III. ПРОБЛЕМИ МЕТОДИКИ НАВЧАННЯ ТЕХНОЛОГІЧНИХ ДИСЦИПЛІН

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CRITERIA AND INDICATORS OF EFFICIENCY OF MULTIMEDIA APPLICATION IN THE PROCESS OF TECHNOLOGICAL TRAINING

Determined effectiveness criteria, advantages of multimedia usage in technological education of students according to the stages of work (presentation of educational information, enhancing motivation of education, explanation of new material, completion of educational objectives, command and control of the quality of education, showing results of students' activity), who determined by the degree of self-education, the development of creativity, creation an atmosphere of aesthetic pleasure from the perception of information and process of mental activity. The analysis showed that multimedia education is not universal and has a number of both positive and negative features. This emphasizes the role of the teacher in the educational process. Means of teaching only help to vary teaching methods, organize the creative work of students in different ways, make lessons interesting and informative.

Keywords: *multimedia, criteria, indicators, technologies, technology training, students, teachers.*

Scientific issue. A non-stop process of informatisation of education, constantly growing level of educational institutions equipping on the one hand, and the lack of the methods of using computers for technological training on the other, require the development of pedagogical conditions of the use of information and communication learning technologies and, in particular, multimedia.

The solution of any problem requires disclosure of the essence of its original definitions. Based on our research subject, such definitions are the following: «technologies», «multimedia», «multimedia education technology», «multimedia means».

Literature review. Let's analyze the etymology of the term «Technologies». In modern dictionaries the term «Technologies» is defined as:

1) from Greek technē – «art, skill + Logos – science, it means - a combination of processing procedures used in the production process and its scientific description (School dictionary of foreign words, 1990);

2) (techno- and -logy) – set of ways of information processing, products production and processes that accompany these types of work (Dictionary of foreign words, 1974);

3) Body of knowledge, information about the sequence of individual manufacturing operations in the production process. School subject that teaches this knowledge. Or a set of methods of materials processing, products manufacturing. etc. (Great Dictionary of Modern Ukrainian language, 2001).

Based on the analysis of these definitions we can identify the main words that characterize the «technology» – production, skill, science. So, the term technology combines the concept of knowledge («science»), skills («art») and activity («production»). Thus the term «technologies» reflects the convergence and combination of science and technology.

Basic material delivery. With the development of educational means and computerization

of education, the «technology of education» can be described as a system of resources, methods of organization and management of educational process, which includes the whole process of goal setting, constant updating of educational content, testing of alternative strategies and educational materials.

The analysis of the term «multimedia» has shown that the term «multimedia» was originally two separate words: «multi» and «media». «Multi», from Latin, means «a lot», «more than one». At first it was a combined form of such compound words as multimillionaire and multiplier. In its turn, «Media» can be translated as «means of communication» and for a long time it was associated with mass media, in other words mass means of communication, such as newspapers, magazines, radio, television and etc.

The term «multimedia» as a one word emerged in the 80 years of the twentieth century and meant «several means of communication» (L. Issing, 1994). With the development of computer technologies, IT professionals began using the term for the definition of computer programs and products containing sound, graphics, video and text. In modern dictionaries «multimedia» is defined as:

1) the term for definition multiple means of communication that combine several media (B. Cayne, 1992). B. Cayne suggests synonyms of the word multimedia: intermedia – art products containing various means of art and science, for example, movies, dances, computer graphics, still images; and mixed media – the use of several types of communication simultaneously with the presentation;

2) the term for definition of computer technology that allows managing different streams of information flexibly – texts, graphics, music, video images (D. Kindersley, 1998). We believe that it is the right interpretation of this term, but with the introduction of multimedia in education, the term got slightly different meaning. Collins English Dictionary defines term multimedia that the most precisely fits education:

3) the use of different media in education such as books, television and radio (P. Collin, 2001).

Some researchers have attempted to define the essence of multimedia.

M. Buharkina notes that «multimedia is a computer technology used to present not only text, but also graphics, colors, animations, video in any combination» (M. Buharkina, 2001).

Kravtsova and L.Kravtsov defines multimedia as a «complex of hardware and software that allow using computers to work with text, sound, graphics, animation and video» (L. Kravtsov, G. Kravtsov, 1997).

Y. Romanenko believes that «multimedia is the possibility to support material with music, use the animations, video and sound effects, and the possibility of combining ready-made automated software» (Y. Romanenko, 2004).

L. Shevchenko gives the following definition: «Multimedia – a special interactive technology, providing by means of hardware and software the work with animated computer graphics and text, language, high-quality sound, still images and moving video» (L. Shevchenko, 2002).

J. Nelson notes that «multimedia is a «key technology « of information space, open information world that is presented in the form of portals, search systems, directories, websites, electronic dictionaries, encyclopedias, virtual universities» (J. Nielsen, 1996).

The problem of training tools has always been a subject of didactics. At the beginning of XX century Stoyunin V. wrote: «The value of teaching each school subject depends not so much on the personality of the teacher, but on those educational tools, that he can freely use. Without them, he does not have an opportunity to meet the educational requirements, no matter how thorough and reasonable they seem to be» (V. Stoyunin, 1908).

Psychology and philosophy considers the use of tools that alter human activities as one of the fundamental conditions and a significant indicator of human development. Distribution of labor according to this meaning is the most important characteristic of the development of human civilization. These processes determine the efficiency and quality of education.

The Large explanatory dictionary of modern Ukrainian language defines the term «means» as: a special kind of action that makes it possible to implement something, achieve something; way; an instrument that causes any action. Audiovisual means are the means based on the simultaneous perception by hearing and vision. Means of production – a set of tools and subjects of labor used in manufacturing of goods, work and services. Means of reproduction: in information processing systems – programs and procedures designed to playback data in case of distortion or erasing» (Great Dictionary of Modern Ukrainian language, 2001).

Today, the issue of using multimedia teaching tools in education is very significant. L. Pressman notes that «... the teaching and learning process is considered as a dialectical integrity, including complex and contradictory structural subdivisions (units). The development of the teaching and learning process is carried out by overcoming its inherent contradictions. Teaching tools play a significant role in the process of overcoming these contradictions» (L. Pressman, 1988).

Education using computer as a means of gaining, mastering, solidifying knowledge, the development of thinking and control of these processes brings together a variety of technologies: from simple programs to reinforce skills to intelligent tutoring systems that provide reflexive training management, conduct dialogue with student, language, close to natural, and upon the accumulation of experience, improve the strategy of solving educational assignments.

I.Bogdanov, A. Sergeev describes means of information technologies as a «software and hardware functioning on the basis of the microprocessor, computer technology as well as the modern means of information exchange that provide information collection, storage, processing, transmitting» (I. Bogdanov, A. Sergeev, 2001).

So, if you compile and combine different and at the same time correct definitions than multimedia should be considered as a set of different education technologies, such as text, graphics, music and video, software and hardware. While using these means students can obtain knowledge and improve their skills. The review of literature has confirmed that the use of multimedia raises many contradictions, significant from the point of view of psychology and pedagogy. One of these contradictions is the psychology of communication of teachers and students with multimedia resources and computers.

The conditions to promote learning activities and develop students' professional interests while learning technology, chemistry, physics and other technical subjects are: the integration of educational material with vocational guidance; the use of innovative teaching methods; the creation of a special learning environment in order to form need and interest in the use of information and communication technologies; the completion of carrier guided tasks with the use of multimedia; the ensuring the integrity and continuity.

The systematic use of multimedia provides: the improvement of the quality of visual aids use; the establishment of interdisciplinary relations; the organization of students' project activity with the creation of training programs under the guidance of teachers; the logical construction of educational material, which has a positive impact on the level of students' knowledge; the increase of learning motivation; the changing attitude to computer. The students begin to perceive it as a universal tool for work in any field of activity.

It should also be noted that the methodology of multimedia application at various stages of a lesson may significantly differ. The stage of revision and summing up the educational material is very complicated considering both the method of implementation and opportunities to enhance students' work. They meet already known events and phenomena, scientific facts, that's why there is the goal to find such instructional techniques and tools that would help not only to reproduce acquired knowledge but also to systematize and generalize, complement and enhance it. At these stages the importance of the multimedia means application is that they are making the classes more interesting. Due to the content and form of presentation they make it possible to reproduce in a short time a great amount of material and create new images, specify vaguely formed concepts, enhance students' knowledge.

O. Pinchuk (2007) states that the application of multimedia in the process of revision and summing up educational material can be designed for individual work, comparison, solving specific cognitive tasks. Using this material students have to figure out the essence of phenomena and processes, the importance of the event, draw up some conclusions. In this case information due to its didactic purpose can be applied as a material for independent work.

The didactic role of multimedia application in the process of revision and summarizing differs from its application during explanation stage. The difference is that revision can cover multiple topics and material can be used not as a source of knowledge, but as a base or additional illustration of obtained knowledge, for example, from chemistry, technology and other disciplines.

The multimedia methodology depends on whether it is already known to students or it is introduced to them for the first time. If one uses multimedia program constantly it would help not only reproduce the teaching material, but organize it, enhance and generalize. If multimedia means are not used previously their didactic purpose would be different: they not only reproduce the known material, but present it in the new form, complement with new facts, help to generalize and systematize the knowledge.

It is worth mentioning that during the classes multimedia teaching program can be used with high efficiency not completely, but with separate fragments if you want to simulate the complex process or phenomenon that students have learned not enough. However, some multimedia means can be successfully used during revision process for the purpose of generalization and systematization a great amount of material, topics studied in other disciplines. For example, when learning the theme «Elements of Materials» multimedia teaching program «Chemistry in pictures» can be used as a material for revision and testing the knowledge.

According to the various learning objectives, content and purpose of revision, multimedia means can be used during explanation with the elements of revision, as well as during separate classes as visual material, manual for individual work or as a means of revision, generalization and systematization of knowledge. According to it, the place of multimedia information and methodology of its application can be altered.

Consequently, the multimedia means can be used in different ways according to the needs of a particular type of class, level of different programs awareness and the availability of certified programs. These needs can be classified according to the following criteria: the usage both frontal and group work; mostly frontal forms of work; the use of electronic textbooks only as a means of individual learning; the use of certain types of files (images, video, audio, animation) from electronic educational means, distance learning courses, some materials from the Internet; the creation of own lessons through the integration of different objects in one format – presentations, projects, web-pages. The teacher has to choose the required material not only from the printed textbooks and electronic media, but also using other sources of information, including the Internet.

The analysis of pedagogical, psychological and technical literature allowed us identifying effectiveness criteria, advantages of multimedia usage in technological education of students according to the stages of work determined by the degree of self-education, the development of creativity, creation an atmosphere of aesthetic pleasure from the perception of information and process of mental activity:

Stage of the work: Presentation of educational information.

Effectiveness criteria: Ability to expand representation of information (color, graphics, animation, sound, video). Clarity of information.

Effectiveness indicators and benefits: Modeling and forecasting allow reproducing the real situation. Due to its visual capabilities computer is superior to film and television.

Stage of the work: Enhancing motivation of education.

Effectiveness criteria: Differentiation of the learning objectives in terms of complexity. Providing individualization of the learning process.

Effectiveness indicators and benefits: The possibility to fulfill the assigned tasks, consider various options and propose innovative solutions; identify originality, ask any questions and offer any solution without risk to get a low score for it; this contributes to a positive attitude to learning.

Stage of the work: Explanation of new material.

Effectiveness criteria: Ensuring the active involvement of students to the educational process.

Effectiveness indicators and benefits: During the explanation even by experienced teacher students perceive new material differently: some did not understand anything; others have already known that material; rest at that moment simply turned away thinking about something else. Most educational process is based on an average student. Use of multimedia can significantly change the educational activities, for example, draw students into a certain game situation; also students can choose the best form of assistance (eg, demonstrate with detailed comments the way how to complete the task), the way of teaching material (expanded or compressed, with or without illustrations, etc.).

Stage of the work: Completion of educational objectives.

Effectiveness criteria: Providing and significant expansion of variability of educational objectives.

Effectiveness indicators and benefits: The use of multimedia permits to successfully complete such tasks as: modeling and simulation of various situations, search and solution of problems. It is also possible to expand the range of planning tasks as multimedia program allows evaluating the possibility of any decision making, including the unexpected, the effectiveness of the

chosen strategy and may constantly control the process of task completion. It is important that the student can «dive» in the specific situation, becoming a «participant» of events.

Stage of the work: Command and control of the quality of education.

Effectiveness criteria: The quality of the educational process

Effectiveness indicators and benefits: Multimedia tools allow qualitatively change control over the activities of the students, while providing flexibility in controlling the educational process. One of the main problems of traditional forms of learning is an inability to provide permanent control over the teaching activities. The computer makes it possible to check all the answers, and in many cases, it not only finds the mistake, but also accurately determines its nature, which may help to eliminate the reasons of its occurrence.

It is very important that modern multimedia teaching systems allow student defining what kind of help in solving educational objective he needs. None of the previously known educational means was intended for this. The most advanced intellectual educational systems upon the accumulation of data from the interactive dialogue with students can significantly improve the learning strategy, make it more effective. They can take into account a wide range of individual characteristics. Intelligent multimedia educational systems developing a dynamic model of a particular student, taking into account the peculiarities of his thinking and memory, perception and understanding of information, can control and manage training based on this model.

Stage of the work: Showing results of students' activity.

Effectiveness criteria: Getting the expected results.

Effectiveness indicators and benefits: Computer forces students to analyze their activity. Multimedia means allow students to visualize the results of their actions. In this respect intelligent learning systems have exceptional opportunities because they show correct answers as well as strengths and weaknesses of the selected strategies, informing about the most typical mistakes.

However, while using ICT and multimedia in the classroom, we should not forget that «creative» level of conversational human-computer interaction is determined by the content and level of his intellectual development. This means that interaction between man and multimedia resources should be based on personal knowledge.

The analysis showed that multimedia education is not universal and has a number of both positive and negative features. This emphasizes the role of the teacher in the educational process. Means of teaching only help to vary teaching methods, organize the creative work of students in different ways, make lessons interesting and informative, for example: the visualization aids (demonstration and encyclopaedic programs, presentations, e-training complexes, etc.) may be used while explaining the new material; virtual laboratory works using multimedia programs for technologies, chemistry, physics, etc can be carried out; trainings, online discussions, Web quests can be conducted while reinforcing your knowledge; the programs for control and grade (testing evaluation, monitoring programs) can be used; independent work of students (training programs such as «tutor» encyclopedia, educational programs) can be organized; Class-and-lesson system should be partially abandoned, integrated lessons, business and role-playing games, teleconferences can be conducted; modern Internet technologies can be used; specific skills of students (attention, memory, thinking, etc.) should be trained.

Conclusions. All the above mentioned proves the need of multimedia in the process of technological education. A modern education institution has to form in students mind not only a

certain set of competencies but also a desire for self-education, realization of their abilities. A necessary condition for the development of these processes is to promote teaching and learning activities. The multimedia plays an important role in solving this problem, creating the significant opportunities to enhance educational activities. Widespread use of multimedia in the process of preparation makes it possible to implement the principle of «learning with enthusiasm» and then technical disciplines (physics, chemistry, and technology) will have an equal chance to be favorite for students.

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КРИТЕРІЇ ТА ПОКАЗНИКИ ЕФЕКТИВНОСТІ ЗАСТОСУВАННЯ ЗАСОБІВ МУЛЬТИМЕДІА В ПРОЦЕСІ ТЕХНОЛОГІЧНОЇ ПІДГОТОВКИ

Виділено критерії, показники ефективності та переваги застосування засобів мультимедіа в процесі технологічної підготовки студентів відповідно до етапів роботи (подання навчальної інформації, посилення мотивації навчання, пояснення нового матеріалу, розв'язання навчальних завдань, управління та контроль за якістю освіти, відображення результатів діяльності студентів), що визначаються ступенем самостійності засвоєння знань, розвитком творчих здібностей, створенням атмосфери естетичного задоволення від сприйняття інформації, самого процесу розумової діяльності. Визначено, що мультимедійні засоби навчання не є універсальними і мають низку як

позитивних, так і негативних рис, що підкреслює роль викладача в освітньому процесі. Засоби навчання лише допомагають йому урізноманітнити викладання, по різному організувати творчу роботу студентів, зробити заняття цікавим і пізнавальним.

Ключові слова: *засоби мультимедіа, критерії, показники, технології, технологічна підготовка, студенти, викладачі.*

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КРИТЕРИИ И ПОКАЗАТЕЛИ ЭФФЕКТИВНОСТИ ПРИМЕНЕНИЯ СРЕДСТВ МУЛЬТИМЕДИА В ПРОЦЕССЕ ТЕХНОЛОГИЧЕСКОЙ ПОДГОТОВКИ

Выделены критерии, показатели эффективности и преимущества применения средств мультимедиа в процессе технологической подготовки студентов в соответствии с этапами работы (представление учебной информации, усиление мотивации учения, объяснение нового материала, решение учебных задач, управление и контроль за качеством образования, отображения результатов деятельности студентов), определяемых степенью самостоятельности усвоения знаний, развитием творческих способностей, созданием атмосферы эстетического удовольствия от восприятия информации, самого процесса умственной деятельности. Определено, что мультимедийные средства обучения не является универсальными и имеют ряд как положительных, так и отрицательных черт, что подчеркивает роль преподавателя в образовательном процессе. Средства обучения только помогают ему разнообразить преподавание, по-разному организовать творческую работу студентов, сделать занятия интересным и познавательным.

Ключевые слова: *средства мультимедиа, критерии, показатели, технологии, технологическая подготовка, студенты, преподаватели.*

ВІДОМОСТІ ПРО АВТОРІВ

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Коло наукових інтересів: підготовка майбутніх учителів технологій до інноваційної педагогічної діяльності.

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Research Interests: training future teachers of technology for innovative educational activities.

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СУЧАСНІ ПІДХОДИ ДО ФОРМУВАННЯ КУЛЬТУРИ ЗДОРОВ'Я МАЙБУТНЬОГО ВЧИТЕЛЯ ПРИРОДНИЧО-МАТЕМАТИЧНИХ ДИСЦИПЛІН

На основі аналізу наукової літератури виділено основні параметри педагогічної діяльності майбутнього вчителя, пов'язані з валеологічним вихованням; розкрито сутність та основні складові готовності майбутніх учителів природничо-математичних дисциплін до формування культури здоров'я школярів.

Ключові слова: *культура здоров'я, здоровий спосіб життя, готовність, валеологічне виховання, експеримент.*

Постановка проблеми. На сьогодні у суспільстві сформувалась соціальна толерантність, її намагаються зрозуміти, виправдати, посилаючись на власний вибір кожної особистості. Молодь практично проходить непросте випробування майже необмеженою