IT-Technologies — a Conceptual Approach of the Project Method

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Abstract

This paper considers some issues of application of new information and telecommunication multimedia service-technologies designed for solving problems of increasing the efficiency of using the project method for educational purposes on the basis of the State educational standards of secondary vocational education, regulatory and legal support for the implementation of state programs on informatization in the field of education.

We recommend applying new information and telecommunication technologies to solve problems in the implementation of educational programs. Modern information and telecommunication projects are very complex. In order to implement these projects, it is necessary to apply special information and organizational technologies, means of support. These technologies can be applied in different areas of activity - education, industry, economy, culture and art. In education, these technologies are referred to as Universal Educational Activities (UEA). The results of applying these technologies can be adapted both for education and for other areas of human activity. The universality of these approaches ensures the effective results, and an integrated approach ensures the possibility of application for educational or economic tasks. The article discusses the use of methods of universal educational actions and the method of project-based training. These issues were considered by a large number of foreign and domestic scientists. On the basis of the research work, technological maps and work flow diagrams were developed for conducting classes on the subject of "Technology of Works on Ships". Students have mastered computer science, ship technologies, drafting and other disciplines. For the practical implementation of this direction, a comprehensive interdisciplinary lesson "Technology of creating and processing digital and multimedia information" was also prepared and conducted. The developed standardized adapted plan that was used at the lesson "Technology of creating and processing digital and multimedia information" on the theme: "Creating a business card in the vector graphics program Corel Draw" was presented at the VII International Conference-Competition "Innovative Information and Educational Technologies in the System of IT-education". During the lesson, students master ICT competencies in computer science, history, cultural studies and other disciplines. Methodical development received a certificate "Winner of the Competition" Innovative Information and Educational Technologies in the System of IT education." A wide range of projects can be implemented using these methods. For example, the application of the project method for the implementation of the information and telecommunications multimedia service audio guide is considered.

IT-технологии – концептуальный подход метода проекта

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Аннотация

В статье рассматриваются вопросы применения новых информационно-телекоммуникационных мультимедийных сервис-технологий для решения задач по повышению эффективности использования метода проекта в образовательных целях на базе Федеральных государственных образовательных стандартов среднего профессионального образования, нормативно-правовое обеспечение реализации государственных программ по информатизации в области образования.

Для решения задач по реализации образовательных программ предлагается применить новые информационно-телекоммуникационные технологии. Современные информационно-телекоммуникационные проекты весьма сложные. Для реализации данных проектов необходимо применять специальные информационные и организационные технологии, средства обеспечения. Эти технологии можно применять в разных областях деятельности – образовании, промышленности, экономике, культуре и искусстве. В образовании эти технологии называются как универсальные учебные действия (УУД). Результаты применения этих технологий можно адаптировать как в образовании, так и в других областях человеческой деятельности. Универсальность этих подходов обеспечивает достижение эффективных результатов, комплексный подход – возможность применения для образовательных задач или экономических. Рассмотрено применение методов универсальных учебных действий и метода проектного обучения. Для решения широкого круга задач. Данными вопросами занимались большое количество зарубежных и отечественных ученых. На основании научно-исследовательской работы были разработаны технологические карты и схемы выполнения работ для проведения занятий по предмету «Технология работ на судах». Учащиеся освоили компетенции по информатике, технологии работы на судах, черчению и другим дисциплинам. Для практической реализации данного направления также было подготовлено и проведено комплексное междисциплинарное занятие «Технология создания и обработки цифровой и мультимедийной информации». Разработанный типовой адаптированный план, использовавшийся на занятии «Технология создания и обработки цифровой и мультимедийной информации» по теме: Создание визитной карточки в программе векторной графики Corel Draw, представлен на VII Международной конференции-конкурсе «Инновационные информационно-педагогические технологии в системе ИТ-образования». На занятии учащиеся осваивают ИКТ-компетенции по информатике, истории, культурологии и другим дисциплинам. За методическую разработку был получен сертификат «Лауреат конкурса «Инновационные информационно-педагогические технологии в системе ИТ-образования». Широкий спектр проектов может реализовываться с помощью данных методов. Для примера рассмотрено применение метода проектов для реализации информационно-телекоммуникационного мультимедийного сервиса аудиогид.

Ключевые слова: универсальные учебные действия, метод проекта, информационно-коммуникационные технологии, аудиогид, нормативно-правовые документы, образование, культура, туризм, обеспечение безопасности, общество, государство.

Introduction

Information and telecommunication multimedia technologies and services are increasingly used to solve various problems in the field of economics, production and education, development of society and the state[1],[2].

Currently, an education system is being formed in the Russian Federation that has new approaches to education. The national doctrine of education in the Russian Federation (defined until 2025), the modernization program of the education system "Our New School" focuses on training in the system of additional education. To achieve these targets, new methods of teaching and educating students are needed. These methods can be applied both with basic and additional training.

To improve the efficiency and quality of education, it is proposed to use the modern and most effective method of projects as a basic method[3]. The project method is based on the students' choice of the direction and nature of the activity. Focusing on the method of projects in the professional activity of a pedagogue or a teacher allows you to meet the requirements of the federal state educational standards, using new information and telecommunications multimedia technologies.

Using software tools of information and telecommunications multimedia technologies ensures the involvement of students, both in the process of creating these software tools, and the use of opportunities to achieve learning goals based on universal learning activities.

Theoretical part.

The phenomenon of project-based training was developed by foreign authors J. Dewey, V.H. Kilpatrick, E. Collings, M. Knoll, W. Scholler, J. K. Weiss.

Domestic researchers in this field are V.V. Guzeev, M.V. Clarin, O.S. Kruglov, D.G. Levites, E.S. Polat, I.D. Chechel [1-17].

Methods of project training are a full-fledged scientifically grounded technologies of training. Knowledge and skills are mastered by students independently and methodologically soundly, they can be used for self-education or training, they contribute to the mastery of methodological knowledge, skills, and skills by students.

V.P. Bespalko, V.V. Guzeev, E.S. Polat, G.K. Selevko, I.D. Chechel study didactic and methodological aspects.

Methods of project-based training can also be considered as subject-specific aspects - technology, history, computer science, etc. [1-17].

The historical aspect of project-based training methods was discussed by L.I. Bogomolov, R.B. Vendrovskaya, E.Yu. Rogacheva, comparative pedagogical aspect of the research - S.S. Grinshpun, A.V. Zaytseva, G.V.Pichugina, I.V. Yaroshinsky, cognition - O.A. Grebennikova, initiative - S.G. Lesnikova, abilities - N.E. Saurenko, M.L. Serdyuk, T.V. Shevtsova, responsibility - N.V. Matyash, spirituality and morality - A.V. Khodyreva, information culture - I.N. Bukhtiyarova [1-17].

Involvement methods: younger age group - T.E. Batsaeva, O. Yu. Elkina, N.N. Novikova, younger teenagers – V.B. Bulanova, L.M. Ilyaev, M.P. Pastarnak, E.V. Rogaleva and older teenagers - S.B. Gnezdina, L.P. Petukhova, high school students - A.N. Bobrovskaya, O.A. Grebennikova, S.M. Shustov [1-17].

N.V. Bochkina, N.V. Kukharev, and I. Lerner, M.I. Makhmutov, I. Molnar, P.I. Pidkasisty, N.A. Polovnikova in their research focuse on the development of student autonomy [1-17].

The main idea of the proposed educational project is the formation of new views on teaching from a teacher and a student. This approach is based on the Federal State Education Standards of Secondary Vocational Education (FSES SVE)[4] and Basic General Education (FSES BGE)[5].

It seems that one of the main directions of the FSES SVE is the formation of information and communication competence (ICT competence), as students' ability to independently acquire knowledge, and metasubject ICT competence, as the development of universal educational activities in students[6].

Thus, the purpose of the research is to develop a technology for project-based learning based on universal learning activities, the formation of project independence of students, the definition of the most promising approaches to the formation of ICT competence, as a UEA.

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[1] Konstitutsiya Rossiiskoi Federatsii (prinyata vsenarodnym golosovaniem 12.12.1993) (s uchetom popravok, vnesennykh Zakonami RF o popravkakh k Konstitutsii RF ot 30.12.2008 N 6-FKZ, ot 30.12.2008 N 7-FKZ, ot 05.02.2014 N 2-FKZ, ot 21.07.2014 N 11-FKZ) [The Constitution of the Russian Federation (adopted by popular vote on 12.12.1993) (as amended by the Law of the Russian Federation on amendments to the Constitution of the Russian Federation on 30.12.2008 No. 6-FKZ, on 30.12.2008. No. 7-FKZ, on 05.02.2014 No. 2-FKZ, on 21.07.2014 No. 11-FKZ]. Available at: http://base.consultant.ru/cons/cgi/online.cgi?req=doc;base=LAW;n=2875 (accessed 14.01.2019). (In Russ.)

[2] Prikaz Minobrnauki Rossii ot 02.08.2013 N 862 (red. ot 09.04.2015) "Ob utverzhdenii federal'nogo gosudarstvennogo obrazovatel'nogo standarta srednego professional'nogo obrazovaniya po professii 180103.05 Elektroradiomontazhnik sudovoj" (Zaregistrirovano v Minyuste Rossii 20.08.2013 N 29724) [Order of the Ministry of Education and Science of Russia dated 02.08.2013 N 862 (ed. 04.09.2015) "On Approval of the Federal State Educational Standard of Secondary Vocational Education by Profession 180103.05 Ship Engineer " (Registered in the Ministry of Justice of Russia 20.08.2013 N 29724)]. Available at: http://www.consultant.ru/document/cons_doc_LAW_153118/ (accessed 14.01.2019). (In Russ.)

[3] Tomyuk O.N., Filonenko I.A. Project activity as a condition for the development of the personality of schoolchildren. Modern problems of education. M.A. Dyachkova, O.N. Tomyuk (eds). N. Ekaterinburg: Azhur, 2014, pp. 30-33. Available at: http://elar.urfu.ru/bitstream/10995/31313/1/spo_2014_09.pdf (accessed 14.01.2019). (In Russ.)

[4] Prikaz Minobrnauki Rossii ot 02.08.2013 N 862 (red. ot 09.04.2015) "Ob utverzhdenii federal'nogo gosudarstvennogo obrazovatel'nogo standarta srednego professional'nogo obrazovaniya po professii 180103.05 Elektroradiomontazhnik sudovoj" (Zaregistrirovano v Minyuste Rossii 20.08.2013 N 29724) [Order of the Ministry of Education and Science of Russia dated 02.08.2013 N 862 (ed. 04.09.2015) "On Approval of the Federal State Educational Standard of Secondary Vocational Education by Profession 180103.05 Ship Engineer " (Registered in the Ministry of Justice of Russia 20.08.2013 N 29724)]. Available at: http://www.consultant.ru/document/cons_doc_LAW_153118/ (accessed 14.01.2019). (In Russ.)

[5] Federal'nyj gosudarstvennyj obrazovatel'nyj standart osnovnogo obshchego obrazovaniya (utv. prikazom Ministerstva obrazovaniya i nauki RF ot 17 dekabrya 2010 g. N 1897) s izmeneniyami i dopolneniyami ot 29 dekabrya 2014 g., 31 dekabrya 2015 g. [Federal State Educational Standard of Basic General Education (approved by order of the Ministry of Education and Science of the Russian Federation of 17.12.2010 N 1897) with changes and additions dated 29.12.2014, 31.12.2015]. Available at: https://base.garant.ru/55170507/53f89421bbdaf741eb2d1ecc4ddb4c33/ (accessed 14.01.2019). (In Russ.)

[6] Prikaz Minobrnauki Rossii ot 02.08.2013 N 862 (red. ot 09.04.2015) "Ob utverzhdenii federal'nogo gosudarstvennogo obrazovatel'nogo standarta srednego professional'nogo obrazovaniya po professii 180103.05 Elektroradiomontazhnik sudovoj" (Zaregistrirovano v Minyuste Rossii 20.08.2013 N 29724) [Order of the Ministry of Education and Science of Russia dated 02.08.2013 N 862 (ed. 04.09.2015) "On Approval of the Federal State Educational Standard of Secondary Vocational Education by Profession 180103.05 Ship Engineer " (Registered in the Ministry of Justice of Russia 20.08.2013 N 29724)]. Available at: http://www.consultant.ru/document/cons_doc_LAW_153118/ (accessed 14.01.2019). (In Russ.)

To solve this problem, it is proposed to use the project method for different areas of training students as a means of developing the UEA, and improving the technology of the "project method" as a means of UEA.

In this context, the basis of the project method is the method of transforming or creating a model. Sign-symbolic actions are classified as substitution, encoding / decoding, modeling.

On the basis of the research work, technological maps and work flow diagrams were developed to give classes on the subject of "Technology of Works on Ships".

Students have mastered computer science, technology of work on ships, drafting and other disciplines.

For the practical implementation of this direction, a comprehensive interdisciplinary lesson "Technology of Creating and Processing Digital and Multimedia Information" was also prepared and conducted.

The developed standardized adapted plan that was used at the lesson "Technology of creating and processing digital and multimedia information" on the theme: "Creating a business card in the vector graphics program Corel Draw" was presented at the VII International Conference-Competition "Innovative Information and Educational Technologies in the System of IT-education".

During the lesson, students master ICT competencies in computer science, history, cultural studies and other disciplines. The psychological characteristics of students learning the subjects taught were studied, and interesting results were obtained.

Methodical development received a certificate "Winner of the Competition" Innovative Information and Educational Technologies in the System of IT education. "

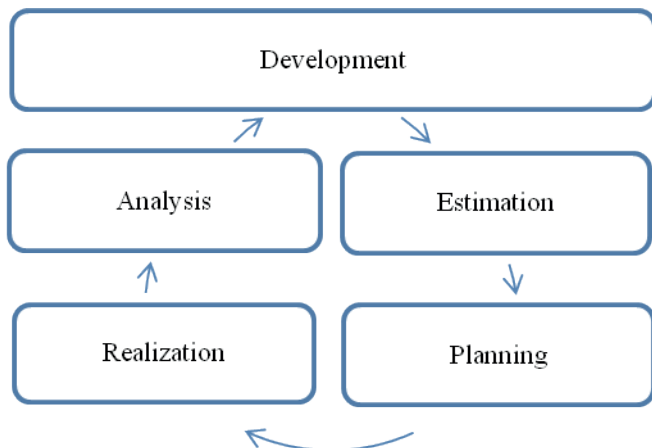A flow chart of the project development is presented in Fig. 1.

Fig. 1. The flow chart of the project development

Let's consider a method of project training for solving educational and applied problems as the formation of a person-oriented or competence-based approach.

The project method, as a means of integrating the scientific and educational component of the activity, the project meta-technology and the process of influencing technology, covers production, education, the social sphere, and politics. It has been agreed to separate project, research and design and research activities.

The subject of the study is the automation of access to information resources in the field of cultural and educational activities using information and telecommunications multimedia tools and services.

The relevance of the project results from to the possibility of improving public access to world's cultural resources. Project implementation is a complex task.

The project concerning implementation of the information and telecommunications multimedia complex in the field of education, culture and tourism requires the interaction of humanitarian and technical disciplines. The result of the project is the final product - a mobile application.

The effectiveness and uniqueness of the project of introducing an information and telecommunications multimedia service is determined by the interdisciplinary nature of the research.

The main directions of the project activity for the creation of an information and telecommunication multimedia complex and service are research, research and development, engineering, cultural and philological.

The project requires the participation of a team of about ten people in the role-based distribution of professional duties among the project participants.

The presence of competent specialists and team members must ensure the solution of the tasks posed in the field of information technology and computer engineering, philology and communications, linguistics, cultural studies and history.

The research potential of participation in the development of an information and telecommunication project gives great opportunities for improving the applied competencies of participants.

The implementation part

The informative content of the developed mobile application of the information and telecommunications multimedia system consists of: audio, video files, text records, graphic image files, geolocation information about the location of the user and design objects in the space of the premises or on the ground.

A feature of this project is the implementation of applied multidisciplinary competences at the intersection of the disciplines of information technology and computing, linguistics, and knowledge of foreign languages, history, museology and cultural studies.

The research and development projects on creation of an information and telecommunications multimedia service-project can be classified as follows:

1. analysis and assessment of the relevance, consumer and social significance of the designed mobile application, multilingual version of the product;

2. software-algorithmic and analytical modeling of the subject area of a research project: technical requirements, software architecture of a mobile application;

3. modeling of the logical structure of an information and telecommunication project, recording the content of text, video or audio files, inputting visual and audio content files, implementing an information and telecommunications database for storing and presenting data;

4. elaboration of the design of the appearance and interface of the developed mobile application consisting of:
    *   request window of the mobile application (choice of excursion);
    *   windows displaying a map of the city and geolocation of the current location of the user excursion route.

5. software implementation of launching (enabling) content of a mobile application at a certain point of the route using the GPS navigation geolocation system, Bluetooth activation points

and automatic geolocation — automatically playing an audio file with a tour or textual information about the current exhibit or an attraction; manual - using QR codes or specifying launch points on the map. The user's location is visualized using Yandex or Google maps.

The project under development consists of the following competencies. Seven "alpha" of the project: problem situation, stakeholders, decision, requirements, team, work technologies, work.

The main problem is the implementation of a project for the improvement and informatization of museum activities.

Stakeholders - museums, travel agencies, credit institutions, industry experts. The project ensures effective interaction of all stakeholders.

Stakeholders, their goals and interests. Users - visitors of the institutions and tourists, functional beneficiaries, technical support - specialized organizations in the industry, service personnel - technical specialists of the organizations in which the project is being implemented.

Investors - credit organizations, customers - travel agencies. Regulators - information and communication centers, holders of the place of implementation.

Anti-stakeholders - the results of the study are determined in the process of project implementation.

The solution of the problem is assumed by using modern high-performance technologies in the field of electronics and informatization.

Regulatory requirements are specified in paragraphs of federal laws and regulations. The team consists of highly qualified specialists.

A target system, a using system, a supporting system in the project. The target system is formed of the development of information content on the implementation of the communicative function.

The using system is formed of enterprises and organizations of the tourist sphere.

The supporting system is formed of specialized hardware development organizations. The supporting system is required at all stages of the project life cycle. The supporting system becomes the service system at the project launch stage, and at the development stage.

The ratio of the life cycle of the target system and the project. The target system is an integral part of the project.

The idea is being tested according to SMART criteria:
- S - specific;
- M - measurable;
- A - attainable / achievable;
- R - relevant / realistic;
- T - time-bound.

Documenting system requirements. System requirements: versatility, mobility, autonomy, speed and modularity.

Project life cycle and task planning. To implement the project it is planned to use the V-model of the system life cycle.

Material resources for the project. The resources necessary for the implementation of the project are financial and economic sources, technical means of project implementation (devices, studios, etc.).

Identify the risks that arise when working on a project and rank them according to the occurrence probability and the expected damage level.

Project implementation risks are minimized due to the formation of a business plan and elaboration of the marketing strategy of the project.

Environment for the project. Space (both offline and online part) in which the project will be implemented:

- offline: the project requires an audio studio with special sound recording equipment and room zoning, a language laboratory, specialized computer software, devices for programming and reprogramming devices, and specialized software. The storage system is a server. Communication facilities - cell phones, radio telephones.

Mechanisms for solicitation of additional competencies and resources to the project. The pool of experts is created during the project implementation, the basis is the commercial or scientific interest of the project participants, and the resources are the implementation through a commercial loan. The list of experts is specified when forming a business application to the project plan. The list of equipment is specified in the specification.

Ways to use the environment and interaction protocols between participants as the project progresses. As the project progresses, the work program, necessary equipment and competencies change. The internal contour of the project should include specialists (competencies) ensuring the technical implementation of the project, namely: technical specialists (electronics engineers, computer scientists), linguists, specialists in history and culture.

A feature of the project is that the external and internal contours intersect, i.e. specialists implementing the project should simultaneously be experts in their field of activity. External contour can be implemented - by users.

When implementing the project, taking into account the characteristics, it is necessary to use such approaches like CDIO (Conceive - Design - Implement - Operate / Think up - Develop - Implement - Control), which is associated with the training and implementation of engineering projects, it is also necessary to use approaches to the implementation of integrated strategic projects (for example, the new educational technology "School of General Designers" - workshops on various topics) [27].

CDIO was developed at the Massachusetts Institute of Technology in the 1990s,it is based on an engineering approach.

The main approach is a structural method of project management SCRUM and design-thinking.

SCRUM is a structural direction of Agile - agile software development, framework or methodology of "flexible", adaptable approaches to the development of software for IT-technologies, it is applied without strict restrictions on standards in programming, industrial engineering and artificial intelligence.

The Agile framework was created in 2001. The core concept of Agile is flexible, practical customer orientation and interaction in a constantly changing external and internal environment.

The structural approach of SCRUM is characterized by a focus on building an adapted organizational structure: the project team, the product owner is the curator providing interaction with the customer, and the scrum master is an organizing business process with the division into universal temporal characteristics of sprint-periods.

The Kanban balance approach, "just in time", was originally developed in the automotive industry to optimize the continuity of the work, it is characterized by dividing the business process into the stages of tasks performed: planning, development, testing and completion, etc.

The effectiveness of the project is determined by the average time of task completion with visualization on a physical board or electronic board opened for all specialists.

At the design stage it is planned to conduct an expert assessment of the work, at the stage of project delivery to the customer – excur-

sions are planned.

According to the results of work, the actual result is planned - the creation of a mobile application. The educational result of the project is the creation of a team, the acquisition of competencies and the implementation of a plan.

The main feature and a characteristic of the project is the result as a change in human practice. If there is such a result, then we can talk about project implementation. The results of this project can affect almost everyone.

Four stages of the project: "design" - "implementation" - "implementation" - "operation". The full life cycle of this engineering project consists of the following characteristics:

"Intention" - the wording of the project idea, the preparation of the terms of reference (TOR) of the project;

"Actualization" - some kind of prototype or product that is obtained in the framework of the project;

"Implementation" - how the product will be tested and built into the practice of users;

"Operation" - an assessment of the product adequacy, of how satisfies the user and solves the problem.

The next stage specifies the theme of the project, assuming that it will be engineering. The project subject indicates both the problem being solved and the proposed solution.

A feature of the project is that the most effective implementation involves the use of modern information and telecommunication technologies, in particular the object-oriented programming methods.

Thus, the technologies for creating information and telecommunication multimedia services using the project method when implementing high-tech products of a new generation are considered.

The direction of improving the method of projects is associated with the use of new information and telecommunication multimedia technologies and programs.

Experimental part

To improve the effectiveness of training, the organization of various events can be applied so-called game practices.

Using information and telecommunication multimedia computer technologies and services, for example, an audio guide and a mobile phone, it is possible to significantly increase the interest of students in the lessons.

A lesson-tour with the use of new information and telecommunications multimedia technologies can be held both in the classroom and outdoors.

The use of technical means of information technology, for example, an audio guide or mobile phones with installed specialized software, provides automation of the organization and conduct of excursions or training sessions.

The organization of such classes requires serious preliminary organizational preparation, careful study of the route, relevant information support and software, and guaranteeing the safety of participators in.

A lesson can be organized by methods of orienteering, with trigger zones for objects, a route designing, timing determination, setting and preparing materials, QR readers, etc. or as a city tour (using guided tour apps) with competence in history, which will increase motivation, students' interest in classes, make the lessons more in-

teresting and memorable.

The audio guide can be implemented either as a special technical device, or with a mobile phone with specialized software installed on it.

A new and dynamically developing phenomenon in the field of information and telecommunication multimedia technologies is a virtual museum[7].

The importance of virtual museums lies in the fact that they have wide access to the world culture heritage, and allow you to take a close look at the world artistic achievements.

Conclusive statement

According to statistical studies, the attendance of websites and electronic pages of virtual museums is high.

Virtual museums are an effective way of spreading world cultural values [2-8; 18].

In order to study the social and informational nature of the information and telecommunication multimedia service "virtual museum", a comprehensive study of this phenomenon as a normative and scientific concept is needed.

The various directions of the virtual museums topic were to some extent discussed in the dissertations of specialists and scientists in the field of museology.

The phenomenon of the "virtual museum" is determined by the use of new information technologies. The "virtual museum" element is an pattern recognition system.

The pattern recognition system is based on the use of information coding-decoding systems.

Virtual museums and electronic audio guides can be effectively used in the educational process.

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