



Interactive educational digital resources for computer science in terms of transition to the trilingual training

Recursos digitales educativos interactivos para la informática en términos de transición a la formación trilingüe

Assen Zhetpisbayevich ASSAMBAYEV ¹; Zhamilya Yerbolatovna TAICHIK; Gulbarshin Sharapidenovna NURGAZINOVA; Raushan Amanzholovna YELTINOVA; Saduakas Dulatovich BAIZHUMANOV

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ABSTRACT:

The present article considers the importance and the need for methodological support of the study of computer science in the 11th grade of high school in three languages. We show that an important aspect of economic and social modernization in Kazakhstan is the development of trinity of languages. Knowledge of Kazakh as the state language, knowledge of the Russian language as a means of international communication and knowledge of English as a means of integration into the international educational environment are now an objective necessity. The result of our work is the elaborated educational website for computer science.

Keywords: training of computer science in English, digital educational resources, trilingual education, educational site.

RESUMEN:

El presente artículo considera la importancia y la necesidad de apoyo metodológico del estudio de la informática en el undécimo grado de bachillerato en tres idiomas. Demostramos que un aspecto importante de la modernización económica y social en Kazajstán es el desarrollo de la Trinidad de las lenguas. El conocimiento del kazajo como lengua del estado, el conocimiento de la lengua rusa como medio de comunicación internacional y el conocimiento del inglés como medio de integración en el entorno educativo internacional son ahora una necesidad objetiva. El resultado de nuestro trabajo es el Web site educativo elaborado para la informática.

Palabras clave: formación de la informática en inglés, recursos educativos digitales, educación trilingüe, sitio educativo.

1. Introduction

In the Message of the President of Kazakhstan Nursultan Nazarbayev "New Kazakhstan in the new world" in order to ensure the competitiveness of the country and its citizens there was proposed gradual implementation of the cultural project "Trinity of languages", according to which we need to develop three languages: Kazakh as the state language, Russian as the language of international communication and English as the language of successful integration into the global economy (Nazarbayev 2007). This idea was continued in the speech of the President of Kazakhstan Nursultan Nazarbayev at the XIXth session of the Assembly of People of Kazakhstan "Kazakhstan's way: stability, unity and modernization" in which it was pointed out that an important aspect of economic and social modernization is the trilingual development (Nazarbayev 2012). Of course, the leading factor in the successful implementation of this idea is the system of education, in particular, the process of training of multilingual specialists in priority sectors of the economy and education, which was discussed at the national meeting of the Ministry of Education and Science of the Republic of Kazakhstan "Multilingual education in the Republic of Kazakhstan: Strategy of development " in June 2012 (Multilingual education in the Republic of Kazakhstan: Development Strategy, 2012). In the book "Strategy of radical renovation of the global community and partnership of civilizations" Leader of the Nation Nursultan Nazarbayev outlined that "in the context of globalization and the migration of labor world order is becoming multipolar and multilingual. Dialogue and partnership among civilizations covers various aspects of society such as science, culture, education. The foundation of this partnership is the formation of multilingual environment in response to the global challenges of the 21st century " (Nazarbayev 2011).

The purpose of the trilingual education is not just teaching other (foreign) languages but it is also immersion in the real intercultural environment, conducting of the dialogue, the dialogue between cultures, based on mutual understanding, harmony, and friendly interest in different cultures. The concept of a dialogue of cultures is understood as a philosophy of communication in today's multicultural world, it is fundamentally different from the traditional "foreign language teaching" (The Law of the Republic of Kazakhstan "On Education", 2011). A person, capable of conducting the dialogue of cultures, must be competent not only linguistically, but he must also be cultured, moral and spiritual (Law of the Republic of Kazakhstan "On languages in the Republic of Kazakhstan, 2011).

Knowledge of Kazakh as the state language, the Russian language as a means of international communication, English as a means of integration into the international educational environment are now an objective necessity.

Pavlodar State Pedagogical Institute has been consistently implementing the programme of trilingualism since 2010, first of all in the aspect of the development of the conceptual foundations of multilingual education, defining the strategy, goals, objectives, content, main directions of its development and implementation stages.

Information Science training in English will be introduced in accordance with the standard curriculum of general secondary education starting from the 2020th-2021st school year in grades 10 and 11 (State program of development and functioning of languages in the Republic of Kazakhstan for 2011-2020, 2011).

Information technologies have become an integral part of our everyday life and gradually penetrate into all spheres of human activity. Use of information technology speeds up and simplifies the process of working with different types of information, presented in digital form.

In a number of countries one of the priorities of education has been done in favor of formation of computer literacy of students. If, on the one hand, acquisition of these competencies by the students is a requirement of time, on the other hand, this requirement is due to the fact that information technology has become a new tool in the study of other subjects, providing resources and technical means for the integration of different educational areas.

In connection with the abovementioned, we set a goal to develop interactive educational digital resources on computer science for secondary education.

As it is known, on the one hand, on the high school level general education of students is completed, providing them with functional literacy, social adaptation of personality, and, on the other hand, there is a social and civic self-determination of young people. At the high school level these features predetermine focus of educational content in it on the formation of socially competent and socially mobile personalities, who are aware of their civic rights and responsibilities, who have a clear idea of the potential, resources and ways to implement the chosen way of life. Focusing on new goals and educational outcomes in high school is a response to the new demands that society makes to the social status of each person. The most important of these requirements are to be independent, to be able to take responsibility for themselves, for the success of the selection and implementation of life plans, to have a civil position, to be able to study and learn new ways of activities, professions, depending on the situation on the labor market, etc.

Computer science is a subject, which is directly in demand for all kinds of occupations and the different trajectories of continuing education. Training on this subject provides this need. The study of the subject contributes to the further development of such skills as critical analysis of information, search for information from various sources, representation of their thoughts and views, modeling, forecasting, organization of private and collective activities. At the same time this increases the effectiveness of training, if it is carried out in the new informational educational environment (Vyushkova 2015).

At the present moment the role of science in shaping the modern scientific picture of the world, the fundamental nature of its basic concepts, laws, and the universality of its methodology have clearly become more visible. Computer science has a very large and ever increasing number of interdisciplinary connections, both at the level of conceptual device and at the level of instruments, in other words, methods and means of knowledge of reality. Modern information technology represents by itself a kind of "metadiscipline", in which a language was formed, that is common to many scientific fields. The study of the subject is the key to understanding many phenomena and processes of the world (in natural science fields, sociology, economics, language, literature, etc.). Many provisions, developed by computer science, are considered as the basis for the creation and use of information and communication technologies (ICT) which is one of the most significant technological advances of modern civilization. In computer science, many of the activities that have metasubject character are formed, the ability for them forms the so-called "ICT competence".

This project will use the theoretical and practical teaching approaches to the educational process, basic textbooks, educational materials on computer science.

The integrative approach will be used that will closely link the subject of computer science with many other disciplines. A systematic approach to the teaching of computer science will be also used, in other words studied sections of the course are viewed not in isolation but in their relationship with each other.

2. Method

The leading methodological approaches of modern pedagogy and psychology have made the theoretical and methodological basis of the project.

Differentiated approach allows to actively develop creative and critical thinking of students, to find other approaches to learning motivation, it promotes the creative development of the personality;

Activity approach allows to direct training at performing activity, which forms a key information and communication competence based on maximum independent cognitive activity of school students. Person-oriented approach implies equitable interaction of teacher and student in the process of achieving educational goals. It allows you to perform the following learning objectives: breaking down barriers between the student and the teacher; the establishment of dialogue relations; facilitating the manifestation of personal qualities, creativity, and willingness

to cooperation and social activity.

Competence approach presupposes involvement of students into mastering knowledge and skills, which are not separate from each other, but the mastery of those as the complex.

Integrative approach will closely associate the subject of computer science with many other disciplines.

The systemic approach in teaching computer science is that the studied sections of the course are considered not in isolation but in their relationship.

In order to solve identified problems the following methods will be used: analysis of the technical, pedagogical sources for teaching computer science, psycho-pedagogical and methodological literature on the problems of improving the system of methods and training content, the development of new educational technologies; generalization of innovative domestic and foreign experience, curricula, textbooks in natural sciences; conversation, questioning, observation, pedagogical experiment, testing and analysis of domestic and foreign practice.

The purpose of studying computer science in grades 10 and 11 is a specialized system of mastering basic knowledge on the theoretical foundations of modern information technologies, the formation of information culture of students, mastery of specific skills of using information and communication technologies, education aspirations of continuous improvement using the latest information and communication technologies, the development of cognitive and intellectual abilities. In this regard, the project objectives were as follows

- creation of methodological support of the study of computer science in the 11th grade of high school in the English language;
- publication of interactive electronic training manuals, guidelines and interactive educational digital resources;
- development of trilingual terminological dictionaries and glossaries for teachers and students.

The methodical peculiarities of teaching the subject of computer science is to form the base of initial theoretical knowledge needed to solve specific problems related to the use of visual programming technology and modern information and communication technologies.

Particular attention in the study of computer science should be paid to the method of projects as it directly contributes to the increase of interest to the computer science course. The use of design technology enhances the quality of education, in not only computer science, but also implements interdisciplinary communication and increases the efficiency of the subjects study.

In order to improve the quality of education it is recommended to use the following pedagogical approaches: differentiated, activity, student-centered, competence-based, system approaches.

Implementation of these approaches is done through work in groups; organization of research activities; problem-based learning; application of critical thinking in the collection, processing, preservation and transfer of information; project work; formulation of public tasks that require creativity and interpretation; use tasks that are integrated with other subject areas in order to demonstrate the applied nature of the subject of computer science.

The first lesson on computer science in each class is conducted for revision of safety rules in the classrooms of computer science. When you perform practical tasks related to the work on the Internet, you must pay special attention to the ethical and legal aspects of working with information in accordance with the current legislation of the Republic of Kazakhstan.

In grades 10 and 11 with the focus on natural sciences and mathematics a systematic and algorithmic thinking on the basis of problem solving continues to develop. A direct continuation of this activity is work in the workshops (Syllabuses in the subjects of educational area "Mathematics and Informatics" for grades 10 and 11 of socio-humanitarian and natural-mathematical areas of secondary school, 2013).

A special feature of the course of computer science in the classes of social and humanities is a

more in-depth study of information and communication technologies (Yermekov and others, 2007).

After examining of each section some hours are allocated to the project activities. For students, who show an increased interest in computer science and its practical applications, the school can increase the number of hours in the study of computer science by providing an optional course of their choice. Teaching materials on computer science for grades 10 and 11 which are available on the website of the Academy of Education (www.nao.kz) are developed to help teachers (Tsvetkov, 2013). The didactic material includes multilevel task that allows an individual and differentiated approaches in teaching computer science.

The volume of academic load on the computer science is as follows:

- in grade 10 there is 1 hour per week, these are 34 hours per academic year;
- in grade 11 there is 1 hour per week, these are 34 hours per academic year.

The course of computer science in grades 10-11 is designed for the continuation of the study of computer science after mastering the basics of the subject in grades 7 through 9. Systematized basis of the content of computer science studied at different levels of school education is a common content structure of the educational area, which includes the following sections:

1. Theoretical foundations of computer science.
2. Information equipment (hardware and software).
3. Information technology.
4. Social computer study.

The subjects, which are studied in grades 10 and 11 on the basic level, have a general education focus. Therefore, the study of computer science at the basic level in high school continues the general education line of a course in basic school. Based on the progress made in the basic school in acquiring knowledge and skills in computer science, the course for grades 10 and 11 is developing them in all above-mentioned four sections of educational field. A higher level of progress and literacy of high school students as compared to the primary school students contributes to improvement of the scientific level of the course content. This allows, for example, to consider some of the philosophical questions of computer science, to extensively use mathematical apparatus in topics related to the theoretical foundations of computer science and information modeling.

A substantial line of "Information Modeling" (that is included in the section of the theoretical foundations of computer science) is largely manifested metasubject role of computer science. Here solvable problems relate to different subject areas, and computer science provides solutions for their methodology and its tools. New knowledge gained in the study by high school students from other disciplines, such as mathematics, contributes to the increased (compared to the basic school) level of issues study of information modeling.

From the sections, relating to information technology, students acquire new knowledge about the possibilities of ICT and skills to work with them, that brings them to the level of use of ICT in professional fields. In particular, much attention is paid to the development of up to date knowledge and skills in processing database (DB). Methods of designing and developing multiple-database and applications to them are studied in addition to the course of primary school. Considered problems give an idea of creating a real industrial information systems.

In the section on the Internet students gain new knowledge on the hardware and software of global computer networks, on the information services functioning on their basis. In this section students get introduced with the basics of site building, they learn to work with one of the high-level tools for developing sites (a site builder).

Teaching computer science at the basic level can take place both in the class of all-round teaching and in the classes of diverse profiles. In connection with this, the course is considered for the perception by students with a humanitarian way of thinking as well as with a scientific

and technological ones.

Our proposed project of providing Kazakhstani secondary education with interactive educational digital resources in computer science to assist teachers and students will allow moving quickly and painlessly to the trilingual education. Practical significance of the project is to directly use the elaborated interactive methodological support in trilingual computer science in the practice of secondary education.

In the practical part of our project it is planned to carry out a pedagogical experiment with school students. For example, questionnaires, observation, interviews and testing are carried out in order to identify the motivation of students and emerging challenges of mastering the material.

To implement the project ideas as an experimental platform we choose a high school. This will provide an opportunity to test the educational materials and to modify them according to the detected flaws and requirements.

For realization of tasks, we will create an educational website, which can be used by students and teachers. The contents of the site will be constantly updated and expanded.

The structure of the educational site is as follows:

- electronic form of lessons;
- video lessons;
- interactive computing environment for testing;
- manuals for teachers;
- presentations;
- a forum for the free communication of teachers.

Educational Resources website is complete e-learning modules of three types: informational, practical and control.

Information modules contain information on specific topics, the study of subjects.

Practical modules, except for the information component, contain questions and tasks related to the practical application of acquired knowledge.

Control modules are sets of tests that can be used for self-control of learning issues.

3. Results

To implement the objectives of the project we elaborated the educational website <http://it-4school.info/>. Resources of the educational website are complete e-learning modules of three types: informational, practical and control ones. Currently, we have elaborated a training module on Hypertext Markup Language HTML in Kazakh, Russian and English. The open access teaching materials have been partially used (Electronic collection of secondary school).

The home pages of the website are in three languages. In the upper part we placed a horizontal menu. The site interface is intuitively understandable and convenient for a user.

On the tab with lessons, one can find contents of the respective classes in three languages. Information modules contain information on specific topics of the study subjects.

To consolidate the knowledge one can use tabs with practical training classes in three languages. Practical modules, except for the information component, contain questions and tasks related to the practical application of acquired knowledge.

The structure of the site in addition to traditional lessons includes presentations and video tutorials. To download video lessons there are references from YouTube (Links to the video lessons in the state language; Links to the video lessons in the Russian language; Links to the video lessons in the English language).

Control of students' knowledge can be carried out on the appropriate tabs of the site. Control modules are sets of tests that can be used for self-assimilation issues.

For a detailed understanding of specific terms relevant to topics of the lessons, we developed a glossary in three languages.

4. Discussion

Thus, the results of research introduction is to increase the level of learning by well-structured theoretical material, that is accompanied by the full lesson complexes, presentations, video tutorials, workshops and tests. This educational website is a great methodical support for science teachers conducting lessons in the Kazakh, English and Russian languages.

Work on the structure of the educational site will continue. It is planned to fill the content for all sections of the course of computer science in grades 10 and 11. Including the following sections: software, information coding, the basics of logic and logical foundations of computer, basics of algorithms and object-oriented programming, modeling and formalization, working with databases, information systems, technologies of processing of textual information and numeric data, information and communication technologies. There will be provided materials for current and final control of mastering of educational material by students. The role of the educational site for teachers as a methodological platform for experience exchange and elaborated teaching materials will increase. Content and structure of the educational system will be constantly updated and expanded. A tab for exchange of views, holding forums and discussions will be introduced.

5. Conclusion

The main result of the scientific project within the framework of the implementation of trilingual education in schools of the Republic of Kazakhstan is the elaboration of a three-language educational site <http://it-4school.info/>.

Teaching materials, presented at the educational site, are used in conducting computer science lessons in the 10-11th grades of the secondary general education school.

Educational resources of the site are complete e-learning modules of three types: informational, practical and control. The information modules contain additional or detailed information on specific topics the sequence of topics in computer science. Practical modules, except for the information component, contain questions and tasks related to the practical application of acquired knowledge. The control modules are sets of tests that can be used for self-examination of mastering the subject.

The developed educational site for schoolteachers and students was tested at the secondary school No. 35 in Pavlodar and the secondary general boarding school named after Sh. Aimanov of the Education Department of Bayanaul District. In the process of approbation, 11th form pupils used an educational web-site to master the topic "Web site". They learned existing tools to create web pages, have learned the issues of designing and publishing a web site, familiarized himself with the features of a word processor to create web pages. The result of the practical sessions was the creation of a simple web-site to the hypertext markup language HTML.

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1. Pavlodar State Pedagogical Institute, Kazakhstan, 140000, Pavlodar, Mira Street, 60. E-mail: aassambayev@mail.ru

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