these bases and used at realization of educational programs and information technologies providing its processing, technical means, information and telecommunication networks providing transfer on lines of interrelation of the specified information, interaction of pupils and teachers [13].

Network training is based on ideas of mass cooperation, ideology of the open educational resources, in combination with the network organization of independent interaction of participants which are (trained). Network training is based on ideas of "horizontal" educational activity and mutual training (i.e. the doctrine and training in the model "equal to equal") unlike traditional pedagogiy and an andragogy [Nagayeva, 13].

Network training as an organizational phenomenon comprises huge potential. The network form of realization of educational programs is one of the directions of improvement of quality of education and the academic mobility at the higher school.

According to many domestic and foreign scientists, network training becomes the highly effective innovative technology allowing higher education institutions today not only to survive, but also to develop dynamically.

Network training predetermines introduction of new educational technologies, methods and approaches in teaching and training, new economic mechanisms, and also other institutional and organizational structures that in total represents unity of technological, economic, pedagogical and organizational innovations. Development of economic innovations in education is carried out in the conditions of the market relations that allows to strengthen the competition in the sphere of the provided educational services and educational products among the educational organizations of various forms of ownership. The used educational technologies in an education system, in particular in the form of online and offline - training, change nature of teaching activity, thereby making impact in general on development and transformation of a pedagogical subsystem in which a new educational environment is created. All these innovations, both technological, and economic and pedagogical, assume also change of the available organizational structures of the educational organization. In structure of higher education institution or other educational organizations the centers, departments, virtual schools directed including on maintenance of model of distance interactive learning are created. The similar model of training by means of the Internet may contain such forms as webinars, a chat - and web occupations, web conferences, online meetings and seminars, etc. [Yakovleva, 15].

Many universities have considerable experience of the organization of training at a basis of network programs which were designated before as "joint programs" and "programs of double diplomas". The hard work on creation of joint programs was conducted within Bologna Process. The standard and legal basis for implementation of programs in a network form in the Russian Federation appeared in 2012 after entry into force of the Federal law No. 273 of Federal Law "Of Education in the Russian Federation". By article 15 of the law it was established

that the network form of realization of educational programs is understood as the organization of training with use of resources of several organizations which are carrying out educational activity including foreign, and also if necessary - with use of resources of other organizations. Such broad treatment which is not limiting the list of the organizations involved in a network form of realization of educational programs opened to universities new opportunities. First of all, it concerns the organization of the practice-focused training at a basis of development of cooperation with the scientific, production and other organizations possessing unique modern resources for training of specialists. For university science - this cooperation with the leading scientific centers, introduction of innovations in the content of education, especially at the level of preparation of scientific shots. From positions of economy of education is the possibility of decrease in costs of updating of financially technical and research base through collective use of resources.

For students - it is a possibility of acquisition of unique competences, rapprochements of theoretical training with practice, implementation of practice-concerned projects by orders of employers during training.

Thus, a modern "educational era" with the available information resources and technologies opens not only before the states, but also before the education system, the educational organizations, teachers and trained unique opportunities of various level. Along with a traditional education system, network training at a basis of multimedia technologies, network interaction with a possible entry into "co-learning centers" (the centers of coeducation) represents innovative approach in an education system.

Submitting the priority project in structure of the State program of the Russian Federation "Development of education" for 2018-2025. "The modern digital educational environment in the Russian Federation", at a meeting of presidium of Council at the President of the Russian Federation for strategic development and priority projects, the prime minister Dmitry Medvedev emphasized that formation of the digital educational environment is a strategic national objective. Project purpose: to create conditions for system improvement of quality and expansion of opportunities of continuous education for all categories of citizens due to development of the Russian digital educational space.

For achievement of this purpose the way of widespread introduction of online training, including, mass open online courses - the training courses with interactive participation and open access on the Internet is chosen. It has to lead to the end of 2025 of increase in number of the trained educational organizations which mastered online courses to 11 million people.

2   Problem Definition

In the modern world an integral part of educational process is active development and use of means of network training and remote educational technologies where the main component are multimedia electronic educational resources, in all spheres of professional and pedagogical activity.

Practice showed that positive transformations in society cannot be reached within traditional model of training. Modern educational technologies give the chance to increase quality of education and more effectively to use school hours. They are focused on individualization, a distantness and variability of educational process, the academic mobility of students, irrespective of age and education level.

The multimedia is priority area of information technologies and has great opportunities in education. Among modern researches there is a significant amount of works in which the priority of use of multimedia technologies in education is noted (N.V. Apatova, Yu.S. Branovsky, J. Bruner, N. Gardner, G. Deyvis, D. Dzhonassen, Yu.N. Egorova, V.A. Izvozchikov, S.S. Kravtsov, E.S. Polat, I.V. Robert, N.V. Safonova, S.A. Hristochevsky, etc.) . The separate directions of process of design of multimedia educational resources (T.G. Vezirov, S.G. Grigoriev, S.V. Zenkina, O.A. Kozlov, A.V. Osin, I.V. Robert, N.V. Sofronova, V.A. Traynev, S. A. Hristochevsky), a role of multimedia educational resources in formation of uniform educational space (V.I. Zhog, M.N. Pankin, S.V. Panyukov), creation of multimedia educational resources for distance learning (M.A. Evdokimov, O. A. Zakharova, A.V. Petrov, E.S. Polat) are intensively investigated.

Now a large number of various multimedia electronic educational resources which are even more often used in training is created, significantly increasing quality of educational and scientific activity and which range considerably extended: from creation of the training programs before development of the complete concept of creation of educational programs in the field of multimedia, formation of new tutorials. The idea of multimedia consists in use of various ways of submission of information, inclusion in the software video and a soundtrack of texts, high-quality graphics and animation allows to make the software product is information saturated and convenient for perception, to become the powerful didactic tool, thanks to the ability of simultaneous impact on various channels of perception of information. Prospects of new technology for education were estimated by the

international community, at the 28th session of General conference of UNESCO within the Education program the research project "Technologies of Multimedia and Development of the Personality" was founded [Knyazeva, 10].

Multimedia information as the effective instrument of receiving, fixing and application of knowledge allows to reach quality education that considerably increases interest of students. Multimedia, enriching training process, involving in process of perception of information the majority sensual a component of trained, is one of the perspective directions of informatization, mass communication and globalization of education.

The success of use of modern technologies in education depends on the level of the software and methodological ensuring educational process, and also on a skill level of teaching structure. The modern education system provides equipment of educational institutions the interactive multimedia equipment and information systems for active work of the teacher and effective perception of information provided to students.

Use of multimedia in educational process through visualization and interactivity stirs up cognitive activity of the trainee and develops algorithmic style of thinking. Carrying out occupation with use of multimedia technical means, allows to consider problematic issues in the interactive mode. Competently picked up multimedia strengthens attention, positively influencing understanding of content of educational occupation and an emotional background of occupation. As show the tests spent 72 hours later after an explanation of new material if these data move in an oral form, the person remembers from them about 10 percent, and in a case with multimedia this indicator raises to 50 percent [Vezirov, 17].

A number of scientists in the researches showed that use of multimedia means as instrument of activity means emergence of new forms of cogitative, mnemic, creative activity. Multimedia means have structure, considerably different from the printing text. Images and sounds create models of recognition and are turned to the sensual party of the subject. Use of this property, creation of a lesson on the basis of processes of the organization and interpretation of multimedia information considerably increases the potential of human thinking, causes certain changes in structure of cogitative activity. The multimedia environment has significant effect on the main characteristics of thinking: tendency to experimenting, flexibility, connectivity, degree of structure. All listed characteristics provide the informative processes connected with creative activity and the solution of problems. Ideas not only of thinking, but also of other mental functions are exposed to revision: perception, memory, representations, emotions, etc. Before psychologists and scientists-teachers there was already a task of the conceptual description of development of human activity and mental functions of the person in the conditions of technologization and use of multimedia means in education [Astvatsaturov, 15].

I.V. Robert in the work [Robert, 94] allocates the basic didactic provisions of use of multimedia educational technologies: training process individualization; implementation of diagnostics of results of educational activity; organization of self-checking; computer visualization of educational information; modeling and imitation of the studied or used objects, processes and the phenomena; use of information databases and ensuring access to network resources; strengthening of motivation of training; development of a certain type of thinking (for example, evident and figurative and theoretical).

Certainly, creation of multimedia electronic educational resources demands participation of the experts owning programs of computer animation 3DMax, Macromedia Flash, etc., computer-aided engineering systems and drawing of ProtoCad, AutoCad, etc. Training in a format online (network) changes very tectonics of activity of the teacher, according to his process of interaction and communication with trained.

For the solution of these tasks we realize the "Multimedia Laboratory of Educational Resources" project.

The purpose of our project is development and mass introduction of qualitative multimedia electronic educational resources in training of specialists since use of multimedia technologies through network training opens new opportunities in the organization of educational process, energizing of cognitive activity of the trainee through visualization and interactivity, and also in development of its creative abilities.

3   Development Of A Technique

For realization of this purpose we create temporary on-stage performance groups, presenting it in the model form which part teachers of disciplines on which multimedia electronic educational resources, (teacher-developer) and technicians of laboratory are developed for development of multimedia electronic educational resources (the programmer-developer, the screen designer, etc.), with accurate distinction between tasks and functions of each member of team (fig. 1) are.

1. Functions of the teacher-developer. The requirement to the teacher participating in development of a multimedia educational resource have to consist of a set of the traditional professional competences and specific

questions connected with use of modern ICT in educational process. Thus, a necessary condition of participation of the teacher in development is computer literacy, knowledge of subject domain, creative approach to work, and also readiness and desire to use the ICT tools in professional activity. To the teacher-developer, it is necessary to think over the scenario of realization of interactivity of the developed multimedia educational resource.

2. Function of the programmer-developer can be presented to three stages:

- stage 1: design according to the specification. At this stage the conceptual logic of work of a multimedia educational resource and mechanisms of data transmission in the client server model according to the received specification is projected. Then the programmer develops mechanisms of interaction between the client and the server party, and also flowcharts of algorithms of program modules and charts of interaction of entrance and output data flows of the designed system. In addition, also the model of protection of the user data against external hindrances and data protection of the server from possible attempts of the choice of the correct answer in tests is projected.

- stage 2: realization of a multimedia electronic educational resource. At this stage there is a main part of a production activity of the programmer including development of design of the interface and its realization by means of hardware and the software.

- stage 3: post-release works. At the final stage there is a coordination of the done work with the teacher, amending and changes in a program code and the interface of client part of the program taking into account remarks of the teacher.

The conducted researches Mayer R.E. and She Hsiao-Ch. demonstrate that the students who are trained with use of a multimedia electronic educational resource work in the subsequent tests and practical tasks better, than students who obtained the same information only in words.

Besides, R.E. Mayer and its colleagues made a series of experiments and found out that examinees who received animation with the simultaneous audio-narration surpassed subjects who received animation with simultaneous submission of the printing text on the screen [Mayer, 09].

Modern multimedia electronic educational resources well correlate with regularities of training (presentation, interactivity, consciousness, consistency, problematical character); the didactic principles (orientations of training, scientific character, sequence and consistency, unity of education, development and education, communication with real professional problems, high level of difficulty, fast rate of passing of the studied material, the prevailing value of theoretical knowledge, formation of sensibleness and possession of receptions of the doctrine); with the principle of creation of necessary conditions for training (availability, consciousness, sensibleness and effectiveness of education, a combination of various methods acts also tutorials depending on its tasks, contents and methods of training); with category of forms of the organization of training (collective, group, individual), etc.
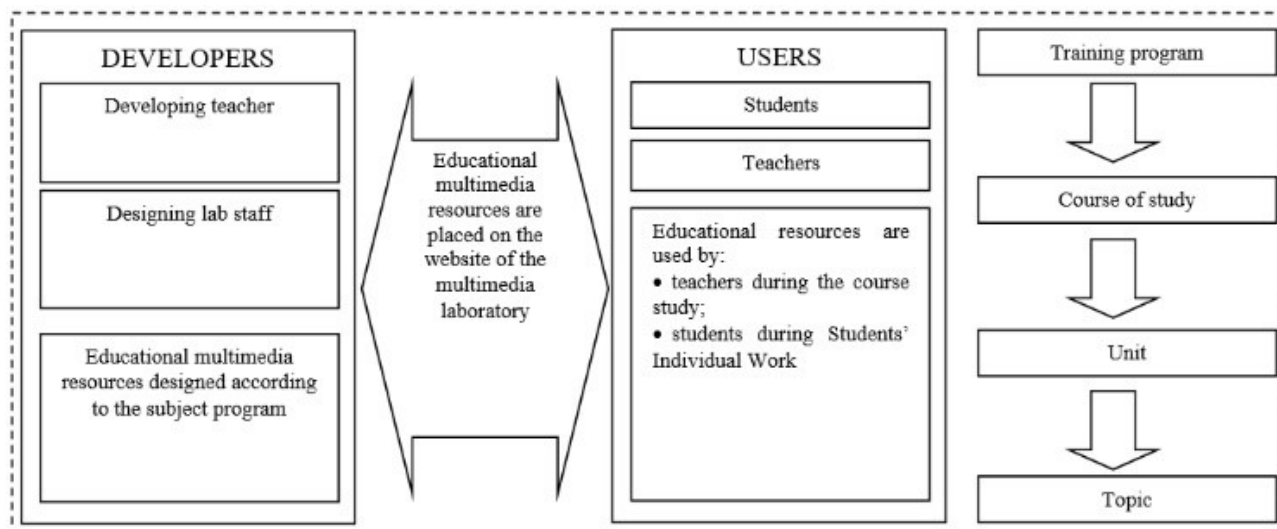

Figure 1: Model of work of multimedia laboratory of educational resources

In our opinion, from all tutorials existing now only multimedia electronic educational resources can compete with the teacher as can be carriers of substantial educational interaction.

Achievement of the purpose and the solution of the set pedagogical tasks is possible if multimedia electronic educational resources is modular architecture and respectively separate electronic educational modules are developed taking into account the basic and special principles of the general didactics and techniques of teaching subject matters - standard requirements to the organization of educational process: modularity; structuring of content of training on separate elements; dynamism; effectiveness and efficiency of knowledge and their system; flexibility; conscious prospect; versatility of methodical consultation; equal share; unification; openness and variability; present; independence; interactivities; appropriateness of age [Vezirov, 18].

In our opinion, multimedia electronic educational resources have to be constructed by the principle of the branched computer training program. The first - the basic level has to contain the basic concepts, definitions of a subject and an illustration of these concepts and definitions. Making about a half of a training material and to contain a detailed statement of all questions of the training program: course subjects. This level, has to give the finished complete picture of a subject. The second level includes a profound statement of single questions for that trained which wish to expand the knowledge in the matter.

The multimedia electronic educational resource has modular structure and according to the working program of discipline is divided into modules (fig. 2).

Logic of creation of a multimedia electronic educational resource on discipline such is that the used elements are in the following interrelation among themselves: transition to the following element of a course is not possible without performance of "Criterion of performance" of the previous element.

For example: "PT - Practical tasks" will not be open until trained passes test and depending on that how many balls will gather moves to an appropriate level (the minimum lowest passing score - 50, "PT-B" - a basic level 50 - 80, "PT-U" - profound 81 - 100). In turn performance of practical tasks opens a possibility of studying of the following subject.

The structure of a multimedia electronic educational resource can include the working program of discipline, a reference media, encyclopedias, references to other educational resources including on the Internet, anthologies, video lessons and so forth. The working program of discipline is the main standard and methodical document which determines volume, contents and an order of studying of a training course.
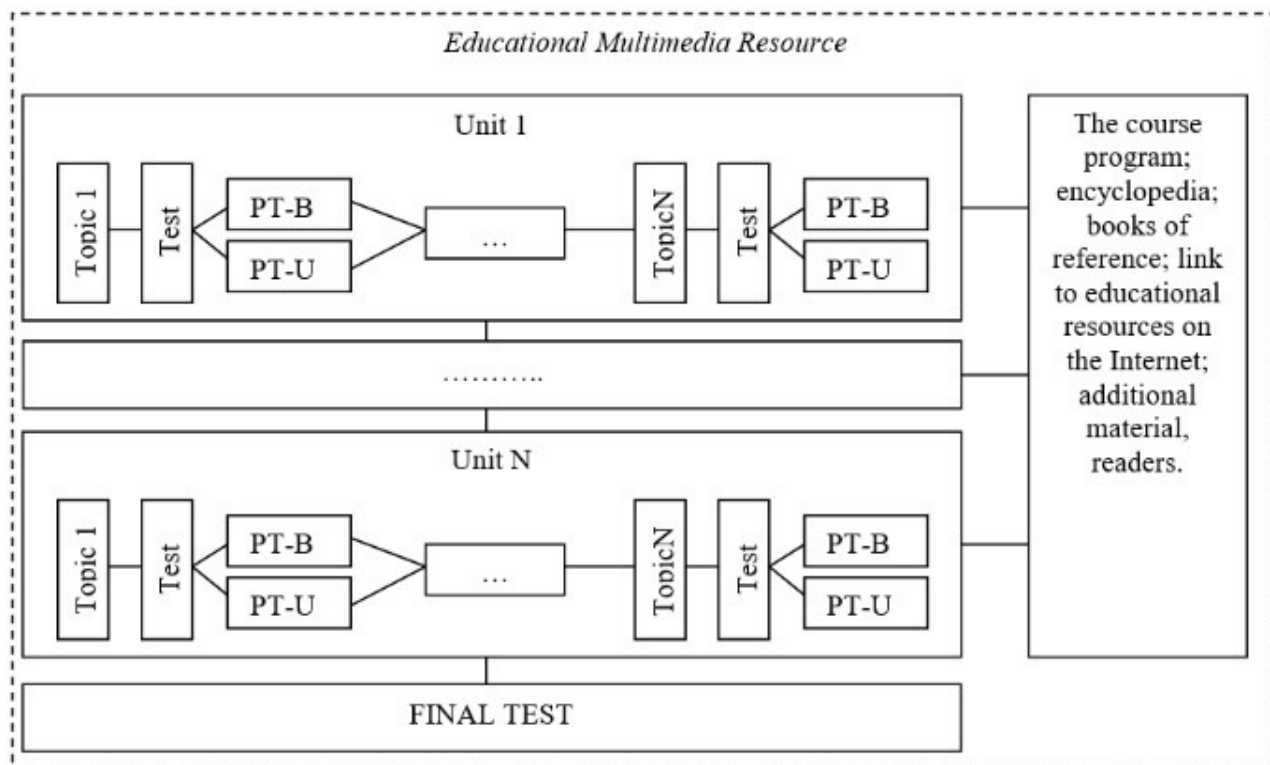

Figure 2: Structure of a multimedia electronic educational resource

4 Results

For achievement of a goal pedagogical experiment was made. At the initial stage among students of the Dagestan state medical university and Dagestan state pedagogical university we conducted survey which problem was to learn the relation of students to use by teachers of multimedia electronic educational resources in educational process.

According to result of poll of students of 1-3 courses, 93,49% are positive to multimedia electronic educational resources, 4,65% - have a neutral position in relation to resources of such character, and only 1,86% negatively perceive them. 72,54% of students consider multimedia educational resources effective as the training material better is perceived, acquired and occurs saving of time.

The assessment of learning efficiency of students with introduction of an author's multimedia electronic educational resource on discipline of "Information scientist" was the main task of the following stage. At this stage for a learning efficiency assessment the level of assimilation of a training material or quality of assimilation is chosen as us. For definition of indicators of assimilation during experiment we addressed the assimilation levels offered V.P. Bespalko who allocates several levels of assimilation at examinees, such as: 1) knowledge acquaintance; 2) knowledge copy; 3) knowledge ability; 4) knowledge transformation [Bespalko, 89].

During experiment students had to reach the third and fourth levels of assimilation. The test ladder was offered them (tasks 4-level complexity) that gives rather objective material about the level of knowledge and allows to apply a rating scale of quantitative characteristics of process of training.

Criteria of exposure of points by results of performance of tasks corresponded to the level of assimilation and were determined by a twelve-ball scale. For the first level the lower limit made 1; for the second level - 4; for the third level - 7 and for the fourth level - 10. In case the GPA got by the student appeared below possible minimum value of this level, we considered that the trainee did not acquire a training material at this level. The total assessment was defined by a GPA of the highest level which is successfully passed by the student.

It is necessary to draw a conclusion that results of students in experimental group were rather high, than results of students of control group.

By results of the obtained data it is possible to claim that use of a multimedia electronic educational resource in training of students is effective as positively influences the level of assimilation of a training material or on quality of
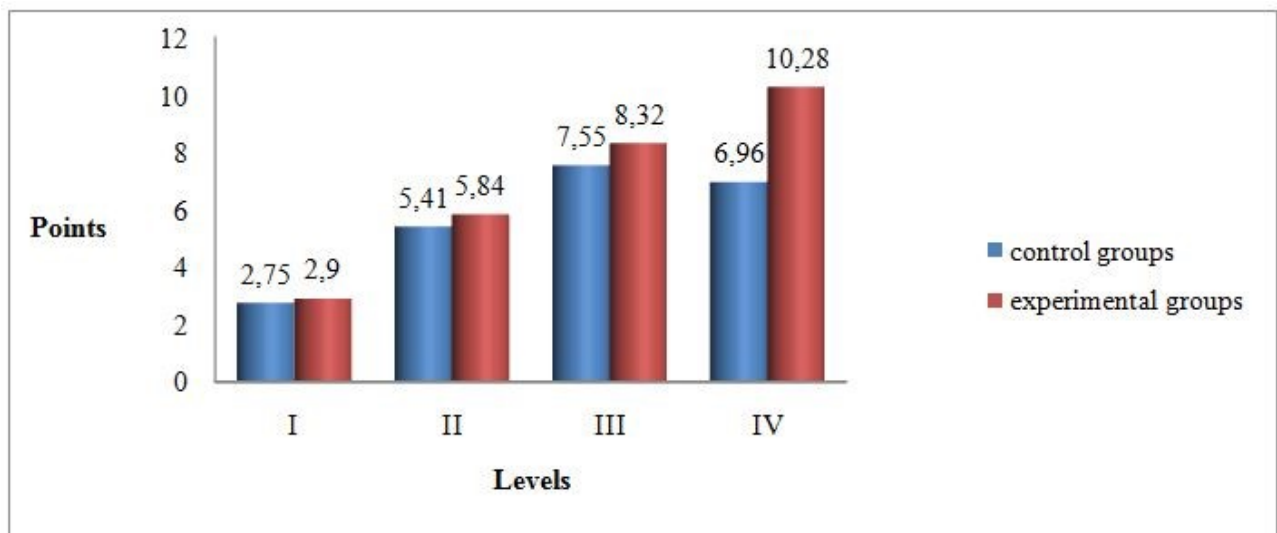

Figure 3: Indicators of level of assimilation of a training material in control and experimental groups

Success of experimental group is explained the third and fourth levels of assimilation of a training material, in our opinion, by application in training of students of this group of the author's multimedia electronic educational Informatics resource.

The purpose of teaching discipline to students, is development of profound fundamentals of informatics by them and modern information technologies, bases of representation of knowledge by means of information technologies, improvement of skills of work on the computer and use of these skills in practical activities.

Thus, the multimedia electronic educational resource allows students to acquire qualitatively a training material on discipline of "Information scientist". Results of intermediate and final assessment of students also testify to it.

5 Discussion

Results of researches were discussed at departments in each of the specified educational organizations, at the International and All-Russian scientific and practical conferences.

In 2017 within a grant of the Head of the Republic of Dagestan by results of a competition in the field of education on support of pedagogical employees of the educational institutions introducing innovative technologies, the "Multimedia Laboratory of Educational Resources" project became the winner.

The electronic multimedia electronic educational resources developed by us are posted on the website "Multimedia Laboratory of Educational Resources" (www.multilab-edu.ru <http://www.multilab-edu.ru>)

6 Conclusion

The main aspect in a modern education system creation of conditions for independent work of the free access to various information resources which is trained with granting on the Internet and on various websites and portals of the country and other higher education institutions, and also introduction of network technologies and in the higher education institution, at the department is considered.

The website of multimedia laboratory - the information, scientific, educational and communication basis of modernization of pedagogical activity of higher education institution promoting creation of new model of education in the conditions of informatization of an education system of society.

Problems of the website of laboratory:

1) to provide timely access to students and teachers to constantly updated information;

3) to concentrate on the website of the reference to the thematic educational websites and portals of other higher education institutions;

4) to provide to students and teachers access to all multimedia educational resources of laboratory;

5) to create conditions for introduction of innovative technologies of training in pedagogical activity of the teacher;

6) to provide photographic materials about activity of laboratory;

7) to provide continuous monitoring of scientific and pedagogical activity of department;

8) to conduct the current information and advertizing work.

For teachers the website of laboratory has to become a necessary, vital component of pedagogical activity. It has to provide, first of all, information exchange between the teacher and the student and to facilitate interaction between them through providing necessary educational information (educational and methodical materials).

The website on the Internet allows users to obtain quickly from laboratory fresh information constantly 7 days a week. Using the hypertext, interactivity inherent only in the Internet, it is possible to achieve effective impact on students.

Within this website in the subsequent it is planned to conduct network interaction with other higher education institutions.

Consecutive implementation of the "Multimedia Laboratory of Educational Resources" project will promote formation of the regional innovative system of professional education demanding training of specialists of innovative type, having creative thinking, profound knowledge, abilities, skills in a certain subject domain and in the adjacent areas capable to master high technologies, to develop, introduce and extend new competitive products and technologies. Formation of the innovative type which is trained in higher education institution can be successfully realized in a bachelor degree, a specialist programmer and a magistracy.

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