DIGITAL PREPAREDNESS OF THE EDUCATIONAL SYSTEMS IN FIVE CEE COUNTRIES

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Abstract

This paper is focused on the assessment of digital preparedness of the educational systems in five Central-Eastern European (CEE) countries: Poland, Hungary, Slovakia, Serbia and Romania. The analysis of policies, programmes and school evaluation reports were done as well as analysis and interpretation of various statistical data sets, relevant documents and statements issued by the government, agencies or stakeholder organizations. Based on the results of digital preparedness of schools and governance systems in the CEE countries, conditions and possibilities for digital transformation of educational system in the CEE countries are analyzed and presented in this paper.

If we are comparing CEE countries to the European average based on the share of digitally equipped and connected schools, there are less highly digitally equipped and connected schools at all levels. Before any investments in improving the ability of schools, main conditions must be ensured. Most of the CEE countries are planning to use systematic approach in equipping the schools by using European Social Funds (ESF) and European Investment Bank (EIB) loans. After ensuring the main conditions, the next phase for schools is a reconstruction process with big emphasis on the consolidation of the processes in school enabling them to adapt digital technologies and improve the quality of teaching and learning. This process must be based on the know-how approach and professional expertise. The school must be able to absorb external resources and professional support. To reach this objective, it is necessary to use systematic approach and create governance environment for supporting schools in this process.

Digital transformation of educational system is a systematic and continuous approach based on the framework with a clear roadmap involving a variety of stakeholders with their strong support. From an organisational point of view, digital transformation can be seen as a deep and accelerating transformation with regard to processes, activities, competences and models. It allows organisations to take advantage of the changes and opportunities offered by digital technologies. How to integrate digital technologies in a decisive way is one of the main challenges for educational system. Digital transformation brings a new digital technologies, methodologies and mindsets of the stakeholders. The main prerequisites for the digital transformation of educational systems are strong leadership and strategic planning of digital technologies integration.

Digital transformation must be a systemic approach planned and implemented at the level of educational institution in accordance with support from national level. The process of digital transformation of educational institutions is progressing at different speeds and with different aims and outcomes and it is a need for using framework for digital maturity to foster the integration and effective use of digital technologies by educational organizations.

In this paper the various reference frameworks for digital learning outcomes and for the digital preparedness of schools and teachers as well as contextual relevance of international frameworks in the CEE countries will be analyzed and systematic - strategic approach will be suggested.

Keywords: digital preparedness, digital transformation, educational system, CEE countries, framework

1 INTRODUCTION

This research is a part of the comparative study [1] focused on assessing the actual digital preparedness of the educational systems and the institutional conditions of further development in five Central-Eastern European (CEE) countries: Poland, Hungary, Slovakia, Serbia and Romania.

In comparative study, the analysis of policies, programmes and school evaluation reports were done as well as analysis and interpretation of various statistical data sets and available data on student achievement. Relevant papers, reports, documents and statements issued by the government,

government agencies, EU agencies or stakeholder organizations were analysed and results were presented in the comparative study [1].

In this paper, some of the results obtained in a comparative study [1] are presented. The objectives of research presented in this paper are as follows:

1. to analyze and interpret the digital inequalities in CEE countries
2. to analyze and compare the preparedness of CEE countries for ICT-based teaching prior to the crisis
3. to define transformation determinants in educational institutions
4. to present methodology for strategic planning of digital technologies integration in education
5. to analyze frameworks focused on digital maturity of educational institutions and digital competences and the contextual relevance of frameworks in CEE countries.

This paper consists of eight sections. After introduction, in second section the results of researches related with digital inequalities in CEE countries are presented and analyzed. The digital preparedness of school systems in CEE countries as a main topic of this study is interpreted in section 3. In section 4 the role of digital transformation in education is emphasized and overview of proposed methodology for strategic planning of digital technologies integration is done. The various frameworks with focus on two main frameworks for digital maturity and digital competences are presented in section 5 and 6. The frameworks consists of areas and elements that contribute to the digital maturity of educational organizations as well as for planning the integration and use of digital technologies. In section 7 the contextual relevance of international frameworks in CEE countries is analyzed. In Conclusion section, based on the presentation and analysis of the results of preparedness in CEE countries, some conclusion remarks are highlighted. By using a developed methodology for strategic planning as well as framework for digital maturity and instrument for assessing digital maturity of educational institution (EI), educational system can become better prepared for facing new challenges of digital technologies, new concepts of learning and teaching and digital transformation in general.

2 THE DIGITAL INEQUALITIES IN THE CEE COUNTRIES

The Organization for Economic Co-operation and Development (OECD) defines the term “digital divide” as “the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to both their opportunities to access information and communication technologies and to their use of the Internet for a wide variety of activities”. Because of the importance and interest, OECD (2001) has started to measure the digital divide through indicators such as communications infrastructures, computer availability, and potentially the availability of alternative access through TVs or mobile phones, and Internet access which are “readiness” indicators. The digital divide is evolving to digital inequality, such as the quality and the cost of the connection to the Internet, the skills and the knowledge to find the required information, etc. [2]. Disparity regarding digital technologies has moved to the higher level. Now the question is not only if somebody has Internet access but how he/she is able to benefit from the access to the Internet.

OECD (2019) report documents [3] across 11 key dimensions - Income and wealth, Jobs and earnings, Housing, Health status, Education and skills, Work-life balance, Civic engagement and governance, Social connections, Environmental quality, Personal security, and Subjective well-being. In the Report, a summary of existing studies highlights 39 key impacts of the digital transformation on people’s well-being, having possible positive impact as digital technologies expand the boundaries of information availability and enhance human productivity, but also bringing risks for people’s well-being, ranging from cyber-bullying to the emergence of disinformation or cyber-hacking. It is emphasized in the report (OECD, 2019) that “making digitalization work for people’s well-being would require building equal digital opportunities, widespread digital literacy and strong digital security”.

According to OECD (2019) report the results of Central-Eastern European (CEE) countries: Poland, Hungary, Slovakia, Serbia and Romania were analyzed. Compared to other OECD countries, Hungary is highly exposed to the risks of the digital transformation, while only experiencing limited benefits from its opportunities and has a very high level of inequality of Internet uses. No matter of limited use of Internet, Hungary is in the top three of OECD countries in the share of people reporting digital security incidents and a country with the highest share of people reporting lack of skills as a reason not to use e-government services. The positive is that national data show that 29% of Hungarian people have submitted completed forms to public authorities’ websites, which correspond with the EU average. The Internet is not widely used for key economic activities, although the share of information industries in employment is well above the OECD average. In Hungary is the share of extreme Internet users

among children above the OECD average and Hungary is ranked as second in terms of children reporting cyberbullying [1].

Poland has mixed performance in reaping the benefits of the digital transformation, but is also somewhat less exposed to the risks, compared to other OECD countries. The rate of access to the Internet in Poland has increased since 2005 when the share was only 30.4%. Nowadays in Poland almost 78% of households are connected to broadband Internet. This percentage is slightly above the OECD average. However, the share of people using the Internet remains low, the variety of uses of the Internet is limited, and there is substantial inequality of uses of the Internet. Despite the fact that teachers do not consider themselves to lack ICT skills, people in Poland have relatively low levels of digital skills. Due to the relatively low share of workers with computer-based jobs, the negative impacts of associated job stress and worries about work when not working are more contained than in other countries. Exposure to disinformation online or extreme internet use of children in Poland are below the OECD mean (23.4%) [1].

Compared to other OECD countries, Slovakia's exposure to the opportunities and risks of the digital transformation is mixed. At 64.4%, Slovakia's share of jobs at risk of automation is the highest across all OECD countries. At the same time, Slovakia benefits more from a decrease in extended job strain associated with computer-based jobs than any other OECD country, potentially because of reduced physical demands. People in Slovakia are less engaged online in the political and social spheres, with only 7% of people expressing political opinions online. Important risks in the areas of digital security and governance and civic engagement are relatively contained. In Slovakia, 81.3% of households are connected to broadband Internet in 2019. This is enormous gains comparing with percentage of household connected to Internet in 2005 (only 23 %). Inequality of use of the Internet is at average levels of OECD countries([1],[3]).

According to the data provided by the CEU's Center for Media, Data and Society (CMDS) in report "Media influence matrix: Romania" the number of households with internet connection in 2018 stood at 80%, but broadband coverage (fixed and mobile combined) is slightly lower (74% in 2017, according to the latest data available) [4]. Fixed broadband penetration is slightly lower, with 60% of households in Romania having a subscription. Also, the results reveal a digital divide between urban and rural residents in terms of access and Internet penetration.

According to the survey on the Usage of Information and Communications Technologies in the Republic of Serbia in 2019 (Usage of ICT in the Republic of Serbia in 2019), 73.1% of households in Serbia have a computer, which is an increase of 1% and 5% in relation to 2018 and 2017. Differences are observed when the availability of computers in urban and other areas of Serbia are observed. In the Republic of Serbia 80.1 % of houses holds have an Internet connection, which is an increase of 7.2% and 12.1%, when compared to 2018 and 2017. In 2019, 71.9 % of individuals used a computer in the last three months,1.4% more than three months ago and 5.0% more than one year ago. There are even 21.7% of individuals who have never used a computer.

3 THE DIGITAL PREPAREDNESS OF SCHOOL SYSTEMS IN CEE COUNTRIES

To provide more data and evidence regarding digitization in education and digital technologies in learning, the European Commission has published the final report of the 2nd Survey of Schools: ICT in Education [5]. The main objective of the research was to benchmark progress in ICT in schools providing a detailed and up-to-date information related to access, use and attitudes towards the use of technology in education. The survey was carried out in 31 countries (EU28, Norway, Iceland and Turkey), by conducting interviews with head teachers, teachers, students and parents (ISCED level 1: primary schools: ISCED level 2: lower secondary schools; ISCED level 3: upper secondary schools). A range of different topics was covered, including: Access to and use of digital technologies, Digital activities and digital confidence of teachers and students, ICT related teacher professional development, Digital home environment of students, and Schools' policies, strategies and opinions.

The target population of the 2nd Survey of Schools encompass 400 schools (ISCED levels 1, 2 and 3) per country. Methodology was based on the interviews with head teachers, class teachers, students and parents and the online questionnaire – parent and head teacher survey. The key findings related to the main objective of research are presented in Table 1.

Table 1. Key findings of the 2nd Survey of Schools: ICT in Education [5].

Connectivity	Being connected to the Internet is a prerequisite for schools to access up-to-date resources or access online learning platforms and they are increasingly requesting bandwidth-demanding applications such as video streaming or video conferencing; The results of the study show that less than 1 out of 5 of European students attend schools which have access to high-speed Internet above 100 mbps, and there are large differences between and within European countries;
Coding and related gender gap	Digital skills including coding skills are essential so that everyone can take part in society and contribute to economic and social progress in the digital era" and "coding helps practice 21st century skills such as problem solving or analytical thinking. The results show that students rarely regularly engage in coding/programming activities at European level - 79% of lower secondary school students and 76% of upper secondary school students never or almost never engage in coding or programming at school; the results are less favorable for female students – on average, more than 4 out of 5 female European students attending secondary schools never or almost never engage in coding school.
Teachers' training	Teachers' training / continuous professional development (CPD) is key for teachers to integrate digital technologies into their teaching practices. The results show that more than 6 out of 10 European students are taught by teachers that engage in professional development activities about ICT in their own time; in contrast, participation in a compulsory ICT training is less common – to conclude, as teacher training in ICT is rarely compulsory, most teachers end up devoting their spare time to develop these skills.
Parents	New era of pervasive technology, a positive attitude of parents towards digital technologies is key for the successful implementation of ICT at school; survey reveal that the majority of European parents, opposite of their children (usually) not born in a completely digitized world, believe that digital technologies can help their children to study more efficiently; additionally, over 90% of the European parents believe that the use of ICT at school will potentially help their child find a job in the labour market.

If we are comparing CEE countries to the European average based on the share of digitally equipped and connected schools, in Hungary there are less highly digitally equipped and connected schools at all ISCED levels. In Slovakia is similar situation while the share is slightly above the European average at ISCED level 2 (lower secondary schools). In Romania, there are substantially less highly digitally equipped and connected schools at all ISCED levels. In Poland is slightly more highly digitally equipped and connected schools at ISCED 1 (primary schools), but compared to the European average there are less highly digitally equipped and connected schools at ISCED level 2 (lower secondary schools) and level 3 (upper secondary schools).

If we are comparing countries based on the high-speed connectivity above 100 mbps, in Romania is slightly higher share at all ISCED levels, compared to the European average. In Slovakia is lower share at ISCED levels 1 and 2, compared to the European average but higher share at ISCED level 3. In Hungary is high-speed connectivity above 100 mbps higher share at ISCED levels 1 (primary schools) and 2 (lower secondary schools) but lower share at level 3 (upper secondary schools) compared to the European average. In Poland is high-speed connectivity lower at lower secondary schools level but higher at primary school level and upper secondary school level.

The share of students who use a computer at school on a weekly basis in Hungary is higher at level 2 (lower secondary schools) but lower share at ISCED level 3 (upper secondary schools) compared to the European average. In Romania is lower share at ISCED level 2 and 3 compared to the European average. Results in Slovakia are similar to the European average.

If we are comparing type of training of teachers on the pedagogical use of ICT in teaching and learning, subject-specific training on learning applications, equipment-specific training, the best situation is in Slovakia. It is a higher share for courses on pedagogical use of ICT in teaching and learning at ISCED level 1, lower share in Slovakia for subject specific training on learning applications

at all ISCED levels compared to the European average and higher share for equipment specific training at all ISCED levels. Teachers' confidence in their digital competence is lower or similar confidence of teachers in Hungary at ISCED levels 1 and 2 in all digital competence areas – except in problem solving. It is slightly lower confidence of teachers in Romania at ISCED level 1 in all digital competence areas – except in communication and collaboration as well as problem solving. In Slovakia is slightly higher confidence of teachers at all ISCED levels in all digital competence areas compared to the European average except in information and data literacy (ISCED 1 and 3). If we are comparing students' confidence, there is a higher confidence of students in Romania at ISCED levels 2 and 3 in all digital competence areas compared to the European average – except in communication and collaboration. In Hungary is slightly higher confidence of students at ISCED levels 2 and 3 in all digital competence areas – except in digital content creation, but in Slovakia is slightly lower confidence of students at all ISCED levels in all digital competence areas compared to the European average except in safety (ISCED 2 and 3) and problem solving (ISCED 3).

Preparedness of CEE countries for ICT-based teaching can be analyzed based on three indicators: teachers' preparedness for ICT-based teaching prior to the crisis, school and student preparedness for ICT-based learning prior to the crisis.

During the COVID-19 pandemic schools were forced to replace the time in class with online learning and emergency remote teaching in most cases facilitated by teachers and parents. Based on the OECD country note in Poland [6] "excluding the non-compulsory part of the curriculum, each week of school closures represents about 24 hours of face-to-face compulsory instruction time at school (lower secondary school – general orientation), that is to say 2.8% of annual compulsory instruction time".

In Poland, 96% of students reported having a computer they could use for school work, which is higher than the OECD average (89%). For those from the bottom quartile of the socio-economic distribution, 93% of students reported having a computer they could use for school work, which is higher than the OECD average (78%) [6]. In the OECD Country note Poland, results from the 2018 Teaching and Learning International Survey (TALIS) prior to the crisis show that on average across participating OECD countries and economies, only slightly more than half of lower-secondary teachers (53%) reported that students use ICT for class "frequently" or "always". In Hungary, this was the case for 48% of teachers, which is lower than the average of the OECD countries participating in TALIS.

In Hungary, 51% of teachers reported that use of ICT for teaching was included in their formal education or training, which is lower than the average of the OECD countries taking part in TALIS (56%). In Hungary, 79% of teachers felt that they could support student learning through the use of digital technology, which is higher than the average of the OECD countries participating in TALIS (67%) [7]. In Hungary, 91% of students reported having a computer they could use for school work, which is higher than the OECD average (89%). For those from the bottom quartile of the socio-economic distribution, 79% of students reported having a computer they could use for school work, which is statistically not significantly different from the OECD average (78%) [7].

Results from the TALIS 2018 show that in the Slovak Republic, 62% of teachers reported that use of ICT for teaching was included in their formal education or training, which is higher than the average of the OECD countries taking part in TALIS (56%). At the time of the survey, 70% of teachers in the Slovak Republic felt that they could support student learning through the use of digital technology, which is higher than the average of the OECD countries participating in TALIS (67%).

In the Slovak Republic, 92% of students reported having a computer they could use for school work, which is higher than the OECD average (89%). For those from the bottom quartile of the socio-economic distribution, 78% of students reported having a computer they could use for school work, which is the same as the OECD average (78%) [8].

4 POSSIBILITIES FOR DIGITAL TRANSFORMATION OF EDUCATIONAL INSTITUTIONS

Digital transformation of educational institutions is a journey that needs a staged approach with a clear roadmap, data and facts, involving a variety of stakeholders beyond internal and external limitations [9]. From an organizational point of view, digital transformation can be seen as a deep and accelerating transformation with regard to processes, activities, competences and models. It allows organizations to take advantage of the changes and opportunities offered by digital technologies [10]. Main five digital transformation trends in education for 2020 are: 1.) customized learning experiences, 2.) accessibility, 3.) Internet of things, 4.) security and 5.) schools are strapped [11].

Due to the digital transformation, educational systems have had to transform teaching, learning and assessment practices for teachers and students. In the new digital era, where educational system operates in a competitive environment, an innovative use of digital technologies is becoming a main tool of survival and a policy priority across Europe. From a digital education policies point of view, the most important for integration of digital technologies into educational systems is the commitment to supporting teachers and strengthening their digital capacity [12]. Digital technologies in educational institutions promise to empower transformation of business, learning and teaching processes, to enhance competencies and skills of students and teachers in digital literacy and to boost readiness for facing challenges in the labour market and to form potentials for educational opportunities and improvements in the future. It enables educational institutions to implement transformation by using innovative methods of teaching and learning as group learning, project-based learning, hybrid learning, Massive Open Online Course (MOOC), the global delivery of materials, student interactions, transforming learning communities with digital pedagogy [13].

How to integrate digital technologies in a decisive way is one of the main challenges in public but also in private sector. To the educational system, digital transformation brings new digital technologies, methodologies and new mindsets. Strong leadership and strategic planning, as well as the systematic integration of digital technologies, are prerequisites for the digital transformation of educational systems. Guidance can be introduced through adoption of new methods and techniques for the strategic planning of digital technologies integration.

Changes that are under the influence of technological development pose new challenges to the educational system that generates future participants and holders of the social environment. Educational institutions should address these challenges through coordinated strategic planning and operationalization of plans, in following priorities [9]:

- using modern teaching and learning methods
- updating of teaching and related contents
- application of digital technologies in teaching and non-teaching processes
- encouraging creativity and innovation
- strengthening enactment competencies and skills.

Digital transformation determinants of educational institutions [14] are given in Table 1. Introducing digital technologies and business-related operating models into educational institutions processes increases educational institutions digital maturity level.

Table 2. Transformation determinants in educational institutions (EI's)([1], [14]).

Strategy orientation. EI's strategy orientation comprises two perspectives: bottom up (school to government) and top down (government to school) visible in a clear vision translated into EI's strategic goals. Management is crucial for turning goals into feasible actions. Leadership capabilities define the level of delivering efforts that need to be made in order to accomplish aimed goals.
Student centricity. Identifying expectations and deliverables in form of student's readiness to take part in the labour market or through self-accomplishment requires new methods and techniques in the EI's teaching processes.
Supporting IT infrastructure. Although digital transformation is not primarily about technology, potentials of new digital technologies need to be considered and implemented in the EI's infrastructure: the operating business model, its supporting IT infrastructure, its devices and communications infrastructure, its learning content management and other infrastructural subsets.
Twofold aspect: student-related and teacher-related talent, capability and capacity strengthening. Continuous effort in acquiring new skills, knowledge and capabilities is important at several levels: at the national level, at the local community level, at the EI's level, at the employee individual level and at the student level. The activities need to be well-coordinated, strategically aligned, student-focused, talent-oriented and future-capacity strengthening.
Innovation culture related to teaching, learning and organizational commitment to continuous transformation. EI's short and long-term commitment to encouraging creativity and innovation is essential for ensuring that working environment is supporting innovation and change.

Strategic planning of digital technology implementation is a creative, long-term and comprehensive process. It is a form of educational institution improvement planning that involves models of educational institution management, the legacy of educational institution effectiveness and the role of educational institution principals. With strategic planning, educational institution can increase their digital maturity and create a more appealing perception of the educational institution in the local, national and international community. By using a strategic approach, the educational institution can become better prepared to face the new challenges and new approaches to learning and teaching.

Table 3. Strategic approach for raising digital maturity of educational institutions (EI's) [1].

Methodology step	**Methods and techniques**	**Deliverables**
Assess EI's digital maturity	EI-ICT Digital maturity model [15]	Rubric based digital maturity assessment report
Run situational analysis	Concrete, realistic, energetic, dynamic and ambitious - CREDA analysis Strengths, Weakness, Opportunities and Threats – SWOT analysis Political, Economic, Social, and Technological factors - PEST analysis	Identification and analysis of contextual factors, by generating initiatives relevant to EI's mission and vision: • Stakeholder analysis • Identified contextual factors within EI (SWOT) • Political, Economic, Social, and Technological forces influencing EI's environment
Define EI's ICT mission	Custom developed guidelines Workshops	Defined EI's transformation mission statement
Formalize organizational values	Brainstorming Custom techniques	EI's agreement on organizational values which will frame the EI's behaviour during the transformation process and beyond.
Define EI's transformation vision	Custom developed guidelines Workshops	EI's transformation vision statement
Define transformation related strategic initiatives	Business Model Canvas [16] Customer experience Mapping techniques	Framing the EI's operational ("business") model Evaluate how the operational model contributes to Student Experience improvements.
Define strategic goals for strategic initiatives	Specific, Measurable, Achievable, Relevant and Time-related – SMART criteria	SMART strategic goals are defined for proposed transformation initiatives with responsible and contributing actors. Goals must correspond to vision and mission statements, developed in previous steps.
Operationalization of strategic goals	Goal Cascading techniques	Deliverables from this step should include: • Detailed Activity plan • Detailed Resources plan • Detailed Time frame • Key performance indicators
Monitor ICT strategy realization	Balanced scorecard	Following the Balanced Scorecard paradigm, a key deliverable from this methodology step includes a monitoring model comprising measures (key performance indicators) and values for tracking how strategy is operationalized.
Reassess EI's digital maturity	EI-ICT Digital maturity model [15]	Rubric based digital maturity reassessment report

5 FRAMEWORK(S) FOCUSED ON DIGITAL MATURITY OF EDUCATIONAL INSTITUTIONS

Digitally mature educational institution is organization with a high level of integration of digital technologies and systematized approach to digital technologies use in their teaching, learning and organizational practices. In digitally mature institutions, the appropriate use of digital technologies contributes to an efficient management of the institution, the development of digitally competent teachers prepared for the innovations in their own practices and the development of digitally competent students, who are prepared for lifelong learning and competitive on the labour market [17].

In the process of raising the level of digital maturity of EIs is a need for using framework for digital maturity to foster the integration and effective use of digital technologies by educational organizations. The framework for digital maturity consists of areas and elements that contribute to the digital maturity of educational organizations as well as for planning the integration and use of digital technologies [15]. It is needed to enable the identification of areas and elements that contribute to the digital maturity of educational institutions as well as for planning the integration and use of digital technologies. It is important to stress that different maturity levels in frameworks have been established for educational institutions for strategic planning. The policy creators in the educational system can exploit the existing frameworks for digital maturity of educational institutions for the development of policies and initiatives aiming at successful integration of digital technologies into the educational system [15].

The results of performed literature review of selected frameworks [15] have shown that there are several frameworks across Europe designed regarding the digital maturity of EIs but there is no generic framework and instrument. However, the Framework for Digitally-Competent Educational Organisations - DigCompOrg best describe the comprehensive field of digital maturity of schools [18]. The framework DigCompOrg [18] offers a comprehensive conceptualization taking into account all aspects of digitalization for learning in educational organizations [19]. It helps educational organizations in self-assessment in their process of digitalization and it enables policymakers to develop policies for digital learning. DigCompOrg is developed to reflect three dimensions in the process of digitalization of education, namely the pedagogical, technological and organizational dimensions and it defines seven key elements in these dimensions: infrastructure, collaboration and networking, content and curricula, teaching and learning practices, assessment practices, professional development, leadership and governance practices.

The mostly used instrument for assessing the digital maturity of EI is a SELFIE tool [20] developed by the European Commission and education experts from across Europe. SELFIE represents the practical implementation of DigCompOrg, providing initial evidence on how the Framework can be used. There are seven key areas for digital maturity of schools: 1. Teaching and Learning Practices; 2. Assessment Practices; 3. Content and Curricula; 4. Networking and Collaboration; 5. Professional Development; 6. Leadership and Governance Practices and 7. Infrastructure [20]. In the process of self-assessment and external assessment of the digital maturity level, each school receives the feedback based on their characteristics and regarding the assessed maturity level.

Based on examining frameworks for digital maturity of educational institutions, common goals of digital transformation initiatives can be identified: Contemporaneity of educational processes, Collaboration between participant and stakeholders, Centricity on students, Content excellence, Creativity and innovation culture, Commitment for continuous change, Cooperation with stakeholders and Concern on equal opportunities and others.

To conclude, the framework and tool for digital maturity of educational institutions can be used to assess the school's digital maturity level but also for the identification of the areas for improvement that could enable the growth on the scale of digital maturity and improve the overall reputation of educational institution. Through the implementation of framework and tool for assessment, the educational institutions developed their own digital strategies to enhance teaching, learning and business processes and to perform digital transformation by using digital technologies.

6 FRAMEWORK(S) FOCUSED ON DEVELOPING DIGITAL COMPETENCES

In the context of digital transformation there are two main challenges for educational organisations: 1) what relevant digital competences in terms of knowledge, skills and attitudes do students and teachers need in order to cope with digital transformation? 2) how to organise, design and support learning and teaching contributing to digital competences and digital transformation? ([13], [21])

To cope with these challenges, a large number of frameworks have been put forward, most of them focused on developing the digital competences of teachers and students and on skills development and the ability to use a specific set of tools and applications [13]. The Digital Competence Framework for Educators (DigCompEdu), provides a more specific reference, merging digital skills with skills that are key for educators, to foster educators' digital competence, as a prerequisite for digital learning [22]. The DigCompEdu [22] helps educators at all levels of education to assess their competence, identify their training needs and offer targeted training. It is a scientifically sound framework which helps to guide policy and can be directly adapted to implement regional and national tools and training programmes. It proposes 22 elementary competences organized in six areas: 1) professional engagement (using digital technologies for communication, collaboration and professional development), 2) digital resources (sourcing, creating and sharing digital resources), 3) teaching and learning (managing and orchestrating the use of digital technologies in teaching and learning), 4) assessment (using digital technologies and strategies to enhance assessment), 5) empowering learners (using digital technologies to enhance inclusion, personalization and learners' active engagement), and 6) facilitating learners' digital competence (enabling learners to creatively and responsibly use digital technologies for information, communication, content creation, wellbeing and problem-solving) [22].

In the European Framework for Digitally-Competent Educational Organizations: DigComOrg [23], the Leadership and Governance Practices element refers to the role of leadership in the organization - wide integration and effective use of digital technologies with respect to teaching and learning goals and activities. The element consists of three sub-elements: 1) integration of digital-age learning as a part of the overall mission, vision and strategy, 2) strategy for digital-age learning supported by an implementation plan, and 3) management and governance model. A digitally-competent educational organization refers to the effective use of digital technology by the educational organization and its staff in order to provide a compelling student experience and to realize a good return on investment in digital technology ([13], [23]). DigCompOrg encompasses also the element of Infrastructure. Both elements may be seen as organisational responsibilities, while other elements such as Teaching and Learning Practices refer more to individual responsibilities [23]. It has been emphasized that a "digitally-competent educational organization needs a combination of strong leadership and governance and at the same time needs staff and stakeholders who are individually capable of taking responsibility for self-initiated actions and bottom-up efforts and initiatives [23]". Main presented European frameworks aim to provide a common language and common ground for discussions and developments at national, regional and local levels. Moreover, they offer a consistent set of self-reflection tools at European level addressing citizens and learners, educators as well as schools.

7 THE CONTEXTUAL RELEVANCE OF INTERNATIONAL FRAMEWORKS IN CEE COUNTRIES

Based on the Eurydice Brief report (2019) [24] half of the European education systems are currently engaged in curriculum reform related to digital competence. The revision is focused on introducing digital competence into the curriculum or making the subject area more relevant. Most of reforms are about changing the curriculum approach, updating content or strengthening areas such as coding, computational thinking or safety. The majority of education systems have included learning outcomes related to all five digital competence areas defined in the DigComp framework: information and data literacy, digital content creation, communication and collaboration, safety, and problem solving [24].

Most of the learning outcomes related to digital competences are associated with lower secondary education. For primary education, the number of countries with related learning outcomes is the lowest, but still around 30 education systems (including Romania and Hungary) cover the first four areas and 24 education systems (Bulgaria, Czechia, Germany, Estonia, Greece, Spain, France, Italy, Cyprus, Malta, Poland, Portugal, Slovakia, Finland, Sweden, United Kingdom, Switzerland, Iceland, Montenegro, North Macedonia and Serbia) also cover problem-solving ([1],[24]). Some of the countries have developed their own digital competence frameworks for teachers. Croatia as well as Estonia, Serbia, Spain, Lithuania, Austria, Norway provided a complete mapping of the essential competences, including those related to the pedagogical use of technologies. These developed frameworks can help teachers to assess their digital competencies and plan how to raise it.

If we compare the number of recommended hours for information and communication technologies as a compulsory separate subject in primary education, Lithuania and Cyprus allocate the highest number of hours during lower secondary education, but Romania has the highest number of hours related to digital competence as a compulsory separate subject in upper secondary education [24].

Serbia was one of the countries that promoted the use of self-assessment tools as SELFIE. Other education systems that promoted tools for evaluation of digital competence are Bulgaria, Czechia, Estonia, Spain, France, Cyprus, Austria, Portugal, Slovenia, Finland, United Kingdom, Switzerland. There is a lot of educational systems where digital competences are never assessed at school through national testing. Only Austria and Norway have tests in digital competences at all school education levels. Serbia tests digital competences only at lower secondary level. In less than ten education systems including Poland and Romania, digital competences are tested only at general upper secondary level [24]. In following education systems (Greece, France, Croatia, Cyprus, Lithuania, Hungary, Poland, Slovenia, United Kingdom and Norway), digital competence tests that carried out for assessment purposes only involve students on a particular educational pathway (e.g. STEM), or those who decide to take the specific test. Only in Bulgaria, Denmark, Malta and Romania are all upper secondary education students required to take a national test to assess their digital competences [24].

8 CONCLUSION

Based on the results analyzed in the comparative study "Comparative overview of the digital preparedness of education systems" [1] in selected CEE countries and results presented in this work, we can conclude that the stage of building the fundamental institutional conditions of school level change cannot be skipped. If we are comparing CEE countries to the European average based on the share of digitally equipped and connected schools, there are less highly digitally equipped and connected schools at all levels (primary schools, lower secondary schools and upper secondary schools). Before any investments in improving the ability of schools, main conditions must be ensured.

Most of the CEE countries are planning to use systematic approach in equipping the schools by using ESF funds and EIB loans. After ensuring the main conditions, the next phase for schools is a reconstruction process with big emphasis on the consolidation of the processes in school enabling them to adapt digital technologies and improve the quality of teaching and learning. This process must be based on the know-how approach and professional expertise. The school must be able to absorb external resources and professional support. To reach this objective, it is necessary to use systematic approach to create environment for supporting schools in this process. To support systematic approach we developed and presented methodology for strategic planning of digital technologies integration in education with aim of digital transformation and raising digital maturity of EIs.

By using a proposed methodology as well as framework for digital maturity and instrument for assessing digital maturity, educational system can become better prepared to face new challenges of digital technologies, new concepts of learning and teaching and digital transformation in general.

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