



REthinking
EDUCation COmpetencies.
Expertise, best practices
and teaching in Digital Era

IO1-A1.3 – National Need analysis Desk Research

Cyprus National Report

Scientific Direction:

Panicos Masouras

Author:

Panicos Masouras

Toumazis Toumazi

Christina Papamiltiadou

Organisation: Cyprus Computer Society (CCS)

Date: 05/07/2021



Erasmus+

RE-EDUCO - REthinking EDUCation COmpetencies. Expertise, best practices and teaching in Digital Era
2020-1-IT02-KA201-079433 | Co-funded by the Erasmus+ Programme of the European Union

TABLE OF CONTENTS

1. INTRODUCTION	3
2. THE IMPACT OF DIGITAL TRANSFORMATION IN CYPRUS	3
2.1 The 2012 Digital Strategy for Cyprus	3
2.2 Establishment of the Deputy Ministry Of Research, Innovation and Digital Policy	4
2.3 The 2019 and 2020 Cyprus Statistical Service Reports	5
3. NATIONAL FRAMEWORK FOR THE ADOPTION AND THE DEVELOPMENT OF ICTS IN MARKET LABOUR	6
3.1 Strategies by the Deputy Ministry Of Research, Innovation and Digital Policy	6
3.2 Establishment of the “Parallel Parliament”	8
4. FINANCING PROGRAMS OF SPECIFIC PROJECTS TO IMPLEMENT DIGITAL TECHNOLOGIES AT LOCAL CONTEXT	8
4.1 Erasmus + Projects in Cyprus	9
4.2 Horizon 2020 Digital Transformation calls	9
4.3 COVID-19 National Calls	9
4.4 New instruments in 2021 by the European Commission	10
5. NATIONAL FRAMEWORK TO SUPPORT THE INCORPORATION OF DIGITAL TECHNOLOGIES IN EDUCATION	10
5.1 DESI 2020	10
5.2 Initiatives at a European Level	12
6. NATIONAL NEED ANALYSIS ON DIGITAL REVOLUTION AND ITS EFFECTS ON THE LABOUR MARKET	14
6.1 School Curriculum	14
6.2 Ministry of Education, Culture, Sports and Youth Annual Report	14
6.3 The gap between ICT graduates and the industry	15
6.4 Cyprus Skills forecast by CEDEFOP	16
6.5 Other initiatives	17
6.5.1. <i>Cyprus Computer Society</i>	17
6.5.2. <i>Digital Skills Certification</i>	20
6.5.3. <i>Youth Board of Cyprus</i>	21
6.5.4. <i>Makerspaces in Cyprus</i>	22
6.5.5. <i>Advanced Training programmes and initiatives</i>	23
6.5.6. <i>Active formal and informal Professional Associations</i>	23
7. CONCLUSIONS	24

1. Introduction

The 2020 COVID-19 pandemic acted as an accelerator for the digital transformation of Cyprus. The public sector has started being digitized and at the same time private and international Cyprus based companies invest and install state-of-art infrastructure. They also set and follow safety guidelines to safeguard both their physical and digital assets.

Trying to follow a number of specific European acts and analyzing the various statistics, Cyprus has made a lot of progress in 2020. Although it has not been measured yet it is obvious that the public and private sector as well as education and training towards digital transformation is happening. This change is also happening due to the funding of national and European projects implementing digital skills and technologies to the general public, the civil services, students and educators.

The national desk research in the frame of the “REthinking EDUcation COmpetencies. Expertise, best practices and teaching in Digital Era - RE-EDUCO” Erasmus+ project aims to support the competence profiles, update perspective and impacts for the future digital society.

2. The impact of digital transformation in Cyprus

The need for a digital strategy on a national level has been identified early enough in Cyprus with the preparation of a report in 2012 from the Department of Electronic Communications. It was not until March 2020 that a Deputy Ministry Of Research, Innovation and Digital Policy was established when the COVID-19 pandemic had just started and required immediate and fast actions by all key actors.

2.1 The 2012 Digital Strategy for Cyprus

In February 2012, the Cyprus Department of Electronic Communications (DEC) of the Ministry of Communications and Works prepared the report on the “Digital Strategy for Cyprus”¹ aiming to promote economic growth, increase the competitiveness of the private sector and the modernisation of the public sector, the report set out a plan for the period 2012-2020.

The report identified 6 objectives with subsequent 20 Measures and 103 Actions.

1. Objective 1: Connect Cyprus

- Measure 1 - Promotion of a stable regulatory framework
- Measure 2 - Licensing of wireless networks
- Measure 3 - Promote competition and decrease broadband prices

¹ [Digital Strategy for Cyprus, Executive Summary](#)

- Measure 4 - Establish Fiber to the Home network (FTTH)
- Measure 5 - Network and information security
- 2. Objective 2: Modernize public administration and provide public electronic services
 - Measure 6 - Network and information security
 - Measure 7 - Paperless Government and eGovernment Services
 - Measure 8 - Electronic Local Authorities
 - Measure 9 – eHealth
 - Measure 10 - eID and esignatures
 - Measure 11 - Use of ICT to promote cultural heritage
 - Measure 12 –Use of ICT to promote tourism
 - Measure 13 –Knowledge park (Smart City)
- 3. Objective 3: Inclusion of all (including vulnerable groups) into digital Cyprus
 - Measure 14 –Promote digital literacy
 - Measure 15 –National program for broadband penetration
- 4. Objective 4: Education and Learning
 - Measure 16 –eEducation
- 5. Objective 5: Digital Entrepreneurship
 - Measure 17 –Promotion of Digital Entrepreneurship
- 6. Objective 6: ICT for the environment
 - Measure 18 –National Strategy for the Use of Intelligent Transport Systems (ITS)
 - Measure 19 –Water management system
 - Measure 20 –Teleworking framework

2.2 Establishment of the Deputy Ministry Of Research, Innovation and Digital Policy

In March 2020, the Deputy Ministry Of Research, Innovation And Digital Policy was established aiming for Cyprus to become a dynamic and competitive economy, driven by research, scientific excellence, innovation, technological development and entrepreneurship, and a regional hub in these fundamental areas. It's mission is to support scientific research, investing in innovative entrepreneurship and implementing an ambitious digital transformation reform and aspire to develop a modern and efficient state, competitive at European and international level, and a dynamic digital economy, where every citizen and every business will be able to grow and prosper.

2.3 The 2019 and 2020 Cyprus Statistical Service Reports

The Cyprus Statistical Service of the Ministry of Finance, prepares a yearly “ICT usage and e-Commerce survey in Enterprises”. The 2019 report² was focused on the use of computers, the employment of ICT specialists, the access and use of the Internet, the sharing of information electronically within the enterprise, ICT security and e-commerce. In 2020 report³ the topics analysed were focused on the access and use of the Internet, e-commerce, invoicing, the use of cloud computing services, big data analysis, the employment of ICT specialists and their skills, internet of things, use of 3D Printing and the use of robotics.

Since 2012 both SMEs and Large enterprises use computers in percentages higher than 95% reaching 97.7 for small enterprises, 99.6% for medium companies and 100% for Large enterprises. Regarding the use of the internet since 2016, there has been a steady increase of demand for high speed internet connections. High speed internet connections (100 Mbit/s or more) are becoming more popular and increased from 2,6% in 2016 to 31,8% in 2020. Internet access for small enterprises reached 97,2%, for medium 99,8% and for large enterprises 100%

It is important to note that in 2020, around 67% of all have a website and 73% use social media.

Regarding the use of ICT security 82,9% of all enterprises declared that they use one or more security measures (such as strong password, authentication, up to date software, biometric methods of user identification and authentication, data backup (cloud), network access control, ICT security tests, etc.) to ensure their data and their information systems. It is important though to note that only 31,8% of enterprises have documents on measures, practices or procedures on ICT security.

Cloud computing in Cyprus is becoming more and more popular among enterprises over the years. Since 2015, the usage of Cloud Computing services has risen from 13,0% of enterprises to 34,6% in 2020.

The vast majority of large enterprises (81,5%) employ ICT specialists compared to just 19,8% of small enterprises. 10,7% of enterprises recruited or tried to recruit ICT specialists in 2019. 4,4% of enterprises faced difficulties to fill the vacancies during 2019 (Figure 16). Applicants' lack of relevant ICT related qualifications from education and/or training and applicants' lack of relevant work experience were the two of the main difficulties faced by enterprises during the ICT specialists' recruitment process.

Finally, it is important to mention that enterprises are steadily increasing the use of big data analysis, IoT devices, 3D printing and Robotics. 3D Printing and Robotics are two new technologically advanced areas that can significantly benefit the enterprises in Cyprus. Despite

² [2019 - ICT usage and e-Commerce survey in Enterprises](#)

³ [2020 - ICT usage and e-Commerce survey in Enterprises](#)

their limited use in Cyprus, the signs are promising since enterprises are slowly becoming familiar with these technologies. Compared to two years ago when the use of robotics and 3D printing was measured for the first time, the numbers have more than doubled.

3. National framework for the adoption and the development of ICTs in market labour

In 2020 the Cyprus Government announced the establishment of the Deputy Ministry Of Research, Innovation and Digital Policy (DMRID). The DMRID is focused on three strategic pillars related to Research and Innovation, AI and Blockchain. In addition the Cyprus parliament has identified key experts in various fields and has set up the “Parallel Parliament”.

3.1 Strategies by the Deputy Ministry Of Research, Innovation and Digital Policy

A very important accomplishment for Cyprus was the creation of the Deputy Ministry Of Research, Innovation and Digital Policy (DMRID) in March 2020. Within a short period of time, DMRID has to run in full speed since at the same time (March 2020) the COVID-19 pandemic hit Cyprus and many of the Government’s actions had to be implemented with the support of ICT technologies.

DMRID has set three pillars related to (a) Research and Innovation for the period 2019-2023, (b) the AI strategy and (c) the Blockchain Strategy which will be briefly analysed.

The **Cyprus Research and Innovation strategy**⁴ framework for the period 2019-2023 has set the following strategic categories:

- Strategic Enabler 1. Governance
 - Adopt an integrated, coherent and operational governance system that will facilitate effective and timely implementation of R&I strategy
- Strategic Enabler 2. National R&I Strategy
 - Adopt and implement a national strategy for technological, social and economic development of Cyprus, based on research and innovative entrepreneurship
- Strategic Pillar 3. Research Excellence
 - Develop a sustainable system of academic and research excellence, based on leading international institution standards
- Strategic Pillar 4. Knowledge Transfer & Commercial Exploitation

⁴[https://www.dmid.gov.cy/dmid/research.nsf/All/93BD79089C22336BC225853400356CCB/\\$file/Innovate-Cyprus-CYRI-Strategy-Framework-2019-2023-NBRI-May-2019.pdf?OpenElement](https://www.dmid.gov.cy/dmid/research.nsf/All/93BD79089C22336BC225853400356CCB/$file/Innovate-Cyprus-CYRI-Strategy-Framework-2019-2023-NBRI-May-2019.pdf?OpenElement)

- Enhance knowledge transfer among the science community, the public sector, the business sector and the society. Facilitate commercial exploitation of new knowledge and technology, aiming at developing competitive and added-value products, services and processes and support social innovation
- Strategic Pillar 5. Innovative Entrepreneurship
 - Develop a favourable environment for technological development and innovative entrepreneurship
- Strategic Enabler 6. Cultural Change
 - Nurture a culture of creativity, innovation and entrepreneurship across all levels of education, industry, society and the state
- Strategic Enabler 7. International Dimension
 - Enhance extroversion of the national R&I system and develop targeted strategic collaborations with selected countries and international organizations in fields including science, technology and innovation. Promote Cyprus as a R&I hub, as a means to attract foreign investment in high-tech companies based in Cyprus.
- Strategic Enabler 8. Communication
 - Increase stakeholder awareness at national and international level on the benefits and impact of R&I. Communicate the reform of the R&I governance system, R&I strategy, as well as defined policies, actions, measures and results.
- Strategic Enabler 9. Digital transformation
 - Ensure that necessary strategies, technologies, infrastructures and skills for digital transformation of the economy are interlocked with R&I ecosystem, as facilitating and enabling factors for knowledge sharing and innovation.

The National Strategy on Artificial Intelligence⁵ was released January 2020 which focuses on 4 main pillars.

- Pillar 1. Maximizing investment through partnerships
- Pillar 2. Creation of national data centers
- Pillar 3. Training of talents, skills and lifelong learning
- Pillar 4. Ethical and credible TN development

The National Strategy on Blockchain⁶ was published in May 2019 and identified the following priorities:

- Priority 1. Preparation of the relevant legislative framework

⁵ [National Strategy on Artificial Intelligence](#)

⁶ [National Strategy on Blockchain](#)

- Priority 2. Strengthening the application of the technology by the public and the private sector
- Priority 3. Promotion of Blockchain technology in financial sector

Since the whole effort is quite new on the official website of the Department of Electronic Communications which is now reporting to DMRID only one law is listed

- [The Implementation of Regulation \(EU\) No. 910/2014, on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market, Law of 2018](#) (in Greek)

3.2 Establishment of the “Parallel Parliament”

In May 2019 the Cyprus House of Representatives (Parliament) established the Parallel Parliament which aims at the development of an interactive relationship with society and citizens, through which citizenship, participatory democracy, pluralism and transparency are strengthened.

The Parallel Parliament consists of 7 thematic groups which are:

1. Research, Innovation and Digital Governance
2. Environment, Ecology-Sustainability and Health
3. Culture
4. Civil Society
5. Entrepreneurship
6. Youth representatives
7. Children’s Parliament

In the Research, Innovation and Digital Governance group 37 members are included and they represent both the academic and the industrial sector. It is also important to note that within the Entrepreneurship group, there is a specific committee on technology.

4. Financing programs of specific projects to implement digital technologies at local context

The European Commission and the Republic of Cyprus try to promote and support the digital transformation and culture in Cyprus through various funding opportunities. It is noted that funding is available to both the industrial and the academic sectors for the creation and implementation of digital technologies. Smaller groups also can also apply for funding targeting to train and engage the whole population in digital transformation projects.

4.1 Erasmus + Projects in Cyprus

Numerous EU funded projects have been identified in which Cyprus partners participate. It is very important to note that during the past 3 years, more than 300 projects dealing with the promotion and use of ICT in all sectors and not only STEAM have attracted a lot of the Erasmus+ project funding

4.2 Horizon 2020 Digital Transformation calls

The European Commission through the Horizon 2020 funding scheme opened 7 calls on the following projects, but Cypriot partners do not participate in any of the funded projects.

- Adoption of a “Digital Transformation” approach to improve NGCTR design and simulation (2018)
- Support to further development of international cooperation in digital transformation of health and care (2018)
- Innovation uptake and digitalisation in the tourism sector (2020)
- Support to a Digital Health and Care Innovation initiative in the context of Digital Single Market strategy (2018)
- Citizen-centric public services in local and regional administrations (2019)
- Mentoring scheme for schools: mainstreaming innovation by spreading the advanced ICT-based teaching practices to a wide circle of schools (2019)
- Society and innovations: understanding the contexts, processes and consequences (2019)

4.3 COVID-19 National Calls

During the pandemic the Youth Board of Cyprus opened a specific call “ReCOVer20” aiming to mobilize young people themselves to plan and implement actions in the fields of culture, prevention, information, dealing with psychosocial and other problems that arose through the pandemic. ICT

In addition the Research and Innovation Foundation opened a call during the pandemic aiming to collect innovative ideas in order to support the various public authorities. The calls aimed in:

- Investigation of Industrial Application of Technology / Expertise
- Development of Internationally Competitive Innovative Products and Services by Startups
- Development and Promotion of Internationally Competitive Innovative Products and Services by Existing Companies

All submitted ideas after their evaluation were sent to all public authorities. In case where an idea was in the scope and needs of a service, it could be receive funding for immediate implementation. Such an example is the smartphone application “CovTracer - Exposure Notification” (CovTracer-EN)⁷. CovTracer-EN is the official application of the Cypriot Government which was created to detect contacts based on your phone's Bluetooth technology. The application aims to support the efforts of the Epidemiological Surveillance and Control Unit of the Ministry of Cyprus to limit the spread of COVID-19 in the Cypriot community.

4.4 New instruments in 2021 by the European Commission

In 2021 the European Commission is expected to launch two new instruments for the support and the sustainable development of digital skills. The Recovery and Resilience Facility (RRF) is an unprecedented one-off programme of the Commission to address the economic impact of the COVID-19 pandemic. Twenty percent of its funds must be spent on the digital transition and transformation of Member States, including on digital skills. The Commission also encourages Member States to invest in the ‘Upskilling & reskilling’ Flagship and integrate digital skills and vocational training in their education systems. The Digital Europe Programme will be a new instrument to fund European strategic digital capacities and the deployment of digital technologies. Promoting digital skills is a core element of this new funding. It will provide training opportunities for future experts in key capacity areas like data, artificial intelligence and cybersecurity, as well as focusing on the upskilling and reskilling of the existing workforce through training following the latest technology.

5. National framework to support the incorporation of digital technologies in education

5.1 DESI 2020

The Digital Economy and Society Index⁸ (DESI) monitors Europe’s overall digital performance and tracks the progress of EU countries in digital competitiveness. By providing data on the state of digitisation of each Member State, it helps them identify areas requiring priority investment and action. The European Commission has been monitoring Member States’ digital progress through the Digital Economy and Society Index (DESI) reports since 2014. The latest DESI report was released in December 2020 and uses data and statistics from 2019 and each country receives a ranking within the EU and an individual report is being published as well. Although the scoring of Cyprus has improved its results (scores) on all DESI dimensions and has increased from 39.4 in 2018, to 41.5 in 2019 and 44 in 2020, it still scores below the EU average which is 52.6 for 2020.

⁷ <https://covtracer.dmrtd.gov.cy/>

⁸ <https://ec.europa.eu/digital-single-market/en/digital-economy-and-society-index-desi>

Although Cyprus ranked 24th out of the 28 EU Countries it is obvious that in the past 2 years, a lot of effort and progress has been made in relation to national strategies in various topics a greater effort is needed (Figure 1)

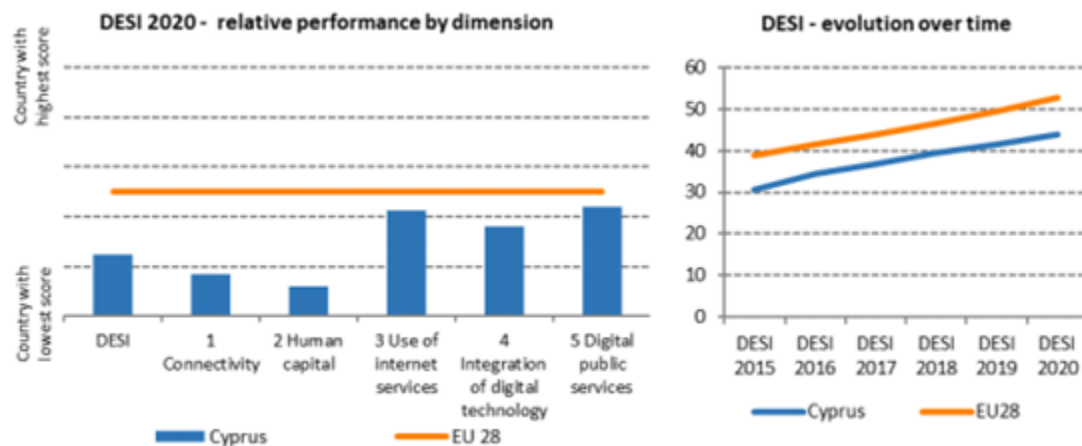


Figure 1. Cyprus relative performance by dimensions and evolution over time compared to the EU average

The major issues and achievements identified in the National Report are:

- Issues
 - Cyprus ranks below the EU average on the take-up of fast broadband
 - Almost an eighth of Cypriots have never used the internet
 - Half of Cypriots lack basic digital skills
 - Despite growing demand in the labour market, the supply of ICT specialists is still below the EU average
- Achievements
 - Cyprus ranks above the EU average on mobile broadband take-up
 - The current “Digital Strategy for Cyprus”, which started in 2012 and was updated in 2015 and in 2018, is in line with the objectives and measures proposed in the “Digital Agenda for Europe”
 - The new digital strategy plans to publish the strategy in the second half of 2020
 - Cyprus has a cybersecurity strategy in place since 2012 and the Digital Security Authority has proposed a new cybersecurity strategy, which is pending final approval from the Ministry of Communication and the Council of Ministers
 - The Council of Ministers adopted the new ‘Cyprus Industrial Strategy Policy ’ for 2019-2030 in May 2019, and it is currently being implemented.

- In January 2020, the government approved a national strategy on artificial intelligence (AI).
- Cyprus is a member of the EuroHPC Joint.
- It has also signed the Declaration of European Blockchain Partnership, and the Declaration on Cooperation on Artificial Intelligence.
- Cyprus is focusing on boosting digital skills in the public sector and is running a new project to identify and evaluate the needs of civil servants regarding digital skills (e-skills).

During the pandemic the following activities have been promoted and implemented:

- In the area of education, various online activities were developed to facilitate the provision of the best possible education to students of all levels. At the same time, supportive educational materials have been uploaded to the “Ministry of Education, Culture Sports and Youth” and individual school webpages, for all students of all grades.
- Digitisation of the public administration is also being accelerated, enabling citizens to use their e-banking credentials to engage with e-government services.
- Tele-working has also been promoted for civil servants through the use of services supporting remote access and teleconferencing.

5.2 Initiatives at a European Level

Following up the European Commission’s programmes and activities, the following projects and initiatives are implemented in Cyprus.

The ‘**Cyprus National Reform Programme**’ focuses on digital entrepreneurship, digital skills, women in digital and the national plan for the **Cypriot National Coalition for Digital Skills and Jobs**⁹. The **Human Resource Development Authority** of Cyprus promotes digital skills building via a number of actions to improve and update the ICT knowledge and skills of company employees. The actions include single and multi-company training programmes. Cyprus provides ICT classes to the public at its **Adult Education Centres**, as part of its strategy to provide lifelong learning opportunities.

The European Commission funds several initiatives, such as the ‘**Youth Board of Cyprus**’ that aims to develop and boost young people’s entrepreneurial skills through education and practical training and through a special network of mentors.

The **Cypriot National Coalition for Digital Skills and Jobs** is running actions on digital skills development, including with industry, employer associations, labour unions and representatives of

⁹ [Cyprus Digital Champion](#)

the education sector. It is expected soon to implement its new action plan that will incorporate action proposed by its stakeholders (private and public institutions, ICT companies, and academia) on education, certification and awareness, aiming to promote digital skills for the whole population.

Cyprus participated in the 2019 **EU Code Week**, which attracted a total of 4.2 million participants to participate in over 72,000 activities in over 80 countries around the world. Cyprus doubled the number of activities (72) compared to 2018, and attracted 6,772 participants. These events saw a balanced share of male and female participants, (49% female), with most held in schools (93%).

The **Department of Labour Relations** is carrying out initiatives to help raise public awareness on the gender pay gap and its detrimental consequences to women's economic and social lives. In the same vein, it would be beneficial for Cyprus to continue promoting digital skills initiatives to improve skills, to match the demand for ICT specialists and fill vacancies in these jobs. It is of great importance to further support the National Coalition in finalising the action plan and implement the actions to improve digital skills in Cyprus.

The **Cyprus Pedagogical Institute (CPI)** is implementing a number of ICT-related actions promoting training for schoolteachers and other executives at various levels. In this context and in cooperation with the Department of Electronic Communications, the Institute introduced a programme for the training of teachers for the use of digital technologies in classrooms.

CPI has a dedicated Educational Technology Department which offers seminars on the incorporation of Digital Technologies in the teaching process and offers education programmes for elementary and secondary school educators. The aim of these training sessions is to enable at least an educator in every school, which will have a role of transferring the knowledge and how to use technological equipment and software to the rest of the educators of the school unit.

An important activity are the projects "Safe Internet" and "Cyber Safety" which educates both students and adults (parents and educators) on the safe use of the internet. It also offer both a helpline and a hotline (over the phone, email, online form or online chat) where students and/or their families can receive support but also report anonymously cases and activities related to cyber bullying, technical support, possibly harmful content, sexual harassment, hate expression, online addiction, etc.

CPI also participates in numerous EU and National funded projects that enable it to develop and participate in innovative projects.

6. National need analysis on digital revolution and its effects on the labour market

In order to revolutionize the labour market, it has been identified all across the world that Education has to adapt and change to meet the market needs. Various education approaches have been applied and tested with all having their benefits and disadvantages. The Cyprus Ministry of Education, Culture, Sports and Youth is changing the curriculum from primary to secondary education, but it also promotes activities from various initiatives targeting both students and teachers.

6.1 School Curriculum

A very important report was published by the Organisation for Economic Cooperation and Development (OECD) in November 2020 under the title “Curriculum overload, a way forward”¹⁰. The report for the first-ever compares data on curriculum at the content level and summarises existing literature, examines trends in curriculum change with challenges and strategies, and suggests lessons learned from unintended consequences countries experienced with their curriculum reforms. The report does not include information from Cyprus but this report should be taken into account. The report focused on the tendency to include new content items in the curriculum as a response to societal demands without proper consideration of what needs to be removed. This is known as curriculum expansion.

6.2 Ministry of Education, Culture, Sports and Youth Annual Report

The Cyprus Ministry of Education, Culture, Sports and Youth (MoECSY), published an annual report covering all 4 categories (Education, Culture, Sports and Youth). The latest published report is for 2019¹¹ mentions that during the school year 2015 – 2016, a new curriculum was introduced in Secondary General Education which differs in the distribution of periods taught per subject in the Gymnasium and Lyceum.

In 2019 the subject of Design and Technology in Primary Education was renamed, by the Council of Ministers, to "Design and Technology - Digital Technologies". Thus, in addition to the development of Technological Literacy, the enhanced subject also aims to provide pupils with opportunities to acquire knowledge, skills, attitudes and values related to the use of digital technologies as well as to develop digital competence and computational thinking. Specifically, the syllabus of "Design and Technology - Digital Technologies" has been enhanced with the addition of

¹⁰ [OECD - Curriculum overload](#)

¹¹ [MOEC - Annual Report](#)

"Computational Thinking", which aims to foster problem solving and algorithmic thinking. In order to implement the new programme, Design and Technology - Digital Technologies and IT advisors offered in-service training courses to teachers.

Regarding secondary education, the syllabi of all IT courses have been updated in the past years in order to meet European standards and current trends. Teaching of these courses at the Gymnasium and the Lyceum aims to engage pupils in meaningful learning using the computer as a problem-solving tool.

In all Gymnasia, IT courses are mandatory for all pupils and are taught for two periods per week in each of the three classes. The main objective of these courses is for pupils to cover material of European standards (ECDL). During the 2018 – 2019 academic year pupils in Class A' took the Word Processing ECDL examination, pupils in Class B' took the Presentations and Spreadsheets ECDL examination and students in Class C' the Databases ECDL examination. In addition, pupils are taught IT essentials and basic concepts of algorithm development and computer programming. In the A' Lyceum class, the IT course is mandatory for all pupils and is taught for two periods per week. Its objective is to introduce pupils to computer science. In B' and C' classes of the Lyceum there are three elective IT courses (Computer Science, Computer Applications and Networking/CISCO) which are taught for four periods per week.

It is important to mention that although the digital transformation of Schools has been discussed in the past, this was tackled at a slow pace. Due to the pandemic though, the transformation became mandatory and immediate actions had to be taken in a short time. These actions though have not been reported yet by the MoECSY.

6.3 The gap between ICT graduates and the industry

In 2015 the Cyprus Productivity Centre in collaboration with Human Asset Training Consulting Solutions, published a report on the evaluation of the ICT professionals gap¹². The report identified that around 7 out of 10 companies claim that the level of academic knowledge from the universities in Cyprus partially responds to their needs and around 8% mentioned that the academic knowledge does not respond at all to their needs.

The most important topics in which graduate students are lagging behind are:

- Training in system and technologies used by the industry
- Experience through internships during their studies and not after graduation
- Communication skills and knowledge of foreign languages
- Project Management skills
- Knowledge on application and web design

¹² [ICT professionals gap](#)

As a result it was proposed to the Academic institutions to support their students by providing internship opportunities, real life industry focused projects/assignments and to provide training in systems and technologies used by the industry. It is interesting to note that additional scientific directions, collaborations between the industry and academic institutions abroad as well as certification (CISCO, ORACLE, Microsoft) were proposed from the industry.

This lack of certification has a financial impact on the companies that go ahead and pay for the training and the certification of their employees.

The report showcases that companies are searching for candidates with soft skills including but not limited to:

- IT problem solving
- Be open to gain new skills and techniques which are considered are key skill within the company
- Good communication skills with their colleagues
- Organizational and self-discipline
- Teamwork in all levels (within and other departments)
- Communication skills with clients

Summarizing a key factor is the continues update of the academic curriculum since new technologies are implemented and used by the industry in a faster pace that in the past and graduates need to be trained in them as well (Social Media Applications, Gaming Applications, Cloud Services, 3D and AR, Robotics, Digital Image Processing and AI)

6.4 Cyprus Skills forecast by CEDEFOP

Based on the 2020 skills forecast for Cyprus¹³ as published by the European Centre for the Development of Vocational Training (CEDEFOP), employment in Cyprus is forecast to increase significantly over the period 2018-30, albeit slightly slower than seen over 2014-18. Employment in Cyprus is expected to grow by 9% in the short term (2018-22) and medium term (2022-26) and by 8% in the long term (2026-30). Growth is expected to be well above the EU-27 average, surpassing it by around 7 percentage points (pp) in all subperiods. As a result, labour market conditions in Cyprus will continue to improve and the unemployment rate will maintain its downward trend.

It is specifically mentioned that computer programming and information services is expected to exhibit strong growth because of the government's effort to promote the use of ICT technologies across the economy through the implementation of the National Digital Strategy. The

¹³ https://www.cedefop.europa.eu/files/skills_forecast_2020_cyprus.pdf

objective of this strategy is to achieve the digital transformation of the public sector (e-Government) and the promotion of the digital transformation of the private sector.

6.5 Other initiatives

6.5.1. Cyprus Computer Society

The Cyprus Computer Society (CCS) is a professional, scientific and independent non-profit organization, founded in 1984 with the aim of developing, upgrading and promoting the IT sector in Cyprus. CCS seeks to set high standards among industry professionals, recognizing the impact that Information and Communication Technologies (ICT) has on employment, business, society and the quality of life of the citizens. Playing a key role in connecting academics with the professional sector, the Association promotes key issues in the industry, especially in the fields of digital literacy, professional skills, professionalism, education, training and research.

CCS has been conducting a Study for the Cyprus Market of Information and Communication Technologies (ICT) since 2017. The research is conducted by IDC through questionnaires and interviews with the largest Cypriot IT companies, Greek organizations operating in Cyprus and international companies with a presence in our country. Each study includes an in-depth analysis of a specific market segment. (<https://ccs.org.cy/en/page/ict-report>)

In addition to the participation of CCS in various EU funded projects (<https://ccs.org.cy/en/page/projects>), an important effort is put towards student education through the introduction and organisation of various competitions:

- The Cyprus Olympiad in Informatics is a competition for students of secondary education, public and private schools, which is organized by the Cyprus Computer Society in collaboration with the Ministry of Education, Culture, Sports and Youth. Its aim is to select the National Team, which participates every year at the International Olympiad in Informatics (IOI), the Balkan Olympiad in Informatics (BOI), the Junior Balkan Olympiad in Informatics (JBOI) and the European Junior Olympiad in Informatics (EJOI). Students that receive gold, silver or bronze medals at the International and Balkan Olympiads in Informatics, can be admitted to departments of the University of Cyprus without exams and only with a high school diploma. Classes are offered free of charge and are conducted in all districts. (<http://www.coinformatics.org/>)
- Bebras is an international student competition, a challenge, on Computational Thinking and is organized in Cyprus by the Cyprus Computer Society in cooperation with the ICT Teachers Association under the auspices of the Ministry of Education, Culture, Sports and Youth. Its goal is to promote Computational Thinking among students in a way that advances student ability beyond science and mathematical skills and enhance the students' analytical, algorithmic and problem-solving skills. Bebras®, the International Challenge on

Informatics and Computational Thinking, has been organized every year since 2004. In Cyprus, it was introduced in 2012 as a challenge amongst gymnasium students and in 2020 for primary school students. It is offered both in the Greek and English languages and students from both the public and private schools can participate. The challenge is made up of 20 questions ranging in difficulty and it consists of two rounds. The first round is open for a whole week for students to attempt from the school or home without supervision and the second round is organized in schools under supervision. (<https://www.bebras.org.cy/>)

- CCS in cooperation with information security specialists in Cyprus, from both academia and the industry, are organising the Cyprus Cyber Security Challenge (CCSC), a competition which aims to select and train the Cyprus National Team which competes at the annual European Cyber Security Challenge (ECSC) which takes place annually. Volunteer mentors setup and run the national challenges, disseminate the activities, train and prepare the cyber talents for the ECSC. The participants can be individuals aged 14-25, both professionals and non-professional, hackers, security researchers but also self-taught in the field of cyber security who will be able to test their abilities against multiple goals in real-time! The competition is organized with the aim of identifying new talents in the field of cyber security, as well as encouraging young people to pursue a cyber security career. The goal of the competition is to identify 10 individuals who participate in the ECSC representing Cyprus. The ECSC is an initiative of the European Agency for Network and Information Security (ENISA). The participants are asked to solve challenges related to web security, mobile security, crypto puzzles, reverse engineering and forensics and will collect points for each challenge they solve. (<https://ccsc.org.cy/>)
- The Pancyprian Competition Robotex Cyprus is organized on an annual basis by the Cyprus Computer Society in collaboration with a plethora of organizations. The aims of the event are to upgrade the field of educational robotics, to introduce robotic technology in the educational process, to upgrade the STEAM scientific fields (Science, Technology, Engineering, Arts, Mathematics) and to promote new forms of learning. The goals of the event are to attract students in STEAM areas, to develop 21st century skills, interdisciplinary analysis and problem solving, to develop a spirit of communication, teamwork and collaboration between pupils / students and teachers / academics and to learn basic code principles for solving problems. The event is open to students of all public and private schools of all levels of education in Cyprus (primary, secondary, technical), students of private and public educational/training centers, students of all universities and colleges in Cyprus, public and private, soldiers and adults with an interest in robotic technology. (<https://www.robotex.org.cy/>)
- The Pancyprian Educational Robotics Competition (WRO Cyprus) is a unique way for students to understand science, coding and automation, to learn to think like engineers, to

develop their problem-solving skills and to expand their creativity. By exploring these skills in a practical and participatory way, children develop the supplies they need today and for the future, whatever career choice they follow. The competition is addressed to students of all school levels and each level has different educational goals, and therefore different competition categories and competition criteria. The competition is organized by the Cyprus Computer Society in collaboration with the educational robotics, science, technology and mathematics organization STEM Education. (<https://wrocyprus.org/>)

CCS is also participating in the various projects and initiatives aiming to train citizens in gaining digital skills. These include but are not limited to:

- **Coding Our Future** started in 2016 as a voluntary initiative of individuals and organizations with the common goal of promoting computer and coding skills for students, teachers and parents. The program includes events, seminars and workshops to promote and develop computer skills and problem solving through programming. The program is offered for free with sponsorships from various agencies and on its logo superheroes are featured, because the coding skills are considered as the superpowers of the future. (<http://codingourfuture.org/>)
- **EU Code Week** is a grass-roots movement that celebrates creativity, problem-solving and collaboration through programming and other tech activities. The idea is to make programming more visible, to show young, adults and elderly how you bring ideas to life with code, to demystify these skills and bring motivated people together to learn. In 2019, 4,2 million people in more than 80 countries around the world took part in EU Code Week. The average participant was 11 years old and 49% of participants in 2019 were women or girls. 92% of EU Code Week events took place in schools, which show that efforts to empower teachers during the 2019 campaign have been successful. EU Code Week is run by volunteers and supported by the European Commission. (<https://codeweek.eu>)
- The **European Robotics Week (ERW)** was conceived at the European Robotics Forum (ERF) 2011 by the desire of the European Robotics community to bring robotics research and development closer to the public and to build the future Robotics Society. Since then and every year, the ERW has offered one week of various robotics related activities across Europe for the general public, highlighting the growing importance of robotics in a wide variety of application areas and the growing importance of skills in science, technology, engineering and math (STEM). STEM subjects are increasingly becoming an important part of basic literacy in today's knowledge society, and we need to continue developing and growing Europe's future scientists and researchers to close a skills gap, which by 2020 will require us to have an additional one million individuals! ERW therefore aims at inspiring technology education in students of all ages to pursue careers in STEM-related fields. (https://www.eu-robotics.net/robotics_week/)

- The **Hour of Code** started as a one-hour introduction to computer science, designed to demystify "code", to show that anybody can learn the basics, and to broaden participation in the field of computer science. It has since become a worldwide effort to celebrate computer science, starting with 1-hour coding activities but expanding to all sorts of community efforts. This grassroots campaign is supported by over 400 partners and 200,000 educators worldwide. (<https://hourofcode.com/>)
- **ALL DIGITAL Week** is an annual digital inclusion and empowerment campaign run at digital competence centres, libraries, community centres, schools and other venues across Europe. Every year it helps 100,000 Europeans to learn and be inspired by what technology can do for them. ALL DIGITAL Week strives to give people tools and approaches to develop and enhance their digital skills. Thousands of events, training and awareness-raising activities will be organised across Europe covering a variety of topics from basic digital literacy, media literacy and digital citizenship to coding, robotics, and STE(A)M skills. Since 2010, the campaign has involved over 1,255,000 people; for most participants, the training during the campaign was their first acquaintance with technology; they made their first clicks and went online for the first time. However, according to Digital Economy and Society Index DESI, 43% of the EU Population have insufficient digital skills and 17% have none at all, and ALL DIGITAL Week helps them to start their digital journeys! (<https://alldigitalweek.eu/>)
- Council of European Professional Informatics Societies (CEPIS) recognised the threat of a limited supply of ICT graduates and the threat that this poses for the ICT sector, the European economy and competitiveness overall. A focused effort started in order to promote the participation and advancement of women in digital careers and encourage and stimulate the interest of women to engage in ICT-related studies. The **CEPIS Women in ICT** Task Force was established to pool the expertise from its Member Societies on the topic of women in ICT, share best practice and develop pan-European activities to increase women's participation in the ICT profession. The group aims to grow the numbers of women working in IT professions in Greater Europe. (<https://cepis.org/women-in-ict>)

6.5.2. Digital Skills Certification

Well known for many years as ECDL (European Computer Driving Licence) and managed by the ECDL Foundation, the leading digital skills certification body was recently renamed to ICDL(International Computer Driving Licence) and is managed by ICDL Europe. ICDL is the international digital skills standard. Across the world, education and training institutions, and public and private sector employers, use ICDL to provide the current and future workforce with the digital skills necessary to perform effectively in the modern workplace. ICDL is made up of several programmes: ICDL Workforce, ICDL Professional, ICDL Insights, ICDL Digital Student and

ICDL Digital Citizen. Within each programme, a range of modules cover skills for work and life. (www.icdleurope.org)

ECDL has been introduced in Cyprus since 2000 and initiatives undertaken under the ECDL flagship was the training and certification of secondary education teachers in which more than 5000 teachers participated. A similar programme was offered to unemployed people during the period of 2013-2014 in which more than 1500 persons participated. ECDL certification is also offered for free to secondary education students within their school curriculum since 2016.

6.5.3. Youth Board of Cyprus

The Youth Board of Cyprus was founded in 1994 as a public legal entity pursuant to the Youth Board Law of 1994 (N.33 (I)/94), which was passed unanimously by the House of Representatives. Since the beginning of its operation on the 2nd of June 1994, when the first Board of Directors was appointed, the organization has offered young people multiple opportunities for active participation in social activities in Cyprus and abroad.

The organization's main role is advisory but it also undertakes youth related projects, following the approval of the Council of Ministers, either during the approval on the organization's annual budget or under another special decision. As an advisory body, the Board of Directors submits proposals on the formation of a comprehensive and specialized youth policy to the Council of Ministers, via the Minister of Education and Culture.

The aim of the YBC policies are:

- progress and welfare of all young people in Cyprus
- providing opportunities to young people and their organizations to actively participate and be responsible for the social, economic and cultural development of their community and country
- young people's creative engagement and entertainment dealing with youth related problems directly and effectively

YBC focuses on various programs and services which are grouped as follows:

- Creative Activeness (The STEAMers, Makerspace)
- Funding Opportunities (European Solidarity Corps, Youth Initiatives Project, Erasmus+, Youth Entrepreneurship, Students in Action, Prevention-Intervention)
- Volunteerism-Participation (European Voluntary Service, Youth Volunteer Team, Municipal/Community Youth Councils, e-participation)
- Information (Eurodesk, Active Youth-Youth Guarantee, KEPLI)
- Counselling Services (1410 Help Line, e-counseling, entrepreneurship development programme)
- Benefits or young people (Youth Festival and Artistic Creation venue, European Youth Card - Student Card)

More specifically, “The STEAMers” program operates along the international S.T.E.A.M Centers standards. The program offers a series of workshops on Robotics, Coding, Film Making, Photography, Graphic Design, Creative Writing, Music, Drama and Art. The workshops aim for young people’s creative development, entertainment and learning, the enhancement of their creativity and communication skills, as well as their personal development and wellbeing. The participants will have the opportunity to meet, experiment and learn new programs, use their imagination, create, gain skills and cultivate their interests. The workshops address children and young people aged 6-35 and are conducted by specialized trainers.

6.5.4. Makerspaces in Cyprus

YBC, Youth Makerspace Larnaka is based on the Makerspace standards developed by university institutions or communities abroad. It provides young people with access to high-quality and state-of-the-art equipment for developing prototypes and implementing their business ideas. “Makerspaces” represent the democratization of design, mechanization, construction and education. It is a space where young people can learn about technology, crafts and other creative manufacturing processes and methods, share their knowledge and skills, and apply this knowledge and skills in practice. The equipment includes 3D printers, laser cutters, drones, virtual reality, robotics, arduino, raspberry pi and many more. At the same time, various workshops are being carried out on the premises on how one can learn how to use the equipment, but also to develop ideas, projects and synergies. Children and young people aged 6 to 35 as well as organized groups of young people, classes or groups of educational institutions and schools and more can use the existing equipment for free.

Currently on the island there have been many initiatives for creating makerspaces from academic institutions or projects..

- Cyprus University of Technology MGA Makerspace is the makers lab of the Department of Multimedia and Graphic Arts (MGA) of CUT. It has been operating since October 2017, mainly to serve the internal research needs of the Department’s faculty as well as class projects and BA theses projects of MGA students. (https://www.cut.ac.cy/faculties/aac/mga/mga_makerspace)
- Centre for Entrepreneurship (C4E) of the University of Cyprus Makerspace is open to the general public. (<https://www.c4e.org.cy/activities/makerspace>)
- The Research and Innovation Centre on Interactive Media, Smart System and Emerging Technologies – CYENS Centre of Excellence aims to proceed with establishing a multifunction creative space open to the public. A fabrication, rapid prototyping, electronics, Mix-R and machining laboratory. This space will critically help CYENS deliver its strategic objectives, namely the promotion of innovation, creativity, and practical hands-on experimentation. (<https://www.cyens.org.cy/en-gb/innovation/makerspace/>)

6.5.5. Advanced Training programmes and initiatives

In Cyprus there are many organizations offering advanced training programmes and other initiatives. Some examples include:

- Training on new technologies and skills (e.g. SPACEAC ADEMY, MMC, EDITC).
- Professional certifications (Microsoft, Oracle, CISCO, Security related etc)
- Universities offer MSc programmes in Cybersecurity, Artificial Intelligence and Educational Robotics and even on Blockchain with international participation
- Educational activities in the field of Robotics both in the public and private schools. Secondary schools which are equipped with various types of robots (Lego, Engino, Edison and Arduino). A large number of private training centers are offering training to students to advance their skills and participate in local and international competitions
- Various hackathons
- Cyprus Entrepreneurship Competition (<https://www.cyec.org.cy/>)
- Cyprus Innovation Award (<http://www.innovationaward.oeb.org.cy/>)
- Junior Achievement Cyprus (<https://jacyprus.org/el/>)
- Chrysalis Leap (<https://chrysalisleap.com/>)

6.5.6. Active formal and informal Professional Associations

Some examples of professional associations that are established and very active in Cyprus are:

- IET - Institution of Engineering and Technology
- ACM - Association for Computing Machinery
- IEEE - Institute of Electrical and Electronics Engineers
- ETEK - Cyprus Scientific and Technical Chamber
- ISACA - Information Systems Audit and Control Association
- PMI - Project Management Institute

In addition to these associations there are many active groups over social media that enable interaction and continuous discussions between its members. Some examples include

- Startup Cyprus (4.8K members)
- Hack Cyprus (2.8K members)
- Cyprus Robotics (1.1K members)
- Cyprus Game Developers (400 members)
- Google Developers Group Cyprus (600 member)

- TechCyprus (1.2K members)

7. Conclusions

It is obvious that although Cyprus ranks lower than the EU average, a great effort is being put by both Public and Private organisations. It is expected that in the coming years the digital skills of students and the workforce will rise but it is crucial for everyone to identify and acknowledge that digital transformation all around the world is happening at a fast pace. As a result, the public authorities mainly need to speed up their policies and implement their strategies in order not to be left further behind.