Journal of Geology, Geography and Geoecology

Journal home page: geology-dnu-dp.ua

ISSN 2617-2909 (print)
ISSN 2617-2119 (online)

Journ.Geol.Geograph. Geology, 30(1), 90–99.
doi: 10.15421/112109

A model for the development of high quality training of tourism professionals through the use of computer 3D-tours

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Received: 29.04.2020
Received in revised form: 21.05.2020
Accepted: 08.06.2020

Abstract. The article is focused on the problem of training future tourism specialists using informational and communication technologies. The educational process of preparation requires changing the educational and methodological support in order to give the students the opportunities to master modern professional tools, technologies, methods of creating high quality tourist products. To solve this problem, the authors propose a model for the development of high quality training of tourism professionals through the use of computer 3D-tours. The development of this model took into account the theoretical and methodological basis regarding the professional training of future specialists in the field of tourism, the results of the analysis of educational programs, curricula for training students of the speciality "Tourism" and the data of the pilot experiment. It consists of the following main blocks. The conceptual-oriented block includes concepts, approaches, principles of participation, information and communication technologies. The content-technological block includes the content of the educational project of developing 3D-tours, levels of professional knowledge and skills, as well as types of familiriazation with ICT tools. The educational content of the model takes into account the practical mastery of the student's professional skills in the development of various 3D-tours. During this process, the ICT tools are introduced gradually in a certain order. The organization-activity block of the model includes forms of organizing the study and technologies for studying. This model entails the involvement of classroom-based and remote, individual, and group forms of organization of the educational process, organization of project development for a detailed analysis of educational topics. The assessment-resultative block includes criteria, metrics and levels. During the development of the model, the results of the activity of the subjects of the educational process were analyzed in accordance with two groups of criteria: the criterion of formation of professional theoretical knowledge, practical skills of 3D-tour development and the criterion of the level of using modern software and technical means in creative educational development. The developed model allows for increasing the quality of training of future tourism specialists. During the practical application of the proposed model, virtual 3D-tours were developed. Their development has shown the possibility of implementing the model of development of training of specialists in tourism by using computer 3D-tours with the use of modern ICT tools in the study of special disciplines and the attaining professional skills.

Keywords: virtual tour, tourism, development model, concepts, approaches, future specialists.

Модель розвитку якісного навчання фахівців з туризму шляхом використання комп'ютерних 3D-турів

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Анотація. Стаття присвячена проблемі підготовки майбутніх фахівців сфери туризму з використанням інформаційно-комунікаційних технологій. Навчальний процес підготовки потребує змінювати навчально-методичне забезпечення, щоб надати студенту можливість засвоювати сучасні професійні засоби, технології, методики створення якісних туристичних продуктів. Для вирішення зазначеної проблеми, авторами запропоновано модель розвитку якісного навчання фахівців з туризму шляхом використання комп'ютерних 3D-турів. Розробка даної моделі передбачала врахування теоретико-методологічних положень щодо професійної підготовки майбутніх фахівців сфери туризму, результатів аналізу освітніх програм, навчальних планів підготовки студентів спеціальності «Туризм» і даних пілотажного експерименту. Вона складається з таких основних блоків. Концептуально-цільовий блок включає концепції, підходи, принципи участі, принципи інформаційно-комунікаційних

технологій. Змістовно-технологічний блок включає зміст навчальної проектної розробки 3D-туру, рівні сформованості професійних знань та умінь, а також типи ознайомлення з засобами ІКТ. Навчальний зміст моделі враховує практичне оволодіння студентом професійних умінь розробки різноманітних 3D-турів. При цьому залучається поступовість у використання засобів ІКТ, що реалізується за рахунок побудови відповідної послідовності. Організаційно-діяльнісний блок моделі включає форми організації навчання та технології навчання. Дана модель передбачає залучення аудиторних та дистанційних, індивідуальних, групових форм організації навчального процесу, організації проектної розробки для детального розгляду навчальних тем. Оцінювально-результативний блок включає критерії, показники та рівні. В ході розробки моделі аналізувалися результати діяльності суб'єктів навчального процесу за двома групами критеріїв: критерій сформованості професійних теоретичних знань та практичних умінь розробки 3D-туру та критерій рівня застосування сучасних програмних та технічних засобів в творчій навчальній розробці. Розроблена модель дозволяє підвищити якість навчання майбутніх фахівців з туризму. Практичне застосування запропонованої моделі дозволило розробити віртуальні 3D-тури. Їхня розробка показала можливість реалізації моделі розвитку навчання фахівців з туризму шляхом використання комп'ютерних 3D-турів із застосуванням сучасних засобів ІКТ в ході вивчення спеціальних дисциплін та формування професійних умінь.

Ключові слова: віртуальний тур, сфера туризму,модель розвитку, концепції, підходи, майбутні фахівці

Introduction.

The level of development of computer technologies at the current stage allows for enlarging the possibilities of presenting objects of tourism, and posting them on the Internet, at the same time providing opportunities for interactive effects. Thanks to interactive effects, whole informational systems can be created inside one panorama, supplementing it with video material, animation, sound, informational windows and menu, and also various special effects, for example reflections of the sun depending on the scene which is being observed. In turn, a virtual 3D-tour is a set of such panoramas, between which one can move using special areas on the panorama. A single click of the mouse on such point or area brings the effect of going to another panorama or object. All this provides unique possibilities of producing virtual tours to well-known places, museums and galleries with complete integration into virtual reality.

Currently the system of higher professional education of future specialists in the sphere of tourism is oriented toward development of the student as a future professional with professional competence, high spiritual culture, learning flexibility, the ability to navigate through the novel achievements of science and practice, high level of development of moral-ethical qualities and professional ethics. In such conditions, requirements to the formation of individual qualities of specialists in the sphere of tourism significantly increase (Cherezova, 2013).

The educational process of training future specialists in the sphere of tourism requires changes in the educational-methodological base in order to provide the student with opportunity to master the professional tools, technologies, methods of creating high-quality tourist products. At the same time, the traditional process of education cannot entirely meet the current requirements to education of future specialists. The educational process needs introduction of novel approaches of innovative development of tourism, new information-communication technologies and formation of a pedagogic environment, aimed at organizing favourable conditions for education in the modern information environment.

While researching the education of specialists in tourism by using computer technologies, we used conceptual provisions of touristic education and professional preparation of specialists in tourism (I. Zorin, V. Kvartaliov, L. Knodel, A. Konoh, V. Fedorchenko); scientific works on the problems of helping future specialists in attaining the required professional level (I. Havrysh, K. Durai-Novakova, M. Diachenko, L. Kandybovych, O. Kucheriavy, A. Lynenko); scientific research on the problems of effective use of information technologies in tourism (H. Haluzynsky, M. Yefremova, M. Zhelieni, A. Levkova, S. Melnychenko, H. Papyrian, M. Skopen, T. Tkachenko, F. Ullaha, M. Hammera); studies on the problems of introduction and determination of the main purposes, goals and perspectives of virtual technologies in the tourism business (Z. Hadetska, V. Shamlikashvili, O. Sporysh, M. Bahrov, O. Shablii, L. Melnyk and others). At the same time, we determined that the problem of education of specialists in tourism by using computer 3D tours in scientific papers remains unanalyzed. The relevance of solving these issues conditioned the selection of the topic of our research and determined its objective and goal.

Objective of the paper is scientific substantiation of the theoretical-methodological base and practical provisions of development of technological and management solutions regarding improvement of the pedagogic system of preparation of specialists in the tourist sphere by developing a model of high-quality education using computer 3D tours. Based on this research, we determined an optimum model of development of high-quality education of specialists in tourism, which would help improve the process of acquisition of knowledge of the material studied and automatization of the process of control and analysis

of student activity, performance of academic tasks, and also provision of distant practical and module tasks.

Materials and methods of studies.

For the purposes of the development of high-quality education of future specialists in the sphere of tourism, we constructed a model of high-quality education of specialists in tourism by using computer 3D tours. In order to achieve the goal of the study, we used the following methods:

- Analysis of philosophical, psychological-pedagogic and scientific-methodological literature (to determine the problem of professional preparation of specialists in the sphere of tourism);
- Generalization and systematization (to determine the essence of the notion "virtual tour");
- Systemic-structural analysis (to classify the contemporary professional means and describe the pedagogic conditions of their implementation);
- Complex analysis (to determine the tendency of training specialists in the tourist sphere);
- Analytical and comparative methods (to study contemporary trends in using computer 3D tours);
- Processing approach (to present the mechanisms of the development of high-quality education of specialists in tourism by using computer 3D tours);
- Program-purpose approach (to determine goals during drawing of the model of development of high-quality education of specialists in tourism);
- Systemic analysis and synthesis (to develop conceptual basis of the development of high-quality education of specialists in tourism);
- Methods of modeling and projecting (to create the model of development of high-quality education of specialists in tourism);
- Graphic and cartographic methods (to visualize the image of start windows of developed 3D tours).

Results and their analysis.

A virtual tour is a sequence of several connected panoramic photos, between which in the process of viewing one may visually navigate through using special transitions, and interact with the objects included in the image for additional information. In other words, a virtual 3D tour is a means of projecting a realistic image of three-dimensional multi-element space on the screen (Hadetska, 2014).

A 3D tour (virtual tour) unites several 3D-panoramas interconnected by several references – points of transition between each other, interactive map of the area, means of navigation of panorama in one style. Also, the panoramas may include Flash animation, sounds and noises. By moving from one three-dimesional object to another, you can go straight into the action, see objects and interiors, people who surround you, while remaining at one's workplace at the computer.

A virtual tour is an effective tool of marketing which allows the potential consumer to see the goods or services in a special way. It creates "the effect of presence" for the viewer – bright memorable visual images, thus providing the fullest possible information on goods or services. Virtual tours and panoramas are some of the most efficient and persuasive ways of providing information today (Hadetska, 2014).

Virtual tours have a number of advantages over other commercial and information means. Virtual tours are actively displacing such broadly applied means of media advertizing as presentation and videos. All this is possible due to the simplicity of the development of such novel technologies, reduction of time between the tour and the familiarization of the buyer with it, simplicity and speed of posting new tours, and updating and replacing old virtual tours, which is a guarantee of relevance of the presented information. The cost of virtual tours is lower, while the efficiency is higher as compared to that of video.

The main advantages of virtual tours are as follows:

Possibility of saving time, both for the party which presents the tour (seller) and for the buyer (potential buyer or client);

Increasing the interest in the tour itinerary, object or tour company;

Increase in prestige of the tour objects, and therefore attraction of new clients;

Increase in revenues of the companies.

Disadvantages of virtual tours are

Complexity of required knowledge and skills for the development of such types of tour;

Difficulty of asking questions while viewing the tour;

Lack of emotions, low level of memorizing;

Quality of tour depends on developers (professional skills of developers are the main factors of quality of touristic products);

High cost of creating services for the client;

May be viewed only on electronic devices (Kravchenko, Sushchenko, 2018).

Professional preparation of future specialists in the sphere of tourism is the process whereby students gain special knowledge, practice and skills, work experience, which help to raise highly professional specialists in the sphere of tourism (Kobzova, 2013).

Students who study the Speciality 242 Tourism study a large number of disciplines, including "Informational systems and technologies", "Management of projects in tourism", "Information systems and technologies in tourism", "Analysis of activity of touristic enterprises", "Innovation technologies in tourism". We analyzed typical programs of special disciplines for training future specialists in the sphere of tourism and distinguished the following generalizing requirements to the speciality-related competence:

- Awerness of contemporary tendencies and regional priorities of development of tourism in general and its separate forms and kinds;
- Abilities to develop, promote, implement and organize the consumption of the tourist product;
- Understanding principles, processes and technologies of organization of work of the subject of the tourist industry and its subsystem;
- Ability to monitor, interpret, analyze and systematize tourist information, ability to present tour informational material;
- Ability to use information technologies and office equipment in the work of tourism enterprises;
- Ability to determine individual needs using modern technologies which provide services to tourists;
- Ability to co-work with business partners and clients, ability to effectively communicate with them;
- Ability to create specialized tourism products and organize services to tourists.

Based on the research performed, we built a model of development of high-quality education of specialists in tourism by means of using computer 3D tours (Fig. 1).

While developing such a model, we took into account theoretical-methodological provisions concerning preparation of future specialists in the sphere of tourism, results of analyses of curricula, educational plans of training students of the Tourism speciality and data of the pilot experiment. Using means of information-communication technologies in the study of specialized disciplines would help:

Increase effectiveness of grasping the material;

- Automatize the process of control and analysis of students` activity, performance of academic tasks, and also provide remote execution of practical and module tasks;
- Develop the student`s independence in performing typical tasks, self-assessment and self-analysis with remote checking of the stages of execution and final academic result by the teacher;
- Build professional skills in using ICT in development of tourist products;
- Build information-communication competence in students, modern professional skills in using and operating means of ICT, professional software and innovatory technical means.

Education with use of information-communication technologies in higher education institutions may be organized according to the level of coverage:

- At the level of the educational institution;
- At the level of a structural unit (subunits) of the educational institution;
- At the level of speciality of training;
- At the level of cycle of educational disciplines;
- At the level of separate educational discipline (Borysenko, 2018).

Depending on the level of organization of education, we may distinguish the structure which would include informational, program, and technical resources, methodological provision, and also create additional structural units for technical support. At each level, there are individual peculiarities of informational content, organization of communication and achievement of result.

The model of development of high-quality education of specialists in tourism by using computer 3D tours is based on the concepts of Smart City, sustainable development of tourism, innovatory development of tourism, educement, scientific concept, 3D visualization, decomposition of 3D models, problem-oriented, creative approaches, correspondence of current requirements to the labour market, social orientation of tourist preparation.

We consider the proposed model as a theoretical construct of the corresponding process of preparation during teaching special disciplines. It is an integrity of interrelated structural blocks oriented toward developing students` attainments in using computer 3D tours: conceptual-oriented (the main concepts, approaches and principles of organization of education which influence the use of computer 3D tours are determined), content-technological (the student

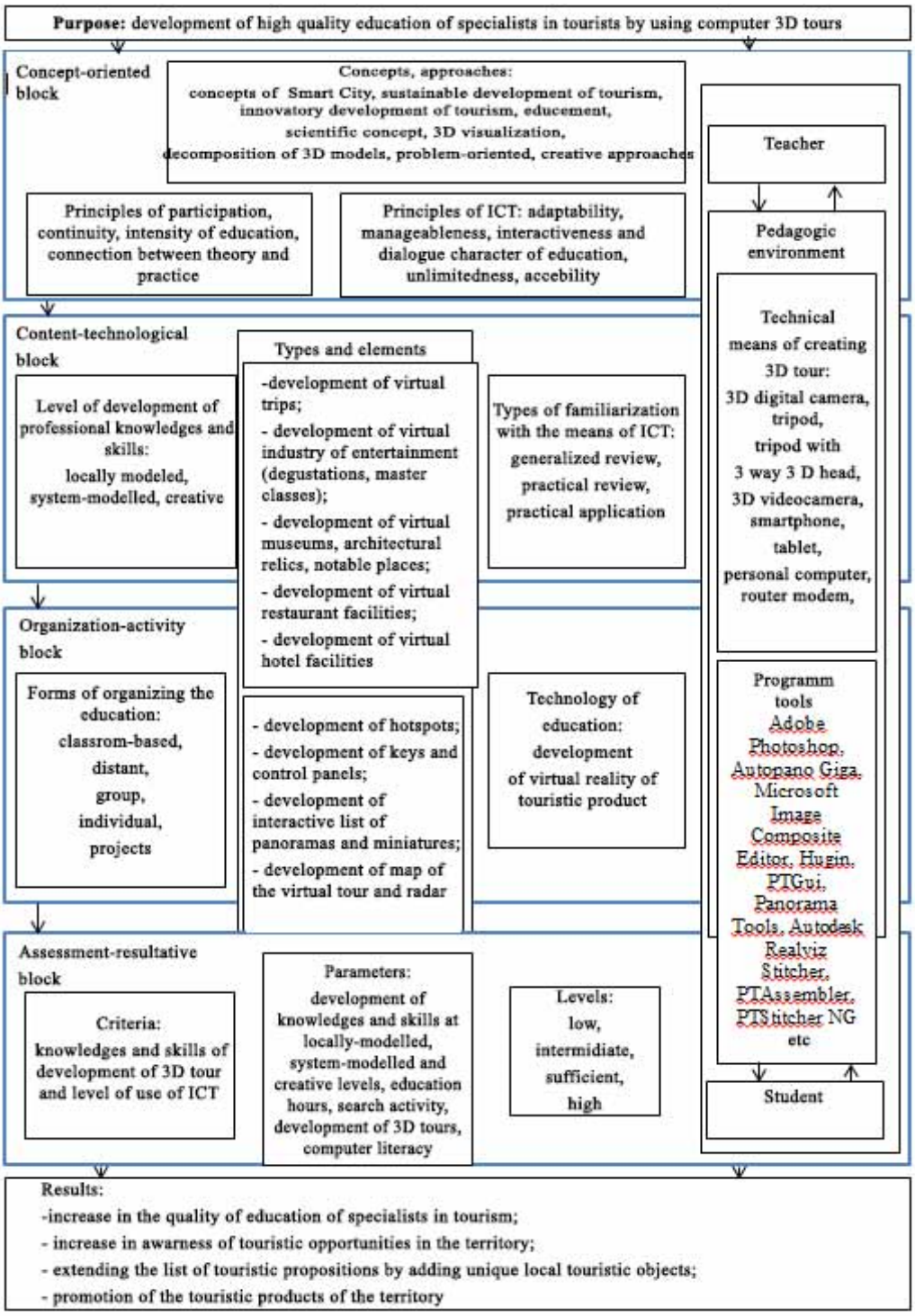

Fig. 1. Model of development of high-quality education of specialists in tourism by using computer 3D tours [developed by the authors]

becomes aware of the content of academic project development of the 3D tour, types of educational purposes, taking into account the levels of professional knowledge and skills, types of familiarization with the means of ICT), organization-activity (involvement of forms of organizing study and specifics of implementating education technologies based on the development of virtual reality of the tourist product), assessment-resultative (includes students attaining the corresponding level of readiness to use computer 3D tours).

The concept-oriented block includes concepts, approaches, principles of involvement, information-communication technologies. The method of development of education of specialists in tourism by using computer 3D tours was implemented with consideration of the following concepts of tourism: "Smart City" (efficient integration of physical, digital and human systems in an artificial environment for the purpose of providing a sustainable, successful and all-round future for citizens), sustainable development

of tourism (system of views in the sphere of tourism which help orientatation in the use of virtual environment and create new 3D products, consideration of historical experience of using media means in the sphere of tourism, directions and styles), innovatory development of tourism (introduction to the market of improved services of people's intellectual work , which have new consumption qualities, which shall in some time become an object for new improvements, to the market. The goal of the innovation in the sphere of tourism is increase in satisfaction of clients as a factor of heightening their quality of life), educement (content of education and organization of obtaining knowledge through various forms of organization and self-organization for meaningful recreation. A high level of education which progresses in its development with active involvement in tourism is a trait of the new epoch of social development, therefore introduction of such a type of education in preparation of specialists in tourism, in our opinion, is possible by the means of using 3D tours), approaches: scientific (analysis of views of scientists and researchers on the possibilities of using the advantages of a virtual environment, priority directions of use in pedagogic communication), 3D virtualizations (possibilities of contemporary technological trends concerning their use in the educational process for visualization of information), decomposition of 3D models (replacing solution of a large task with solving series of smaller tasks, although not interrelated, but simpler), problem-oriented (formulation of problem tasks and situation), creative (establishing education while taking into account the creative development of students) approaches.

The model takes into account the didactic principles of: participation (direct involvement of students in creating virtual media in the process of search activity), continuity (systemic and systematic repetition of the studied material in logically complete parts – modules), intense study (communicative goal of study becomes reality, therefore purpose-oriented and resultative technology of education develops), relationship between theory and practice (emphasizing importance of practical study, consolidation of acquired theoretical knowledges in the process of practice), as the main fundamentals of training future specialists in tourism.

Consideration of the specifics of using ICT first of all concerns the parameters of adaptivity (adapting the computer to individual peculiarities of future specialists in tourism), manageability (the tutor can correct the process of making 3D product at any moment), interactivity and dialogue character of study (information-communication technologies can "respond" to the actions of students and teachers, "become involved" in dialogue with them), unlimitedness (content, its interpretation and additions are quite large), availability (provision of open access to gaining competence in using the resources of means of ICT).

The content-technological block includes the content of educational project development of the 3D tour, levels of professional knowledge and skills, and also types of familiarization with the means of ICT. Educational content of the model includes professional practical skills of the student in development of various 3D tours. At the same time, the means of ICT are learned gradually according to the following sequence: development of virtual trips; development of virtual industry of entertainment (degustations, master classes); development of virtual museums, architectural relics, notable places; development of virtual restaurant facilities; development of virtual hotel facilities, development of hotspots; keys and control panels; interactive list of panoramas and miniatures; development of a map of the virtual tour and radar. Educational content will be presented in the educational program and detailed for each academic task in the methodological recommendations for performance of practical tasks. During the study, one should take into account three levels of professional knowledge and skills: locally modeled, system-modelled, and creative. They include the transition from the apprehension of knowledge to testing the thinking. At the same time, at the first, local-modeling, level, the student is able to effectively solve didactic-methodological tasks in order to achieve the goal – develop the 3D product, as much as possible taking into account the real educational situation, using the novel achievements of modern science. At the second, systemic-modeling, level, the student is supposed to be able to model the individual trajectory of development of the product using the means of problem-search methods of study which correspond to the needs, motives and interests of the future specialists in tourism. At the third, creative, level, the student should have thorough knowledge of the professional sphere, generate new concepts, organizes activity in non-typical situations.

During the training of future specialists in tourism, the following types of familiarization with the means of ICT are studied: generalized review and practical review and practical application. At the same time, the students become gradually familiarized with the software and technical means. At the first stage, the generalized review, the students go over the prop-

erties of the software or apparatus capacities and then gradually proceed to practical application of them for particular tasks. During practical review, the students integrate more into working with software or technical devices, becoming familiarized with the complete list of functions and possibilities, its practical application for solving professional tasks. Practical application is characterized by dynamic involvement of the program or technical device, its professional use with already planned results using instruments of software or parameters of the technical device.

The organization-activity block of the model includes forms of organization of education and technologies of education. The model of development of high-quality education of specialists in tourism by the means of computer 3D tours implies involvement of classroom-based and distant, individual and group forms of organization of the educational process, organization of project development for detailed analysis of the topics. The model is orientated to the development of virtual reality of the tourist product – implies virtual visits and viewing of especially interesting natural-, historic-cultural objects using the means of modern information-computer technologies and communications and the Internet in any point of the space in online regime. The elements of virtual tourism are virtual excursions and virtual tours, which in the contemporary tourist management are effective tools of attracting the potential tourist or guide to really visit the objects of these excursions/tours (Biletskyi, Kotyk 2019).

Such products are interesting to operators and hotels which promote a certain touristic direction or particular place of recreation. A 3D tour helps the tourist more simply understand what to expect in the journey. During the virtual tour, he would feel the real dimensions and atmosphere of the place, walk along the beach or swim in coral reefs, therefore knowing exactly where to go afterwards.

The assessment-resultative block includes criteria, parameters and levels. During the development of the model, we analyzed the results of activity of subjects of the educational process according to two groups of criteria: the criteria of professional theoretical knowledge and hands-on skills in developing 3D tours and the criteria of the level of applicability of the contemporary program and technical means in creative educational development.

The first level and criterion of professional theoretical knowledge and practical skills of development of the 3D tour is the level of understanding of the 3D tour and its further creation. In the process of study, specialists in tourism begin to acquire the first understanding of the 3D tour, and implement this understanding. The subsequent level in achieving the goal is studying technologies of making the product. While studying, specialists in tourism construct special knowledge and skills sufficient for the functions of the first level of professional activity for creating the tour. The final, the main level is mastering the special disciplines, which is characterized by attainment of individual professional abilities, development of creative and individual abilities which are necessary to create a virtual tour, and constant interest is manifested in this program product.

The criteria of the level of application of contemporary software and technical devices in creative academic development allow the specialists in tourism, during study of special disciplines, to raise their level of skills in computer technologies and technical devices; based on the algorithm of creating 3D tour, to formulate a creative approach to use of the elements to solve a given task and individually create a 3D tour.

According to the group of criteria, the corresponding parameters were formed for each level of knowledge, professional skills, expenditure of educational time, search work, development of 3D tours, computer literacy, and also the influence of the elements of the methodological system on the formation of interest and activity, practical resultativeness and use of contemporary software and technical devices.

Parameters should be evaluated according to corresponding levels of professional skills, distinguishing low, average, sufficient and high. The division should be made based on an accumulative (range) system of assessment corresponding to the results of performing academic tasks.

Organizing lessons in special disciplines requires creating an information environment where the following elements would be used complex combination :

Communication devices:

- Email (the most common technology of sharing information on the Internet, not only for entertainment and social needs, but in the professional sphere as well – analyses of stages of development of the 3D tour, remote development of technical documentation and its analysis, etc);
- Blog (web-site with broad or limited access which allows one to interact with its authors in comments);
- Virtual board (interactive remote tool of

communication of teacher with students, which may be also used in the future professional sphere to organize the process of making 3D tours);
- Social networks (active instrument of up and running contact between participants of discussion which implements not only information sharing, but through which it is possible to development social status, as well as using them as a presentational tool) and others;

Information means:
- Traditional office set of programs and apps (their use is not limited by the use of already installed functionalities, but may additionally demonstrate new elementary ways of development of a 3D tour, design of creative ideas, simple graphic interface of the search, analysis of 3D tours and development of prototype);
- Software for analysis of image (various software allows for processing of photos and creating equiangular projections of panorama, i.e. combines images into one);
- Software for graphic design of tour (their use allows addition of active zones into a panorama, developing graphic design of the tour, if needed, adding sound, pop-up windows with text, etc).
- Division into informational and communication means is specific, because the representatives of communicative means allow not only transfer, but creation of information content in complex with additional software (on-line and off-line apps) (Bilushchak, Paslavska, Reut, Rudnyk, 2016). Also, these means include additional technical devices for analysis, presentation and making of 3D tours (3D digital camera, tripod with 3-way head, 3D video camera, smartphone, tablet, PC, router modem, multiplexor, etc). Mastering them is the main goal of methods of education of specialists in tourism.
- The general structure of the pedagogic environment of use of computer 3D tours in education of future specialists in tourism can be usefully presented in the following steps:
- Lectures concerning mastering theoretical generalized material from the special discipline;
- Lectures that familiarise students with the means of ICT they may use;
- Practical mastering of the means of ICT during practical lessons;
- Obtaining thematic object for academic task;
- Performing academic tasks using technical and software means of ICT;
- Achieving educational results and implementing them practically.

At first, one may use traditional classroom-based presentation of the material, which may have a distant format of exchange of information content between the teacher and students through developed program systems, universal models and shells, or ways specially designed by the teacher. The main goal of the remote variant is creating conditions for providing high-quality preparation by giving students an opportunity to attain fundamental or additional knowledge of information-communication technologies. This variant is important for the extramural form of education, when there is increased education load on teacher and other cases. For full time students, classroom-based study is the dominant form. Moreover, for raising the motivation component, the teacher enriches the traditional forms with innovatory specifics of organization, contemporary technical means, developed electronic support in the form of multimedia lecture-conspectuses, web apps, etc.

The next stage is familiarizing students with contemporary technical resources and other means of ICT, which shall be used to perform academic tasks. These means have broad universal application, as well as specific professional orientation. Among the technical means used are 3D digital camera, tripod, tripod with 3D head, 3D videocamera, smartphone, tablet, personal computer, modem router, multiplexor. Availible software would include Adobe Photoshop, Autopano Giga, Microsoft Image Composite Editor, Hugin, PTGui, Panorama Tools, Autodesk Realviz Stitcher, PTAssembler, PTStitcher NG, etc.

While familiarising future specialists in tourism with the means of ICT, the teacher emphasizes the available range of software and certain software products for academic tasks due to specific peculiarities, the simplicity of quick mastery, professional use and other criteria.

During the analysis of typical programs for special disciplines “Information systems and technologies”, “Mangement of projects in tourism”, “Information systems and technologies in tourism”, “Analysis of activities of tourism enterprises”, “Innovatory technologies in tourism”, we determined inter-subject connections with other educational programs of disciplines: “Geography of tourism”, “Recreational complexes of the world”, “Organization of tourism”, “Organization of tourist trips”, etc.

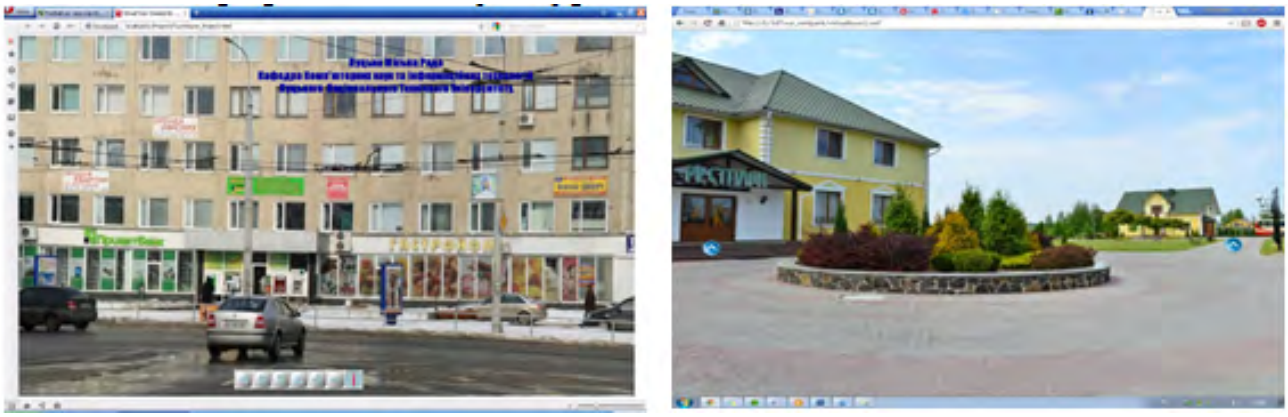

Fig. 2. View of start windows of developed 3D tours – "Virtual Lutsk" and Recreational Complex "Restpark"

The process of development of virtual tours included several stages:

- Selection of the number of points (panoramas) in virtual tour;
- Development of individual menu and additional interactive functions;
- Taking photos of the object;
- Composing the 3D panorama and virtual tour;
- Posting on the web-site and testing.

In order to form the required tourist products, we conducted studies of the expedience of their introduction to selected tourist objects. Accordingly, during the lessons in the discipline "Innovatory technologies in tourism", we developed the following virtual 3D tours (Fig. 2):

- "Virtual Lutsk";
- "Recreational Complex "Restpark",
- Center of Traditional Culture "Medova Hata".

The virtual excursion "Virtual Lutsk" was developed using PTGui, Microsoft Image Composite Editor, Tourweaver 5 Professional Edition programs. To develop the virtual tours "Recreation Complex RESTPARK" and "Center of Traditional Culture "Medova Hata", we used a complex of software tools, namely Kolor Autopano Giga, PanotourPro and Adobe Photoshop.Those program products have a friendly, intuitively understandable interface, and also allow the achievement of impressive results in a relatively short time (although the latter is possible only if ideal photographs are stitched into the panorama). Ultimately, development of the program product takes a minimum amount of time, whereas using other technologies achieving the same result would take a week of work by a team of developers. Virtual tours are launched through swf file, supported by almost all computers (Lepkyi, Podoliak, Kosheliuk, 2015).

To navigate through virtual 3D tours, a Help key was installed, which is located first on the right side. At any moment, the Help window may be opened.

Assessment of the mentioned tourist products was made by students during production and pre-diploma practice. The results of assessment met with a favourable response from consumers of tourist products, increasing the quality of educational program in the speciality "Tourism" by forming corresponding competences in learning.

Summming up our research, based on the said conceptual generalized provisions, we may note that realization of the model of development of education of specialists in tourism is possible by means of use of computer 3D tours with application of contemporary means of ICT during study of special disciplines and formulation of professional skills.

Conclusions.

The training of future specialists in the sphere of tourism in the use of computer 3D tours is a constituent of the general system of preparing specialists in the sphere and is considered as a process of acquisition of preparedness to perform this particular activity. To determine the structure of this process of training, we developed a model, which according to characteristics, is a total of interrelated structural blocks – concept-oriented, content-technological, organization-activity, assessment-resultative, oriented towards making students ready to create 3D tours. The presented model becomes a benchmark of developing the corresponding process of training in practice. Expedient directions of further studies include the identification and adaptation of special methods of high-quality education of students for efficient realization of the given model of development of high-quality education of specialists in tourism by means of using computer 3D tours.

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