THE TECHNOLOGY OF APPLICATION OF MULTIMEDIA TOOLS IN THE PROCESS OF PREPARING STUDENTS OF ENGINEERING AND CONSTRUCTION UNIVERSITIES FOR EDUCATIONAL AND FUTURE PROFESSIONAL ACTIVITIES (ON THE EXAMPLE OF INTEGRATED LESSONS IN SPECIAL COMPONENTS AND ENGLISH LANGUAGE)

Abstract. Currently, the quality of higher education in Ukraine is considered one of the essential factors of the stable development of the country. Improving the quality of higher education is one of the most global issues that must be resolved in order to match the skills and abilities of future specialists to the modern labor market. The successful implementation of this task depends on the application of new methods and technologies of learning, aimed at acquiring knowledge, abilities and skills necessary for the implementation of educational and future professional activities at a high professional level. For this purpose, new multimedia technologies should be used, which will help future specialists to acquire knowledge, acquire skills and abilities necessary for the implementation of future professional activities, will make the learning process more interesting, more saturated, effective and modern. It should be noted that the use of new multimedia technologies in higher education helps to form and develop professional and personal qualities, such as: scientific attitude, imagination, initiative, scientific judgment, skills of independent work and research activity.

In today's world, the use of multimedia tools during the professional training of future specialists in universities is of great interest. Every year, students and teachers apply many means for improving the educational process. Humanity is surrounded by the latest technologies and gadgets everywhere. Currently, they are constantly present in all spheres of our lives, such as in education, work, even during rest. Now it is impossible to imagine the world without them, because they provide humanity with new opportunities for information exchange and communication.

Considering this, the modernization of the educational process and the introduction of the latest multimedia tools in universities is more than appropriate. Modern multimedia tools provide an opportunity to radically improve the quality and efficiency of training future specialists. Currently, computerization of various scientific disciplines is introduced into pedagogical practice, which is due to the
rapid development of multimedia. The mode of interactivity in combination with graphics, animation, photo, video and audio content creates a multimedia environment that helps to activate the educational and cognitive activities of students of modern universities.

The relevance of the topic of the article is determined by the need to improve the process of using multimedia technologies in the professional training of future specialists. Opportunities provided by multimedia technologies in the educational space attract the attention of researchers both in Ukraine and abroad. Since the spread of the coronavirus in 2020 and the war (2022), Ukraine has completely switched to online education, which led to the emergence of new multimedia tools in order to improve the educational process in this terrible time.

Keywords: readiness; model; technology; multimedia technology; higher; engineering and construction profile; educational activity, future professional activity.

Dubinenya Natalia Vasylivna candidate of pedagogical sciences, docent of the department of foreign languages, Odessa National Academy of Architecture and Construction, Dviriska, 4, 65029, tel.: (050) 607-52-17, https://orcid.org/0000-0002-3250-9528

ТЕХНОЛОГІЯ ЗАСТОСУВАННЯ МУЛЬТИМЕДІЙНИХ ЗАСОБІВ У ПРОЦЕСІ ПІДГОТОВКИ СТУДЕНТІВ ІНЖЕНЕРНО-БУДІВЕЛЬНИХ ВИШІВ ДО ЗДІЙСНЕННЯ НАВЧАЛЬНОЇ ТА МАЙБУТНЬОЇ ПРОФЕСІЙНОЇ ДІЯЛЬНОСТІ (НА ПРИКЛАДІ ІНТЕГРОВАНІХ ЗАНЯТИЙ ЗІ СПЕЦІАЛЬНИХ КОМПОНЕНТІВ ТА АНГЛІЙСЬКОЇ МОВИ)

Анотація. Наразі якість вищої освіти в Україні розглядається як один із суттєвих факторів стабільного розвитку країни. Підвищення якості вищої освіти є одним із найбільш глобальних питань, які мають бути вирішені з метою відповідності вмінь та навичок майбутній фахівцям сучасному ринку праці. Успішне виконання цього завдання залежить від застосування нових методів та технологій навчання, спрямованих на набуття знань, умінь та навичок, необхідних для здійснення навчальної та майбутньої професійної діяльності на високому професійному рівні. Для цього слід застосовувати нові мультимедійні технології, які допоможуть майбутнім фахівцям засвоїти знання, набути уміння та навички, необхідні для реалізації майбутньої професійної діяльності, зроблять процес навчання цікавішим, більш насиченим, ефективним та сучасним. Слід відзначити, що застосування нових мультимедійних технологій у виші допомагає сформувати і розвинути професійно-особистісні якості, такі як: наукову позицію, уяву, ініціативу, наукове судження, навички самостійної роботи та дослідницької діяльності.

У сучасному світі застосування засобів мультимедіа під час професійної підготовки майбутніх фахівців у вищих викликає великий інтерес. З кожним
роком студенти та викладачі застосовують безліч засобів для вдосконалення освітнього процесу. Людство всюди оточено новітніми технологіями та гаджетами. Нарешті вони постійно присутні в усіх сферах нашого життя, як в навчанні, роботі, навіть під час відпочинку. Зараз вже неможливо уявити світ без них, бо вони надають людству нові можливості обміну інформацією та комунікації.

Зважаючи на це, модернізація освітнього процесу та впровадження новітніх мультимедійних засобів у у вищих є більш, ніж доцільним. Сучасні засоби мультимедіа надають можливість радикально підвищити якість та ефективність підготовки майбутніх фахівців. Нині у педагогічну практику впроваджується комп’ютеризація з різних наукових дисциплін, що зумовлено стрімким розвитком мультимедіа. Режим інтерактивності у сукупності з графікою, анімацією, фото, відео та аудіо контентом створює мультимедійне середовище, що допомагає активізації навчально-пізнавальної діяльності студентів сучасних вишів.

Актуальність теми статті визначається необхідністю вдосконалення процесу застосування мультимедійних технологій у професійній підготовці майбутніх фахівців. Можливості, що надають мультимедійні технології в освітньому просторі привертають увагу дослідників як в Україні, так і зовнішнього світу.

Ключові слова: готовність; модель; технологія; мультимедійна технологія; вища; інженерно-будівельний профіль; навчальна діяльність, майбутня професійна діяльність.

**Formulation of the problem.** According to the modern education system, there is a need to ensure the possibility of practical mastering by students of technical universities of the engineering and construction profile with modern multimedia tools. In order to achieve this task, it will be expedient to develop a technology that will help modern students to acquire high-quality knowledge, skills and skills in the use of multimedia learning tools in the course of educational and future professional activities, thanks to which they will be able to perform it at a high level, which is especially relevant in conditions of distance learning.

**The purpose of the article** - to develop the technology of using multimedia in the educational process of the technical higher education institution of the engineering and construction profile.

**Analysis of recent research and publications.**

The problems of the use of multimedia technologies in the educational process of higher education institutions of various profiles were investigated in works by the following scientists: I. Werner, R. Gurevich, A. Gurzhii L. Konoshevskeyi,

According to V. Bykov, O.M. Spirin, O.P. Pinchuk. multimedia technologies are a set of technologies (techniques, methods, methods) that allow using the technical and software tools of a personal computer to process, store, and transmit information presented in various forms (text, sound, graphics, video, animation) using interactive software [1; 192].

I. Bohdanova defines multimedia as a system of collecting, storing, saving, searching, processing and presenting information, which is based on the use of computer and telecommunication tools [1; 26]. M. Zhaldak understands this phenomenon as a set of methods and technical means of collecting, organizing, saving, processing, transmitting and presenting information that spreads people’s knowledge, develops their ability to manage technical means and social problems [5; 21].

O. Romanishyna considers multimedia to be powerful tools for creating and presenting multi-level scientific thought. The advantages of using multimedia technologies in lectures are obvious, as they increase the interest of students and ensure their activity during the presentation of the material, which is impossible in the situation of the classical format, when the teacher does not have multimedia technologies [8; 180].

Therefore, after analyzing the opinions of various scientists regarding the concept of "multimedia technologies", agreeing with the authors of the first and second approaches, we will understand the phenomenon of "multimedia technologies" as information technologies containing printed text, graphic images, video and audio recordings, which allow all organs to be involved senses for better assimilation of information and provide opportunities for interactive interaction between the user and the computer due to the hypertext mode of operation.

**Presentation of the main material**.

By "the technology of training students of engineering and construction universities for educational and future professional activities " we will understand a set of tools and methods that will make it possible to prepare future specialists of the specified profile for educational and future professional activities at a high level, taking into account the modern requirements of the labour market. This phenomenon includes the ability to predict ways to improve the efficiency of one's professional activities in the context of the use of multimedia tools.

In the structure of the preparation of students of engineering and construction universities for the implementation of educational and future professional activities, we have distinguished four components of readiness: motivational, contextual, procedural-operational and evaluative.
The motivational component determines students' interest in using multimedia tools; awareness of the expediency of using multimedia tools in the process of higher education; students' understanding of the meaning and functions of using multimedia in classes and in future professional activities. It corresponds to the motivational and personal criterion.

The contextual component of the preparation includes: knowledge of the features of the use of multimedia technologies in classes from both profiling components and socio-humanitarian ones; a set of knowledge that allows developing and using multimedia tools. It corresponds to the cognitive criterion.

The procedural-operational component requires the presence of practical skills and skills in the use of multimedia programs when studying special and socio-humanitarian components; students' ability and desire to constantly improve acquired skills and abilities for effective use of multimedia programs; creating a favorable atmosphere in classes (ability to work with the use of multimedia tools in groups and independently). It corresponds to the conscious and practical criterion.

The evaluative component includes the ability to analyze, think, and scientifically substantiate one's ideas; students' ability to objective self-analysis of their work, as well as self-improvement of their professional activity in the conditions of using multimedia technologies. It corresponds to the reflexive-evaluative criterion.

In order to develop the technology for the use of multimedia tools in the process of preparing students of engineering and construction universities for the implementation of educational and future professional activities, it is necessary to identify the level of their preparation for the use of multimedia tools, as well as to create a model of training students of engineering and construction universities for the implementation of educational and future professional activities. The result of this training will be their readiness for the specified type of activity.

The following methods were used during the ascertainment experiment: the study of pedagogical experience in the use of multimedia technologies in professional activities; surveying future engineering and construction specialists with the aim of determining the level of their preparation for the use of multimedia technologies in future professional activities; conversations, observations; analysis of their professional creative works (drawings, schemes, construction projects), testing to identify students' skills in working with multimedia technologies, assessment of the level of creative potential, ability to self-assess and self-improvement of their professional capabilities. To determine the level of students' motivation to use multimedia technologies, we took as a basis the methodology of I. S. Dombrovska "Motivation of educational activity". To determine the assessment of the level of creative potential, we used the projective technique of E. Torrens. We obtained the following results. (See Table 1).
Table 1.

Levels of readiness of future specialists in engineering and construction to use multimedia tools in the process of preparing for educational and future professional activities/according to the results of the ascertaining experiment (in %)/

<table>
<thead>
<tr>
<th>Groups</th>
<th>Low</th>
<th>Average</th>
<th>Sufficient</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG (experimental group)</td>
<td>38</td>
<td>44</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>KG (control group)</td>
<td>34</td>
<td>40</td>
<td>20</td>
<td>6</td>
</tr>
</tbody>
</table>

Thus, 38% of students of experimental groups and 34% of students of control groups showed a low level of readiness.

44% of the experimental and 40% of the control groups corresponded to the average level. 15% of the experimental and 20% of the control groups showed a sufficient level. A high level was found in 3% of the experimental and 6% of the control groups.

The above allows us to conclude that most of the researched have a poorly formed interest in using multimedia tools, as well as a desire to use them in the course of educational and future professional activities. We believe that the reason for this is the insufficient number of multimedia classrooms, multimedia tools, as well as the reluctance of teachers to conduct classes using them.

The analysis of the results of the ascertaining experiment confirms the need to further search for optimal ways and means of improving the training of future engineering and construction specialists for the use of multimedia tools during their educational and future professional activities.

The formative experiment was based on the fulfillment of the following three pedagogical conditions: the acquisition of skills and abilities to use multimedia technologies during educational and future professional activities; organization by teachers of the educational process in higher education on the basis of the systematic use of multimedia technologies; creation of emotional appeal of educational activities with the use of multimedia technologies.

Thus, with the aim of implementing the first pedagogical condition – acquiring the skills and abilities to use multimedia technologies in the course of educational and future professional activities – future civil engineers were offered a special course "Multimedia teaching aids in classes from the components of special and social and humanitarian cycles", which consisted of theoretical, methodical and practical blocks. The effectiveness of mastering the proposed special course depended on the degree of students' awareness of the use of multimedia technologies for educational and future professional activities.
The program of the special course developed by us reveals to future civil engineers the specifics of professional activity with the use of multimedia technologies. While working on the special course "Multimedia technologies in classes from the components of special and social-humanitarian cycles", in lecture classes, students received theoretical knowledge on the problem of using multimedia technologies in the course of educational and future professional activities, in practical and seminar classes - they learned to apply multimedia technologies to practice, when performing independent and individual work - consolidated the acquired knowledge, skills and abilities obtained during lectures, practical and seminar classes. All classes were held in English.

In order to implement the second pedagogical condition - the organization of the educational process based on the systematic use of multimedia - various forms and methods of work were used in the classes: students were shown multimedia presentations and animated videos in lecture-integrated classes from the components of the special and social-humanitarian cycles selected for conducting experiment (geodesy, architectural design, engineering graphics, English language) in English. The use of computer multimedia programs for engineering purposes was shown at the practical classes.

The implementation of this pedagogical condition required teachers to choose methods, teaching tools and areas of work where it is appropriate to use multimedia technologies, determine the role and place of multimedia at certain stages of the lesson, combine traditional teaching methods with the use of multimedia technologies, use an individual approach to students in the process of working with multimedia.

This pedagogical condition was implemented with the aim of applying theoretical knowledge of the specifics of multimedia technologies and acquiring professional skills and practical skills in the use of multimedia programs for engineering and construction purposes in the preparation of construction drawings, projects, and performing geodetic work in the area in the future professional activity.

The implementation of the third pedagogical condition – the creation of emotional appeal of educational activities using multimedia technologies – provided for the conduct of classes that will be attractive and convenient for students, will be able to develop students' interest in the educational process, motivate students to use multimedia tools and contribute to the formation of positive emotions in classes.

In order to create an emotional appeal of educational activities with the use of multimedia technologies, video materials were shown to future specialists in engineering and construction during lectures instead of topics studied in classes of special and socio-humanitarian cycles, such as geodesy, engineering graphics, architectural design and English with using multimedia, active and interactive methods and technologies. All classes were held in English.

Active and interactive learning methods and technologies were used in the practical classes of the above components, namely: brainstorming, decision tree,
take a position, Brownian motion, discussion, debate, cooperation technology, work in small groups, video conference. In addition, role-playing and business games were held, which used multimedia tools, an "architect tournament", a "civil engineering tournament", an electronic crossword puzzle on construction topics was compiled, and students were also taught to create websites in English advertising the professional services of civil engineers and architects.

We believe that the implementation of this pedagogical condition will contribute to the better assimilation of knowledge, abilities, skills and experience necessary for the implementation of professional activities by future engineering and construction specialists, since during its implementation we used relevant and developing methods that are much more interesting than traditional ones.

After fulfilling all three pedagogical conditions on which the formative experiment was based, we calculated its results in % according to all readiness criteria.

The results of the levels of readiness of future engineering and construction specialists to use multimedia technologies in the course of educational and future professional activities based on the results of the formative experiment are shown in Table 2.

Table 2.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Low</th>
<th>Average</th>
<th>Sufficient</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>E G</td>
<td>18</td>
<td>32</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>KG</td>
<td>34</td>
<td>44</td>
<td>17</td>
<td>5</td>
</tr>
</tbody>
</table>

Thus, it can be seen from Table 2 that after conducting the formative experiment, the level of readiness of the students of the experimental groups to use multimedia technologies in the course of educational and future professional activities is placed as follows: a low level of readiness was shown by 18% of the students of the experimental groups and 34% of the students of the control groups; 32% of the respondents of the experimental and 44% of the control groups corresponded to the average level; 30% of the respondents of the experimental and 17% of the control groups showed a sufficient level; a high level was found in 20% of students of the experimental and 5% of the control groups.

So, we will provide a comparative description of the levels of readiness of future engineering and construction specialists to use multimedia technologies in the course of educational and future professional activities based on the results of ascertaining and formative experiments and find out what changes occurred in the
groups of respondents. Table 3 shows the comparative data of the levels of formation of readiness of the specified specialists to use multimedia technologies in the course of educational and future professional activities based on the results of ascertaining and formative experiments.

Table 3.

Levels of readiness of future engineering and construction specialists to use multimedia technologies in the course of educational and future professional activities / according to the results of ascertaining and formative experiments (in %)

<table>
<thead>
<tr>
<th>Groups</th>
<th>Types of experiment</th>
<th>levels (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>EG</td>
<td>ascertaining</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>formative</td>
<td>18</td>
</tr>
<tr>
<td>KG</td>
<td>ascertaining</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>formative</td>
<td>34</td>
</tr>
</tbody>
</table>

As shown in Table 3, in the experimental groups there were positive changes in the level characteristics of the readiness of future engineering and construction professionals to use multimedia technologies in the course of educational and future professional activities.

These tables show that the number of students with a low level of readiness to use multimedia technologies in the course of educational and future professional activities in the experimental groups after the formative experiment decreased to 18% (it was 38%), and in the control groups the number of students with this level remained unchanged (34%), which is almost 2 times more than in the experimental groups.

The number of students with an average level of readiness to use multimedia technologies in the course of educational and future professional activities in the experimental groups after the formative experiment decreased to 34% (it was 44%), and in the control groups the number of students with this level was 44% (it was 40%), which is 10% more than in the experimental groups.

The number of students with a sufficient level of readiness to use multimedia technologies in the course of educational and future professional activities in the
experimental groups after the formative experiment increased to 30% (it was 15%), and in the control groups the number of students with this level decreased and amounted to 17% (was 20%), which is almost 2 times less than in the experimental groups.

The number of students with a high level of readiness to use multimedia technologies in the course of educational and future professional activities in the experimental groups after the formative experiment increased to 20% (it was 3%), and in the control groups the number of students with this level decreased to 5% (was 6%), which is 4 times more than in the experimental groups.

**Conclusions.** The results of the formative experiment prove the feasibility of using our methodology, its effectiveness and its important role in shaping the readiness of these specialists to use multimedia tools, since today this condition is necessary for the successful implementation of professional activities, the formation of professional competence and the formation of qualified specialists who will be competitive in the modern market labor.

**Prospects for further research.** An experiment on the introduction of the technology of using multimedia tools in the educational process of a higher engineering and construction profile was carried out at the Odesa State Academy of Construction and Architecture (ODABA) with students of the following specialties: "Geodesy and land management", "Architecture and urban planning", "Industrial and civil construction", "Urban construction and economy" and "Manufacturing of building structures". We consider it expedient to apply this technology in universities not only of the engineering and construction profile, but also of any technical orientation, because it significantly increases the level of students' mastery of multimedia tools and work with them, forms motivation for their use, increases the desire not only of students, and teachers to carry out educational activities with their help, which ensures its quality.

**References:**


Література:


