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Применение трехмерной визуализации при обучении иностранному языку как важное условие повышения качества иноязычной подготовки будущих специалистов социально-культурной сферы

Проблема и цель. Иноязычная подготовка специалистов социально-культурной сферы предполагает не только развитие коммуникабельности, языковой и гражданской грамотности, но и компетенций, связанных с управлением проектами, работу с изображениями. Авторы предлагают для совершенствования подготовки будущих специалистов включать в иноязычную деятельность практику в среде трехмерной визуализации.

Методы исследования. Трехмерная визуализация реализуется при выполнении проектов социально-культурной направленности и в процессе иноязычной коммуникации. Проводится тестирование, включающее проверку знаний по синтаксису, лексике и грамматике, умениям профессионально-ориентированного общения и навыков работы с инновационными технологиями. Экспериментальное исследование выполнено в Вятском государственном университете (Российская Федерация) при изучении курсов «Иностранный язык», «Современные информационные технологии». К иноязычной коммуникации в трехмерной среде привлечены 52 студента направления подготовки «Организация работы с молодежью». При трехмерном моделировании используются Blender. Для установления статистически достоверных различий применяется угловое преобразование Фишера.

Результаты. Студенты изучают программы для трехмерной визуализации, дидактический потенциал и спроектированных социально-культурных трехмерных моделей. Обучающиеся экспериментальной группы применяют их для решения проблем профессионально-ориентированной, иноязычной коммуникации. Выявлены статистически достоверные различия в изменениях, произошедших в системе, по качеству иноязычной подготовки (ф_крит = 1,64 < ф_эмп = 2,514).

В заключении описываются особенности применения трехмерной визуализации в обучении для повышения качества иноязычной подготовки: профессиональная коммуникация, планирование, организация и практическая реализация досуга; сохранение и создание межкультурных ценностей. Представлены варианты совершенствования содержания учебных дисциплин «Иноязычная культура» и «Современный технологии иноязычного образования».

Ключевые слова: иноязычная коммуникативная компетентность, профессионально-ориентированное общение, digital-навыки, трехмерная графика, моделирование, Blender
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The use of three-dimensional visualization when teaching a foreign language as an important condition for improving the quality of foreign language training of future specialists in the socio-cultural sphere

Problem and aim. Foreign language training of specialists in the socio-cultural sphere involves not only development of communication skills, language and civic literacy, but also competences related to project management and image processing. The authors propose to include work in the three-dimensional visualization environment during foreign language activities with the purpose of improving training of future specialists.

Research methods. Three-dimensional visualization is introduced when implementing socio-cultural projects and in the process of foreign language communication. The author's testing is carried out, which includes checking knowledge of syntax, vocabulary and grammar, skills of professionally oriented communication and skills of working with innovative technologies. The experimental study was carried out at Vyatka State University (Russian Federation) while studying the courses "Foreign Language", "Modern Information Technologies". 52 students of the training program – «Organization of work with youth» – were involved in foreign language communication in the three-dimensional environment. Blender is used for 3D modeling. Fisher angular transformation is used to find out statistically significant differences.

Results. The students study programs for 3D visualization, didactic potential and designed socio-cultural 3D models. The students of the experimental group use them to solve the problems of professionally oriented, foreign language communication. Statistically significant differences in the changes that took place in the system were revealed in terms of the quality of foreign language training ($\phi_{\text{crit}} = 1.64 < \phi_{\text{emp}} = 2.514$).

In conclusion the features of using three-dimensional visualization in education to improve the quality of foreign language training are described: professional communication, planning, organization and practical implementation of leisure; preservation and creation of intercultural values. The options for improving the content of the academic disciplines "Foreign Language Culture" and "Modern Technologies of Foreign Language Education" are presented.

Keywords: foreign language communicative competence, professionally oriented communication, digital skills, 3D graphics, modeling, Blender

Introduction

The relevance of the study is determined by the following factors:

1. In modern conditions of uncertainty, the world continues to actively develop along the path of interaction between various countries, peoples, cultures in the online and offline space. On the one hand, this enhances the processes of foreign language communication. On the other hand, it requires that a highly demanded specialist develop qualities that allow adapting most flexibly in a rapidly changing reality. For example, L. Wang, D. Kokotsaki noted the skill to quickly make decisions and act in new conditions, to present information in various forms and forms [1].

2. The Charter of UNESCO regulates that “in order to maintain human dignity, all peoples are obliged to widely disseminate culture and education among all people on the basis of justice, freedom and peace, ... the relationship of culture and thinking ...” [2]. In Russia, for implementing the norms of international law and developing a value-oriented model of state cultural policy, it is of particular importance to develop the skill of a future specialist to effectively implement such urgent tasks as [3]:
   - implementing intercultural interaction of people in the creation, development, preservation and dissemination of significant cultural values;
   - implementing innovative design in the field of social and cultural activities, including the use of foreign languages;
   - using digital technologies and methods of modeling objects of cultural heritage.

3. According to the forecasts of the All-Russian Research Institute of the Ministry of Labor and Social Protection of the Russian Federation, in the coming years the country's need for specialists in the socio-cultural sphere will increase [4].

   In connection with these points the requirements for the quality of training of competitive and competent graduates with a high level of general and professional culture, fundamental knowledge in the field of socio-cultural activities are increasing. Formation of the student's foreign language professional competence, according to M. M. Bazhutina, A. V. Tsepilova, is a specific task, a social requirement that the society places on Russian education today [5].

   Vyatka State University makes a significant contribution to the solution of the identified problems. In particular, the training program specializations “Organization of work with the youth”, “Organizational psychology”, “Sociology of management”, “Applied methods of sociological research”, “Management of innovative development of the youth in the professional environment”, “Social work with different groups of the population”, "Integrated Social Analysis" are being improved. On the information portal of the university it is noted that the advantages of the training program 39.03.03 Organization of work with the youth (bachelor degree level) are: high-quality humanitarian education, a high level of foreign language training, the possibility to choose an educational trajectory, participation in active project and research work [6].

   E. V. Soboleva et al., summarize the results of digitalization of general and vocational education in Russia and conclude that the information educational environment should not completely replace direct communication and interaction of participants in the sociocultural process [7]. Modern methods and digital technologies are designed only to increase effectiveness of foreign-language socio-cultural activities. For example, to activate knowledge and support the presentation of theoretical facts through the demonstration of
an educational film with elements of 3D graphics or quest rooms. T. F. Kuznetsova describes the didactic possibilities of computer graphics for recreating a fictional reality in cinema [8]. The author notes that the era of 3D animation is coming. In her opinion the invention of perspective revolutionized painting will happen one day. Now new computer sophistication makes it possible to combine the two main directions of animation (hand-drawn and volumetric) into one whole.

According to the conclusions of C. Sagonas et al. 3D animation is both plastic and multi-volume, bright and highly demanded by the modern audience. At the same time, it supports the interaction and interconnection of cultures and peoples [9]. A. I. Benzer, B. Yildiz note that three-dimensional graphics is a source of information (especially for the younger generation) [10].

So, in the foreign language training of modern specialists in the socio-cultural sphere technologies of three-dimensional computer graphics, methods of mixed and interactive learning are actively used. However, there are also objective problems of including modern digital tools (monitors, printers, photo and video cameras, tablets) in foreign language training and effective foreign language professional activities of social and cultural specialists:

1) the lack of a unified methodology of designing and introducing into educational programs training of specialists in the socio-cultural sphere for studying the basics of three-dimensional computer graphics and animation;

2) insufficient orientation of higher school teachers to the use of 3D technologies as a didactic support for teaching a foreign language and organizing various types of practices;

3) poor development of the mutual use of digital resources and three-dimensional models (including those in foreign languages) between various entities that provide international cultural activities: libraries, museums, theaters, etc.

Thus, there is a need for additional research of introducing into the training programs courses for training specialists in the socio-cultural sphere that involve:

• studying the basics of three-dimensional computer modeling as an important component of the graduate’s information culture;

• integrating elements of three-dimensional computer graphics into the study of other disciplines of the training program (including a foreign language);

• practical application of three-dimensional models in foreign language professional activities.

The purpose of the work is to study the features of the use of three-dimensional visualization in teaching a foreign language as an important condition for improving the quality of foreign language training of future specialists in the socio-cultural sphere.

The hypothesis of the study is that the introduction of blocks/modules in the content of foreign language training of specialists in the socio-cultural sphere so that students can gain experience in intercultural application and design of three-dimensional models will provide additional conditions for the development of sought-after professional competences and soft skills.

The following were identified as the main tasks:

• to describe the didactic potential of three-dimensional visualization, taking into account the specifics of foreign language training of specialists in the socio-cultural sphere;

• to supplement the existing system of requirements for the use of three-dimensional computer graphics in teaching a foreign language to highly qualified specialists in the socio-cultural sphere;
to describe the system of using and designing own three-dimensional visualization models in foreign language education and intercultural interaction of specialists in the socio-cultural sphere;

to experimentally check the effectiveness of the proposed option for improving foreign language training.

Materials and methods

The following methods were used in the work: theoretical analysis and generalization to the literature when reviewing scientific theories on the formation of foreign language communicative competence; specifying the conditions and methods of three-dimensional visualization to improve the quality of foreign language training of students; revealing the didactic potential of 3D visualization technology for teaching a foreign language.

The term “three-dimensional visualization” is used in the work, since it is 3D visualization that is used in art. It allows transforming simple drawings into three-dimensional images, filling the space with cultural values, coloring them and setting textures. This approach allows at the design stage to think over the layout of the premises of cultural institutions, their purpose and area, as well as ways of external decoration of building facades.

In the process of using 3D visualization technology for learning a foreign language all participants of the didactic process are involved in various activities (cognitive, regulatory, innovative, collective, etc.). In the presented study interaction with the 3D modeling program allows us to provide the most effective conditions for forming a foreign language communicative competence of future specialists in the socio-cultural sphere, developing demanded soft skills, and gaining experience in 3D visualization. At the same time, the inclusion of three-dimensional visualization in teaching a foreign language is simultaneously considered as a technology for acquiring new knowledge and competences. And as a technology, accompanying, foreign language professional communication.

In this study the Blender three-dimensional graphics software package is used to support the technology of three-dimensional visualization. At different stages of the organization of educational and practical activities on the use of three-dimensional graphics in foreign language communication, digital resources were: LightWave 3D, Maya, 3Ds Max, Lumion, Vectary, Blender. Criteria for comparing 3D visualization tools were: user-friendly interface, a forum for new users, flexible configuration of the working window, selection of 3D effects, work with video files, 3D graphics modeling functionality, saving the project in a single file.

But, of course, the most important criterion when choosing this particular software is the range of didactic functions. Blender is great for creating high quality models and scenes. For example, it is more convenient and faster to create a three-dimensional model of a room in Blender than in 3DSMAX. Blender is very popular with animators and artists due to its sculpting mode, which allows sculpting a model as if from clay.

The experimental study was conducted on the basis of Vyatka State University while studying the courses "Foreign Language", "Modern Information Technologies", "Culturology", "Organization of Leisure Activities of Youth", "Introduction to the Profession". 52 students of the Faculty of History, Political Sciences and Cultural Studies were involved in the educational activities and foreign language communication in the environment of three-dimensional visualization, the training program is 39.03.03 Organization of work with youth. The average age of the respondents was 20 (52% female and 48% male).
The empirical methods (observation, analysis of the results of educational activities and foreign language communication in a three-dimensional visualization environment) were used to obtain up-to-date information about real qualitative changes in foreign language training; in assessing the degree of trust; in managing emotions in case of errors; ability to constructive dialogue, informational interaction in the team and with the program; mutual support; reflection in the team and individually, in the use of feedback mechanisms; application of three-dimensional models in practice.

To diagnose the formation of foreign language communicative competence and competences in the field of three-dimensional modeling, 25 tasks were formulated (to check the level of formation of language skills, communication skills, knowledge of basic algorithmic structures and modern information technologies).

For the test the student could get from 0 to 50 points. According to the results of measurements, the marks were determined as follows: from 0 (inclusive) to 25 points – “failed” and “passed” in all other cases. To assess the effectiveness of the specially organized activity on working with three-dimensional visualization in foreign language communication in terms of improving the quality of education the Fisher criterion was used.

**Literature review**

An important condition for supporting the competitiveness of the state at the world level in the direction of the innovative development of culture is the presence of a large number of specialists who are ready for independent creative activities in a foreign language, for innovation, for making discoveries in various fields of science, education and art.

H. Mykhailyshyn, O. Kondur, L. Serman note that information technologies have significant didactic potential for the development of creative, innovative thinking [11]. The structure and requirements for the competences of specialists are changing under the influence of digitalization, the tasks that need to be solved are becoming more complicated. Thus, knowledge of a programming language often appears in job descriptions along with knowledge of a foreign language. Basic competences and skills common to all digital specialists are highly valued: English proficiency, business communication, project management, 3D modeling, business and presentation skills, analytical thinking, result orientation, time management [12].

L. Wang, D. Kokotsaki consider innovations in the teaching foreign languages, conduct a factor analysis of professionally oriented foreign language communication of future specialists in various curricula [1]. M. M. Bazhutina, A. V. Tsepilova also present the experience of using innovations and computer methodologies in Russian educational systems [5].

L. Dzasezheva et al. explore popular digital platforms that broadcast diverse opportunities for developing competences in various foreign languages. Scientists consider modern technologies of distance online learning as well as modern educational practices [13].

T. Terzidou, T. Tsiatsos, H. Apostolidis reasonably conclude that in any professional activity a person of the modern society has to deal with a variety of information (text, graphics, fabric, textiles, stone, etc.) [14]. A large array of digital data, according to J. Forman et al., must be processed, presented, structured and analyzed daily [15].

The development of these types of activities, the implementation of appropriate algorithms using ICT tools require additional resources, effort and time from the teacher [6]. L. Bautista, F. Maradei, G. Pedraza suggest using AR tools in teaching [16].
V. Panfilova, V. Spichak, A. Zhukhanova include m-learning in foreign language training [17]. The authors develop and implement a holistic course, including blocks on the development of mobile applications and their use in foreign language professional communication.

Ponomarenko et al. substantiate that digital educational resources are necessary for students for independent work, because they: contribute to understanding of the material being studied by increasing the ways of presenting the material; activate the educational process; support the implementation of ideas for the development of education; the rate of learning increases; the quality of assimilation and memorization of the material increases; provide tools for individualization and differentiation of learning; automate control and intensify the supply of feedback [18].

According to P. Jääskelä, S. Nykänen, P. Tynjälä, an effective means of enhancing cognition, training and education is 3D modeling [19]. Three-dimensional graphics, as a branch of computer graphics, according to A. I. Benzer, B. Yildiz, has the following distinctive features [10]:

- images are designed for architectural visualization, cinematography, television, computer games, printed materials, as well as scientific research;
- realistic images and “moving pictures” are created;
- understanding of tools for three-dimensional modeling requires regular study and practice;
- the implementation of rotations, approximations, removals, deformations involves a large amount of calculations;
- the study of an object, phenomenon or process occurs through the construction and study of its model.

B. Liu et al. consider 3D modeling technologies to be a trend in the struggle to attract and retain the attention of students [20]. 3D design and 3D printing is an important part of the training of specialists of various levels in the field of design, fine arts and architecture. Many schools and universities support (financially, technically, methodically, organizationally) the introduction of additive technologies into their educational programs. The inclusion of 3D content makes it possible to visually explain scientific (fundamental theoretical) facts and positions to students, to move from an integral structure to its individual elements, from complex to simple [21]. N. N. Yaroshenko analyzes the essence of socio-cultural activities and notes that its nature makes it possible to organically combine pedagogical and interactive educational disciplines [22]. As a result, the modern digital educational environment of foreign language training of specialists in the socio-cultural sphere can be developing if it is filled, according to J.-H. Kim et al., with the following components [23]:

- various innovative technologies (m-learning, 3D printing, computer graphics, gamification, flipped classroom, storytelling, quests, micro-qualification programs, combining study with practice, etc.);
- foreign language value-semantic content.

A. Presbitero indicates that the culture as a part of the content of teaching foreign languages is knowledge, norms and relations stored in a large or small social group [24].

Teaching the culture in the context of teaching foreign languages includes, first of all, informing students about their own and other cultures, as examples of the diversity of forms of collective existence. Another component is information about cultural values. The key role is played by the choice of methods, means and forms of presentation of the material [25]. N. S. Korgozha comes to the conclusion that most of the students in the humanities
cannot give examples of the practical use of information technology in their foreign language or socio-cultural activities. For example, a text editor can be useful for preparing reports, spreadsheets for plotting graphs and automating calculations, presentations for speeches and defending projects [26].

However, as A. Presbitero notes, the use of immersive methods, interactive services and cloud technologies, according to survey results, requires special technical training [24].

So, three-dimensional computer graphics has a wide range of possibilities. Summarizing the analyzed information, we can objectively conclude that the use of visual modeling in the foreign language teaching of specialists in the digital society allows us to solve important didactic tasks as:

- real time savings when explaining complex concepts (grammar, vocabulary). Topics in 3D space are presented as small plots of 3-5 minutes each;
- students better understand the material being studied in a foreign language due to the visualization of "complex" topics of the educational program;
- increasing motivation due to the inclusion of innovations in the "routine" process of learning a foreign language;
- students learn a larger amount of foreign language information, which has a positive effect on the results of tests and exams;
- cognitive abilities are formed: memory, attention, imagination, the ability to perceive information in a foreign language with various senses;
- creative properties of the mind are developed, since manipulation with a three-dimensional object is often a catalyst for heuristics;
- natural systematization of knowledge, their focus on practice - further foreign language socio-cultural activities.

So, three-dimensional visualization can really contribute to "immersion" into the topic of the studied foreign language socio-cultural subject/phenomenon during a lecture, seminar or laboratory session.

However, there are also disadvantages of using 3D visualization in foreign language classes for specialists of the future:

1. Mentors do not always have enough time to prepare material with three-dimensional graphics for the lesson.
2. It is difficult to integrate 3D visualization into educational programs.
3. Insufficient motivation of students.

Thus, there is an objective problem, which is expressed in the need to study the features of the use of three-dimensional computer graphics when teaching specialists in the socio-cultural sphere in order to improve the quality of their training.

Research program

The main purpose of the experiment was to test the effectiveness of using 3D visualization in foreign language classes in order to improve the quality of training of future specialists in the socio-cultural sphere. The study was conducted on the basis of Vyatka State University during the study of the courses "Foreign language", "Modern information technologies", "Culturology", "Organization of youth leisure activities", "Introduction to the profession". 52 students of the Faculty of History, Political Sciences and Cultural Studies were involved in the educational activities and foreign language communication in the environment of three-
dimensional visualization, the training program 39.03.03 Organization of work with youth. The average age of the respondents was 20 (52% female and 48% male).

At the first stage of the study, the analysis of scientific, pedagogical, educational and methodological literature was carried out in order to determine the state of development of the problem of using three-dimensional visualization in foreign language classes to improve the quality of training of future specialists. Besides, the research materials on the possibilities of using 3D graphics to personalize learning, improve the quality of training of future specialists are taken into account.

The analyzed software tools are: LightWave 3D, Maya, 3Ds Max, Lumion, Vectary, Blender. Criteria for comparing 3D visualization tools are: user-friendly interface, a forum for new users, flexible configuration of the working window, selection of 3D effects, work with video files, 3D graphics modeling functionality, saving the project in a single file.

To achieve this purpose it was necessary to specially organize the process of learning a foreign language. Creative pedagogical influence and complex of optimal pedagogical conditions were combined on the basis of integrating and interpenetrating of modern achievements in pedagogy and psychology.

In order to provide the most effective conditions for implementing innovative design in the field of socio-cultural activities, including the use of foreign languages, within the unified information educational environment of the university, it was decided to use Blender.

The mentors of the course assessed the initial conditions of the pedagogical system using the specially developed test. There are 25 tasks in total, which are divided into three groups.

In 10 tasks of the first group, the level of formation of language skills was checked. This refers to speech, language competence. The correct performance of this type of task was assessed at 2 points.

Task. In ancient Greece it was customary to erect monuments on the battlefields in honor of victories. From the proposed answers-questions, choose the one with which you can find out: a) What material are they made from?; b) Why was this very material chosen?

In 10 tasks of the second group the diagnostics of communicative abilities was carried out. It refers to socio-cultural, compensatory and educational-cognitive competences: the ability of students to interact with other people, groups of people in the process of performing professional tasks. The correct performance of each task was estimated at 2 points.

Task. Offer your own description of the development of the socio-cultural situation. “Misha was not very popular in the class, but he could draw well. One day he...”. For example, give examples of borrowed English words in the Russian language.

In 5 tasks of the last group, knowledge of computer science, information and communication technologies in professional activities was tested. The correct performance of each task was estimated at 2 points.

Task. When registering in a computer system, each user is given a password consisting of 15 characters and containing only the characters K, O, M, P, L, Yu, T, E, R. Each password in a computer program is written as minimally possible and the same an integer number of bytes (in this case, character-by-character encoding is used and all characters are encoded with the same and the minimum possible number of bits). How many passwords are stored in memory if they occupy 240 bytes on disk? For example, add and implement an algorithm for the spreadsheet editor, how to calculate the salary of employees (in rubles and dollars), if you know the number of hours worked, the total amount for the salary and the dollar exchange rate.
Thus, data on 52 students of the Faculty of History, Political Sciences and Cultural Studies, the training program – 39.03.03 Organization of work with youth - were collected. The average age of the respondents was 20 (52% female and 48% male).

The second stage of the experiment was devoted to determining the structure of the course in accordance with the purpose of the study. In the foreign language classes the topics "The role of the family in a person's life", "Active and Passive Holidays", "Traditions of Russian and other national cuisines"; "Higher education in Russia and abroad", etc. were studied. The teacher of the course "Modern Information Technologies" organized the activities in the experimental group according to the following stages: Studying the theoretical material; Development and application of three-dimensional visualization for the formation of the foreign language communicative competence; Installation, interface and functionality of the software tool; Creating and modifying 3D objects in Blender; Adding color, adjusting lighting and camera, saving; applying three-dimensional models in professional social and cultural activities.

The third stage of the study. Further, when organizing project work, social activities and practice, future specialists in the field of socio-cultural sphere were asked to apply the developed three-dimensional models in their professional activities.

Institutions of the social and cultural sphere of Russia, on the basis of which students applied the skills of three-dimensional modeling: the museum and exhibition center "Diorama", the open-air museum of I.S. Turgenev "Spasskoe-Lutovinovo", Leonid Andreev's house, Museum of the History of Chocolate Criollo, Museum of I.A. Bunin, the Museum of Fine Arts, the theater for children and youth "Free space", the central city model library named after. A.S. Pushkin, a regional special library for the blind, the Church of the Icon of the Mother of God, a music college, an art school.

Statistical processing of the results was performed using the Fisher criterion.

Research results

Summarizing the above concepts, we can conclude that:

1) the success of training students is directly dependent on the level of foreign language self-education (the ability to learn, the desire for self-development, the ability to raise the level of intellectual and cultural development, interest in learning foreign culture and science, personal qualities).

2) ensuring the accuracy of the representation of a three-dimensional object in an intercultural space implies the ability and readiness of higher school graduates to create three-dimensional models (including in a foreign language).

Therefore, in the foreign language training of specialists in the socio-cultural sphere, dedicated to the development of foreign language professional communication skills, the use of innovative pedagogical technologies, it is necessary to allocate time to work with three-dimensional computer graphics.

Working in the 3D editor environment is the process of creating a 3D model of an object. In the course of modeling the socio-cultural (intercultural) activity (object/phenomenon), an appropriate virtual three-dimensional image is created. Using the tools of three-dimensional graphics editors, a model that is a copy of a specific subject of the socio-cultural sphere and a new object can be created.

The analysis of the literature on the research problem allows us to conclude that in the foreign language training of specialists in the socio-cultural sphere, it is effective to use
two methods of three-dimensional modeling: creating a model with software tools for 3D graphics or converting a real world object into a digital model using a 3D scanner.

The specifics of the training program 39.03.03 The organization of work with youth involves three-dimensional documentation of unique objects of arbitrary form from all periods and in different languages of human culture.

For the design of three-dimensional images and their subsequent use in foreign language professional activities, the following system of classes was defined:

I. In the foreign language classes the topics "The role of the family in a person's life", "Active and Passive Holidays", "Traditions of Russian and other national cuisines"; "Higher education in Russia and abroad", etc. were studied.

II. At the same time, in the classes on "Modern Information Technologies", the analysis of graphic editors and 3D modeling tools focused on visualization, animation, and imitation of 3D modeling was made. The goal is to identify the main didactic possibilities of three-dimensional graphics in the context of foreign language training.

III. The analysis of the requests and capabilities of institutions of the socio-cultural sphere. The goal is to identify the main logistical problems, potential projects for 3D modeling.

IV. Work in a graphics editor to create a three-dimensional illustration.

Class 1: Installation, interface, and functionality of the software tool (installing the program; ways of navigation in three-dimensional space; customization of windows; operating modes (object mode, edit mode, etc.)).

Questions for consolidation (formulation and answer – in English):
• How can the scale of the scene be changed?
• How can an object be chosen? What about multiple objects?
• How do save startup file and load factory setting differ from each other?
• Why do we need orthography?
• How is it possible to add another window?
• In what mode can you change the color of an object? How to switch to another mode?

Class 2: Creating and Modifying Objects in Blender (hot keys; navigation in the viewport using the keyboard; changing objects; creation of objects; changing the position, size, and rotation angle of objects). Reinforced tasks:

Task 1. Create 3 cubes: a small one with the same faces, a big one with the same faces, and one different from the other two. On each side, write a word that reflects your attitude to the author's position on the problem of a foreign language text.

Task 2. Create 3 different figures related to the history of a foreign language.

Task 3. Use the figures to create a word in a foreign language. Set up the scene so that it is visible and easy to read.

Task 4. Explore other options in Edit Mode and fill in the gaps in the table.

Class 3: Adding Color, Lighting and Camera Setup, Saving and Individual work in Blender (the color of the object; lighting; camera; visualization).

Independent work. As you know, the university celebrates its birthday on March 13. In addition to the fact that various events take place all day, auditoriums and halls are also decorated. A good tradition is the contest of photozones "Happy birthday, university". A photo zone is not only a flat image against the background in which you can take a picture. The photo zone also contains voluminous objects that you can pick up to revive the photo. Blender will help to create three-dimensional models. Each
student needs to organize own photozone. A prerequisite for participation is the use of school branding: the photo zone should contain the numbers 1963, the "key", the "coat of arms" and the theme of the birthday.

V. Usage of the three-dimensional model in practice (in the institution of the socio-cultural sphere).

In the study, the interaction of specialists of the selected educational program with the editor of three-dimensional graphics is considered as an intellectually directed and cognitive activity, taking into account: features of foreign language, social and cultural activities; norms of international law; directions of state cultural policy in the Russian Federation.

Further on, in foreign language classes the following topics of the course were studied: sections on "My university"; “National traditions and customs of Russia/countries of the studied language/other countries of the world. Motherland. Sights of different countries»; “Travel and tourism as a means of cultural enrichment of the individual. Popular tourist routes. Travel planning: on your own/through a travel agency.

The design of three-dimensional images and their application in socio-cultural activities also took place in practice. For example, currently in the Art Museum named after V. M. and A. M. Vasnetsov the project “Aivazovsky. Living canvases” is being realized. The multimedia project dedicated to the work of our marine painter is supplemented by models of Vyatka State University students.

The students of the control group studied software for three-dimensional modeling within the discipline "Modern Information Technologies". However, there was no specially organized activity on the use of three-dimensional visualization for the development of speech, language, socio-cultural, compensatory and educational and cognitive competencies in the classroom in a foreign language. The students studied the material according to the exercises and assignments given in the work programs. For example, compose a monologue-reflection (on the role of the family in a person's life); implement a dialogue-questioning (about family traditions, culinary and other preferences); conduct a dialogue-exchange of opinions / dialogue-persuasion (within the framework of role-playing games on the identified issues).

Other options for practical activities: work with non-linear texts (social Internet, chats, etc.), pragmatic reference and informational and advertising texts (booklets, brochures, flyers, recipes, etc.).

An example of a task integrating modern information technologies into foreign language communication. Look at the diagram and answer the questions.

In the country K. adult citizens answered the question: “What factor do you consider to be the main one in shaping personality?” The survey results are shown in the diagram. Look at the diagram and answer the questions.

• What answer did the majority of the respondents choose?
• Which factor was considered the least important by the respondents?
• Which of the factors of socialization named by the respondents relate to the immediate environment of a person?
• Which of the factors of socialization named by the respondents relate to the mediated environment of a person?

Make a conclusion about which group of socialization factors the respondents consider the most important in shaping the personality, justify the answer.

At the control stage of the experiment verification work was also carried out using the course materials. The students answered the questions of 3 blocks (described in the
research program). The verification of the reliability of the results of the experiment was implemented using the Fisher criterion. The control measurement data before and after the experiment are presented in Table 1.

The critical value of the Fisher criterion for a significance level of 0.05 ($\phi_{crit}$) is 1.64. The following hypotheses were accepted: $H_0$ – the level of educational results in the experimental group is statistically equal to the level of the control group; $H_1$ – the level of learning outcomes of students in the experimental group is higher than the level of the control group. The empirical value of the Fisher criterion before the start of the experiment is 0.292 ($\phi_{emp}=0.292<\phi_{crit}=1.64$). Therefore, before the start of the experiment, the hypothesis $H_0$ is accepted. The value of the Fisher criterion after the experiment is 2.607 ($\phi_{crit}=1.64<\phi_{emp}=2.514$), so $H_1$ is accepted. 

So, the shift towards increasing the level of foreign language training of specialists in the socio-cultural sphere in the experimental group can be considered non-random.

Discussion of the results

When evaluating the effectiveness of foreign language training of specialists in the socio-cultural sphere in the experimental group after studying the course "Foreign Language" in accordance with the proposed structure of the organization of educational activities: the proportion of students who have the mark "passed" increased by 23.2%. In the control group it increased by 13.9%. When discussing the advantages of including 3D visualization in the foreign language training of social and cultural specialists, it was established that the Blender toolkit allows using the didactic potential of 3D modeling identified in the literature analysis to create spectacular computer objects. In addition, you can insert pre-created models from the 3D library and manage these objects.

All participants in the experiment were unanimous in their opinion that the preservation of cultural (including foreign-language) heritage is no longer conceivable outside of digitization technologies, technologies for the spatial, three-dimensional presentation of museum artifacts and architectural heritage.

The formation of foreign language competences in the field of socio-cultural activities of education occurs due to the fact that:

- in the process of designing a three-dimensional model (and its subsequent application in the classroom), secretive, uncommunicative, shy team members become more free in interaction;
three-dimensional modeling supports the process of decision-making and choice (it is interactive in nature, contributes to the manifestation of empathy, tolerance, mutual understanding, involves the cooperation of the teacher and students with each other, which requires knowledge of not only speech, but also social norms of behavior);

three-dimensional modeling provides the possibility of real interpersonal foreign language interaction of all participants in the educational process, ensuring the development of the socio-cultural competence of the individual;

allows the most constructive organization of interpersonal cognitive communication and interaction in a foreign language of all its subjects.

Objective difficulties, that would complicate the use of three-dimensional models in international cultural activities, were also identified: the high cost of 3D printers and 3D scanners; dependence on commercial software, technical failures of equipment in cultural institutions; doubts of the heads of cultural institutions about the effectiveness (commercialization) of three-dimensional forms of leisure organization; coordination of activities of employees of libraries/museums/houses of creativity, accustomed to working according to traditional methods, and visitors.

In general, the pedagogical experiment allows us to conclude that the simulated educational and cognitive activity and foreign language communication contribute to the formation of such popular skills among specialists in the socio-cultural sphere as communication skills, language and civic literacy; competences related to project management, work with images.

The main thing that a digital school teacher should remember is that the misuse of visual aids and three-dimensional visualization, or their abuse, turns the effect from “positive” to “negative”.

The conclusions about the didactic potential of 3D computer graphics in terms of improving the quality of teaching a foreign language, the formation of popular communication skills, language and civic literacy, competences related to project management, working with images among workers in the sociocultural sphere confirm the results of international studies by A. Presbitero [24]. A significant result of the study is the description of the basic ideas of the approach, expanding the ideas of N. N. Yaroshenko about the possibilities of innovative pedagogical technologies to support socio-cultural activities in Russia [22].

**Conclusion**

At present, the artificial intelligence technology is actively used to improve the performance of employees, to manage innovation, to motivate personal development; to support operational interaction with customers; in the field of education. Artificial intelligence provides tools to support decision-making, choice, and operational feedback.

The requirements of the education system are focused on the use of innovative teaching methods and technologies. Currently, interactive simulators and mobile devices are actively used in teaching a foreign language.

The technology of three-dimensional visualization is one of those actively introduced. It opens up fundamentally new opportunities in various fields of education, culture and science.

The proposed system of classes on the use of three-dimensional computer graphics in teaching a foreign language to specialists in the socio-cultural sphere allows:
• to form the main professional competences of a specialist: foreign language communication skills, organization of creative activity in culture in a foreign language; planning, organization and practical implementation of leisure activities (for children, youth, tourists, the elderly, people with special needs); preservation and creation of intercultural values:
  • to form in-demand soft skills (skills of working in the modeling software environment; development of emotional intelligence, critical and creative thinking; foreign language interaction, etc.);
  • to gain experience in project, foreign language and educational and cognitive activities;
  • to simulate the performance of labor functions
  • to apply theoretical information on technologies for organizing leisure activities in a foreign language in real socio-cultural activities.

The implementation of three-dimensional projects in the field of international culture – in the modern, broad sense of the word - requires a special set of competences and skills: organizational, managerial, informational. This is an entry into a new area – the field of cultural entrepreneurship. But, of course, productive activity in the development of new educational programs is impossible without certain analytical skills, without knowledge and understanding of the processes of modern digital culture.

The results of the study have a specific practical focus. Currently, the university is improving educational work programs for the disciplines "Foreign Language Culture (English)" and "Modern Technologies of Foreign Language Education (English)".

As part of the first academic discipline, specialists in the socio-cultural sphere will be able to improve the skills of effective communicative influence and interaction, taking into account the norms of oral and written communication adopted in English-speaking countries, in order to form a successful communicative personality capable of productive communication in professional and socially significant situations in the English language. All these actions involve the active use of the developed and projected three-dimensional models.

As part of the second academic discipline specialists in the socio-cultural sphere will get an idea of modern trends and methods of teaching English, form professional skills in teaching English and evaluating its effectiveness. The course will allow developing the ability to use a variety of methods of three-dimensional visualization and three-dimensional graphics to increase educational autonomy and stimulate the speech and thinking activity of students in English classes.

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