

Chapter 8

Report on ICT in Education in Greece



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8.1 Overview of the Country

8.1.1 *The History and Geography of Greece*

Greece is situated in the south of the Balkan Peninsula covering an area of 131,049 km². The country combines rugged mountains, forests, lakes in the mainland, and an archipelago of about 3000 islands. Greece is bordered to the east by the Aegean Sea, to the south by the Mediterranean Sea, and the west by the Ionian Sea. There are land borders to the north and northeast with, from west to east, Albania, the Republic of North Macedonia, Bulgaria, and Turkey. The country has the longest coastline in Europe and is the southernmost country in Europe.

The first great civilization in Greece was the Minoan culture on the island of Crete around 2000 B.C. The Mycenaeans from the mainland conquered the Minoans in 1450 B.C. During ancient times the country was divided into city-states, which were ruled by noblemen. The largest were Athens, Sparta, Thebes, and Corinth. Each state controlled the territory around a single city. They were often at war with each other. Athens became the most powerful, and in 508 B.C., the people instituted a new system of rule by the people called democracy. Foreigners ruled Greece for over 2000 years beginning with the Romans conquering the Greeks in the second century. Then, after almost 400 years under Turkish rule, Greece won independence in 1832.

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During the Second World War of 1940–41, Greece was one of the few countries that had resisted for so long against the Axis forces. The war was celebrated on October 28, 1940, and eventually, Greece was captured altogether in June 1941 with the occupation of Crete.

Due to its strategic position, and as a natural limit of Europe with the east and the west, Greece has always been considered a vital area. In 1952, Greece became a member of NATO. On April 21, 1967, a coup from a group of kings led Greece to a military dictatorship until 1974. In July 1974, a referendum resulted in the rejection of the constitutional monarchy and the establishment of the current Presidential Parliamentary Republic. Since 1981 Greece has been a member of the European Union.

8.1.2 The Population Situation

The population of Greece is of 10.8 million permanent residents, and of these 5,303,223 are men and 5,513,063 are women (census 2011). According to forecasts, the country's demographic makeup will be quite different in the coming decades due to adverse demographic pressures. These include a decreasing number of births, an influx of migrants, and an expanding aging population. The average age is 42.7 years. The table shows some of the population characteristics (Hellenic Statistical Authority Census 2011).

Of the total of 10.8 million Greek citizens, more than 76% of the population is living in urban or suburban areas. Based on population forecasts of ELSTAT, the population structure per age groups will be rather different in the upcoming decades due to adverse demographic changes and the trends of low birth rate and population aging (Table 8.1).

Table 8.1 Population situation

	Total	%
Population	10.816.286	
Urban	8.285.275	76
Suburban	2.628.357	24
<i>Gender</i>		
Male	5.303.223	49
Female	5.513.063	51
<i>Age</i>		
0–14	1.514.280	14
15–64	7.214.278	67
65+	2.044.278	19
Average Age	42.7	

8.1.3 The Political System

Greece is a parliamentary constitutional republic, with both a President and a Prime Minister as head of the government. The legislative body is the Greek Parliament, which has mainly regulatory competences. The judiciary branch is independent of the legislative branch.

8.1.4 The Current Situation of Economic Development

The current political status has been influenced by the economic crisis. From late 2009–early 2010, due to both international and domestic factors, Greece confronted serious economic hardships. In 2010, a Memorandum of Understanding signed between Greece and the International Monetary Fund (IMF), the European Union (EU), and the European Central Bank (ECB) to receive financial assistance for reducing its debt.

The economic and political situation in Greece has made its mark on every aspect of Greek society including education. The public education expenditure as a share of GDP was 3.8% in 2017, below the EU average (4.6%) (OECD 2018a).

8.1.5 The Status Quo of Science and Technologies

Innovation as a sector of science and technologies in Europe as a whole had an upward trend in 2018. 25 out of the 28 EU Member States have shown improvement since 2011 (which is the reference year for the study), while performance has worsened for three member states (Germany, Romania, Slovenia). Greece is ranked 20th in Europe (9th from the end) and is ranked among the countries of the third category—it is a country of “moderate innovation.”

Greece’s relatively strong points are the innovative sector (38.8% increase from 2011) and the interconnection sector (an increase of 35.7% from 2011). In both areas, Greece is above the EU average. This means that small- and medium-sized businesses in Greece seem to be innovative in their internal way, but they also seem to offer innovative solutions to the market. There is also an improvement in public–private partnerships in projects aimed at innovation and research. Finally, the employment sector has high prices, which means that jobs in the field of innovation and research have increased. However, this area is likely to need monitoring as there is a general decline (–6.8%) from 2011 (European Innovation Scoreboard Edition 2019).

An important fact that we should not overlook is that in recent years, Greece has experienced a leak of scientific potential that has intensified since the onset of the economic crisis due to the resulting increase in unemployment and the austerity measures that have affected education and the labor market. The result was the mass

escape of highly qualified individuals while the current economic crisis, backed by limited state funding for research and reduced wages, discouraged Greek scientists working abroad from returning to their country (Ifanti et al. 2013).

8.1.6 The Status Quo of Social and Cultural Development

In Greece, the Ministry of Culture has started the implementation of a program which focuses on mapping the whole cultural and creative industries of the country, aiming to a comprehensive understanding of the cultural creation and the development of specific supporting policies. Additionally, it operates a database where private cultural institutions can be registered and a platform, which includes information on intercultural dialog issues as well as all the information about festivals and other cultural events nationwide. The Ministry of Culture focuses also on the accessibility of the people with disabilities, with the improvement of infrastructures in cultural spaces and the development of diversified and innovative cultural products for different social groups (UNESCO 2016).

Funding for cultural activities in Greece is mainly from public sources, either from the Ministry of Culture in the central government or from the local budgets of authorities at local and regional levels (Mergos and Patsavos 2017).

The official language of Greece is Greek, spoken by 99% of the population. In addition, a number of non-official, minority languages and some Greek dialects are spoken as well. The most common foreign languages learned by Greeks are English, German, French, and Italian. English is the most widely spoken foreign language in Greece by 51% of the population. 9% speak French and 5% speak German as a second foreign language (EC 2012a).

8.1.7 The Relationship with China Under the “17 + 1” Cooperation Framework

Greece officially joined the “Cooperation between China and Central and Eastern European Countries” Group, which had been known as “16 + 1,” in April 2019 and became the seventeenth member of the 16 + 1, which has been renamed to “17 + 1.” By joining in, Greece becomes the first new member of the group, which now comprises 12 EU Member States and five Balkan nations that are also slated to join the EU in the future.

8.2 Overview of the Educational Development

8.2.1 Education System and Policy

The Greek education system aims to provide free education to all stages of the school system, and according to the Greek Constitution in Article 16, Sect. 8.4, aims “at the moral, intellectual, professional and physical training of Greeks, the development of national and religious consciousness and at their formation as free and responsible citizens” (Hellenic Republic 2008).

At central level, the Greek education system is under the administrative responsibility of the Ministry of Education, Research and Religious Affairs (MofERRA) across all fields, agencies, and levels (OECD 2017). The Greek education system is highly centralized as the central administrative agency exercises control and takes the key decisions related to long-term objectives and also regulates various issues, such as the content of curricula, the education staff, and the funding (OECD 2015). At regional level, the Regional Education Directorates have the mission to coordinate, supplement, support, and implement the national educational policy along with supervising the implementation of various education projects, like European projects, in schools. At local level, the Directorates of Primary and Secondary Education are responsible for all schools in their area and schools are also taking care of their operation (Eurydice 2018a). The Greek Education System is mainly divided into three levels, primary education, secondary education, and tertiary education as shown in Fig. 8.1. Compulsory education in Greece is mandatory for all children between the ages of 4 and 15 and lasts 11 years.

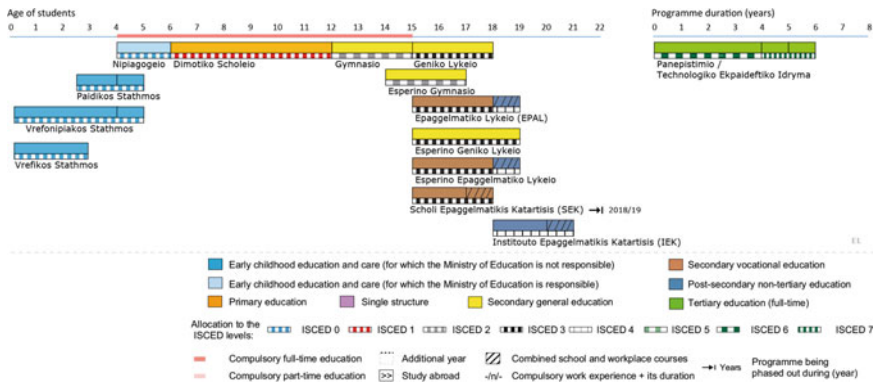


Fig. 8.1 Structure of the Greek education system. Source Eurydice (2018a, b)

8.2.2 *Students and Teachers' Profiles*

Primary education includes pre-primary schools and primary schools. Pre-primary education in Greece lasts 3 years. From the school year 2018–2019, the 2-year pre-primary school for 4-year-old children is compulsory (Law 4521/2018, <https://bit.ly/2YIMzAB>). Attendance in primary schools has 6-year duration and concerning children in the age range of 6–12 years and includes six grades (1–6), each of which represents specific learning goals defined at central level.

Secondary education consists of two stages, compulsory and non-compulsory secondary education. Compulsory secondary education is provided by lower secondary schools (Gymnasia) day and evening, lasts 3 years and covers the ages of 12–15. This school level aims to promote the all-round development of students depending on their age-related competences and life's demand (Law 1566/1985, <https://bit.ly/1hUY1Uh>). Non-compulsory secondary education is provided either by general or vocational upper secondary schools (Geniko or Epaggelmatiko Lykeio) day and evening. General Lykeio (Geniko) lasts 3 years and includes general education subjects and subjects of specialization in specific cognitive fields (Law 4186/2013, <https://bit.ly/2LF9rFr>), while vocational Lykeio (Epaggelmatiko) consists of two cycles of studies, the secondary cycle which lasts 3 years and the optional post-secondary cycle, called "Apprenticeship Class," which is optional, lasts 1 year and is addressed to degree holders of the secondary cycle (Eurydice 2018a, b).

Tertiary education in Greece is public and is the last stage of the formal education system. Students can enter in tertiary education only after they pass entrance exams conducted at a national level. Higher education in Greece includes the university and technological sector and provided only by legal entities under Public Law. The Greek state is responsible for the supervision and financial support of higher educational institutions. Studies are divided into three cycles: the undergraduate studies, which usually last 4 years for the most majors; the postgraduate studies, which last 1–2 years and leads to a Master's degree; and the doctorate study program, which requires a thesis preparation, which lasts at least 3 years and leads to the award of a doctoral diploma. Lifelong learning in Greece is not a part of formal education but can be seen as a wider development plan and includes informal education, which can lead to certifications accepted at national level. Vocational training institutes, lifelong learning centers, vocational training schools, and colleges are the main organizations that provide lifelong learning in Greece (Eurydice 2018a, b).

Figure 8.2 presents the teachers' gender distribution in Greece in 2016 in public and private institutions, by level of education. Women constitute almost all of the teaching workforce at the pre-primary level (99%), something that is observed in other OECD countries (OECD average is 97%). Comparing the data over the past decade (2005–2016), there has been an increase in the share of female teachers and the gender gap has widened by 5% points in Greece (OECD 2018b). On the contrary, at the tertiary level, women represents less than half of the teaching workforce (34%), which also occurs in other OECD countries (OECD average is 43%).

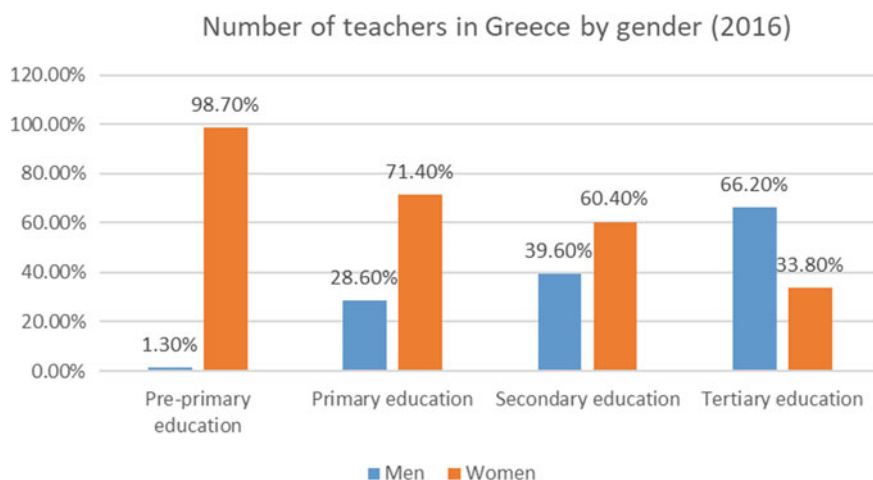


Fig. 8.2 Number of teachers. *Source* OECD.stat data extracted on July 23, 2019

With regards to the initial teaching staff education, teachers of all educational levels in Greece are higher education graduates. Teachers in pre-primary, primary, and secondary education must complete a first cycle degree (UNESCO 2015). Prospective teachers in pre-primary and primary schools must take a 4-year degree in a pedagogical department, while in secondary schools most teachers take a 4- or 5-year subject-based degree at a teacher education faculty (Eurydice 2018a, b). The academic staff in tertiary education must have at least a PhD title and their doctoral thesis and the overall research and scientific work must be consistent with the cognitive field of the announced position.

In 2017, the number of academic staff in tertiary education for Greece was 18.968. As shown in Fig. 8.3, the overall number of teachers in tertiary education shows downward trends over the period 2005–2014, while over the period 2014–2017 shows upward trends.

8.2.3 Enrollment Rate and Retention Rate

Table 8.2 presents the overall number of the enrolled students in Greek pre-primary, primary, and secondary education and its evolution during the years 2013–2017. The number of students enrolled in pre-primary education showed a 9% reduction between 2013 and 2017, while in primary education showed an increase of 2.45% between 2013 and 2017. Finally, the number of students enrolled both in compulsory and non-compulsory secondary education between 2013 and 2017 reduced to 2% and 0.6%, respectively.

Table 8.3 presents the overall number of the graduated students in Greek primary and secondary education (compulsory and non-compulsory) in 2017 compared to

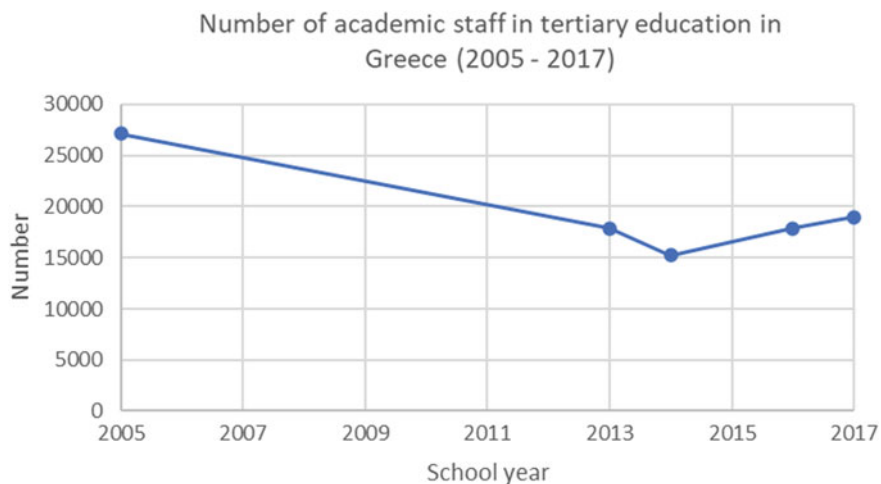


Fig. 8.3 Academic staff. *Source* OECD.stat data extracted on May 1, 2020

Table 8.2 Enrolled students per education level

School year	Pre-primary education	Primary education	Secondary education (compulsory)	Secondary education (non-compulsory)
2013	166.576	630.043	319.950	245.892
2014	160.994	625.165	310.389	241.905
2015	162.781	640.001	315.702	239.055
2016	155.243	642.707	311.236	240.852
2017	151.804	645.250	313.130	244.386

Source Hellenic Statistical Authority

Table 8.3 Graduated students per education level

School year	Primary education	Secondary education (compulsory)	Secondary education (non-compulsory)
2016	101,771	99,820	75,995
2017	103,016	100,980	76,900

Source Hellenic Statistical Authority

2016. The collected data showed an increase of 1.2% in 2017 compared to 2016 regarding the overall number of graduated students both in primary and secondary education levels.

The ratio of students to teachers by education level refers to the number of students enrolled in primary, secondary, and tertiary education, divided by the number of teachers at the corresponding educational level. In Greece, student–teacher ratio

in primary education was declining from 10.3 students per teacher in 2007 to 9.4 students per teacher in 2014. Contrary, student–teacher ratio in secondary education increased from 7.9 students per teacher in 2007 to 8.3 students per teacher in 2014. In tertiary education level, student–teacher ratio increased from 20.79 students per teacher in 2007 to 39.68 students per teacher in 2014 (<https://knoema.com/atlas/Greece/topics/Education#Expenditures-on-Education>).

8.2.4 Government Expenditure on Education

Government expenditure on education in Greece as a percentage of GDP is one of the smallest among OECD and partner countries, as the data show. In 2015, total public spending on education as a percentage of total government expenditure was one of the lowest among OECD countries (around 6%) with an average of 11% among OECD countries (OECD 2018b).

Funding for primary education in Greece covers 34.5% of the ordinary budget of Ministry of Education, Research and Religious Affairs. Over 2013–2015, there was a reduction of 4.3% in the share of public expenditure on primary education. Expenditure per student in primary education decreased around 13% during 2005–2015, as Fig. 8.4 shows (KANEP/GSEE 2017).

Funding for secondary education in Greece covers 35.3% of the ordinary budget of Ministry of Education, Research and Religious Affairs. Over 2013–2015, there was a reduction of 14.7% in the share of public expenditure on secondary education. Expenditure per student in secondary education decreased around 25% during 2005–2015, as shown in Fig. 8.5 (KANEP/GSEE 2017).

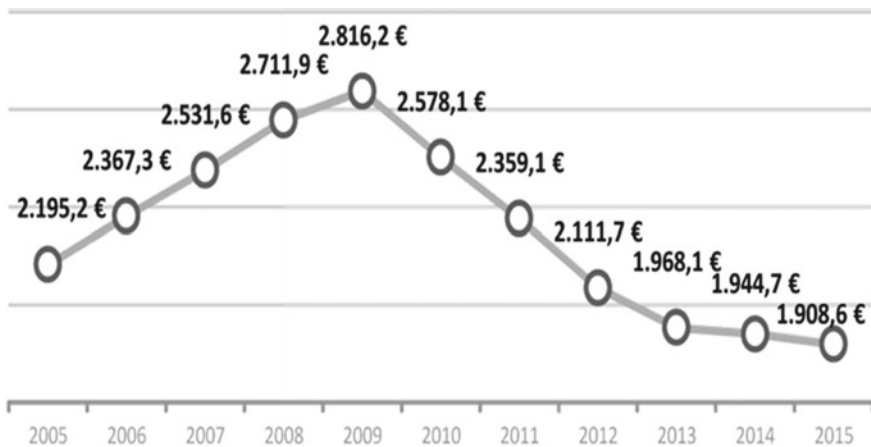


Fig. 8.4 Expenditure per student in primary education and the rate of change during 2005–2015. Source KANEP/GSEE (2017)

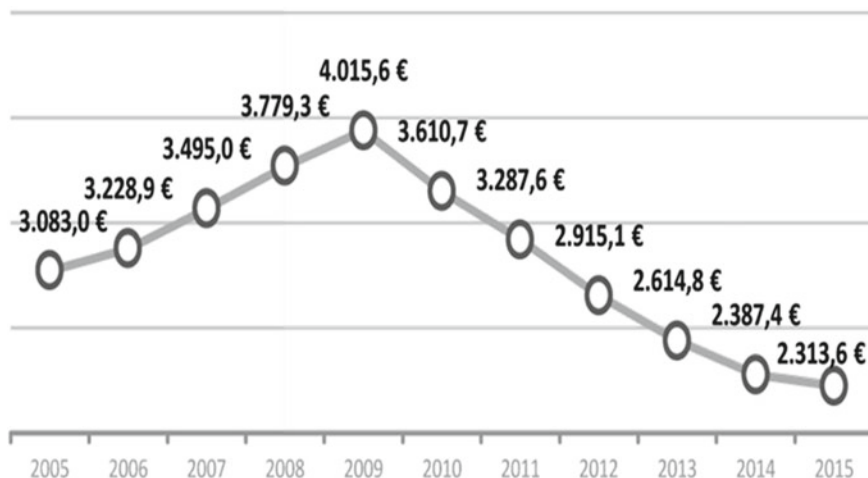


Fig. 8.5 Expenditure per student in secondary education and the rate of change during 2005–2015
 Source KANEP/GSEE (2017)

Funding for tertiary education in Greece covers 20.1% of the ordinary budget of Ministry of Education, Research and Religious Affairs. Over 2013–2015, there was a reduction of 21.4% in the share of public expenditure on tertiary education. Expenditure per student in tertiary education decreased around 16.6% during 2005–2015, as shown in Fig. 8.6 (KANEP/GSEE 2017).

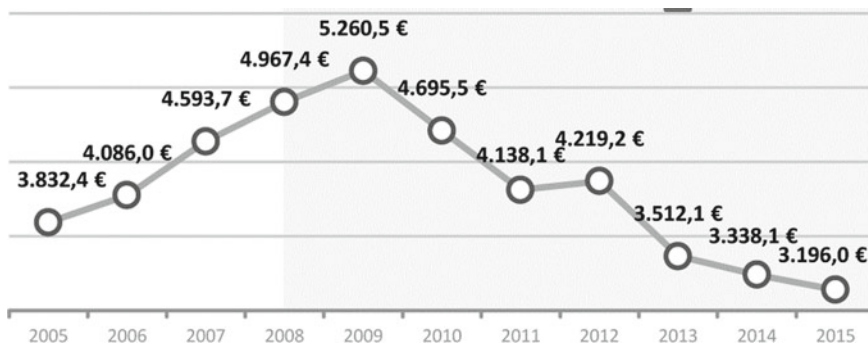


Fig. 8.6 Expenditure per student in tertiary education and the rate of change during 2005–2015.
 Source KANEP/GSEE (2017)

8.2.5 Education Research

Education research in Greece is not sufficiently developed mainly due to insufficient funding. This can be justified mainly because of the fragmentary nature of the educational research in conjunction with the lack of a systematic way of implementation in the Greek context (Mparalos 2006).

According to Law 4310/2014, the research centers in Greece, which are under the supervision of the General Secretariat for Research and Technology (GSRT) of the Ministry of Education, Research and Religious Affairs, are the following:

- “Athena” Research and Innovation Center in ICT and Knowledge Technologies, (<https://www.athena-innovation.gr/>);
- Centre for Research and Technology Hellas (CERTH) (<https://www.certh.gr/root.en.aspx>);
- National Observatory of Athens (<http://www.noa.gr/index.php?lang=en>);
- National Hellenic Research Foundation (<http://www.eie.gr/index-en.html>);
- National Research Centre for Scientific Research “Demokritos” (NSRF) (<http://www.demokritos.gr/>);
- National Center for Social Research (<https://www.ekke.gr/>);
- Hellenic Centre for Marine Research (<https://www.hcmr.gr/en/>);
- Biomedical Sciences Research Center “Alexander Fleming” (<https://www.fleming.gr/>); and
- Foundation for Research and Technology—Hellas (FORTH) (<https://www.forth.gr/index.php?l=e>).

Moreover, the Hellenic Scientific Association of Information and Communication Technologies in Education (ETPE) aims at developing basic and applied scientific research in Information and Communication Technologies in Education (ICT). For more information on educational organizations and research areas, see the link below: <https://www.etpe.gr/drasis-melon/erevnitikes-omades/>.

8.2.6 Teachers’ Professional Development

Teachers’ professional development in Greece can be mandatory or optional. Prospective candidates to be appointed either in primary or secondary education must follow a mandatory introductory training with a duration of at least 100 teaching hours. Continuing teachers’ professional development is optional and is being implemented by various training providers such as school units, universities, the Educational Policy Institute, etc. (Eurydice 2018a, b).

Some of the most representative teachers’ training programs in Greece are the teachers’ training in the use of ICT and the Erasmus + funding program for education.

Teachers’ training in the use of ICT consists of two levels. The first level (A-level training course) was implemented from 2002 to 2008 with the title: “Training of

primary and secondary teachers in the basic skills of Information and Communication Technologies (ICT) in education.” The aim of the program was to provide educators with basic knowledge and skills in the use of ICT in education (Tsoulis et al. 2012). It was a 48 h training program, where almost half of the primary and secondary teachers in Greek education had been certified (EK, Peiraia 2017).

The second level (B-level training course) consists of two sub-levels: the introductory training for the educational use of ICT (B1-level) and the advanced training for the educational use of ICT (B2-level). “B1-level teachers” training on ICT aims at acquiring knowledge and skills concerning the use of new digital infrastructures and modern educational tools in the educational process, while “B2-level teachers” training on ICT aims not only at expanding and deepening the knowledge, skills, and competences of teachers in the educational use of Web 2.0 tools but also at acquiring skills about the design and use of educational software, according to their specialization (Tsoutsas et al. 2013).

The Erasmus + EU funding program for education, training, youth, and sport 2014-2020 includes the key action “mobility project for school education staff,” a program that enables teachers to visit and live in other countries for a certain period of time in order to acquire different learning experiences, including activities like teaching assignments, job shadowing, etc. (Eurydice 2018a, b).

8.3 New Progress of ICT in Education

8.3.1 Infrastructure

This section focuses on more detail on the topics of access to the Internet and access to equipment for all levels for education. Those two factors are very important not only for the implementation of ICT in the learning process, but also to enable the innovation in learning in general (Brecko et al. 2014).

According to the European Commission report (EC 2019a, b, c) about ICT in Education, Greece has levels of Internet speed that are well below the European average. In all public schools of both primary and secondary education, free broadband access is provided. The connectivity technologies (allowing broadband services) are mainly ADSL (basic), VDSL, optical fiber, and dedicated lines. Only 12% of the Greek schools have access to a high-speed Internet speed above 100mbps via fiber optic. Besides, for all levels, schools that are located in larger towns and cities are, on average, more likely to connect to the Internet (GSN 2018).

Highly digitally equipped and connected schools have a high provision of digital equipment per number of students and high broadband speed. In Greece, there are considerable fewer computers available for students in primary and secondary education. Only 2% of the primary schools, 9% of the lower secondary schools, and 21% of the upper secondary schools are highly digitally equipped and connected to the Internet (EC 2019a).

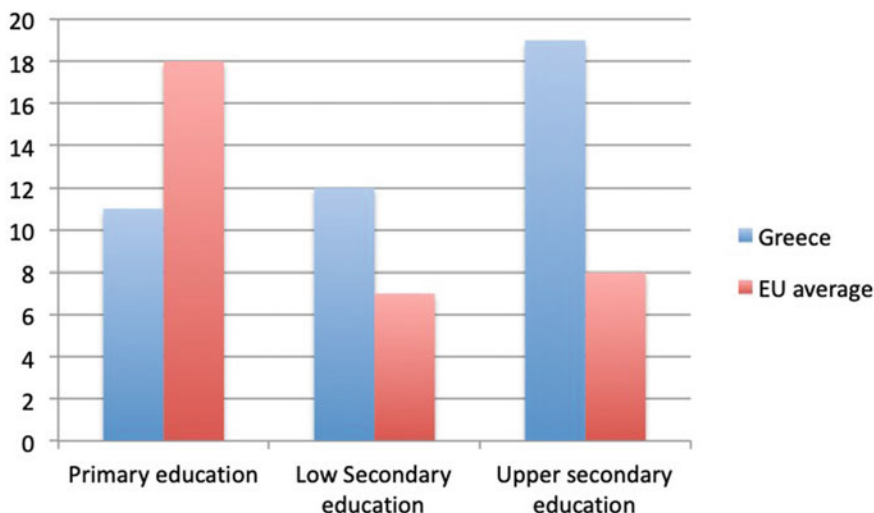


Fig. 8.7 Students per computer ratio in comparison to the EU average

Computer–Student Ratio

With regard to the number of computers per pupil and according to the 2nd Survey of Schools ICT in Education (EC 2019b) by the European Commission, the corresponding average is 11 pupils per PC in Greece in primary education, 12 pupils per PC in low secondary education, and 19 pupils per PC in upper secondary education, while in most EU countries there are 3–7 students on a PC and the EU average is 7–8 in secondary education. Indeed, the higher the education level, this number tends to increase (Fig. 8.7).

As for the location of the desktop computers, on average in Europe, about one-third of the students are in schools where desktop computers are located in classrooms, while in Greece the desktop computers are mostly located in a computer lab. Especially in Greek upper secondary schools, only 10% of the computers are located in the classroom, which is the lowest percentage in the EU (Fig. 8.8).

Campus Network Access

The Greek Research and Technology Network or GRNET (the national research and education network of Greece) provides not only the Internet connectivity, but also high-quality infrastructures and services to the Greek educational, academic, and research communities. GRNET supports all universities, technological education institutes, research centers, and over 9500 schools via the Greek School Network (GSN), serving a population of more than one million people (Wikipedia).

In all public schools and administrative units of both primary and secondary education, free broadband access is provided by the Greek School Network (GSN). Greek School Network (GSN) (<http://www.sch.gr/en>) is the national network of the Ministry of Education, Research and Religious Affairs (MoE) (<http://www.min>

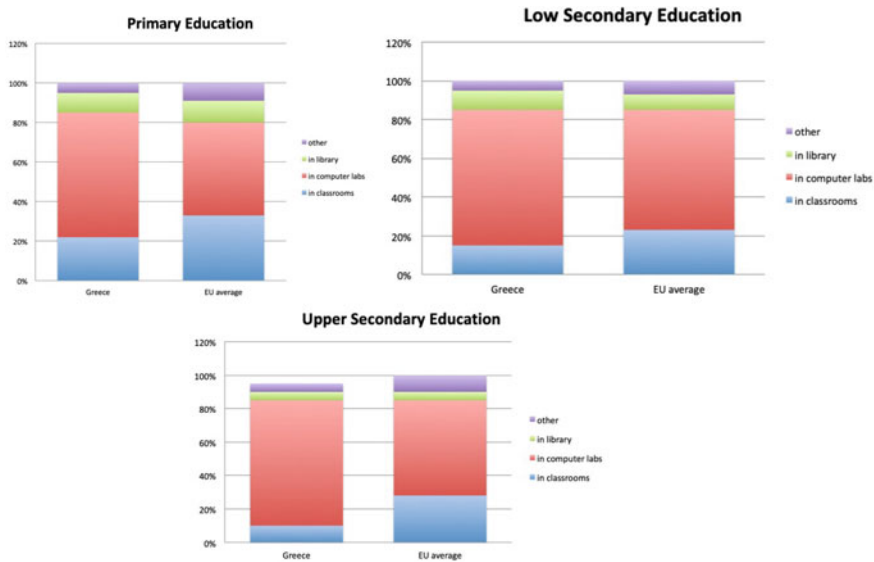


Fig. 8.8 Desktop computers' location in comparison to the EU average

edu.gov.gr). The Central Government Budget covers the connections fees of public educational units with GSN and the Internet. The connectivity technologies (allowing broadband services) are mainly ADSL (basic), VDSL, optical fiber, and dedicated lines (rarely). The GSN is the largest public network in Greece in terms of users that it serves. In particular, it interconnects a community of 1.350.000 pupils and 160.000 teachers (Greek School Network 2018).

ICT Development Indicators

The indicators selected by the European Commission services, which illustrate key dimensions of the European Information Society (telecom sector, broadband, mobile, Internet usage, Internet services, eGovernment, eCommerce, eBusiness, ICT skills, research and development), allow a comparison of progress over time. For the ICT in education, the two sectors are (EC 2012a, b) as follows:

- Computers for educational purposes include desktop, laptop, netbook, or tablet computer whether or not connected to the Internet.

The ESSIE Survey (SMART 2010/0039) shows that the number of computers for educational purposes rose from 9.5 per 100 students in 2006 to 15.8 in 2012, an increase of 66.3% in a 6-year period in the European Union (Fig. 8.9). Specifically for Greece, the report shows that the number of computers per 100 students has declined over a 6-year period, with the largest decline in vocational education, while the opposite has happened in other European Union countries (Fig. 8.10).

- Schools having a website

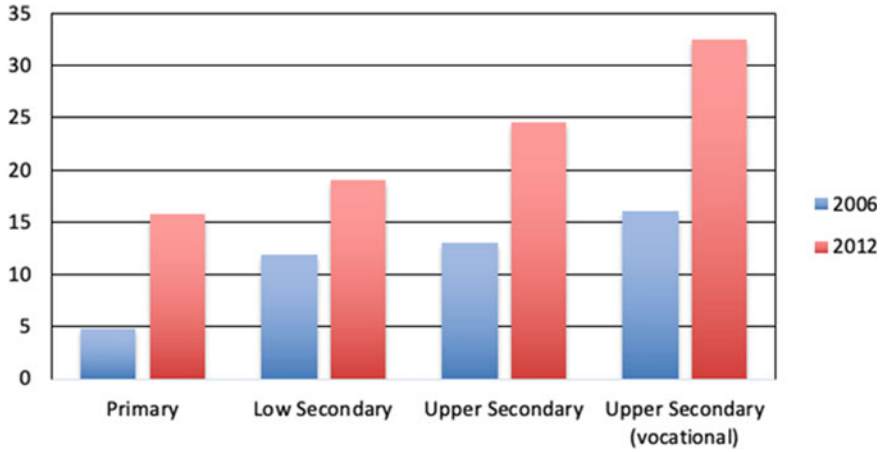


Fig. 8.9 Computers for educational purposes, by educational grade, EU

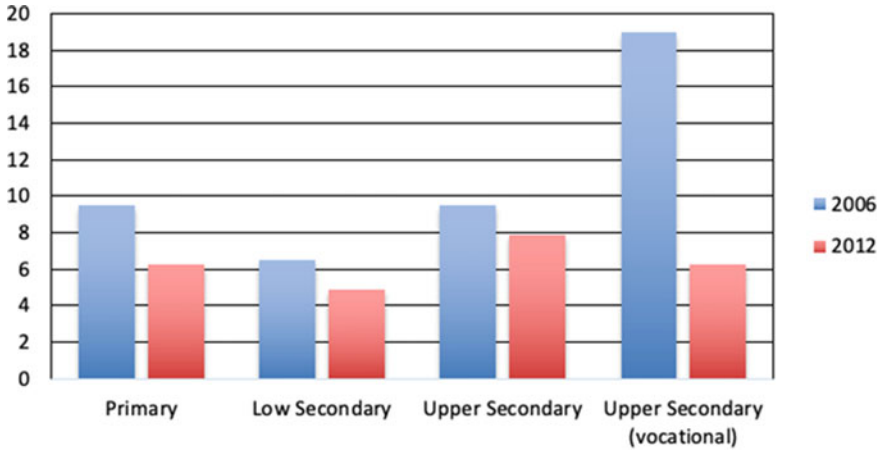


Fig. 8.10 Computers for educational purposes, by educational grade, Greece

The number of primary schools having a website rose from 28.1 to 48.2% which represents an increase of 20.1% in a 6-year period and for upper secondary vocational education from 63.8 to 98.7% which represents an increase of 34.9% in the same period. The increase was not significant in upper secondary general education (from 53.6 to 69.6%) and in lower secondary education (from 51 to 61.3%) (Fig. 8.11).

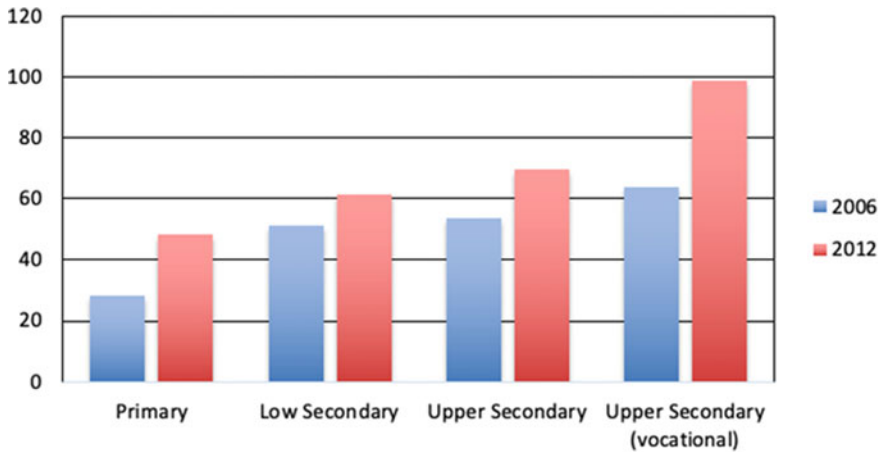


Fig. 8.11 Schools having a website, by educational grade, Greece

8.3.2 Educational Resources

Digital School Project was the most well-known reform, which has been launched in 2010 to integrate ICT into school curricula, as well as the teaching practices. It concerns the design, development, and operation of three Ministry of Education's central web services for the digital educational content of primary and secondary general education:

1. The "Interactive School Books" website (ebooks.edu.gr).
2. A series of digital educational repositories under the name "Photodentro" (repositories of learning objects, educational videos, educational software, user educational material, open educational practices, external sources/cultural collections) and the National Educational Content Collector for school education (photodentro.edu.gr), the Digital Learning Platform e-me (e-me.edu.gr).

The main platforms offering open educational resources both for primary and secondary education are as follows:

- The platform "MITIDA." MITIDA is an online environment specifically designed to assist educational cooperation communities and the promotion of student-centered, active, and non-formal learning. Using a set of online operating tools and freely accessible digital resources, participating teachers both of primary and secondary education have the opportunity to collaborate, experiment, and create digital content, thus contributing to the enhancement of the didactic act and its professional self-improvement (Vagellatos and Panagiotopoulos 2017).
- The platform Photodentro. One of the actions that has been implemented is "Photodentro." Photodentro is the National Accumulator of Educational Content for Primary and Secondary Education. It is the central e-service of the Ministry of Education for the integrated search and provision of digital educational content

in schools. It is open to all: students, teachers, parents, and anyone interested. Photodentro promotes the use of Open Educational Resources (OER) for schools, implementing the national digital content education strategy (Megalou et al. 2016).

The most valuable initiatives for open educational resources for higher education are as follows:

- The portal Openarchives.gr. Openarchives.gr is the largest online portal for search and navigation in reputable Greek digital content science and culture. The National Documentation Center (EKT) develops and maintains openarchives.gr in the framework of its institutional role, namely, the collection, organization, promotion, and diffusion of the scientific and cultural production of the country in a manner consistent with international standards and trends in the field as well as with the modern needs of users.
- The initiative “Open-courses.” This project (co-funded by the European Union) has developed open content based on courses taught at universities, freely accessible and free of charge for all. These courses are not part of a distance education program or a university curriculum. Open digital lessons do not offer support from teachers and do not lead to a certificate. They offer new knowledge, training, and specialization, an opportunity for learning.
- The initiative “Kallypos.” “Kallypos” is a very important open access initiative for higher education. More specifically, as it appears on its website, the Kalyppos Depository is a collection of books, aids, and learning objects that have been created by members of the academic and research community within the framework of the action “Greek Academic Electronic Texts and Assistants/Kallypos” or have been placed in the action through an open call for scientific content. The purpose of the repository is to systematically record, organize, and sustain long-term textbooks and learning objects of the academic and research community.
- “Anemi.” The platform “Anemi” offers a rich collection of bibliographic information, digitized books, and articles with an emphasis on Greek culture. Two million digitized pages of books and more recent editions, the authors of which have allowed digitization and free online availability, are freely available to the visitor. Anemi was created in the spring of 2006 by the Library of the University of Crete, within the framework of the Operational Program “Information Society” and was enriched by 2009 (Vagellatos and Panagiotopoulos 2017).

8.3.3 Learning and Teaching

Information Technology-assisted Teaching

Research by Pesmatzoglou and Papadopoulou (2013) reveals that Greek teachers use ICT more as a source of information and teaching material rather than as a means of supervision during their teaching. The use of ICT as an autonomous teaching unit, however, seems to be still limited at the level of primary education. In another study

(Tassi 2014), teachers were found to maintain a cautious use of systematic use of ICT in their daily teaching practice. In particular, teachers appeared to continue to use ICT more as a source of information not only in order to better organize their lesson but also to create competitions or other assessment tests for their students, rather than as a self-taught lesson taught, for example, the cultivation of digital literacy skills it includes.

At the same time, it is found that Greek teachers have been associated with the use of ICTs, and with the development of competences and skills by the students themselves. That is why they are trying to integrate new technologies into the teaching process. They spend twice as much time at home on their education, through digital technology than at school, where they spend only 1 h a day. At the same time, however, teachers appear to be not yet fully trained and familiar with interactive boards, so they have not yet integrated them into the educational process (Gerouki 2014). Another similar research (Georgouli et al. 2011) also shows that teachers are making the most of ICT in mathematics and language courses. Education software programs of the Ministry of Education are rarely used, while their first preferences include HotPotatoes and GoogleEarth.

In special education, teachers have begun to get their students in touch with special software programs trying to solve various problem situations (Kotti and Politis 2017). In the area of kindergarten, the day-to-day kindergarten teachers use new technologies in an attempt to creatively utilize them in the educational process. The most commonly used applications are the use of the Internet and various painting software programs (Manesi 2016).

At all levels of education, the majority of teachers state that ICT-assisted teaching can be more interesting and help students learn better. In addition, they believe that the use of ICT can contribute to the development of students' educational and cognitive levels (Tsilis 2018).

The Greek Ministry of Education and Religious Affairs in order to enhance the integration and utilization of ICT at all levels of education created the website Open-edu (<https://opengov.minedu.gov.gr/>) intending to present all digital repositories and educational material available to all users with open access. The Greek School Network (GSN) is the official and exclusive network of public primary and secondary education. The e-Classroom service (e-Classroom), which is part of the services of GSN, aimed at teachers and students, to enrich the classical teaching that takes place daily in the school, with modern tools that enhance the learning process. During the school year 2018–2019, the e-Classroom platform hosts approximately 27,500 courses for both primary and secondary education with approximately 37,000 students and teachers registered. On the other hand, the Greek Open Courses Project is aimed at tertiary education and is about freely available courses taught at Greek universities, adapted to the digital environment freely accessible and available over the Internet for everyone. The Greek Open Courses Project contains more than 3750 courses by approximately 4000 instructors with more than 25 academic institutions participated.

Courses about Information Technology

From 1983, Information Technology (IT) was established as a separate educational sector in Vocational High Schools. Nine years later an introductory course of Informatics was introduced in the schools of Lower Secondary Education (gymnasiums). During the same period, the Information Science became a new formal faculty for teachers in secondary education. The first Information Technology course was entered in the upper secondary education (Lyceum) as well in 1998.

The basic principles and terms of information science and the basic simple concepts concerning the general structure and function of computers and acquisition of basic knowledge and skills of computing are the general aims of informatics teaching as a school subject in the lower secondary education. In the upper secondary schools, the IT courses are designed as the continuation and deepening of the knowledge acquired in previous levels of education. According to the Unified Framework Studies Informatics Program, the IT application electives and computer applications courses included in the schools' curriculum emphasize the development of competences and skills in the use of ICT not only as a programming tool but also as a learning and thinking tool.

On the other hand, in vocational education, the offered courses are focused on specialized subjects of informatics and the acquirement of professional-level skills in programming, use and development of computers, computational systems, networks, and the Internet.

Informatics teachers both in primary and secondary schools in Greece are graduates from Computer Science or Information Technology University departments (Kaltsa and Rorris 2013).

More recently in 2010, the introduction of IT was extended to primary education as well, by establishing an indicative curriculum and equipment by schools with computers. The UFC (Unified Framework Curriculum) proposes to incorporate the use of Information Technology first for teaching science and technology in primary education and gradually throughout the entire curriculum. The use of computers by students can also be seen in several activities falling outside the narrow framework of the curriculum (Tsami 2016).

In higher education, there are more than 50 Computer Science and IT Bachelors in Greece offered by the public universities and technological institutions. The majority of the university departments offer ICT courses to acquire basic skills in the applications of Information and Communication Technologies. Additionally, departments of education have integrated ICT modules into students' curriculum, aiming at developing pre-service teachers' competence of ICT use in education (Liu et al. 2014).

8.3.4 ICT Integration into Practices

Many studies indicate how important is the proper preparation not only for the teachers but also for the students to use educational technology in teaching practice in an effective way. Other factors that play a major role to integrate ICT in schools are the lack of Internet access and infrastructure, the large number of pupils in the class, and the lack of funding (Nikolopoulou and Gialamas, 2015).

The Ability for Faculty to Use ICT to Teach

According to Diamantis (2019), most of the researches about the use of ICT to teaching conclude that teachers, even when they have a positive attitude toward digital media, continue to use them in the traditional teacher-centered way, they use them as a tool for presenting information and almost as an exclusive source of knowledge.

According to the research carried out by Tsilis (2018) and Tsakiridou (2016), the teachers who participated in the second-level training programs accept the utility and efficiency of digital media when used in the educational and teaching process. Teachers have also developed the ability to integrate digital media into the teaching process and thus can make pedagogically more technologically enhanced learning. Tsilis research showed (Table 8.4) that both A-level and B-level certified teachers use ICT much more in the process of preparing to teach (58.64 and 67.08% accordingly), less often in teaching using ICT themselves (44.35 and 52.50% accordingly) and even less in teaching by promoting the use of ICT by students (28.50 and 41.73% accordingly).

Especially in terms of gender, male teachers appear to use ICT more often than their female counterparts in both preparation and teaching (Table 8.5).

The Ability for Students to Use ICT to Solve Problems

Regarding the use of ICT outside the school for schoolwork, Greek pupils declare that they are using ICT out of school to complete their obligations to a greater extent than their counterparts in OECD countries. The use of ICT for school purposes involves Internet surfing for schoolwork and studying; exchanging emails or messages via social networks with peers; communicating via email or social networks with teachers, downloading, uploading, or searching for data from the school's website for

Table 8.4 Use of ICT by the teachers

	Frequency of use of ICT by the teacher in preparation (%)	Frequency of use of ICT by the teacher in teaching process (%)	Frequency of use of ICT by the pupils while teaching (%)	Total use (%)
A-level training	58.65	44.35	28.50	35.39
B-level training	67.08	52.50	41.73	46.41
Average	62.83	48.40	35.08	40.85

Table 8.5 Use of ICT by the teachers in the terms of gender

	Frequency of use of ICT by the teacher in preparation (%)	Frequency of use of ICT by the teacher in teaching (%) process	Frequency of use of ICT by the pupils while teaching (%)	Total use (%)
Male teachers	64.94	51.80	40.33	45.30
Female teachers	60.81	45.15	30.06	36.63
Average	62.83	48.40	35.08	40.85

school lessons and announcements; downloading educational applications to mobile devices, etc. In addition, male students seem to use ICT more often outside school for school-related purposes (Sofianopoulou et al. 2017).

8.4 Policy and Strategy of ICT

8.4.1 *Policies-Related Educational Informationalization in Recent Years*

In 2018, the European Commission has adopted the Communication on the Digital Education Action Plan, which outlines how the EU can help individuals, educational institutions, and education systems to better adapt for life and work in an age of rapid digital change by

- Making better use of digital technology for teaching and learning;
- Developing relevant digital competences and skills for the digital transformation; and
- Improving education through better data analysis and foresight (EC 2019c).

Greek educational policies in ICT have adopted the entire ICT literacy objective set by the EU. Existing ICT policies in the Greek school system cover the following areas:

- Learning theories and teaching methodologies to promote digital literacy by introducing both access to digital learning material in classroom and at home (e.g., “Photodentro”) via web portals but also their use under pedagogical indicators in the classroom.
- Two levels of ICT training for primary and secondary educators.
- Integration of e-portals, e-books, and online resources in primary and secondary education.
- Infrastructure and educational software for several special needs schools.
- Incentives to purchase notebooks for secondary school 1st grade students (“Laptop for Students programme”).

- Broadband in many schools through a school network (sch.gr), recognizing Internet access as a basic right.
- ICT equipment in several schools that have the necessary infrastructure.
- Official policies to promote new learning environments under the vision of each political governmental scheme (Abbassi et al. 2015).

8.4.2 ICT Financing Resource

The “Digital Services of the Ministry of Education, Lifelong Learning and Religious Affairs” project from 2007 to 2013 targeted the digital upgrade of the primary and secondary educational process in Greece. The total investment for the project was EUR 174.441.430, of which the EU’s European Regional Development Fond contributed EUR 146.635.815. The project was divided into sub-projects such as the supply and installation of interactive systems, the supply and installation of mobile computer laboratories, with 10 laptops for a primary school and 15 for a secondary school. Overall, 825.423 pupils from primary schools to lyceums and institutes were benefit from the project.

The next period, the PA 2014–2020 (Partnership Agreement for the Development Framework) constitutes the main strategic plan for growth in Greece with the contribution of significant resources originating from the European Structural and Investment Funds (ESIF) of the European Union. The objectives of the European Structural and Investment Funds of the European Union, which co-finance the Partnership Agreement (PA) 2014–2020, are implemented through Operational Programmes (OP). One of the actions is about the procurement of ICT equipment for school units of primary and secondary schools, via the upgrade of the technological equipment.

In Greece, the higher education institutions are funded on a national level from the national budget earmarked for higher education of the Ministry of Education, Research and Religious Affairs. Besides teaching and research, public funding covers administration, infrastructure, lifelong learning departments, and centers for career guidance and psychological support. Other resources are income from the institution’s entrepreneurial activity or private assets, income from investment grants or donations, endowments and bequests. As far as funding for conducting research is concerned, the institutions are beneficiaries of the operational programs that are co-financed by the Greek State and EU Structural Funds, according to the related regulations and directives.

Funding from other private resources outside the National Budget is limited. However, donators, sponsors, and private stakeholders are encouraged to finance higher education with tax relief and exemptions being the primary motive.

It should be noted that public financing of research and technology from the national budget of the Ministry of Education in 2018 amounts to 122.548.000 million

allotted to research organizations such as the Hellenic Pasteur Institute, the Biomedical Sciences Research Center “Alexander Fleming,” and others (Eurydice 2018a, b).

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