Digital school and its impact on the educational process
National project Electronisation of the education system of regional schools in Slovakia

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Abstract
The article analyzes the current state of digitization of primary and secondary schools in the Slovak Republic. It deals with the national project: Digitization of the educational system of regional schools, running in 2013-2015, and with the introduction of electronic services in education in the educational process. It acquaints readers with the tasks and aims of digitization, it refers to the issue of interrelated projects: Planet of knowledge and Digital school. It presents the visions of the project and their fulfillment in the form of supplies to schools: tablet classrooms, projectors, interactive whiteboards, laptops, printers, tablets, wifi routers and a complex software Samsung School for the management of tablet classrooms.

The article describes the implementation of the latest technology to support teaching in primary and secondary education in Slovakia, where the digital content is an important educational tool and an aid for teachers to facilitate their work and increases the attractiveness of learning for students. Its implementation is a logical step in the present time, based on widespread use of information and communication technologies of interactive character.

In the end there is a demonstration of several suitable applications for teaching physics, using various sensors of supplied tablets with Android.

Key words: national project, digitization, e-learning, digital content, tablets, training, projects management, tablet classroom
Introduction

National project *Electronisation of the educational system of regional schools* should bring in and build a functional electronic education system in Slovakia and introduce electronic services in operation. It also includes the establishment and equipment of digital classes, the customization of digital content and, finally, the training of selected staff to ensure the further education of pedagogical staff. It is financed from EU structural funds under the operational programme *Informatization of society* and took place in the period from Nov 22, 2013 to Sep 30, 2015.

Schools across the country, under the project, acquired a modern digital equipment, which allows them to make better use of digital educational content and modernize the teaching in lessons. It totals over 5,680 interactive whiteboards, 5,680 laptops, 2,686 color printers, 20,000 tablets and 1,000 wifi routers.

The project partner is the Methodological and Pedagogical Centre, which is responsible for organizational and staffing logistics of the project and the use of digital educational materials for modern forms of teaching.

Why digital educational content

Digital learning content is an important tool and an aid for teachers to facilitate their work and increases the attractiveness of learning for pupils. Its implementation is a logical step at present, based on widespread use of information and communication technologies of interactive character.

Thanks to digital educational content, the possibilities for teachers will significantly improve in the field of visualization of more complex processes, of actively involving students or connecting theoretical knowledge with practice.

Thus it represents a very convenient and useful supplement to existing printed textbooks. Compared to them, however, it can be much easier to correct or update.

Planet of knowledge

Planet of knowledge is the first major project of digitization of educational content in line with the concept of informatization of the education sector with a view to 2020 - DIGIPEDIA 2020.

Educational portal Planet of knowledge represents a comprehensive tool for schools and their teachers, which is used for the preparation of learning materials, to work with pupils during a lesson and then to check homework assignments completed by students.

The portal contains more than 30,000 educational materials in mathematics, physics, chemistry, biology and science. Educational materials contain multimedia content in the form of videos, animations, simulations, presentations, illustrations, 3D models, images, photographs, interactive exercises and lessons. The materials on the portal are accessible by subjects and levels, as well as by thematic units defined by state educational programme of the Slovak Republic. The educational materials are certified and recommended by the Ministry of Education, Science, Research and Sport, of the Slovak Republic.

National project Electronisation of the educational system of regional schools - Digital school

National project Electronisation of the educational system of regional schools (EES RS) is another step in fulfilling of the Concept of informatization of education. The subject of the project is the Ministry of Education of the Slovak Republic, the project partner is the Methodical and Pedagogical Center, which is responsible for organizational and staffing logistics of the project and the use of digital educational materials for modern forms of teaching. The project is funded under the operational programme Informatization of Society.
The current trend in the market of information and communication technologies (ICT) is a global shift away from the use of PCs and laptops to a more massive use of tablet devices in all areas of life situations.

In the area of development of the latest technology to support teaching, this trend reflects in a shift towards the use of digital educational content (DEC), i.e. processed quality multimedia content, provided via modern devices and peripherals such as touch tablets and interactive whiteboards, which involve a wider spectrum of sensory functions of individuals. An attractive form of learning by using tools and aids of DEC provides opportunities for effective teaching (clearness, connection of life with practical theory etc.).

The trend of growth in the use of modern equipment has an impact on the use of eGovernment services, where it is expected that in the term of a few years there will be a significant part of the transactional eGov services conducted from modern mobile devices. Therefore, it is important to prepare the next generation for the need of increased digital literacy from school and pre-school age.

These needs and trends have been in recent years responded by the state which partly invested in the creation of digital content adapted to the existing infrastructure of facilities in schools. However, it has not supported the investments in modern terminal equipment for modern teaching, whereas the global trend is exactly the deployment of such equipment. The investments were made mainly in lower and upper secondary education, there is a lack of coverage of pre-primary and primary education.

At present, kindergartens, primary and secondary schools have insufficient IT equipment. The vast majority of the equipment used in the field of ICT is morally obsolete and very difficult to use for digital education, which is currently a priority in modern education.

In the framework of the national project EES RS, there will be created an information system called Electronic Services of the Education System of Regional Schools (ESESRS), which will provide an electronic support of the processes aimed at creating and making available of School Educational Program (SEP). Such a system will form the basis for the development of the curriculum preparation for teaching, for the provision of a digital curriculum as well as of the electronic support for the actual teaching and home preparation of pupils.

The educational process has been entered by digital classes, which represent a complete solution to support the deployment of elements of digital learning in all phases of the educational process - preparing lessons, actual teaching process and subsequent home preparation. Provided educational content is and will continue to be tailored to the modern end devices with touch control to ensure a smooth transition from traditional forms of learning to the teaching using digital elements.

For all kindergartens, primary and secondary schools of a target area, meeting the indicators specified by the projects, there are provided sets of equipment containing an interactive whiteboard with a laptop. For kindergarten there are also provided educational packages with educational software for school readiness, with digital educational materials and a color printer. For primary schools there are delivered educational packages to interactive whiteboards, for teaching mathematics on the first level for a minimum of 15 selected thematic units according to the state education program ISCED1. For selected schools there come sets of tablets with router equipment for a digital classroom. For teaching with tablets, there are also adapted 250 educational units for mathematics, physics, chemistry and biology.
The information system of ESESRS will serve the needs of educators, expert public, students and their parents. All users will be logged into the system by user names and passwords and will have access to their modified content both at school and within a home preparation.

In terms of teaching staff, the information system will allow:

- searching for educational materials and digital learning content suitable for inclusion in educational process
- implementing a curriculum preparation and a preparation for teaching directly using the elements of digital learning
- using system tools to manage the lesson in a digital class, subsequently the home preparation, using the elements of digital learning

In terms of students, the system will bring the traceability of digital materials used in teaching and subsequently the use of these additional materials within the home preparation.

From the perspective of parents, the implemented information system will bring the possibility of monitoring the progress of the child in the learning process and within the home preparation it will provide the possibility of closer attachment to the topics being taught at school.

In the area of school readiness, the implemented information system will provide an access to a unified methodology and to the tools for preparing and assessment of school readiness of staff for kindergartens and primary schools, external experts and parents.

School staff and external experts thus will receive a tool for a more effective preparing and assessment of the development of children.

The system will enable parents to monitor the process of development of each child's ability, thereby it will also give the opportunity to address areas of need within the child's home preparation.

Figure 1 Initial experience suggests that students get activated by touch technologies, which bring significant motivational potential and create favorable conditions the learning process
"Tablet" training

As part of the training, teachers learned to use Samsung School solution, to create working materials or collective tasks. They trained how to lead students' work with tablets during school lessons. They prepared model lessons with their students.

The trainings called "Management of tablet classroom" were implemented through the cooperation of national projects Electronisation of the Educational System of Regional Schools (Digital school) and Activating Methods in Education.

School final projects

All schools involved in the project (both tablet and non-tablet ones) committed in their applications to the project, to the development of so-called "school projects".

The schools were committed to develop the following projects:

Mandatory topic for all involved primary and secondary schools:
- 1 video, a multimedial presentation and a methodical material to the topic: We like Slovakia

Optional topic – one of the following:
- 1 video and a methodical material to the topic: Videoexperiments
- 1 video and a methodical material to the topic: I learn, I teach you
- 1 dance video in the competition The 2014/2015 SCHOOL DANCE

Tablets Samsung Galaxy Note 10.1

Under the project Digital School, there were delivered to schools tablets with the following parameters:
- CPU: ARM Cortex A9, quadcore 1.4 GHz processor
- Display: 10.1" WXGA TFT, resolution 2560 x 1600
- Android 4.1.2
- front and rear camera
- flash
- light sensor
- microphone, speaker
- IrLED
- head phones connector
- volume button
- Slot for memory card Micro SD
- S Pen
The attractivity of smart phones and tablets lies in the option of installing a wide variety of applications that the user finds in an online store with both free and paid apps - Google Play.

Currently on Google Play available a vast plethora of application, about 1.5 million, substantially greater part of them is free.

**Sample some suitable applications for teaching physics**

**Figure 2 Tablets Samsung in teaching**

**Google Play**

**Figure 3 A level**
Figure 4 Measurement of dimensions using a photo and a reference object

Figure 5 A distance meter. It allows to calculate the distance of an object using a mathematical algorithm

Figure 6 A Noise meter
Figure 7 A Rangefinder measures the distance and height of an object, using trigonometry

Figure 8 A Protractor measures the angles of inclination of e.g. an inclined plane, a slope etc. It uses a gyroscope and a motion sensor – an accelerometer

Figure 9 A light meter measures light intensity in luxes and color temperature of light in kelvins using a light sensor
Figure 10 A Speedometer measures a current, maximum and average speed of the vehicle, bicycle, boat etc. by GPS

Figure 11 A Vibration meter uses sensors to measure vibrations or an earthquake
Conclusion

To sum up the key messages of the project Digital School and its impact on the teaching process, they are as follows:

1. Creating of an electronic educational system and acceleration of the process of implementation of electronised services and digital Technologies at schools.

2. Creating of digital educational content and its distribution in accordance with the state educational program of the Slovak republic.

3. Creating of eGOV services system, i.e. creating and accessing of school educational program, accessing of digital educational content and an electronic testing of children’s school readiness.

Each school with a tablet classroom, which is involved in the project Digital School, has gained Samsung School - solutions for the management of tablet classrooms. The schools were given an opportunity to gain a Samsung School solution for 1 € per piece for one year, while the contract is always made for a period of five years. The school, which has one notebook and 20 tablets, pays for Samsung School only 25.20 € a year (including VAT), for a total period of five years the amount of only 126 € (including VAT) for the whole solution.

We believe that the process of digitization of education in Slovakia will continue and bring a significant modernization of preparation and actual implementation of modern teaching supported by touch technologies now commonly used by students and pupils of all ages.

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