Chapter 17
Report on ICT in Education in the Slovak Republic

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17.1 Overview of the Country

17.1.1 History and Geography

The Slovak Republic (Slovakia) is a small country (49,035 km^2) in Central Europe with Bratislava as its capital city. In terms of the total area, agricultural land makes up 49% of it, forest soil 41%, and other land 10% (Wikipedia 2018). The country has 2890 municipalities (of which there are 140 cities) (Bačík 2018).

Prior to 1993, Slovakia was part of Czechoslovakia. From 2004, it has been a member of the European Union (EU). From 2009, it has been a member of the Eurozone with the Euro as its currency. Slovakia is a part of the so-called Visegrad (V4) countries (Poland, Czech Republic, Hungary, and Slovakia).

17.1.2 Population

Slovakia's population comprises of 5.43 million people (2016) with an average annual growth rate of 0.2% (2013) (OECD 2018). The highest proportion is of Slovak nationality (80.7%) while around 8.5% are of Hungarian nationality (Government Office of the Slovak Republic 2018), and 7.4% are Roma people (estimated by (Mušinka et al. 2014)).

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17.1.3   Current Situation of Economic Development

The Gross Domestic Product (GDP) is equal to €80.958 billion (2016). The net national income is 22,321 USD/capita (2014) (OECD Total = 33,709 USD/capita (2014)). The household disposable income annual growth rate is 4.1% (2015) and labor compensation per hour worked annual growth rate is 3.72% (2015) (OECD 2018).

17.1.4   Political System

The political system is a parliamentary republic one. The constitutional system is as follows: the National Council of the Slovak Republic has the constitutional and legislative power, the President and the Government has the executive power, and the Constitutional Court and courts have the judicial power. The current government (from 2020) is led by the center-conservative movement OĽANO (Ordinary People and Independent Personalities) in coalition with Sme Rodina (We are Family), SaS (Freedom and Solidarity) and Za Ľudí (For the People).

17.1.5   Language and Religion

The official language is Slovak which belongs to the Slavic group of languages (it includes Polish, Czech, Croatian, and others). Roman Catholicism is the dominant religion (62% of the population) followed by Evangelical (5.9%), and Greek-Catholics (3.8%) (Government Office of the Slovak Republic 2018).

17.1.6   The Relationship with China Under the "16 + 1" Cooperation Framework

In 2015, Slovakia was among the first countries to sign the memorandum with China on Belt and Road (BRI) initiative. In 2017, two documents related to the China strategy were put forward by Slovak government. Firstly, in April, the government approved the Concept of Development of Economic Relations between the Slovak Republic and the People's Republic of China for the Years 2017–2020. Later, it has been extended to the Action plan (Kironská and Turcsányi 2017). Recently, the 8th "16 + 1" summit in Dubrovnik has got the largest reaction in the press and on the websites of government and other relevant institutions. The reason for this was the signing of an agreement enabling the export of Slovak dairy products to China. Slovakia was one of the last EU countries that did not have such a deal

with China in place, Prime minister outlined three areas where Slovakia envisages stronger cooperation with China in the immediate future. Apart from the dairy product certification agreement, the most important one was the development of cargo transit capacities, and the third was the construction of a center of excellence in modern technology in Slovakia (Ondriaš 2019).

17.2   Overview of the Educational Development

17.2.1   Enrollment Rate

According to the demographic development in Slovakia, the number of students in primary to post-secondary education in 2014 was 89.5% of the number of students in 2010 (100%) (Germany 93.8%) (based on data from (OECD 2018)). In Fig. 17.1, we can see the downward trend of the number of students studying at primary and secondary schools in Slovakia.

17.2.2   Years of Schooling

The Slovak education system is divided into four levels (pre-primary, primary (6–15 years), secondary (15–19 years), and higher education) based on the age of the student. In the Slovak education system there are 10 years of compulsory education (until the age of 16 with no exceptions). After leaving secondary school it is possible to enter the labor market or continue into further study.
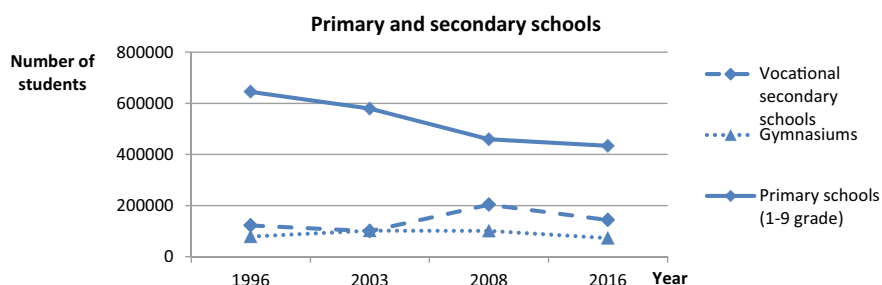
Fig. 17.1 Number of students in primary and secondary schools in Slovakia. *Source* Own, based on Statistical Office of the Slovak Republic (2017)

17.2.3 Academic Performance

In comparison with other OECD countries, Slovakia is at the bottom of academic performance as measured by PISA tests. In mathematics, Slovak students achieved 472 (girls) and 478 (boys) (2015) (OECD average 486 girls and 494 boys). In reading, 471 was achieved by girls and 435 by boys (2015) (OECD average 506 girls 479 boys) and in science, 461 by girls and 460 by boys (2015) (OECD average 491 girls 495 boys) (based on data from (OECD 2018)).

17.2.4 Development of Teaching Staff

The average age of teachers in primary education in Slovakia is 44.3 years (Germany 45.9 years). Teachers in primary education in Slovakia spent 832.1 teaching hours per year (2015) (Germany 799.3 h per year) (Note: teaching hours = preparatory time + statutory teaching time). In Slovakia there are 14,182 teachers which mean professional staffs are directly involved in teaching students. Women in primary education make up 89.7% of teachers (Germany 86.8% of teachers). The average teacher's salary in Slovakia is the second lowest from the OECD countries. In primary education, teachers with 15 years of experience have gross salaries of 17,930 USD/year (Germany 68,265 USD/year) (based on data from (OECD 2018)).

17.2.5 Policies for Educational Inclusiveness, Equity and Quality

These goals of the educational system in Slovakia are secured by the following main Acts (Šebo and PaĽová 2020 (in publishing)):

- The School Act (approved in 2008) aims to increase the equity and quality in the education system and to prepare students for the future. It presents several funding schemes by the Slovak Government with support from the European Union. The new act encourages the learning of new languages and ICT and harmonizes the classification of education in schools with the international classification ISCED.
- The New Curriculum defines education areas, focuses on the development of logical thinking and working with texts as well as increasing the number of compulsory hours in mathematics and natural sciences.
- The New Act on VET (Vocational Education and Training) (approved in 2015) aims to link education and training better to the needs of the labor market. It introduces an option for providing VET in a dual system.
- The Act on Higher Education (last version approved in 2013) aims to improve the higher education accreditation process and introduces new criteria for assessing

a university's competence to award the academic titles of assistant professor and professor.

Besides general acts there are also other strategic documents such as the newly developed National Programme for Upbringing and Education Development in the Slovak Republic until 2027 (called "Learning Slovakia") published in September 2017. This document gives goals and guidelines for the improvement of the Slovak education system over a 10 year horizon.

In relation to policies, it is worth mentioning the spending on education per student in Slovakia. In 2014 it was 6234 USD (2014) for primary education (Germany 8546 USD/student), while in % of GDP (2014) it was 0.9% (Germany 0.6%). Public spending in Slovakia on primary to post-secondary education was 6.3% of public spending (Germany 6.5% of public spending). Private spending on primary to post-secondary education in Slovakia represents 2.8% of GDP (2014) (Germany 3.1% of GDP) (based on data from (OECD 2018)).

17.3   New Progress of ICT in Education

17.3.1   Infrastructure

In Slovakia in general, 87% of those in the fourth grade (75% EU average), 77% in the eighth grade (69% EU average), 55% of those in the eleventh grade (60% EU average), and 78% in the eleventh vocational grade (80% EU average) could use ICT during the lessons (Šebo and Paľová 2020 (in publishing)) based on data from (European Commission 2013). In Fig. 17.2, it can be seen that the number of students per computer and beamer and per whiteboard decreases with the age of students.
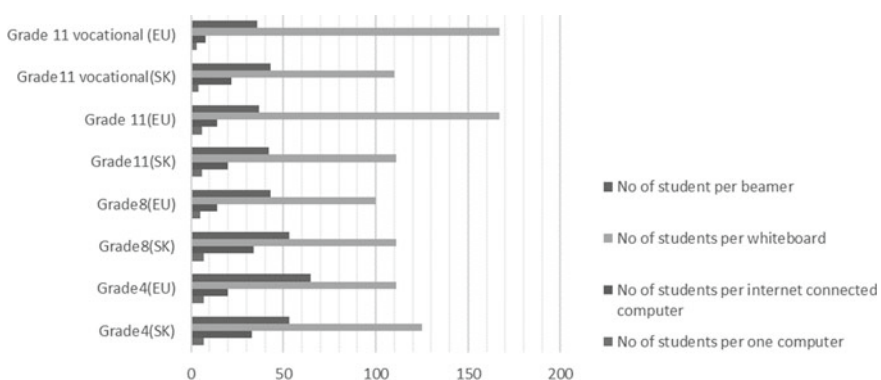
Fig. 17.2 Comparison of main ICT in education indicators in particular Grades of provided education; EU value presents an average value of EU27. *Source* Šebo and Paľová (2020) (in publishing) based on data from European Commission (2013)

The EACEA study (EACEA 2011) shows that at least 50% of students in Slovakia are in schools where one computer is available for every three students (in other European countries it is for every two students). Another study (Indícia n.o. 2012) has highlighted the significant differences in the availability of computers for pupils at primary and secondary schools (at an average primary school, one computer per 4.6 pupils; at an average secondary school, one computer per 2.8 pupils). Moreover, only 47% (EU average 56.6%) of students in the fourth grade have computers available during their mathematics lessons and almost half of the students (EU average: almost 30%) in the fourth grade is affected to some degree by a lack of computers in mathematics and science classes (EACEA 2011). The most commonly used operating system in schools was MS Windows XP and the most widely used office suite was MS Office 2007. The management of hardware and software in schools is usually done by teaching staff, beyond their teaching duties (Indícia n.o. 2012).

Based on the latest officially collected data (European Commission 2013), (Šiškovič and Toman 2015), all primary and secondary schools in Slovakia have access to the internet at present. The national program "Infovek" (2003–2017) has made significant improvement in terms of school access to the Internet. While in 2007, two-thirds had Internet connection with speeds slower than 2 Mbit/s, this number has decreased in 2013 to 38% for primary and secondary schools. These days, the speed of Internet connection is comparable to the speed provided to the business sector, i.e. approx. 13 Mbit/s, however, only every fifth school from all primary and secondary schools has this speed currently guaranteed.

17.3.2 Educational Resources

At the national level (Slovakia), a general initiative by a non-profit organization in the internet called Open Education[1] has simple structured general information and is a gateway to national and international OER. The key public educational portal, the "Planet of Knowledge," has been provided by the Ministry of Education, Science, Research and Sport in the Slovak Republic since 2011. The primary objective of this portal is to provide pupils and teachers with quality and attractive teaching materials for the modernization and streamlining of the learning process. In 2014 it provided up-to-date training materials for some subjects, especially for ISCED2-3 levels. Since 2014, the digital educational content has not covered the full range and levels from pre-primary to secondary education (ISCED0-3). The coverage of ISCED0-1 was also a priority for the near future (The Ministry of Education, Science, Research and Sport of the Slovak Republic 2014). These days, the portal contains more than 30,000 educational materials from various fields such as mathematics, physics, biology, etc. The educational materials are in the form of videos, presentations, simulations, animations, 3D models, pictures, photos, illustrations, interactive exercises, and lessons (Ministry of Education, Science, Research and Sport

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[1]Open Education, otvorené vzdelávanie. www.otvorenevzdelavanie.sk. Accessed 12 Apr 2019.

of Slovek Republic 2017). Despite its undoubted advantages there have been some criticisms. Some of the disadvantages have been addressed by Ján Žabka (creator of schoolbooks). He points out that the portal is not a digital schoolbook but rather an encyclopedia which contains the completed facts which it presents to the pupil. The second problem is that the "Planet of Knowledge" does not know, what takes place at school. The explanatory videos mainly present the knowledge and there is no development of creative thinking. Teachers, on the other hand, claim that the "Planet of Knowledge" is a positively recognized teaching resource (Dobrá škola 2017). Another thematic portal,[2] with more than 120 titles (2014) has solved the shortage of printed textbooks through the temporal availability of the digital format of textbooks and teaching materials (The Ministry of Education, Science, Research and Sport of the Slovak Republic 2014).

17.3.3 Learning and Teaching

In connection with some European ICT-related strategies, Slovakia has implemented ICT as a part of the school curriculum in the form of a mandatory subject at all levels of compulsory education for a number of years. At first, it was introduced in 1985 at upper secondary level, in 2005 at lower secondary level, and finally in 2008 at primary education level.

In Slovakia a teacher's use of ICT is recommended for a variety of subjects (Languages, Mathematics, Natural Sciences, etc.). ICT as a subject is taught at primary level by generalist teachers and at secondary level by specialist ICT teachers or other specialist teachers (EACEA 2011).

In Slovakia at most grades percentages of students taught by teachers for whom ICT training is compulsory are among the lowest in the EU, by teachers participating in training provided by school staff is but close the mean at all grades and by teachers who have not spent any time on ICT-related professional development are close to those in most other countries (European SchoolNet and University of Liège 2012).

17.3.4 The Ability for Faculty to Use ICT to Teach

All specialist teachers for general secondary education have ICT-related skills included in the core curriculum for the initial education for teachers: internet use, subject-specific training, multimedia operations, creating websites, and pedagogical issues. The generalist teachers have first 3 from above mentioned skills in the core curriculum (EACEA 2011). As for ICT skills for teaching, 18.6% of Slovak teachers (19.7% of OECD) have highlighted the need for further professional development in this area (OECD 2014). In order to improve their ICT skills, Slovak teachers

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[2]eAktovka. www.eaktovka.sk. Accessed 12 Apr 2019.

in primary and general secondary education can use websites and platforms for teacher collaboration, and there is also staff available to help teachers with using ICT (60.4% of Slovak students in the 4th grade go to a school with staff available to help teachers use ICT (EU average: 73.1%)) (EACEA 2011). In Slovakia also project "IT Academy" targets schools and universities, pupils and students and aims at training teachers so they can use digital technology and innovative pedagogies.

In Slovakia, use of ICT by teachers is higher at all grades with considerably more teachers using ICT in more than 25% of lessons than the EU average, while use of ICT in more than 75% of lessons is similar for Grade 8 and 11 general, but considerably higher for Grade 4 and Grade 11 vocational. Slovakia is also in the group of leading countries as regards teachers who have been using ICT in lessons for more than six years (European SchoolNet and University of Liège 2012).

17.3.5 The Ability for Students to Use ICT to Solve Problems

Figure 17.3 presents the primary and secondary school pupils' experience with ICT in the learning process. There is also one initiative worth mentioning—eSkills Week. Since 2010, it has provided tools and know-how to help young people better understand the opportunities related to careers in ICT and the relevance of digital skills for their prospects in the labor market more generally.

In Slovakia, student use of ICT equipment in class (reported by students) is in general higher than the EU mean. In more detailed view, use of school desktop/laptop
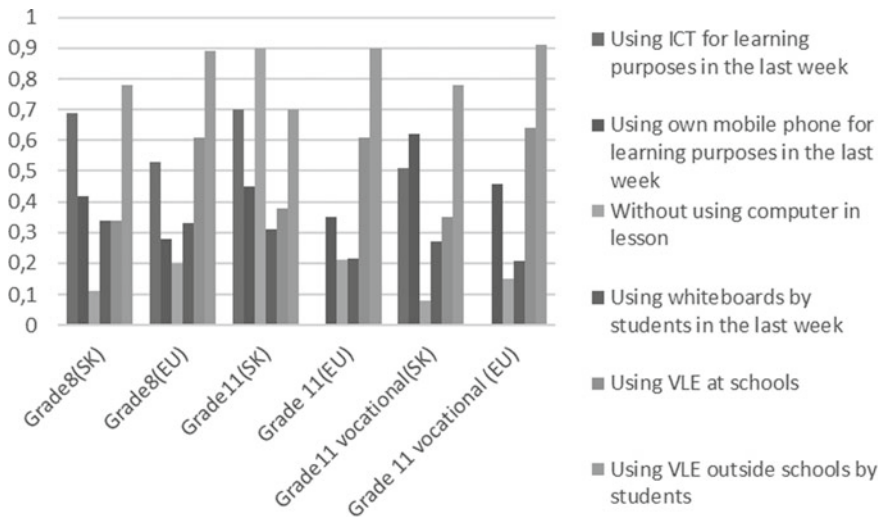
Fig. 17.3 Using ICT for learning purposes by students (according to age).
Source Šebo and Paľová, 2020 (in publishing) based on data from European Commission (2013)

is considerably higher at all grades, use of own laptop is close to EU means at all grades, and use of mobile phone is also considerably higher than the EU mean at all grades. Use of interactive whiteboards is at around the same frequency as other countries at all grades. Only at grade 11 there is more intensive use (European SchoolNet and University of Liège 2012).

17.4 Policy and Strategy of ICT

17.4.1 Policies Related Educational Informationalization

In Slovakia, as almost all EU countries, using of ICT for all EU key competences (mother tongue, mathematical competence, social competences, etc.) is suggested in central steering documents for primary and general secondary education. Central recommendations on the inclusion of cross-curricular skills and using ICT as a tool for skills teaching in primary and general secondary education in Slovakia includes skills as creativity, critical thinking, problem solving, communication, collaboration, and initiative and self direction. Slovakia belongs to EU countries which have most of the ICT learning objectives (knowledge of computer hardware, computer using, office applications, using multimedia, etc.) in central steering documents for primary and general secondary education. Despite there are no official recommendations or suggestions of the use of ITC tools in the classroom in Slovakia, support is nevertheless provided to schools and teachers for using a range of ICT tools (EACEA 2011).

In newly developed above mentioned National Programme (called "Learning Slovakia") in the first chapter the "use of ICT" is defined as a sub-goal from 11 basic goals of Slovak education system. In the part related to learning resources, materials and equipment, there is identified problem of missing textbooks and its partial solution is in the form of an "e-Aktovka" (e-Briefcase) electronic portal. It also mentions the need to provide the necessary material and technical equipment for schools, including the technical conditions for the use of modern technologies, digital content, and resources and that schools do not currently have enough financial resources to provide the necessary equipment, or teaching materials to enrich education. In the part related to measurement, testing, examinations the trouble-free provision of building of an electronic/digital test system by NICEM is outlined. In the part related to school environment and school facilities (interiors and exteriors) the sub-goal of having a learning environment with integrated modern information and communication technologies (Integrating information and communication technologies directly into the learning environment) is discussed. In the part related to informal education and learning the sub-goal of "providing informal education and training financial support" is looked at where financial support of the Ministry of Education is recommended e.g. Slovak Wikipedia pages, Khan Academy education video subtitling, creation of e-learning courses (MOOC) for Coursera, Udacity, etc.

(Šebo and Paľová 2020 (in publishing)). In the second chapter related to teachers, measures with a focus on ICT are outlined: financing technical staff for ICT cares. In the third chapter related to vocational education and training, measures with a focus on ICT are mentioned: promote the dissemination of digital teaching materials. In the fourth chapter related to the financing of regional education in relation to ICT there are recommendations to increase the normative (payment "per student") also according to ICT equipment and in specific financial resources to take into account all the statutory obligations that were added to the schools without raising the funds (including network administrator, ICT administrator).

17.4.2   ICT Financing Resource

In 2014, the Ministry of Education prepared the "Concept of Informationalization and Digitization of the Education Sector with a view to 2020," which analyzes, among other things, the current situation. As stated, in past years in the education sector things have begun to be implemented such as a portfolio of national and demand-side projects focused on material and technical equipment and ICT equipment of schools, the initiation phase of education sector digitization, co-financed from EU funds, as well as other projects financed from the state budget. According to surveys in 2011 and 2012 (UIPŠ 2013), the number of computers (an average of 59 computers per school, 91% of which were connected to the Internet) and ICT equipment of primary and secondary schools in Slovakia was on the rise. Despite the implementation of projects and improving ICT equipment of schools, Slovak pupils under-perform in the PISA (2012) and TIMSS tests, pointing to the lag of Slovak education in comparison to the OECD countries. When looking for ICT deficiencies in schooling, PC learning equipment (57%) was among the identified material deficiencies reported by teachers in the earlier TALIS (OECD 2009) survey. According to the new TALIS (OECD 2014) study, up to 73% of teachers reported a need to develop competences for teaching through ICT. Other issues, such as unprofessional teaching of informatics, poorly utilized improved ICT equipment of schools, and problems with the development of pupils' key competences for lifelong learning and digital skills have been identified on the basis of inspections (The Ministry of Education, Science, Research and Sport of the Slovak Republic 2014).

Slovak Republic, through 9 national programs, benefits from ESIF (5 European structural and investment funds) funding of EUR 15.3 billion. This represents an average of 2830 euro per person from the EU budget over the period 2014–2020 (European Commission 2019a, b). The total budget for 2014–2020 in Integrated Infrastructure program of Slovakia is €8,128,441,573 and the finances that have been planned specifically for ICT represent € 866,988,591 (European Commission 2019a).

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