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## **IMPLEMENTING DIGITIZATION OF CULTURAL AND SCIENTIFIC HERITAGE IN DR ARCHIBALD REISS PRIMARY SCHOOL**

**Abstract.** This paper presents the first phase of the project activities within the project "Digitarijum: Applying digitization of cultural and scientific heritage in school education" realized in cooperation with primary school "Dr Archibald Reiss" in Belgrade. The authors provide a model for the improvement of teaching and educational work in primary schools involving students and teachers of primary schools in the process of digitization of cultural and scientific heritage. Results and interest of participants supports the authors' stand that the introduction of multidisciplinary knowledge and new technologies in teaching and educational work motivates participants to take an active role and responsibility in education and personal development.

**Keywords.** Digitization, cultural heritage, teaching, educational work

### **Introduction**

In 2015, Mathematical Institute SANU (MI SANU), in cooperation with the Centre for the Promotion of Science (CPN), launched the project "Digitarijum: Applying of digitization of cultural and scientific heritage in the school classes"<sup>1</sup>. The project is a continuation of a cycle of projects aimed at students, teachers and young researchers, who represent a unique initiative of promoting science, technology and culture among young people through the digitization of heritage and teaching and educational work<sup>2</sup>. The process of digitization of scientific and cultural heritage is, since it is based on the mixing of several theoretical and practical knowledge, used as a model for the improvement of teaching and educational work in primary and secondary schools. Students, teachers and young researchers have the opportunity to get familiar with the basic principles of digitization of heritage through workshops, guided tours by an expert and previously planned activities on the spot. They, also, gain the necessary knowledge and skills to use and create digital tools and content. A multidisciplinary aspect of the project is considered to be a motivating factor for teachers to develop their creativity and to spread applying of innovative teaching models, and for students and young researchers to continue their professional development in science or culture.

Unlike previous projects, where the focus was on the interaction between the digitization of heritage and teaching and educational work in secondary schools, the idea of the author for this project cycle was to test the hypothesis about the effectiveness of the principles and technology of digitization of heritage in educational work of primary school.

For this, we established cooperation with primary school "Dr Archibald Reiss" in Belgrade. This school was selected according to the following factors: 1) the initiative and expressed great interest of the teacher and school management to participate in the project 2) the school is near the seat of holder of the project, and 3) a proper equipment of the school in terms of technical requirements for the implementation of project activities.

The first phase of realization of the project activities is presented in this paper, showing how the introduction of multidisciplinary knowledge and new technologies in teaching and educational work encourages taking an active role and responsibility of the participants in the education and personal development. After the end of the school year, the authors will try to evaluate whether this kind of cooperation will lead to a better achievement of the students who participated in the project in the school subjects covered by the project activities, such as the Serbian language, History, Physics, Mathematics and Computing.

### **Methodology**

The project, applying of digitization of heritage in educational work, is designed as a stimulus to the popularization of using new technologies in education, in accordance with the recommendation of the Ministry of Education, Science and Technological Development of Republic of Serbia<sup>3</sup>. It is based on an approach of the learning theory of Constructivism<sup>4</sup> and includes the direct involvement of the participants - teachers and students - in the process of creating the project activities. In this approach, the participants take an active role and responsibility in the implementation of project activities and they become directly interested in the success of the project. The creators of the project in collaboration with the teachers of primary school "Dr Archibald Reiss" made a plan of activities for the students of the seventh grade of primary school, aged 13 to 14 years<sup>5</sup>.

When selecting students to participate in the project activities, the creators of the project accepted the teachers' suggestions, who assumed that students who have better grade point average, are more dedicated to learning and likely to have more interest in participating in the project. Hence, it can be said that at this stage of the project, we had a lot of confidence in experience and assessments of the teacher.

However, in all subsequent phases, the teachers as well as the students were consulted. For example, in cooperation with the school psychologist, we created a survey in which the students are given the opportunity to propose other students whom they would like to collaborate with, as well as to select offered relevant cultural institutions they want to visit<sup>6</sup>. This approach encouraged students to take an active role in designing and implementing the project from the start and also motivated them to share their ideas with the creators of the project.

Based on teachers' suggestion and the results of these surveys, students were divided into three groups, each counting eight students. Each group was given the task to visit a relevant cultural institution in the vicinity of the school, whose permanent or temporary exhibition is in accordance with the curriculum of the seventh grade of primary school<sup>7</sup>. Thus, on the advice of teachers of history, as an adequate institution to be visited, we selected Residence of Prince Milos, which contains testimonies of the period of getting independence of the Serbian state in the 19th century<sup>8</sup>. Also, we came out to meet the wishes of students who are mostly keen on natural sciences to visit the museum of famous Serbian inventor, Nikola Tesla<sup>9</sup>, as well as an exhibition on Serbian scientist Mihajlo Pupin

at the Historical Museum of Serbia, which was created according to the latest standards of museology and represents a good example of digitization of scientific heritage<sup>10</sup>. Considering that, according to the curriculum, students study about Nikola Tesla's alternating current only in the eighth grade, and patents of Mihajlo Pupin are not discussed in elementary schools, the primary idea was students to get familiar with Nikola Tesla and Mihajlo Pupin as historical figures and, in this context, we created tasks and workshops.

This approach, where the participants are directly involved in the selection of participants and the content of activities from the very beginning, encouraged teachers and students to take responsibility for the implementation of program activities, not only in order to improve teaching and educational work, but also to enhance their personal development.

### **The first phase of the project activities**

Analysis of the results of the knowledge test<sup>11</sup> given before the start of workshops, showed that although students use new and affordable technology, for example, all have smart phones, 99% of the students have never used any application on their smartphone in educational purposes. For their school needs, 90% of students consult only free online encyclopedia Wikipedia<sup>12</sup>. When being asked about the term 'cultural heritage', students replied that it is a historic object or a property inheritance, while, according to them, the term 'digitization' is related to the transition from analogue to digital television broadcasting. 70% of students do not know about the history and content of cultural institutions in the immediate vicinity of the school, yet they clearly expressed wish what to visit and why.

The creators of the project in consultation with the teachers took listed results of the survey into consideration when designing tasks. For instance, each of the three groups had task to visit a cultural institution near the school: Residence of Prince Milos, Nikola Tesla Museum and the Historical Museum of Serbia. While visiting these institutions, each group was divided into two smaller groups of four students, which had the same or different tasks related to the preservation of cultural and scientific heritage. For example, at the Residence of Prince Milos both groups had the same task- to design the commercial about Residence of Prince Milos by collecting information about the exhibition, interviewing the guide, and capturing images of their choice<sup>13</sup>. On that occasion, they were given a choice how to use collected information, as well as to select tools when creating advertisements that they will present to their peers at the end of project. While visiting the Residence of Prince Milos both groups had the same topic of research, on the other hand, groups that visited the Nikola Tesla Museum and the Historical Museum of Serbia got different ones. In the Museum of Nikola Tesla, one group of students researched the topic: "Attitude to life and work of Nikola Tesla, decades after his death," and the other "Attitude of Tesla's contemporaries towards his life and work"<sup>13</sup>. In the Historical Museum of Serbia, a group tasked to respond to the theme of "Pupin - diplomacy, humanitarian and literary work"<sup>14</sup> and another on "Pupin - scientific work and awards. In the Historical Museum of Serbia, one group got task to respond to the theme of "Pupin - diplomacy, humanitarian and literary work" and the other one on "Pupin - scientific work and awards." They were also given a choice to select tools, to choose way of using them and to present collected information to their peers.

Four out of six groups have shown initiative in the realization of tasks and devising ways of presenting new knowledge to other students. For example, they had the idea to create a vlog or web presentation. Also, it turned out that the introduction of elements of competition and competitiveness between the groups had a motivational effect. To be specific, the groups that had the same task were more focused on the work and showed more competitive spirit.

Workshops in school are planned in the next phase, where students will have the opportunity to process gathered data and photographs and to present their work using modern technology, in order to transfer the acquired knowledge to their peers.

### Conclusion

The first results show great motivation of teachers and students in primary school to participate in projects that, using new technologies, promote science and culture. The implementation of project activities, among other things, resulted in using of the innovations in regular school classes (innovative models of teaching, interactivity an expert- teachers -students, encouraging initiative, developing new skills ...). On the other hand, the active participation of teachers and students in project activities contributed to the progress of the process of digitizing cultural heritage and shifts the perspective of the expert to the utility of digitization of heritage in educational work. The author suggests that a larger number of samples of elementary schools should be included in the next cycle, in order to collect data for advancing model of involving schools in multidisciplinary programs that are outside the compulsory curriculum.

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