

## Training future teachers in computer skills in extra-curricular activity with schoolchildren

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**Abstract.** The article describes the work experience in training future teachers of computer skills at the pedagogical university in extra-curricular activities with schoolchildren. The study of the basic concepts of the robotic technology based on Lego Mindstorms NXT 2.0, the basic concepts of programming in the Scratch environment, and of the web 2.0 social network services is suggested as examples of the extra-curricular activity. The study of the basic concepts of the robotic technology assumes reviewing of robots construction and programming languages. The Scratch environment study assumes teaching programming to grade school students. The study of the web 2.0 services assumes involvement of future teachers in the distant creative academic competitions on this subject.

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### Introduction

Demands to vocational training of future teachers of computer skills permanently increase, especially in connection with adoption by the Russian secondary general education school of the new federal state educational standards [1, 2]. Along with educational activity, a future teacher of computer skills should be able to organize extra-curricular activity with schoolchildren, the requirements to which are represented in [3]. Extra-curricular activity of a teacher of computer skills can include organizing and holding subject-related academic competitions and lessons in robotic technology including participation in the robotic technology competitions, organizing and carrying creative events using the web 2.0 social network services.

The problem of training students at the pedagogical university in extra-curricular activities with schoolchildren has been being approached during the last 2-3 years by introducing new optional disciplines (special courses) with appropriate development of methodological materials. Curricula of training teachers of computer skills included such disciplines as:

- Algorithms of the robotic technology;
- Educational robotic technology programs;
- Organization of extra-curricular activity in computer skills; and others.

For implementation of special courses in the robotic technology, a robotic technology laboratory was established based on Lego Mindstorms NXT 2.0 (this model is used at schools and is intended for working with schoolchildren of 5-9 years of study). It is to be emphasized that these special courses were introduced for the first time in the curricula of training teachers of computer skills, and teachers had

no experience in teaching such special courses, especially in robotic technology. The special course of organization of extra-curricular activity provided learning basic concepts of programming in the Scratch environment. Besides, students were involved in participation in distant academic competitions in information and communication technologies. In this view, one more special course, the Web 2.0 Social Network Services, was introduced with the purpose of training and successful performance of students.

Thus, we had to approach educational and organizational issues, and then switch to developing methodological support for the special courses.

### Methodology

Development of methodological support of the special courses package required analyzing existing publications on subject of the special courses. Among the variety of publications, we paid special attention to publications of methodological nature, which could be recommended to students. We were interested in the teachers' publications who studied basic concepts of the robotic technology at school. We considered the experience of the Chelyabinsk region of Russia. In this region, each school studies basic concepts of the robotic technology, participates in annual regional robotic technology competitions as well as in Russian and international competitions in robotic technology. Some work experience is provided in the publication [4]. We also laid emphasis on the experience in teaching the robotic technology to schoolchildren in Saint Petersburg under the guidance of S.A. Filippov. We studied education materials of websites dedicated to the robotic technology. The publications of ISOGAWA Yoshihito [6] are to be emphasized for presenting many models for constructing robots. Among the Russian websites, the

website [7] (Nizhny Novgorod) deserves being noted, as it is permanently renewed and contains education material on both constructing and programming robots. Initially, while the robotic technology laboratory was under construction, we used the LEGO Digital Designer environment for construction of virtual robots Lego Mindstorm NXT 2.0 [8].

Analyzing various publications concerning the study of the web 2.0 social network services, we selected the ones by Patarakina E.D. [9], which can be recommended to school teachers and students, and also the publication by Tim O'Reilly [10], in which the web 2.0 concept was initially introduced. We also paid attention to the publication by Sejmura Pejperta [11] who is also well known to teachers and students as the creator and performer of the Turtle.

Participating in distant academic competitions on the web 2.0 network services, we gained a worthwhile experience in subject teachers' work, having analyzed which we selected a row of the web 2.0 services that were further included in the Social Network Services Web 2.0 special course program.

#### Body of the work

In the course of solving educational and organizational problems, our predominant purpose was the development of methodological support for the special courses specified above.

Here, we represent methodological materials of one of the special courses on extra-curricular activity – the Web 2.0 Social Network Services course. The choice of the list of social services was determined, first of all, by whether this service was necessary for schoolchildren, whether they could master it, in what cases they could apply it, and for what years of study (ages) it could be recommended. Social services for teachers (development of tests, crossword puzzles, questionnaires, and personal websites) were also considered. At that, students responded to these questions in the course of studying the material of the special course. We taught this special course after pedagogical practical work had been finished, at which students had gained the understanding of the abilities of the schoolchildren of 3-4, 5-6, and 7-9 years of study.

We compiled some blocks of the web 2.0 social services for dealing with schoolchildren and teachers and presented them in tables 1-3.

The simplest social services are the presentation development services. Development of presentations remains one of the most demanded information technologies, which schoolchildren study and use in educational and extra-curricular activity.

A list of recommended web 2.0 services for presentations development by students for learning and framing recommendations about their usage by schoolchildren and teachers was compiled.

**Table 1. The web 2.0 services. Presentations**

1. The Calameo service ( <a href="http://ru.calameo.com/">http://ru.calameo.com/</a> )	
<b>Purpose:</b> The Calameo service allows creating an interactive electronic document for reading on a computer screen. At that, it is possible to turn over pages (if a book is selected), to bend corners of pages, to scale images in magazines, brochures, catalogs, reports, and presentations.	<b>Recommendations:</b> Calameo can be used for working with schoolchildren of 7-9 years of study jointly with the teacher. Senior schoolchildren (10-11 years of study) can work independently. Easy access to the file storage allows schoolchildren to create their own groups, join others, evaluate others' works, and receive marks for their own works.
2. The SlideShare service ( <a href="http://www.slideshare.net/">www.slideshare.net/</a> )	
<b>Purpose:</b> It is a service for storing and using presentations. SlideShare saves initial quality of a presentation including audio and visual elements and animation effects. SlideShare converts presentations for easy and swift viewing in the online mode. SlideShare allows pasting a presentation in your blog or website.	<b>Recommendations:</b> SlideShare can be used for working with schoolchildren of 7-9 years of study guided by a teacher, as well as by senior schoolchildren. And, senior schoolchildren can master this service unassistedly. Works of schoolchildren can be evaluated, as well.
3. The Prezi service ( <a href="http://prezi.com/">http://prezi.com/</a> )	
<b>Purpose:</b> Prezi.com is a web service, with which it is possible to create interactive multimedia presentations of non-linear structure.	<b>Recommendations:</b> Prezi.com can be recommended as a social service for senior schoolchildren. In this case, visitors of the website can also discuss ready presentations. The service appeared less popular among our students, as it requires developing one's own content.
4. The Scratch service ( <a href="http://scratch.mit.edu/">http://scratch.mit.edu/</a> )	
<b>Purpose:</b> In the Scratch environment, it is possible to create one's own interactive stories, plays, and cartoons and share them with other participants of the network community.	<b>Recommendations:</b> Scratch can be used in extra-curricular activity for schoolchildren of 2-7 years of study. The Scratch environment can be considered also as environment for development of simple animated presentations. The Scratch environment is very popular among teachers who use it for teaching basic concepts of programming.
5. The ZooBurst service ( <a href="http://www.zooburst.com/">http://www.zooburst.com/</a> )	
<b>Purpose:</b> The ZooBurst service allows creating interesting 3D books with interactive elements. It is possible to paste pictures, text, and links to the Internet resources into a book. When viewed, a book can be turned in three-	<b>Recommendations:</b> This service can be recommended to schoolchildren of 5-6 years of study for extra-curricular development of various stories or fairy tales. Schoolchildren should preferably know English or a teacher of the English language should assist them to

dimensions, which creates additional effect and attractiveness.	write all stories in English also.
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Students did not face any difficulties at operating these services. It is to be noted that the Scratch environment can be considered as both an environment for development of simple animated presentations by grade school students (3-4 years of study) and an environment for teaching programming to schoolchildren of 5-7 years of study.

**Table 2. The web 2.0 services. Questionnaires, tests, crossword puzzles**

1. The Anketer service ( <a href="http://www.anketer.ru/">http://www.anketer.ru/</a> )	
<u>Purpose:</u> The service is intended for various questionnaires of any configuration. The service offers its members a user-friendly interface and tools for creating, editing, controlling parameters of polls, and analyzing the results.	<u>Recommendations:</u> This service can be mastered quickly enough. It is a convenient tool for a teacher who needs to carry out a questionnaire and gain efficient processing of results.
2. The Puzzle Cup service ( <a href="http://puzzlecup.com/crossword-ru/">http://puzzlecup.com/crossword-ru/</a> )	
<u>Purpose:</u> One of online services of development of crossword puzzles is the Puzzle Cup. Advantages of this service: it is free, no registration is required, and one can print a ready crossword puzzle. The ready crossword puzzle can be saved and sent to schoolchildren in the form of a link for solving.	<u>Recommendations:</u> Its learning is easy. If desired, a teacher can develop crossword puzzles on topics of the computer skills course for 5-6 or 7-9 years of study.
3. The Master Test service ( <a href="http://master-test.net">http://master-test.net</a> )	
<u>Purpose:</u> This service allows developing tests. It is possible to either create tests in an online mode or download them and then pass without connecting to the Internet. This service can be used for distant learning. The main idea is to carry out interactive testing of students and schoolchildren' knowledge.	<u>Recommendations:</u> It is an educational service. On the pages of this website, there is no information, which can distract schoolchildren from passing the test; therefore, it can be recommended to teachers. The developed tests can be offered to schoolchildren for self-training.

The Scratch environment was more interesting for us as an environment for teaching programming to schoolchildren. For profound learning of the Scratch environment, the Organization of Extra-Curricular Activity on Information Science special course was arranged. Besides, additional releases are going to be issued for this special course. The Enchanting programming environment [12] providing the functionality of programming the Lego Mindstorms NXT 2.0 robots is based on the Scratch environment software. Convenient, original, and almost identical interface of the Scratch and Enchanting environments ensures successful training of schoolchildren in basic concepts of programming.

We also recommend the following web 2.0 services block for extra-curricular activity, yet they are mainly dedicated for teachers.

These services and those similar to them interested students, as they understood that a teacher could use them in his work.

**Table 3. The web 2.0 services. Google Sites, Wiki technology**

1. The Wikia service ( <a href="http://www.wikia.com">http://www.wikia.com</a> )	
<u>Purpose:</u> The main purpose of the Wiki technologies is accumulation, structuration, and storage of information materials with a possibility of editing and discussing these materials by groups of users.	<u>Recommendations:</u> Wiki technologies are very convenient for teacher's work. Having developed any Wiki, they can be published in the Internet, and then their discussion can be arranged on different issues. Wiki websites provide opportunities for joint development of projects assuming development of electronic materials, their publication and discussion in the Internet.
2. The Google Sites service ( <a href="https://sites.google.com/">https://sites.google.com/</a> )	
<u>Purpose:</u> A user-friendly service. Very useful opportunity to represent the results of one's professional activity. Development of one's own website becomes a necessity for qualitative work in the information space of a school, a city, or a country.	<u>Recommendations:</u> The service allows a teacher to create his own website, to construct it from a variety of objects. It is possible to add various documents, tables, calendars, photos, videos, questionnaires, tests, newsfeed, etc. on a website. Students highly appreciate the functionality of this service in the teacher's work.

These services require more time for their mastering, than the previous ones specified in tables 1-2. At that, in the course of mastering them, students understand how they can be used in their future professional activity.

### Conclusion

Development of methodological support of the Web 2.0" Social Network Services special course involved direct discussion of the teaching material by

students. After the pedagogical practice, students could competently conclude on the necessity of certain web 2.0 services both for operation with schoolchildren and for a teacher. Observation over students who were performers of tasks related to the web 2.0 services showed that they liked working with the web 2.0 services, but the tasks where they were to develop the content (filling up) by themselves were less popular. Nevertheless, students showed positive attitude to the set of the web 2.0 services offered for learning, as professional orientation of this special course is clear.

As a whole, the system of the new special courses implemented during several semesters yielded positive results. To our opinion, students appeared better prepared for pedagogical practice work and for future professional activity.

### Summary

Training students in extra-curricular activity with schoolchildren demanded systematic solution of this problem. A block of new optional educational disciplines (special courses) was introduced into the specialty curriculum, a robotic technology laboratory was established, and methodological support was developed for the specified disciplines. The last task appeared the most labor consuming; nevertheless, the developed methodology of courses was in demand of pedagogy university graduates.

### Credits

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Vocational and educational activities of primary school teachers have the specifics, which is to provide them with training on all subjects human and natural-mathematical cycles, a portion to the implementation of a wide, extra-curricular educational work. Professiogramme primary school teacher reflects a significant amount of integrative components of its educational activities, which combines the functions of subject teachers and the classroom teacher and, therefore, poses a constant need to develop his teaching skills. School extracurricular activities are an excellent vehicle for teaching moral values to our youth. Love and compassion, cooperation and teamwork, justice and honesty, and respect are taught. In extra-curricular activities, a student's efforts can be entirely self-chosen and this can lead to pride and sense of worth for an individual. Zak Fitzenreider from Chicago, IL on February 08, 2013: Nice hub! This is an interesting perspective on the role of extra-curricular activities. This is very useful for teachers. It is really true the extra-curricular activities are important. This is where you will see the real reactions of students and the time to correct them for better judgment. Voted up and useful. "Extra-curricular activities help students to learn about themselves and develop and use their skills and knowledge in different contexts," says Chris Davison, deputy director of, and careers adviser with, the careers and enterprise team at Durham University. "Such activities are an essential element of the university experience." Sports clubs and societies. Universities and students' unions typically host countless clubs and societies that you can join. Extra-curricular activities help to develop the whole student. We cannot just produce one-dimensional students in our schools. Many students use their skills in extra-curricular activities like athletics or sports and their academic ability to gain athletic or sports scholarships to various universities. Numerous students from my former school are granted athletic scholarships to American universities in this way. Researchers like Massoni, Erin ( 2011 ) and others have listed many benefits derived from participation in extra-curricular activities at school. I have seen the same benefits among