Digital competences for teaching and learning

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ABSTRACT

This paper reflects on the data gathered from research in June 2020 on the experiences of teachers and school management during the online teaching imposed due to the COVID 19 pandemic. The research compiled data from 576 teachers, 61 principals and school support teams from 30 primary schools in urban and rural locations in the country and with 5 different languages of instruction (Macedonian, Albanian, Turkish, Serbian and Bosnian). Information gathered from the respondents of the questionnaires indicated that as many as 10.2 per cent of teachers rated online teaching with the grade "unsatisfactory", 15.8 per cent rated it as "satisfactory", and 41.7 per cent as "good". Furthermore, this research points out that the ways in which online teaching was performed varied widely among schools and among teachers, with the most common being assigning homework, applying existing platforms and sending presentations. ICT training organized by schools and the education authorities, and the equipment provided by the schools, had the least contribution in the success of teaching.

On-line teaching in a time of crise revealed shortcomings in terms of teachers' competences in implementing engaging activities for students and performing different types of distance teaching methods. Although digitalization was somewhere on the agenda globally, very quickly it became a priority all over the world, including in our own country, and specifically in education.The research findings in this paper are considered in the context of The European Framework for the Digital Competence of Educators (DigCompEdu) that aims to provide a general reference framework for the developers of digital competence models and is directed towards educators at all levels of education, including general and vocational training, special needs education, and non-formal learning contexts. Even though this framework was developed and adopted in 2017, during the pandemic it showed advantages to be addressed by many educators and policy makers. The adaptation of this framework would provide a more detailed and practically oriented approach that will enable setting the quality and effective policy and evaluation of the digital competencies of teachers in our country and will improve the teaching according to the new technological advances in society. In addition, part of this framework describing learning competenes for students can assist in reviewing the standards that have already been developed for learning at the end of primary education in the country.

KEYWORDS: *teachers, online teaching, learning, COVID 19, digital competences*

INTRODUCTION

Digital competences became one of the expected skills in our everyday life in the most recent years. The acceleration of the need to be digitaly competent became more important in the time of crisis caused by the COVID 19 pandemic in 2020 and 2021.

Due to the global COVID 19 pandemic and in order to respond to threats to the lives of students and teachers, but also to the entire society, the Government of North Macedonia decided to close down schools and all educational facilities (kindergartens and faculties) based on the proposal of the Steering Committee for coordination and crisis management, on March 10, 2020. At the beginning, this decision was for 14 days only. However, even before the expiry date, the Decree with force of a Law was declared that all educational institutions will remain closed by the end of the 2019/2020 academic year. Being one of the most robust and complex systems in the country, the education sector encompasses over 256,000 students and 28,000 teachers in public schools, along with few hundred employees in the Ministry of Education and Science and numerous other government institutions, who under the Covid 19 circumstances stopped their everyday activities. The Ministry of Education and Science (MoES) and the Bureau for the Development of Education (BRO) were responsible for organizing the teaching process in compliance with the provisions of the Law on Primary Education and the Law on Secondary Education and in accordance with the new way of living in time of crisis. This decree obliged schools to organize teaching in primary schools without physical presence, "through distance learning, that is learning from home, using the means of electronic communication". As the means of approved 'videoconferences' or electronic communicationwere existing platforms, such as e-mail or other electronic data exchange systems". The decision on what kind of teaching would be implemented, was left to the schools themselves.

Most of the schools had difficulties in organizing teachers and other staff members to function under the new circumstances. The first challenge was that schools and teachers themselves did not own computers or laptops and this prevented many of them to respond to the challenge of organizing online teaching. This was especially challenging for teachers working in remote schools and rural areas. Access to the internet and not having technology at home was also a challenge for many students.

METHODOLOGY OF THE RESEARCH AND MAIN FINDINGS

A study on assessing the state of affairs, needs and challenges for implementing online teaching in primary schools in rural areas where the language of instruction is a language of the small ethnic communities as well as children with socio-economic risks was performed by a team of researchers with the aim of assessing the conditions, needs and challenges in the implementation of online teaching in primary schools in rural areas, with teaching on the languages of smaller etnic communities as well as with children at socio-economic risk. The ultimate goal was to give reccomendations and contribute to the better preparation of the educational system in the 2020/2021 academic year.

The techniques used in this research were of a quantitative and qualitative nature, and the collection of primary data and information was made possible with the help of the following instruments: A questionnaire for teachers; A questionnaire for directors and professional services, and Focus groups with teachers, professional services and directors, all performed online.

The sample consisted of: 61 respondents in the surveys (directors and members of the professional services) and 576 teachers from 30 primary schools. 47.2 per cent were teachers in city schools, 37.3 per cent in rural schools, and 5.4 per cent in suburban schools. 25.2 per cent of respondents were working in central/main schools, anad 15.6 per cent in district schools. More than 90 per cent of respondents teach in the Macedonian language; 4.3 per cent in Serbian; 4.2 per cent in Turkish and 1.9 per cent in the Albanian language.

According to this research during online teaching, the vast majority of teachers implemented teaching by assigning homework (78 per cent), by using existing platforms and digital tools (59.3 per cent) and by sending presentations to students (58.1 per cent).

The smallest propoprtion of teachers (only 22.7 per cent) organized online discussions with students on predetermined topics and questions, while less than half (41.2 per cent) held structured online lectures, that is, classes. This piece of information is extremely important because it indicates the possibility that the students from the schools participating in the research did not receive the necessary instruction and assistance from their teachers in understanding and explaining the new material. This is of particular concern for students with lower achievement levels and for those who, for various reasons could not receive the necessary help and educational support at home (children from socially, economically and educationally disadvantaged families).

The findings showed that 50.1 per cent of teachers believed that they completely managed to build a positive and motivating working atmosphere and maintained interest in learning among students, whilst 46.1 per cent that believed that they partially achieved this.. 49.2 per cent of teachers fully achieved the goals and results foreseen by the curriculum, while 45.6 per cent believed that they only partially managed to achieve it. Only 20 per cent of teachers were completely sure that all students regularly participated in their lessons, whilst 55.6 per cent were partly sure of this.

It is quite a worrying fact that only a quarter of teachers stated with certainty that all students did not participate in their lessons, and only one third of teachers completely agreed that they managed to establish an effective two-way communication with their students, that is, with parents, or 58.34 per cent, that is 56 per cent, only partially agreeing while 6.2 per cent, or 10.1 per cent, failed to establish an effective two-way communication at all, which is crucial for the success of the teaching process. The conclusion was that textbooks were the main, and in a large number of cases, the only source of information and knowledge. Another statement which was also self-evident in the main conclusions, that only students who were capable of independent learning had better prospects of mastering the assigned material.

The fact that the average grading of the online teaching was “good” (3 on the scale from 1 to 5) with 10.2 per cent of teachers grading it with 1, was complemented with the statement that the training for ICT provided to teachers organized by schools and educational authorities and the equipment provided to support their teaching had the least contribution for the realization of the teaching. The biggest support for their work was the equipment they possessed at home (73, per cent) and collaboration with parents (36.7 per cent) according to teachers.

Although this research data was not representative for the whole country, other analysis and many journalist reports presented similar findings from schools across the country. This was an alert for the Government and educational authorities to plan and implement more organized support for schools and teaching staff in order to overcome some of the challenges encountered at the end of the 2019/2020 school year.

On-line teaching in time of crise revealed shortcomings in terms of teachers' competences to implement engaging activities for students and perform different types of distance teaching methods. Although digitalization was somewhere on the agenda globally, it very quickly became a priority all over the world, including in our country, and specifically in education.

POLICY OPTIONS AND IMPLICATIONS

The COVID 19 crisis throughout 2020 and 2021, as well as the Ukranian crisis in 2022, called for finding ways and means of working in different circumstances and accommodating one of the most important areas of public life, that is education. A broader look at developments in the educational sector leads to the well-defined framework of competencies within the European Union, common European Framework for the Digital Competence of Educators (DigCompEdu) which teachers should be familiar with, in order to adequately prepare students for the needs of the 21st century market. This framework was developed several years prior to the Covid 19 pandemic crisis, in 2017, however, it specifically gained popularity with the closures of schools. Mainly, this was due to the fact that many guidelines were foreseen in this framework that could guide policies towards the better preparedness of schools for online teaching.

For instance, this Framework proposes a progression model to help educators assess and develop their digital competence. It outlines six different stages through which an educator's digital competence typically develops, so as to help educators identify and decide on the specific steps to take to boost their competence at the stage they are currently at. At the first two stages, *Newcomer (A1)* and *Explorer (A2)*, educators assimilate new information and develop basic digital practices. At the following two stages, *Integrator (B1)* and *Expert (B2),* they apply, further expand and structure their digital practices. At the highest stages, *Leader (C1)* and *Pioneer (C2),* they pass on their knowledge, critique existing practice and develop new practices. The DigCompEdu Framework synthesizes national and regional efforts to capture educator-specific digital competences. It aims to provide a general reference framework for developers of digital competence models, in other words Member States, regional governments, relevant national and regional agencies, educational organisations themselves, and public or private professional training providers. It is directed towards educators at all levels of education, from early childhood to higher and adult education, including general and vocational training, special needs education, and non-formal learning contexts. It invites and encourages the adaptation and modification of the specific context and purpose. The framework is based on work carried out by the European Commission's Joint Research Centre (JRC), on behalf of the Directorate-General for Education, Youth, Sport and Culture (DG EAC).

The wider context of rapid developments of technology and the everyday use of different electronic means for communication and work also resulted in many other research projects and recommendations for adapting to the new era of living in the digital sphere. The 2018 OECD study showed that less than 40 per cent of educators across the EU felt ready to use digital technologies in teaching, while ICILS 2018 study found that one third of 13-14 year olds did not possess the most basic proficiency level in digital skills; whilst a quarter of low-income households had no access to computers and broadband at all(Eurostat, 2019).

The renewed EU Digital Education Action Plan (2021-2027) policy initiative calls for a strong and coordinated effort to address these challenges and support the sustainable and effective adaptation of education and training systems across Europe to the digital

age. In this context, all the research findings and recomendations had to be accelerated in implementation when the COVID 19 crisis became a reality and when due to school closures, education was one of the areas that suffered greatly with children from poorer or rural families affected by the lack of access to the internet or technological devices. Inequality in access to digitally-enabled remote learning from a students', teachers' and parents' perspective, placed education at a crossroad. The countries in the region were struggling with the newly revealed opportunities for the digital transformation of education directed towards the capacity building of stakeholders and training teachers to use digital platforms, improving the quality of the internet, online tools and equipment, digital curricula content, and digital teaching and learning resources. At the same time, everyone had to be aware that there was a difficult path ahead to make a further leap from 'remote classrooms' to 'smart classrooms'. And this brought a multitude of challenges to the table: not only in terms of technology and internet access, but, also in terms of setting a different mind-set for everyone involved in the education processes in terms of everyone's safety and wellbeing.

In 2018, the Commission on Science and Technology for Development defined digital skills as "the knowledge and skills a person needs to use ICT to achieve identified goals in personal and professional life." UNESCO defines digital skills as a set of abilities to use digital products, communication applications and networks to acquire and manage information. Digital skills allow people to generate and share digital content, connect and cooperate, and address challenges for effective and creative realization in private and professional life.

The International Telecomunication Union has taken a more hands-on approach to the concept of digital skills and defined three skills levels with a focus on technical competencies or skills:

• Basic skills: Basic skills for basic tasks, including hardware, software, and basic Internet operations.

• Intermediate skills: Skills that allow people to use technology in more meaningful and useful ways, including professional digital skills, and broadening with the latest technology updates.

• Advanced digital: Skills that are required by ICT professionals, such as computer programming and data analysis, including skills related to emerging technologies such as AI, big data, cybersecurity, the Internet of Things, and application development, that are acquired through advanced formal education.

In the most recent *ITU Report – Digital Skills Assessment - North Macedonia* teachers have reported the lowest levels of overall digital skills compared to the respondents coming from the other two sectors of employment (the private sector anstart-ups). Overall, across all the 5 competence areas, most of the teachers (66.0 per cent) posses a basic level of skills, followed by above-basic skills (25.9 per cent), whereas the remaining 7.6 per cent of the teachers have reported having low level of digital skills. Similar to employees in private companies, teachers' strongest competence areas of digital skills are in Safety and Problem solving, with 81.7 per cent and 72.1 per cent of them reporting above-basic level of skills in these two areas, respectively. In the Communication and collaboration area, 66.0 per cent of the teachers have reported a basic level of digital skills, followed by 28.9 per cent with above-basic skills, which is notably lower compared to the skills of the employees in the other two employment sectors. On a comparative basis with the respon-

dents from the companies and the start-ups, teachers have displayed weaker results in the Content creation area. Namely, the majority of teachers (57.4 per cent) have reported a basic level of skills, and only 17.3 per cent an above-basic level of skills in the content creation competence area, while quite a high number have reported possessing low level of digitalskills (21.3 per cent) and no skills at all (4.1 per cent). In the Information and data literacy area, teachers demonstrate comparable levels of skills to the ones of the employees in the companies (95.4 per cent of the teachers possess basic skills), but this is still significantly lower than of the start-ups' employees.

These facts had to be considered very seriously when planning the next policy steps, but most importantly the necessary interventions in the curricula for teacher education, the curricula for mandatory public education and options for professional development training for teachers and students in digital competences.

The Macedonian experience with the COVID-19 health crisis, demonstrated that the country and its educational institutions can swiftly re-prioritize its operations. At the beginning of the following, 2020/21 school year, that was again under threat of the prolonged pandemic crisis all over the world, MoES with the assistance of academics in the technology field developed and implemented a National Platform for Digital Learning (Digital Education Platform), thus ensuring an uninterrupted educational process in the most difficult of times. The Digital Education Platform has greatly accelerated the process of the digital transformation of the education sector by setting an overall digital ecosystem that ensures uniform standards and consistent practices for online synchronous and asynchronous teaching and learning nationwide across all public schools. Despite the numerous challenges along its implementation, the Digital Education Platform has significantly enhanced quality and inclusiveness in education and has supported the acquisition of digital competencies by teachers and students, thus making some of the existing policy documents obsolete. Different aspects of digital transformation, for example. the enhancement of the digital competences of teachers and students, and the development of digital infrastructure and schools' digital capacities. are addressed in various other policy documents of a more general or sectorial nature. For example, digital literacy and ICT in schools is incorporated as a topic in the Education Strategy 2018-2025 and Action Plan (2018). The Strategy defines ICT and digital literacy as one of the five general topics related to the overall education system and specifies it as Priority III: Ensuring widespread use of ICT in education and training and digital literacy. The outcomes of this priority, alongside the measures, activities and indicators, are further specified in Pillar 7 of the Action Plan to the Strategy, and include: an increased number of ICT-related curricula; upgrading schools' ICT infrastructure; the enhanced use of ICT in teaching and learning processes; the promotion of ICT events and career fairs; the development of an electronic platform for teaching, learning and the sharing of methodological resources. Digital skills in the education sector are also mentioned in the Strategic Plan of the Ministry of Education and Science for 2019-2021, in which the Investment and development of digital skills is defined as one of the goals within the priority Reforms in primary and secondary education and improving the student standard .

On the other hand according to the Law and the Rulebook on the basic professional competencies of teachers in primary and secondary schools by areas, the basic professional competencies of teachers include professional values, professional knowledge and understanding and professional abilities and skills in six areas: 1. Knowledge of the subject and the educational system; 2. Teaching and learning (planning and preparation of teaching, realization of teaching, assessment of students, knowledge of students and meeting their

needs); 3. Creating a stimulating learning environment (creating a safe learning environment and school climate); 4. Social and educational inclusion; 5. Communication and cooperation with family and community and 6. Professional development and professional cooperation. Area 3 includes that teacher should know about the potentials and opportunities to use different means for learning including ICT, and within the professional abilities and skills he/she should enable the usage of different sources, materials and means for learning, including the safe usage of ICT. However, there are no available policy documents that would give directions on how these competences are to be developed in teachers, either in their initial education, and/or through professional training.

The Concept for the Development of Distance Education for Promary and Secondary Schools in the Republic of North Macedonia was developed by a working group formed by the Minister for Education and Science in 2020. This document offers guidelines for establishing distance education and/or e-learning in the country in three main areas in which it should be developed: educational policies, technical support/educational technology and pedagogy. The comprehensive description of the main challenges and plans on how to improve, as well as a detailed overview of the international and national policy documents provide a good basis for a strategic approach towards enhancing digital competences in teachers and learners. Specifically, the area of pedagogy gives direction for the innovative usage of distance learning, thought blended learning, game-based learning, computational thinking, experiental learning, embodied learning and multiliteracies and discussion-based teaching. Additionally, there are guidelines on how to plan teaching, implement and assess student work, and give feedback to students and parents. This document points out the importance of the determination of competences and responsibilities, as well as the cooperation of the different educational institutions, including the Ministry of Education, the Bureau for the Development of Education, the Center for vocational education and training, the State Examination Center, the State Educational inspectorate, and the Center for Adult education. According to their mandate with regard to the development of the distance learning areas and the monitoring of the implementation. However, there is no specific action plan and details with regard to the timeline for achieving the proposed measures with regard to teacher education and training. Based on the key competences for lifelong learning from the European reference framework, as well as on the basis of the framework of separate competences developed by the European commission (for foreign languages, digital competences, entrepreneurship), and especially considering specifics of our educational system and the knowledge, skills and attitudes that need to acquire students in primary education in our social context, eight areas are determined as national standards in primary education in our country. They include transversal competences and/or competences related to certain subjects areas: I. Language literacy; II. Using other languages; III. Mathematics and natural sciences; IV. Digital literacy; V. Personal and social development; VI. Society and democratic culture; VII. Tech, technology and entrepreneurship; VIII. Artistic expression and culture. Competences in area IV, refer to the use of ICT for access to information, skillfull and effective use for problem solving, idea sharing, communication and collaboration in frameworks of the school and life outside school, creating digital contents, as well as ethical and safe use of digital technology in everyday life. The competences that define this area should be developed in students throughout primary school education, in two ways. One way is through the mandatory subject of Technical education and informatics, through which students acquire knowledge, skills and attitudes from the field of information and communication technologies. Additional knowledge and skills from this area can also be acquired through elective subjects (for example, Programming). The other way is through the application of information and computer technology for learning content and skill development within the several other

compulsory subjects (Language, Mathematics, Natural Sciences, Society/History and Society, Music education, and Art education). The acquisition of the competencies for the use of information and computer technology in the school should be associated with the competencies for using digital devices that students use outside of school and when using digital devices for fun and in private communication.

DISCUSSION AND CONCLUSION

All global and national strategic documents give a positive view of the plans and developments in education in terms of policies. The main challenge would be to secure equal implementation and fair access to digital means for all participants in education regardless of their home income, place of residence and work, as well as their educational level. The fast path of digital transformation cannot be followed equally by all students, teachers, parents, and others employed in education. However, if everyone agrees that the focus of transformation in education should be on the teaching process, and more importantly, on the learning process, then we can use already developed frameworks and adapt them to the national frameworks and policies.

One important aspect that has to be additionally considered, is the necessary usable technological and didactical equipment in schools and access to the internet. Some reviews showed that there are huge gaps in the infrastructure and technological equipment in schools in the country, that also influences the capacity for the transformation and improvement of the digital competences of teachers and students as well as quality implementation of the provisions with the new Concept for Primary education and the Education Strategy (2018-2025). If students and teachers have limited equipment and tools for activities that require technology, then there are limited possibilities to education and training, in terms of the digital transformation of teaching and learning.

The OECD Reviews of Evaluation and Assessment in Education in North Macedonia pointed out that the take-up of professional development is relatively low compared to the OECD and Western Balkan countries, and schools receive very little financial support to organise in-service training for their staff. As access to official training programmes is limited, teachers in North Macedonia often find and pay for training themselves, or turn to informal support, such as the Internet, to access teaching materials. The Internet makes it easier for teachers to collaborate beyond their schools and increases the range of teaching tools that teachers can draw upon (Schleicher, 2016). However, the ministry needs to take a more active role in reviewing Internet content and platforms if this resource is to be leveraged effectively to improve teaching practice. The country's market-based teacher professional development model also needs to be complemented by stronger mechanisms for quality assurance.

Furthermore, it is evident that it would be more efficient and effective to make initial teacher education more selective and rigorous and also to update the curricula and programmes for the Initial Teacher Training - to ensure that future teachers possess the necessary level of digital skills before entering the profession, as well as updating the curricula for the Continuing professional development of current teachers - to enable their continuous digital up-skilling and acquisition of skills required for delivering the ICT related curricula.

However, of foremost importance is the need to set up an up-to-date framework for digital competences, similar to the European Framework for Digital Competences for Educators, where the three main categories can be focused on individually:

- professional competencies for teachers,
- digital pedagogical competencies for teachers and
- digital competencies for students.

The DigCompEdu Framework suggests 22 elementary competences organised in six areas: Area 1 is directed at the broader professional environment, that is educators' use of digital technologies in professional interactions with colleagues, learners, parents and other interested parties, for their own individual professional development and for the collective good of the organisation. Area 2 looks at the competences needed to effectively and responsibly use, create and share digital resources for learning. Area 3 is dedicated to managing and orchestrating the use of digital technologies in teaching and learning. Area 4 addresses the use of digital strategies to enhance assessment. Area 5 focuses on the potential of digital technologies for learner-centered teaching and learning strategies. Areas 6 details the specific pedagogic competencies required to facilitate students' digital competence.

The adaptation of this framework would give more detailed and practically oriented approach that would enable setting the quality and effective policy and evaluation of the digital competencies of teachers and wouldl improve the teaching according to the new technological advances in society. In addition to this, part of this framework describing learning competences for students can assist in reviewing already developed standards for learning at the end of primary education in the country.

The crisis has shown that digital transformation brings positive change in the education sector. At the same time, it showed that priorities with regard to adequate strategic direction and policy implementation should be followed by an adequate timeline and funding to secure quality and effectiveness as well as equity for all teachers and students.

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