The introduction of digital educational resources to the educational process as a condition of Kazakhstan education modernization

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Abstract
This article examines the extensive program of education informatization RK, the design and implementation of digital educational resources in the learning process. Paper demonstrates a fragment the development of DERs in mathematics for pupils, and also features the use of DERs in training.

Keywords: ICT impact, technology integration, school education, informatization education

1. Introduction
In 1997, Kazakhstan adopted a program of educational informatization for the first time, established by the Decree N 3645 of the President of Kazakhstan [1]. State program of educational development was defined as a task of e-learning introduction. In this regard, the country began to create conditions for the implementation of the UNESCO declared with the leading principle of the XXI century formation "education for all" and "education through all life» - «Life Long Learning (LLL)» [2]. Without the use of modern information and communicative technologies is impossible to imagine the educational process that meets the requirements of modern society. The role of information and communicative technologies as providing quality modern education is regarded as a key element of the modern school.

Introduction of modern educational technology in the learning process and the development of skills to work with a qualified digital educational resources (DER) based on the opportunities of the Internet is one of the priorities in education. This, in its turn, creates the ability to search and find important information, analyze the data, organize results, in a proper way and accurately prepare and submit relevant information. It is known that the computer will give into the hands five new pedagogical tools: interactive, multimedia, modeling, communication, productivity, the use of which are directly dependent on the efficiency and quality of digital educational resources. And if so far the first three tools are used primarily in the electronic media on the local drive, the last two are the online resources. DERs new generation simultaneously use all of these tools and teaching are highly interactive, rich multimedia e-learning products, distributed on the global computer network. Solution to the problem of network multimedia DERs creation calls for a new architecture, unifying structure content components electronic educational products, and develop a common software environment functioning. On the methodical association of teachers website [3] written, that digital educational resources are the digitized photographs, video clips, static and dynamic models, objects of virtual reality and interactive modeling, maps, sound recordings, symbolic objects and business graphics, text documents and other educational materials which are necessary for school organizations.
In addition with the requirements of modern DER, written as they should not be:
- Represent an additional chapters to the existing textbook;
- Duplicate a shared background, popular science, culture, other information;
- Be based on materials that are quickly losing credibility (obsolete).

Currently DERs are grouped into the following types:
1. A set of digital educational resources, extending tutorials (it the digitized pictures, video, static and dynamic models, objects, virtual reality and interactive modeling, maps, sound recordings, symbolic objects and business graphics, text documents and other educational materials necessary for the educational process).
2. Information sources of complex structures (ISCS). ISCS is a digital learning resource, based on structured digital content (text, video, audio recordings, photos and interactive models, etc.) with the appropriate training and methodical support, to support students and teachers in one or more topics (sections) domain or provide one or more types of training activities within a certain subject area.
3. Innovative educational-methodical complexes (IEMC). IEMC is a full set of training required for the organization and conduct of the training process, which is due to the active use of modern teaching and information and communicative technologies should ensure the achievement of learning outcomes required to prepare students for the information society, including: basic general education, the ability to learn, interpersonal skills, teamwork, ability to think and act, and the ability to solve non-traditional problems using acquired substantive, intellectual and general knowledge skills[4].

In the world of educational practice increasing the share of digital resources. If in 2007 equipping with digital resources in Kazakhstan are in the range of 5% to 36%, then in 2015 e-learning is planned to cover 50% of educational organizations, and in 2020 to increase that to 90%, in organizations of all levels of education. In Russia, the share of educational institutions that use DER in educational activities in 2012 reached 95% [5,6]. Proved that the use of ICT in education is 3 times intensifies the learning process, at the same time is 2-3 times better quality of education, which is confirmed by scientists and educators of different countries (the USA - Seymour Papert, professor, founder of the educational philosophy of constructionism, India - Abdul Waheed Khan, Assistant Director General, Russian Federation - Institute of Information of RW Robert IV, Kazakhstan - Scientific School professor Gul’ Nurgaliyeva) [7]. Computerization has become the main mechanism for the educational reform in Kazakhstan. On the state level a number of regulations that determine trends in educational informatization.

2. The State Programme of informatization

In 2001, the State Programme of informatization of primary and secondary vocational education was accepted. Approved Interagency program "Internet is for the schools." In October 2001, Almaty hosted the International Forum "Informatization of education in Kazakhstan: a step in the XXI Century", invited more than 300 representatives of other countries - experts in the field of modern information and communicative technologies of education. Referring to "Information and communicative technologies in the curriculum (mandatory)" developed and approved:
1) State standard of secondary education;
2) State standard of primary education;
3) State standard of vocational education.

In terms of informatization today we can see radical changes: the activity and teachers functions, the nature of the subjects of the educational process, the methods of cognitive activity of students and the nature of their independent work, methods of training and nurturing, forms and methods of control, etc. Introduction of modern ICT in the educational system is a breakthrough that can significantly change not only the quality of the organization of the educational process,
but also provides high performance school and vocational training, fundamentally changing the nature of learning from verbal to the functional activity-teaching.

National Center of Informatization (NCI), created by Gul’ Nurgaliyeva and Research Institute of Mathematics and Mechanics (MM Research Institute) at the Kazakh National University named after Al-Farabi, under direction of academician Danaev N.T., actively engages the development of informatization education problems. Electronic educational publications of MM Research Institute, included in the list of textbooks that are allowed RK Ministry of Education for use in educational institutions in the 2011-2012 academic year [8]. Pedagogical researches in the field of educational informatization are now the most popular, as it in Kazakhstan the extensive program of information at all levels of education is conducted: computerization and internetization, technological and technical support, development of national digital educational resources and the development of information and communicative networks, teachers training to professional activities using ICT.

On the basis of NCI actively conducting research is on the use of ICT in education at all levels. It is extremely important that the translation of the content of the educational process and technology to modern electronic media can only be made provided that the achievements of science and its teaching methodology as a fundamental basis for the design of modern teaching techniques using ICT. Studies conducted in the NCI is comprehensive and integrated, which meets modern requirements for science are merging, the interpenetration, the integration of many scientific fields [2, 9]. The effectiveness of the development process of e-books as computer applications training was scientific and educational research designed on principles of e-books, modeling technology of the electronic textbook. There is evidence that electronic textbooks (ET) have a huge impact on improving performance and, more importantly, on reflection student goals and objectives of an academic subject, on the interpretation of their educational opportunities. In the experimental schools NCI proved that performance of children who work on electronic textbooks, increased by 2-3 times, while the learning process is enhanced by 3 times. Graduates of these schools, 80% of the total number reaches a threshold level during the delivery of united national testing (UNT).

The new state program, which is in line with the e-learning system is introduced in Kazakhstan. The system sets the development of digital educational resources, as the lesson of teaching materials.

According to Gul’ Nurgaliyeva data 3837 students from 5267 students responded that they like to listen to the teachers’ explanations with the use of these resources. 4405 students reported that learning became much more interesting, 4344 students started understanding the material better. The students survey results confirmed and the data obtained from teachers questionnaires. Teachers of pilot schools indicate that the use of DERs in class maximizes the visualization of the studied material, activated cognitive independence of students, expanding opportunities of learning quality. 83.1% of teachers who work in final classes believe that working with the DER can more effectively prepare for UNT [2].

March 16, 2012 in Astana was the historic event in the education and science of Kazakhstan - The International Consortium of developers of digital learning content for the Kazakhstan system of e-learning.

The consortium was established in accordance with the request of the Minister of Education and Science of the B.T.Zhumagulov to ensure the e-learning quality in Kazakhstan in accordance with the State Program of Education Development 2020 and the resolution of the 5th International Forum on Informatization of Education.

The task of the Consortium is to bring in Kazakhstan educational international best practices on e-learning and digital content creation. This will enable to enrich teaching methods in the subjects, almost to the achievements of the British, Poles, Romanians, Russians. With digital educational resources to learning Kazakh educational organizations will come new methods of
teaching in the subjects on the basis of the latest achievements in the field of information and communicative technologies, a new paradigm of learning. However, it should be noted that there are issues that need to be resolved. Thus, the introduction of DERs in the educational process is being implemented unequally. Along with teaching staff there is actively used ICT, quite a lot of teachers who have superficial understanding of information resources and technologies, as their applications to enhance educational activities. In order to build this competence in students, the teacher himself must have information and communication competence, be able to navigate in a variety of DERs, have the opportunity to use digital educational resources for various educational tasks: motivating students, setting goals and objectives, organizing educational activities, evaluation performance, etc. I will present (part of) a fragment for the preparation of one DER and on mathematics designed for 5th grade students. Topic: "The Image of the decimal point on the coordinate ray. Comparison of decimals."

The table below shows the introduction of mathematician-author and planning and instructions to the participants-developers.

<table>
<thead>
<tr>
<th>Graphics (to artists)</th>
<th>Theory (to speaker)</th>
<th>Explanations (to animator)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stadium. In the interval with sand train athletes - two long jumper (one is Askar, the second is Dima). The long sandy area, side, marked from 0 to 9 meters as the x-axis. Each meter is divided into decimeters, but did not sign any decimeters.</td>
<td>Look at those long jumpers! Sports is definitely good for health. These athletes are preparing for competitions. And how do you determine who is the strongest?</td>
<td>Athletes wave audience. Show how they jumped both one by one.</td>
</tr>
<tr>
<td>Icon unwinding ago.</td>
<td>To do this, measure how far they jumped. For this we find at any of the number specified on the labeled board, landed athlete. Then compare these numbers.</td>
<td>Unwinding back. The icon flashes back unwinding in the top right corner. Board-coordinate axis selected and marked off.</td>
</tr>
<tr>
<td>Jumping Dima. «3m and 4dm»</td>
<td>Let's see how far Dima jumped. Wow! 3 meters and 4 decimeters! Well done, Dima!</td>
<td>Rollback icon disappears. Dima jumps. When he landed the camera closes to the mark at the feet of an athlete, and highlighted the importance of - exactly 3m 4dm.</td>
</tr>
<tr>
<td>Jumping Askar. «2m and 8dm»</td>
<td>Let's see how Askar jump! 2 m and 8 decimeters! So, who jumped farther?</td>
<td>Dima is waiting from the start with the opposite parties. Jumping Askar. Just released figures on landing at the feet of an athlete - 2m 8DM.</td>
</tr>
<tr>
<td>New background. Coordinate axis from 0 to 9m.</td>
<td>We'll see. Dima jumped to the level of 3 meters and 4 decimeters. We write this in the form of &quot;3 whole and four tenths of a meter&quot;</td>
<td>On the left writes equations, in sync with the speaker. On the right - coordinate axis Ox. Has blue segment from 0 to 3m 4dm.</td>
</tr>
</tbody>
</table>
| $3 \text{m} 4 \text{dm} = \frac{3 \cdot 10 + 4}{10} = 3,4 \text{m}$ | And Askar jumped 2metra and 8 detsimetrov. We write this as "2 whole and eight tenths of a meter" | Below the available the following line is $2 \text{m} 8 \text{dm} = \frac{2 \cdot 10 + 8}{10} = 2,8 \text{m}$ synchronously with the announcer. On the same line of
### Question.
Which of the segments are longer?
Approach to the axis. Flashing question mark.

Blue segment is obviously longer.
Blue segment gets brighter.

**New background.**

- «3.8 > 2.8»
- «0.7 and 0.07»
- «0.70 and 0.07»
- «0.70 and 0.07»
- «70 and 7»
- «0.7 > 0.07»

It turns out that the decimal number 3.8 is bigger than 2.8.

There is a record 3.8> 2.8 in sync with the speaker.

- «0.7 and 0.07»
- «1.512 and 1.513»
- «5.14 and 5.41»

How to compare the decimals?
pairs of numbers randomly appear of:
- «0.7 and 0.07»
- «1.512 and 1.513»
- «5.14 and 5.41»

To compare two decimals, it is necessary first to level the number of decimal signs, assigned to one of them zero on the right, and then throwing a comma, to compare the resulting integers.

- «0.7 and 0.07»
- «1.512 and 1.513»
- «5.14 and 5.41»

How to compare the decimals?

- «0.7 and 0.07»
- «0.70 and 0.07»
- «70 and 7»
- «0,7 > 0,07»

To compare two decimals, it is necessary first to level the number of decimal signs, assigned to one of them zero on the right, and then throwing a comma, to compare the resulting integers.

- «0.7 and 0.07»
- «1.512 and 1.513»
- «5.14 and 5.41»

You can also compare the rest of decimals!

All records disappeared. Appear
- «0.7 > 0.07»
- «1.512 < 1.513»
- «5,14 < 5,41»

### tasks

<table>
<thead>
<tr>
<th>Graphics (to artists)</th>
<th>The mathematical part</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. &quot;Given two figures, with their area. Which of the figures more? &quot;</td>
<td>33,6 &gt; 3,36; 33,6 &gt; 3,36; 33,60 &gt; 3,36; 3360 &gt; 336; 3360 &gt; 336</td>
</tr>
<tr>
<td>Two arbitrary figures. And written on each area of the &quot;33.6 m²&quot; and &quot;3.36 m²&quot;. Three options: &quot;&gt;&quot;, &quot;&lt;&quot;, &quot;=&quot;. The window for the answer. To &quot;grab and drag&quot; one of the three options.</td>
<td></td>
</tr>
<tr>
<td>2. &quot;Stick the labels needed to coordinate axis&quot;</td>
<td>0; 0,3; 1; 1,9; 3,4; 5; 6,1; 7; 8,5; 10.</td>
</tr>
<tr>
<td>Coordinate axis from zero to 10. Divided into 19 parts (0.1). Sign 0, 1, 5 and 10. Downstairs in the number of tablets: 3,4; 7,0; 1,9; 8,5; 6,1; 0,3</td>
<td></td>
</tr>
</tbody>
</table>

When all this was done by joint efforts of the NCI and the SIVECO Company, DER got, the entire contents of which can be viewed on the site NIC at [http://lms.nci.kz](http://lms.nci.kz). In compiling this DER had the following objectives: to teach properly display decimals on the real axis, to form the ability to compare decimal numbers, and check the level of learning.

Animation allowed to show the process of displaying a decimal number on the real line in the dynamics (Pic.1), sound accompaniment can better absorb material (not distracted by reading) (Pic.2), game part reinforces and operates skill comparing decimal numbers (Pic.3). The interest of students to the lesson is increase. And the test allow the the student to check the level of learning.
Guided by principles of trust, while offering the DER to teacher complete freedom organization of educational process at their a methodical choice.
In the resources development to find out that not all content lends itself to drawing up DERs. Creating a good and meaningful DER is impossible without the participation of all interested parties - the author, mathematician, methodologist, subject teachers, programmer, animator, artist, speaker, editor, financiers, managers, experts and of course the student and parent.

As is evident, touched upon only a small part of the hard work of creating DERs. Despite the lack of experience we have made a number of DERs and even in this stage, we clearly see the utility and promise of the paradigm of learning.

3. Conclusions
We would like to tell that consistent, systematic introduction to the pedagogical process of information and communicative technologies can not only expand the existing arsenal of teaching tools, but also completely change the existing forms of education. We note features the use of modern digital educational resources:

- Easily achieved level differentiation of instruction;
- Individualized learning, as each performs the task at their own pace;
- Increases the motivation of the training;
- Develops logic and creative thinking;
- Increases the independence of students in obtaining the knowledge and self-esteem;
- Increased practical orientation training;
- Provides access to a wealth of information;
- Use image-visual presentation of the material,
- Tracking errors made by students in completing assignments, and re-worked through enough learning material;
- The teacher spends less time reviewing work.

The use of DERs provide access to non-traditional sources of information, improve the efficiency of independent work of students, provide an opportunity for creativity, allows for entirely new forms and methods of teaching, facilitating efficient process of modernization of education in Kazakhstan.

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5. Single collection of digital educational resources (http://school-collection.edu.ru)
6. Federal Centre for Information and Educational Resources (http://fcicr.edu.ru)
8. Scientific and Research Institute (http://www.kaznu.kz)