

Curriculum approaches to Educational Robotic and Programming

according to national curricula for secondary
education (ISCED 2-3) of Portugal, Poland,
Turkey and Italy



Educational Robotic and Programming and Learning Scenarios
2020-1-PT01-KA201-078670

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Introduction

Digital technologies have revolutionized our society, and children today grow up and live in a world where these are ubiquitous. Education systems are no less affected, not only because technology can impact the way education is delivered, but also because education has a role to play in preparing young people for a tech-driven world. Moreover, as research has long shown, growing up in the digital age does not make 'digital natives', inherently competent and confident with digital technologies. The challenges posed by and the potential benefits of digital education in school are manifold. From a labour-market perspective, there is a skills gap to fill, as an increasing number of jobs require a high level of proficiency in the use of technologies and many new jobs are based on specialized digital skills. From a social point of view, the challenge is one of inclusiveness: a digital divide between those with no or only basic digital skills, and others with higher level skills could widen existing gaps in society and further exclude some parts of the population. From an educational point of view, the challenge is not only to ensure that young people develop the digital competences needed, but also to reap the benefits from the pedagogical use of technology

The use of technology could provide innovative and stimulating learning environments, facilitate individualized learning and increase student motivation. On the other hand, today's students will enter a workforce that is powerfully shaped by computing. To be successful in a changing economy, students must learn to think algorithmically and computationally to solve problems with varying levels of abstraction. These computational thinking skills have become so integrated into social function as to represent fundamental literacies. However, computer science has not been widely taught in K-12 schools. Efforts to create computer science standards and frameworks have yet to make their way into mandated course requirements. In this context the issue of the digital competences has become increasingly important and has been taken up at the highest policy level. At the same time robots and computational thinking are in the political agenda of governments. Educational robotics and programming (ERP) engage learners in the use of robotic technologies for the development of learning objectives, skills or competencies. Educational scenarios aim to design a learning situation composed by different activities in order to achieve certain learning objectives through different learning strategies.

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This report presents an overview on the educational context and systems of the countries involved in the project and a more detailed focus on the approaches to Educational Robotic and Programming (EPR) considering all subjects. It arises from the need to establish a framework that describes the current situation of ERP in the countries that are part of the partnership.

This report has three main sections:

1. In the section – Methodology - all the methodological steps used in the investigation process of the report will be presented.
2. A brief presentation of the main organizational models of ISCED levels 1-3 in each country of the partnership (Italy, Poland, Portugal and Turkey) with some basic statistics information;
3. Curriculum Approaches to Educational Robotic and Programming According to National Curricula. This section is divided into three distinct but complementary parts, starting from the description of a broader European context on digital education, followed by National strategies encompassing digital education in ISCED 2-3. The last section results from an analysis of the curricula and recommendations of the Ministries of Education, with the aim of identifying references to Educational Robotic and Programming.



Methodology

The methodology followed for the preparation of this study followed a protocol agreed between the partners and different approaches were followed depending on the moment of investigation. In order to characterize the different educational systems, official European and national reports were consulted, as well as the statistics provided by *Eurostat*. A common structure for the collection of these data was defined so that the study could be defined.

There was also a need to define a protocol to look for references to the EPR in national educational documents of the partner countries, having chosen to divide into two large groups: mentions in the curriculum of each subject and mentions in the recommendation and guides issued by the Ministries of Education of each country in the partnership. In order to typify the references, the same methodology that was presented by Eurydice in the Digital Education at School in Europe (2019) was followed, considering that the Educational Robotic and Programming (EPR) approaching can be addressed in three main ways:

- **As a cross-curricular theme:** understood to be transversal and are therefore taught across all subjects in the curriculum. All teachers

share the responsibility for developing these competences.

- **As a separate subject:** are taught as a discrete subject area similar to other traditional subject-based competences.

- **Integrated into other subjects:** EPR are incorporated into the curriculum of other subjects or learning areas.

An online form was then created in order to allow the structured registration of each of the references to EPR as well as an open field to, if understood as relevant, leave some reflection on the analysis carried out. In this way, it was possible to obtain structured data from the different partners and define a common framework for analysis.

The methodology used included qualitative research, through document analysis, interpretive, exploratory and descriptive information. As for the sources of information, the information contained on the websites of the national authorities / educational regions of the member country of the consortium, as well as European reports and statistics, were used.

Global characterization of the educational system in the countries of the consortium members (IT, PL, PT and TK)

This chapter presents the structures of education and training systems from pre-school to secondary education in the countries that make up the partnership: Italy, Poland, Portugal and Turkey. For the 2019/20 school year. For each country, the principles and organization of the education system will be presented, following the structure and ending with the qualification of teachers. The data presented come from various sources in which Eurostat data and Eurydice reports were privileged. Each partner complemented it with data they collected from official national documents.

Italy

PRINCIPLES AND ORGANIZATION

The education system is organised according to the principles of subsidiarity and of autonomy of institutions.

The State has exclusive legislative competences on the general organisation of the education system. The Ministry of

Education and the Ministry of University and Research are responsible for the general administration of education at national level for the relevant fields, respectively. The Ministry of education has decentralized offices (Regional School Offices - USRs) that guarantee the application of general provisions and the respect of the minimum performance requirements and of standards in each Region. Regions have joint responsibility with the State in some sectors of the education system (e.g. organisation of ECEC (0-3), school calendar, distribution of schools in their territory, right to study at higher level).

Schools have a high degree of autonomy: they define curricula, widen the educational offer, organise teaching (school time and groups of pupils). Every three years, schools draw up their own 'three-year educational offer plan' (*Piano triennale dell'offerta formativa - PTOF*).

STRUCTURE

Compulsory education starts at 6 years of age and lasts for 10 years up to 16 years of age. It

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covers the whole first cycle of education and two years of the second cycle. The last two years of compulsory education can be attended either in an upper secondary school or within the regional vocational education and training system. The Italian education and training system includes ECEC (0-3 and 3-6), primary and secondary.

Early childhood education and care (ECEC)

ECEC for children aged less than 3 years is offered by educational services (*servizi educativi per l'infanzia*). ECEC for children aged from 3 to 6 years is available at pre primary schools (*scuole dell'infanzia*). Although being part of the same system, the ECEC 0-3 is organised by the Regions according to the single regional legislations, while the 3-6 offer is under the responsibility of the Ministry of education.

Compulsory education

Compulsory education starts at 6 years of age and lasts for 10 years up to 16 years of age. It covers the whole first cycle of education and two years of the second cycle. The last two years of compulsory education can be attended either in an upper secondary school or within the regional vocational education and training system. In addition, everyone has a right and a duty (*diritto/dovere*) to receive education and training for at least 12 years within the education system or until they have

obtained a three-year vocational qualification by the age of 18.

First cycle of education

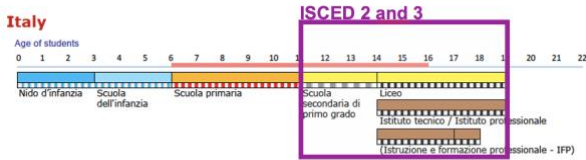
The first cycle of education is compulsory and is made up of primary and lower secondary levels. Primary education (*scuola primaria*) starts at 6 years of age and lasts 5 years. Lower secondary education (*scuola secondaria di I grado*) starts at 11 years of age and lasts 3 years. Within the first cycle, students pass from one level to the next one without exams. At the end of the first cycle of education, students who pass the final state examination progress directly to the second cycle of education, the first two years of which are compulsory.

Second cycle of education

The second cycle of education starts at the age of 14. At the end of the upper secondary school education, students who successfully pass the final exam, receive a certificate that gives them access to higher education. The regional vocational training system offers three or four-year courses organised by accredited training agencies or by upper secondary schools. The following chart shows the structure of the Italian educational system,

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framing the levels that are the object of this study (ISCED 2 and 3):



Adapted from https://eacea.ec.europa.eu/national-policies/eurydice/content/italy_en retrieved on march, 2021.

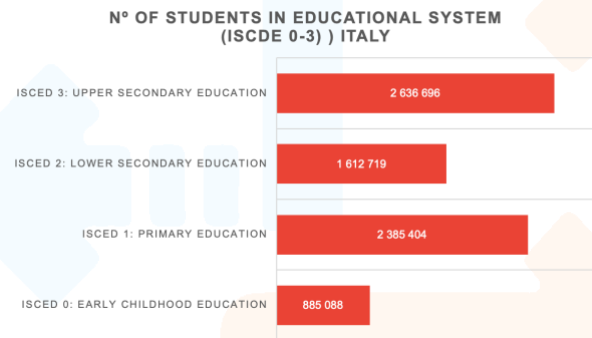
TEACHER QUALIFICATIONS

Public ECEC services for children aged between 0 and 3 years are run directly by the municipalities in accordance with the criteria defined by central and regional regulations.

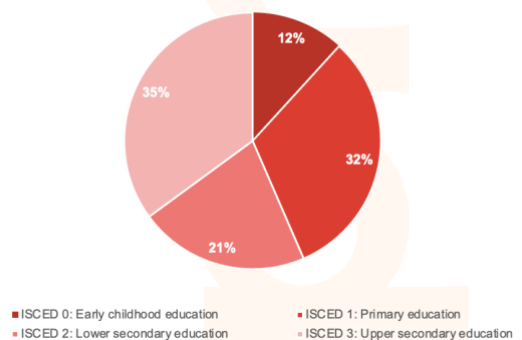
From the school year 2020/2021 educators are required to hold at least a Bachelor degree (ISCED 6 level) obtained after having successfully completed a three-year programme in education sciences specific for this ECEC phase. In its policy act for 2020 (*Atto di indirizzo, febbraio 2020*), the Ministry of education has given priority to the initial training and continuing professional development of teachers and of all school staff. Training of teachers is, in fact, considered the key feature for improving and innovating the education system and to help schools face social, cultural and economic changes. At present, teachers in State pre-primary, primary and secondary schools need to complete a Master programme at higher level and obtain the relevant qualification (ISCED 7). Secondary teachers, beside a

second-cycle qualification, must acquire specific competences in anthropology, psychology and pedagogy, as well as in teaching methods and technologies. To be qualified teachers they have to pass the national open competition for their recruitment and, once recruited, to complete a one-year induction period with a positive assessment. Continuing professional development (CPD) is compulsory for all teachers in State schools. According to the national collective labour contract, CPD activities are both a right and a professional duty, as they contribute to the development of teachers' professional life.

BASIC STATISTIC INFORMATION

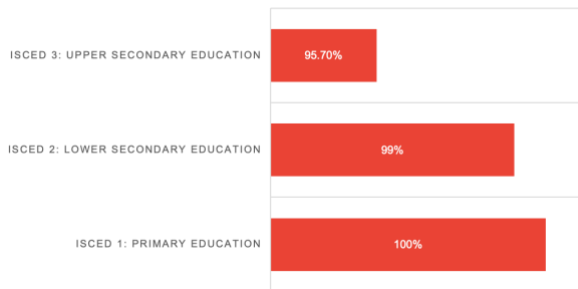


DISTRIBUTION OF % OF STUDENTS IN EDUCATIONAL SYSTEM (ISCDE 0-3) ITALY

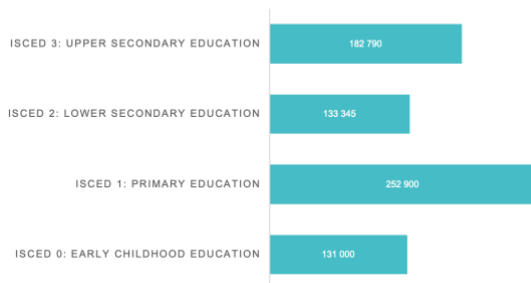


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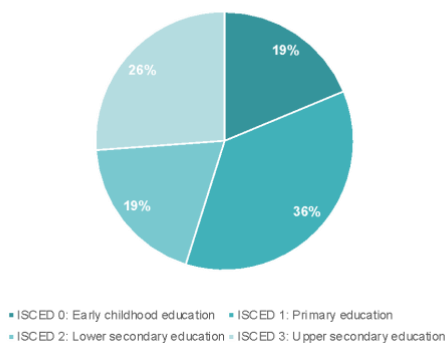
PERCENTAGE OF COMPLETION RATE
(ISCDE 1-3) ITALY



N° OF TEACHERS IN EDUCATIONAL SYSTEM
(ISCDE 0-3) ITALY



DISTRIBUTION OF % OF TEACHERS IN
EDUCATIONAL SYSTEM
(ISCDE 0-3) ITALY



Poland

PRINCIPLES AND ORGANIZATION

Since the political transformation (the collapse of the communist regime) in 1989, the Polish education system has undergone profound changes in nearly all of its aspects including the structure, organization, management and

the core curriculum. A structural reform in Poland has been implemented since the beginning of 2017. Its main goal is to offer students a solid background of general education required for further personal development and the needs of the contemporary labour market.

STRUCTURE

Full-time compulsory education lasts for 9 years. It comprises the last year of pre-school education and 8 years of education in primary school (single structure education).

In the Polish educational system full-time compulsory education and part-time compulsory education are defined:

- *Full-time* compulsory education (obligation to attend 8- year primary school - single-structure education) applies to pupils aged 7-15 years
- *Part-time* compulsory education (obligation to be in education) concerns pupils aged 15-18 and it may take place either in school settings (a student attends upper secondary school) or in non-school settings (e.g. a student follows vocational training offered by employers).

ECEC

Institutions for children aged 0-3 years: creche (*żłobek*) and kids club (*klub dziecięcy*). Attending a creche is not obligatory, creches are not part of the education system as they

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are supervised by the Ministry of Family, Labour and Social Policy. Pre-school education is only obligatory for 6-year-olds. All 6-year-olds have to attend a pre-school institution for one year in order to acquire basic skills before they start school.

Primary education

Primary education is a single structure education (ISCED 1-2) lasting 8-year primary school and is compulsory for all pupils who are usually aged 7-15. It includes two stages: grades 1-3 (early school education) and grades 4-8 (teaching by subject).

At the end of grade 8 of primary school pupils take a compulsory external examination. The results of the exam together with end of school achievement influence admission to secondary schools.

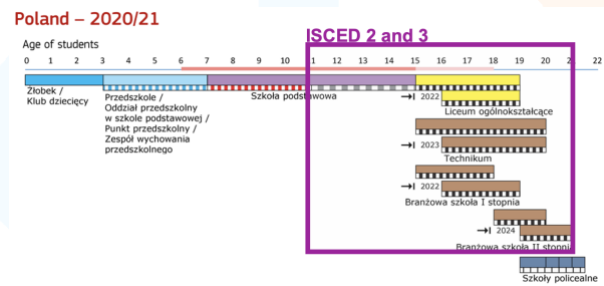
Secondary education

Secondary education (ISCED 3) includes the following options: 4-year general secondary school (*liceum ogólnokształcące*); 5-year technical secondary school (*technikum*); Stage I 3-year sectoral vocational school (*szkoła branżowa I stopnia*) or Stage II 2-year sectoral vocational school (*szkoła branżowa II stopnia*).

Students of vocational schools - sectoral vocational schools and technical upper secondary schools - may take exams

confirming vocational qualifications in a given occupation during the course of study or upon completion of school to receive a diploma. Graduates of general upper secondary schools and technical upper secondary schools may take the external upper secondary school leaving examination (*egzamin maturalny*) to obtain the *Matura* certificate, which gives access to higher education. This possibility will be open also to graduates of the new stage II sectoral vocational school.

The following chart shows the structure of the Italian educational system, framing the levels that are the object of this study (ISCED 2 and 3):



Adapted from https://eacea.ec.europa.eu/national-policies/eurydice/content/poland_en retrieved on march, 2021.

TEACHER QUALIFICATIONS

Initial education and training is provided within the higher education sector: first-, second- and long-cycle programmes, and non-degree postgraduate programmes. It is organised according to two models: a concurrent model and a consecutive one; the concurrent model is predominating; comprises compulsory

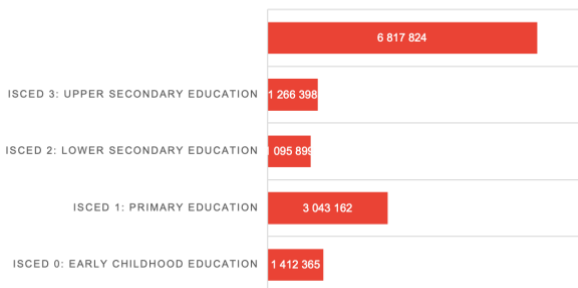
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training for teaching a given subject, psychological and pedagogical training, and teaching methodology training. Teachers are required to develop their professional skills in line with the needs of their schools.

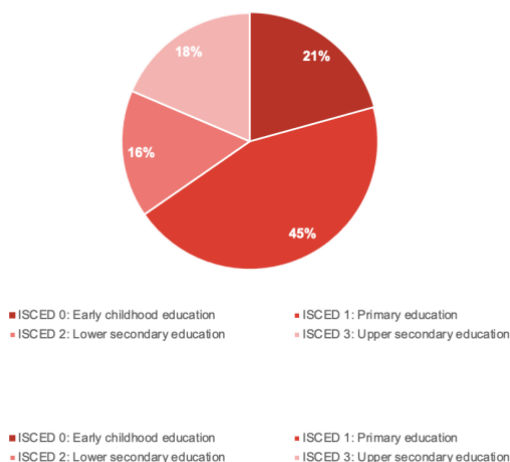
Participation in continuing professional development is necessary for professional promotion. The assessment of professional achievements, conducted as part of the promotion process, covers the extent to which the teacher concerned has implemented an agreed professional development plan.

BASIC STATISTIC INFORMATION

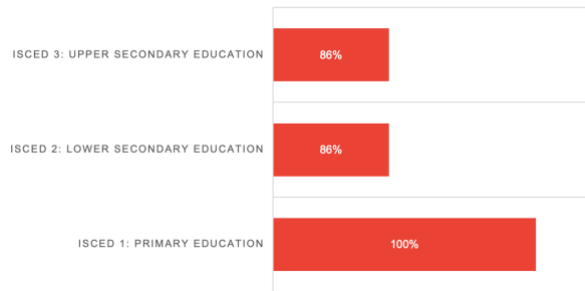
N° OF STUDENTS IN EDUCATIONAL SYSTEM (ISCDE 0-3) POLAND



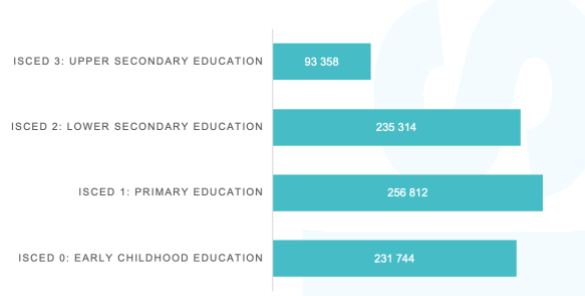
DISTRIBUTION OF % OF STUDENTS IN EDUCATIONAL SYSTEM (ISCDE 0-3) POLAND



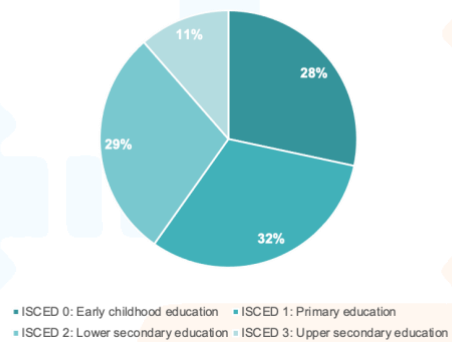
PERCENTAGE OF COMPLETION RATE (ISCDE 1-3) POLAND



N° OF TEACHERS IN EDUCATIONAL SYSTEM (ISCDE 0-3)



DISTRIBUTION OF % OF TEACHERS IN EDUCATIONAL SYSTEM (ISCDE 0-3) POLAND



Portugal

PRINCIPLES AND ORGANIZATION

Education in Portugal is organized in accordance with the democratic principles established in the Constitution of the Republic (1976), namely the freedom to teach and learn, as well as the rights of citizens and the

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State's duties in this area. These same principles were the basis of the Education Law (1986), which defines the objectives, structures and modes of educational organization.

The Ministry of Education (ME) is the government agency responsible for defining, coordinating, implementing and evaluating the national policy relating to the education system (pre-school, basic, secondary and extra-school education), as well as for the articulation of the policy of education with qualification and professional training policies.

The school network is organized into school Groups (Agrupamentos), which have their own administration and management bodies.

STRUCTURE

Compulsory education lasts for 12 years, between the ages of six and 18 (ISCED 3). Public education tends to be free and universal from the age of four.

The Portuguese education system is divided as follows:

Pre-school education (ISCED 0)

Pre-school education covers children aged three to compulsory school age (six years). Attending pre-school education is optional, recognizing the primacy of the family's role in early childhood education. However, the

network of establishments has been expanding within a generalized service availability policy. Provision for children under three, with a special focus on childcare (ISCED 010) (nursery), is not part of the education system.

Basic education (ISCED 1 and 2)

Basic education is universal, mandatory, free and lasts for nine years. It is divided into three sequential cycles; each must complete and build on the above from a global perspective: the first cycle (ISCED 1) corresponds to the first four years of schooling (1st to 4th grades). The second cycle (ISCED 1) corresponds to the following two years (fifth and sixth year). The third cycle (ISCED 2) lasts for three years and corresponds to lower secondary education (grades seven to nine).

Upper High School (ISCED 3)

Secondary education lasts three years and corresponds to grades 10, 11 and 12 of secondary education high school, organized in different modalities. Some are aimed at further studies, others via dual certification (academic and professional), the latter combining general, technical and work placement training. The permeability between the different paths is guaranteed, as well as access through all the higher education through national examinations.

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The following chart shows the structure of the Portuguese education system, framing the levels that are the object of this study (ISCED 2 and 3).



Adapted from https://eacea.ec.europa.eu/national-policies/eurydice/content/poland_en retrieved on march, 2021.

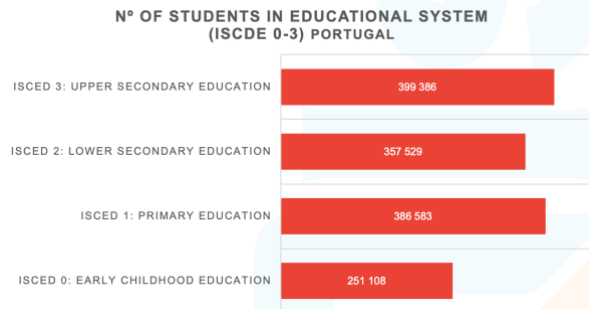
TEACHER QUALIFICATIONS

There is only one professional career for teachers at all levels of non-tertiary education (from pre-school to upper secondary education), which requires a second cycle degree (ISCED 7 - Master). Continuing education and specialized training are two ways that contribute to the continuing professional development of teachers. Continuing education is a right and a duty. It aims to improve and update teachers' professional knowledge and skills, professional mobility and career advancement.

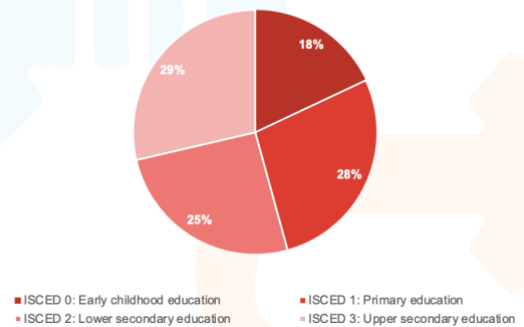
Specialized training is defined as complementary training that enables teachers to obtain qualifications in other educational functions that help schools to function efficiently and the education system to develop.

The Training Centers of the Association of Schools must draw up an annual or multi-annual training plan, taking into account the priorities indicated by the associated schools. The continuing training courses that are part of the training plans of the Centers are subject to accreditation by the Scientific-Pedagogical Council for Continuing Training.

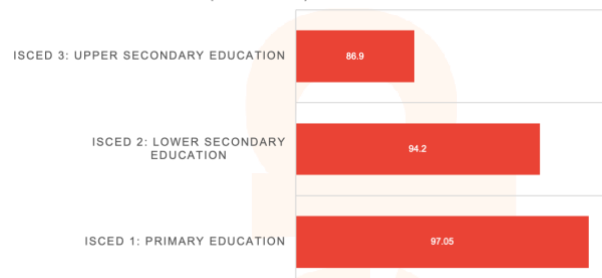
BASIC STATISTIC INFORMATION



DISTRIBUTION OF % OF STUDENTS IN EDUCATIONAL SYSTEM (ISCDE 0-3) PORTUGAL

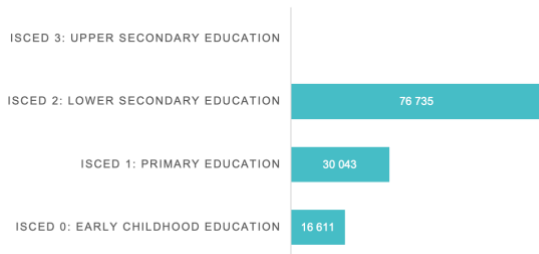


PERCENTAGE OF COMPLETION RATE (ISCDE 1-3) PORTUGAL

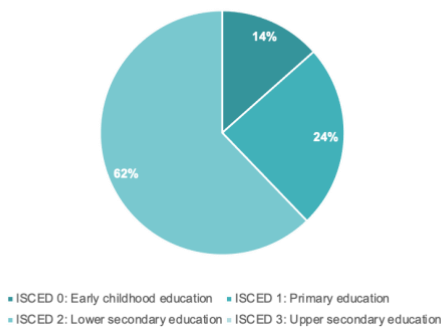


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N° OF TEACHERS IN EDUCATIONAL SYSTEM (ISCDE 0-3) PORTUGAL



DISTRIBUTION OF % OF TEACHERS IN EDUCATIONAL SYSTEM (ISCDE 0-3) PORTUGAL



Turkey

PRINCIPLES AND ORGANIZATION

The Ministry of National Education (MoNE) conducts educational activities on a central level in the Republic of Turkey. The basic principles of Turkish national education system under the 1739 numbered National Education Basic Law in 1973 are as follows:

- To educate citizens of the Republic of Turkey as those who know their duties and responsibilities and act accordingly in accordance with all policies and principles as expressed in the Constitution of Turkey, which is a secular and social law nation,

- To educate individuals who are constructive, creative and productive, and respectful for human rights with a physically, mentally, morally, spiritually and emotionally balanced and healthy character,

- To prepare individuals for life by providing them with necessary information to develop capability and the ability, skills, attitudes and by giving them jobs that will make them happy and provide them with a job to contribute to the happiness of society;

- To improve the welfare and happiness of Turkish citizens and Turkish society; on the other hand, national unity and economic integrity, social and cultural development and to accelerate the contemporary civilization, and finally to make Turkish nation a constructive, creative, and outstanding partner.

STRUCTURE

Each level of education is made up of Pre-School, Primary and Lower Secondary, Upper Secondary.

The first stage is a 4-year primary school (1st, 2nd, 3rd and 4th grade), the second stage is a 4-year lower secondary school (5th, 6th, 7th and 8th grade) and third-tier, four-year is a upper secondary school (9th, 10th, 11th and 12th grade). In addition, early childhood education is also compulsory along with the

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primary and secondary education for the individuals who are in need of special education. Turkish compulsory education (Basic Education) has a structure that corresponds to primary, lower secondary education and secondary/religious secondary education. This education is based on the concept 4+4+4 format. In addition, pre-school education as well as primary education, secondary and high school education is also necessary for the individuals who need special education.

ISCED 0

Early Childhood Education in our country covers the Nursery and Day Care Centres for children of 0-36 months, which operates under the auspices of the General Directorate of Children Services of the Ministry of Family, Labour and Social Services.

ISCED 1

Primary school education covers children of 69 months and 10 year-old and is the responsibility of the General Directorate of Basic Education, the Ministry of National Education. In addition, early childhood education is also compulsory along with the primary and secondary education for the students who are in need of special education.

ISCED 2

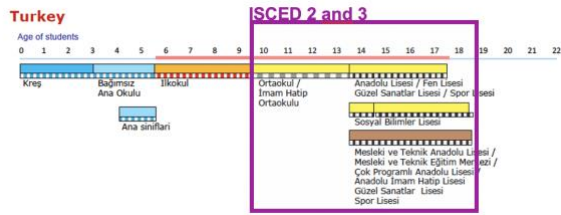
Secondary education, namely religious school and secondary school, covers children of 10 to 14 years old. The actions of the General Directorate of Basic Education and Secondary Education and religious secondary schools are carried out under the responsibility of the General Directorate of Religious Education in the Ministry.

ISCED 3

Upper Secondary Education covers Anatolian High School, Science High School, School of Fine Arts, Sports High School, School of Social Sciences, the Anatolian Religious High Schools and High Schools conducting vocational and technical programs. Such training is aimed at children aged 14 to 18 years and at those who are above 18 in Vocational Education Centres and it is the responsibility of General Directorate of Secondary Education, the General Directorate of Vocational and Technical Education and General Directorate of Religious Education.

The following chart shows the structure of the Portuguese education system, framing the levels that are the object of this study (ISCED 2 and 3).

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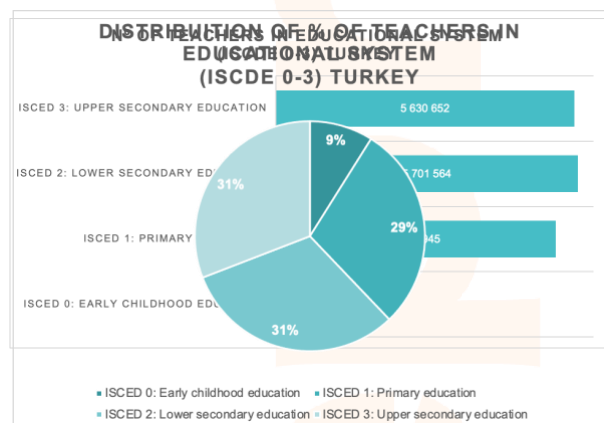
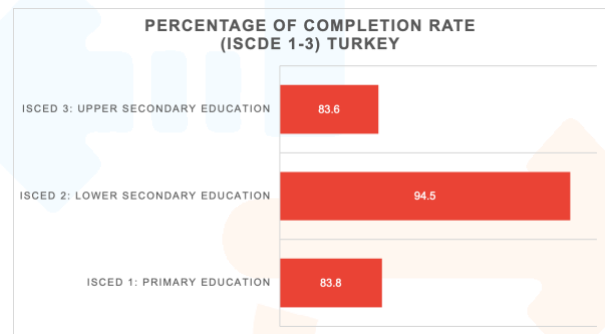
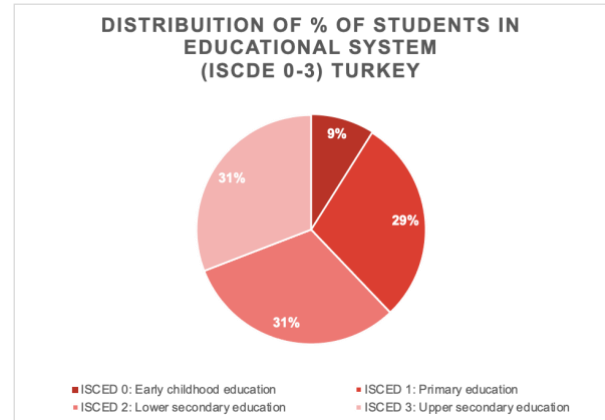
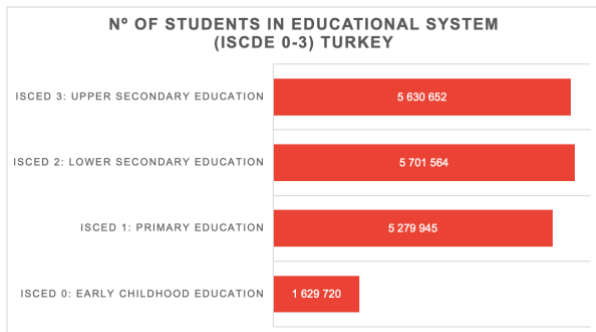


Adapted from https://eacea.ec.europa.eu/national-policies/eurydice/content/turkey_en retrieved on march, 2021.

TEACHER QUALIFICATIONS

Initial teacher training programs for pre-primary education, primary education, and secondary education in Turkey are carried out by the universities. Today, main source for training of teacher is faculties of education. All of the teacher education programs last four years. In addition, Teaching Profession Knowledge Master's Programs without Thesis will be opened in order to provide pedagogical formation for those who graduated from departments other than the faculty of education that constitute a resource for teaching.

BASIC STATISTIC INFORMATION



Curriculum approaches to Educational Robotic and Programming according to national curricula

This chapter is divided into two distinct but complementary parts. The first part, an overview of the approach to digital education in a European perspective and also in each of the countries of the consortium will be presented. This section will have as main references documents from UE and the report published in 2020 by Eurydice, Digital education at school in Europe. The second part, under the sole responsibility of the consortium, results from the methodological process described above. The curricula and guidelines of the Ministry of Education of each country regarding ISCED 2-3 were analyzed in order to look for references to Educational Robotics and Programming.

European strategies encompassing digital education in primary and general secondary education (ISCED 2-3)

The European Digital Competence Framework for Citizens, also known as DigComp, offers a tool to improve citizens'

digital competence. DigComp was first published in 2013 and has become a reference for many digital competence initiatives at both European and Member State levels.

The DigComp framework, now in the 2.1 version, identifies 5 main areas of digital competence which comprise 21 specific competences and defines how they are articulated at 8 proficiency levels and 4 macro-levels (foundation, intermediate, advanced and expert). Also, it provides examples of each competence in two application scenarios (employment and education). DigComp offers a clear view of the wide range of knowledge, skills and attitudes related to the use of digital devices and services that are needed to achieve a full participation in our society. It can be used therefore to assess one's strengths and weaknesses in this domain, hence one's potential for improvement. The ubiquity of digital technologies has profoundly changed almost every aspect of our lives. It changed the way we think and behave. Children and young people are growing up in a world where digital technologies are ubiquitous. National

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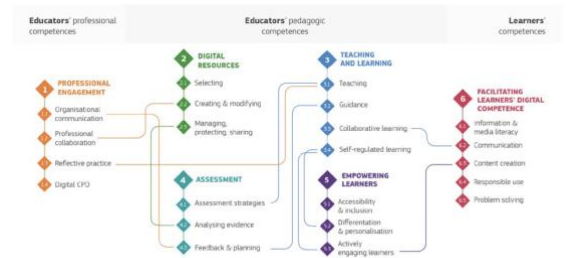
and European policies recognize the need to equip all citizens with the necessary skills to use digital technologies critically and creatively. The DigComp already presented responds to this need by providing a framework that allows European citizens to better understand what it means to be digitally competent and to further assess and develop their own digital competence.

For learners covered by compulsory education, there are a number of initiatives, at European, national and local level, which offer guidance and advice that enable them to develop their digital competence, often with a focus on digital citizenship. In most member states, curricula have been or are being developed to ensure that the young generation is able to participate in a digital society in a creative, critical and productive way.

Consequently, there is, at international, European and national level, considerable interest in equipping educators with the skills needed to fully exploit the potential of digital technologies to improve teaching and learning and adequately prepare learners to live and work in a digital society. The European Framework for the Digital Competence of Educators (DigCompEdu) responds to the growing awareness among many European Member States that educators need a set of digital competences specific to their profession in order to be able to seize the

potential of digital technologies for enhancing and innovating education. The DigCompEdu Framework aims to capture and describe these educator-specific digital competences by proposing 22 elementary competences organised

in 6 areas:



Area 1 is directed at the broader professional environment, i.e. educators' use of digital technologies in professional interactions with colleagues, learners, parents and other interested parties, for their own individual professional development and for the collective good of the organisation.

Area 2 looks at the competences needed to effectively and responsibly use, create and share digital resources for learning.

Area 3 is dedicated to managing and orchestrating the use of digital technologies in teaching and learning.

Area 4 addresses the use of digital strategies to enhance assessment.

Area 5 focuses on the potential of digital technologies for learner-centred teaching and learning strategies.

Area 6 details the specific pedagogic competences required to facilitate students' digital competence.

National strategies encompassing digital education in primary and general secondary education (ISCED 2-3)

Based on the report “Digital Education at Schools in Europe” this section contains references to all digital education strategies that in recent years have been implemented in each partner country.

ITALY - NATIONAL PLAN FOR DIGITAL SCHOOLS

This strategy includes objectives related to students' information and data literacy, digital content creation and computational thinking; the development of innovative school buildings, school digitalization, research units on the impact of digital media and devices, training for school staff, and the development of digital learning resources and OER.

Timeframe: 2017-2020

POLAND - STRATEGY FOR RESPONSIBLE DEVELOPMENT

The strategy mentions the use of ICT in education as one of the means to ensure quality education. The pupils should be able to independently search for, modify and use information. Developing digital competences should take place at all ages (lifelong learning) and not only take the form of formal learning, but also non-formal and self-learning. All schools should have access to new technologies including fast connections and online services.

Timeframe: 2017-2020 (and perspectives up to 2030)

PORTUGAL - INCODE.2030 NATIONAL DIGITAL COMPETENCES INITIATIVE

The strategy focuses on five axes: inclusion (aim to ensure access to digital technologies for all, including those who have already left education and training), education (focus on digital literacy and digital competences at all education levels as well as within lifelong learning, by involving all actors in education), qualification, specialization and research.

Timeframe: 2018-2030

TURKEY

Currently there is no strategy for digital education.

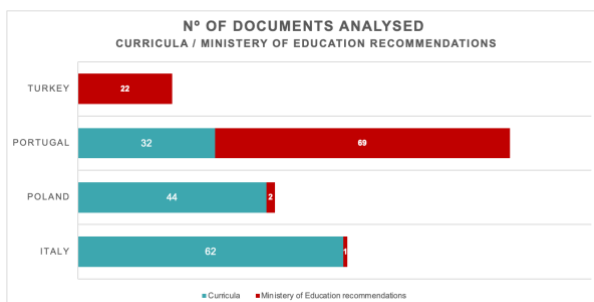
ISCED 2-3 Curriculum approaches to Educational Robotic and Programming.

To identify the different ERP approaches in the curriculum of the countries of the consortium, two types of documents were analyzed:

- *Ministry of Education recommendations*
- *Curriculum*

In the documents analyzed and in relation to ISDCE 2 and 3, 232 references were identified.

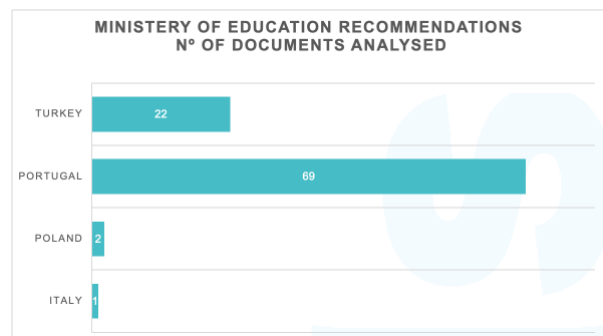
The following chart illustrates the distribution of the type and number of documents analyzed.



The results of this process will be presented below for each of the types of documents analyzed.

CURRICULUM

Regarding the curriculum, the methodology used was presented before, considering that the Educational Robotic and Programming (EPR) approaching can be addressed in three



main ways:

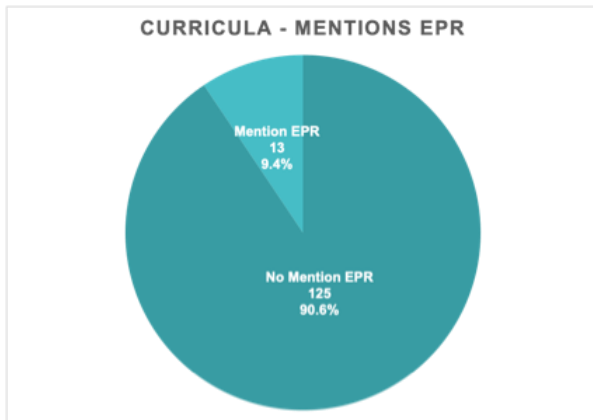
- As a cross-curricular theme;
- As a separate subject;
- Integrated into other subjects;

The curricula and programs of 138 subjects were analyzed, distributing them according to the data in the following table. The absence of references to EPR in Turkish curricula is highlighted.

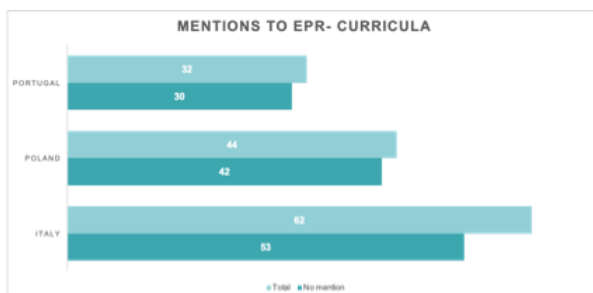
Within the scope of this study, subjects from VET courses in areas related to EPR were not considered. The subjects analyzed were very diverse: Mother tongue, foreign languages, History, Biology, Geology, Mathematics,

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Physics and Chemistry, Arts, Mathematics, Natural sciences, among others.



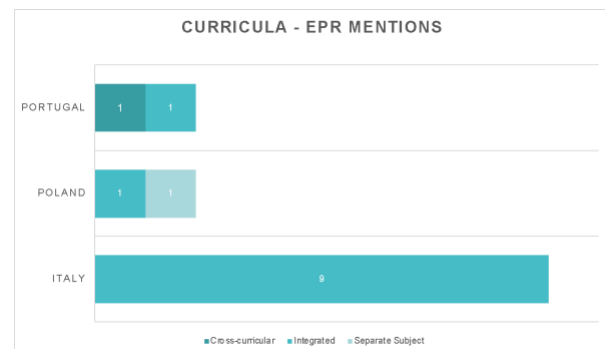
The data in the following chart shows that of the 138 programs analyzed, 125 do not make any reference to the EPR:



The distribution of responses by country is shown in the following chart:

Of the 13 curricula programs where approaches to EPR were identified, the distribution is shown next:

In addition to this quantitative analysis, the form provided for an open field where teachers who collaborated in this process were challenged to make a critical reflection. Below, some of these reflections are reproduced, which show, on the one hand, the potential



that teachers gathered in the EPR, but on the other hand, some disenchantment with the absence of mentions in the syllabuses of the subjects.

Italy

Giudizio positivo sull'introduzione di tali strumenti nella didattica

Positive opinion on the introduction of these tools in teaching

Ritengo didatticamente molto efficaci tali tecnologie e necessario implementarne l'utilizzo

I believe that these technologies are didactically effective and it is necessary to implement their use

Molto positivo l'uso delle tecnologie. Speriamo in un'implementazione delle stesse anche nel l'insegnamento del greco antico.

The use of technologies is very positive. We hope for their implementation also in the teaching of ancient Greek.

Portugal

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É difícil usar as novas tecnologias e a robótica de forma sistemática pois faltam recursos e nem todos os professores e alunos sabem o suficiente para as usar. Pode, no entanto, haver uma colaboração entre os Cursos e Clubes de Robótica e as turmas de Ciências e Tecnologias.

It is difficult to use new technologies and robotics in a systematic way as resources are lacking and not all teachers and students know enough to use them. There may, however, be collaboration between Robotics Courses and Clubs and Science and Technology classes.

Não há nenhuma referência expressa ao EPR. O que diz em todos os programas é isto "A natureza da ciência deve ser valorizada, procurando, sempre que possível, adotar estratégias que evidenciem o processo de construção do conhecimento científico e explorando as inter-relações entre a ciência, a tecnologia, a sociedade e o ambiente (CTSA)"

There is no express reference to EPR. What it says in all programs is this "The nature of science must be valued, seeking, whenever possible, to adopt strategies that demonstrate the process of construction of scientific knowledge and exploring the interrelationships between science, technology, society and the environment (STSE)".

Poland

In physics classes, the subject of robotics can be introduced extensively, from the basics of their functioning to the principles of creation. I believe that physics has a very large influence on the principles of designing and analyzing the manufacturing of robotic processes.

Mathematical subjects give a great opportunity to learn the principles of creating and understanding algorithmics. Algorithms have a great influence on the correct creation of programs and their careful analysis.

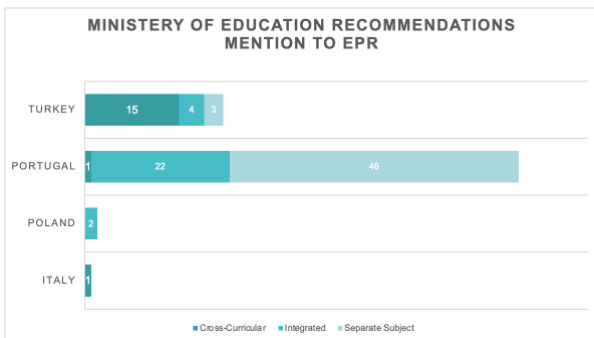
MINISTRY OF EDUCATION RECOMMENDATIONS

A total of 94 recommendations/guidelines from the Ministries of Education of the different countries were identified where references to the EPR are made.

The following chart shows the distribution of documents across countries:

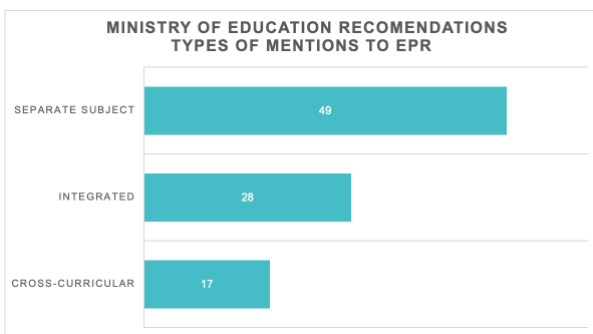
Regarding the Guidelines and recommendations of the Ministries of Education, they were further analyzed by type. Again, the methodology presented by Eurydice was followed, considering that the Educational Robotic and Programming (EPR) approaching can be addressed in three main

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ways (cross-curricular, separate subject and Integrated into other subjects).

The following chart shows the result of the analysis carried out according to this categorization:



Final considerations

The brief presentation of the main organizational models of ISCED levels 1-3 in each country of the partnership (Italy, Poland, Portugal and Turkey) with some basic statistics information showed the differences between the different educational systems. These are educational systems organized according to different principles that reflect cultural differences and some asymmetries. The analyzed indicators provide data and are quite self-explanatory, allowing to draw a picture of the education systems of each country.

With regard to the Curriculum Approaches to Educational Robotic and Programming According to the National Curriculum, it was decided not to make comparisons between countries fall into place, but rather to look for what they have in common. In fact, and despite the clear differences, we can risk the following conclusions from the present study.

- There are ongoing European initiatives to promote digital education, which assume a priority character. Although no digital strategy has been identified in Turkey, at the highest level there is some alignment with European Commission policies;
- Importance is given to computational thinking within the scope of 21st century skills.
- However, when analyzing the most operational documents, the curricula, it appears that the overwhelming majority do not have references to approaches to EPR.
- In general, professors from the most varied disciplines believe that there is a need for a clear orientation towards the transversal introduction of EPR.

References

Baidak, N., Sicurella, A., & Matti Riiheläinen, J. (2020). The Structure of the European Education Systems, 2020/21: Schematic Diagrams. Eurydice--Facts and Figures. Education, Audiovisual and Culture Executive Agency, European Commission.

European Commission/EACEA/Eurydice (2019). Digital Education at School in Europe. Eurydice, Report. Luxembourg: Publications Office of the European Union.

Eurydice (2021), Italy: Organisation of the Education System and its Structure. European Commission, from https://eacea.ec.europa.eu/national-policies/eurydice/content/italy_en retrieved on march, 2021.

Eurydice (2021), Poland: Organisation of the Education System and its Structure. European Commission, from https://eacea.ec.europa.eu/national-policies/eurydice/content/poland_en retrieved on march, 2021.

Eurydice (2021), Portugal: Organisation of the Education System and its Structure. European Commission, from https://eacea.ec.europa.eu/national-policies/eurydice/content/portugal_en retrieved on march, 2021.

Eurydice (2021), Turkey: Organisation of the Education System and its Structure. European Commission, from https://eacea.ec.europa.eu/national-policies/eurydice/content/turkey_en retrieved on march, 2021.

Jacob, S. R., & Warschauer, M. (2018). Computational thinking and literacy. *Journal of Computer Science Integration*, 1(1).

OECD (2021), Secondary graduation rate (indicator). doi: 10.1787/b858e05b-en (Accessed on 13 November 2021)

Prensky, M. (2009). H. sapiens digital: From digital immigrants and digital natives to digital wisdom. *Innovate: journal of online education*, 5(3).

Redecker, C. (2017). European framework for the digital competence of educators: DigCompEdu (No. JRC107466). Joint Research Centre (Seville site).

Vuorikari, R. (2020). DigComp 2.0: The Digital Competence Framework for Citizens. Update Phase 1: the Conceptual Reference Model. European Commission. Luxembourg: Publication Office of the European Union, 2016.



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