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A Comparison between European Digital Competence Framework and the Turkish ICT Curriculum

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Abstract The position of information and communication technologies (ICT) in the Turkish compulsory education has been strengthened in the recent years. As well as ICT infrastructure, production of digital content and teacher training initiatives, the recent curricula reforms support the use of digital technologies in many subjects. A separate compulsory ICT course is offered in middle school for the 5th grades. In order for the citizens to improve digital competence, the European Commission offered a tool known as The European Digital Competence Framework (DigComp). This paper articulates alignment of this theoretical framework with the Turkish ICT curriculum for 5th grades. A comparison between the DigComp framework and the Turkish ICT course has been carried out using the categories, subcategories and learning outcomes. The study shows that even if the concepts identified in the competence dimensions differ in some way, the standards in the framework and the outcomes in the curriculum are closely related. It has been observed that out of 77 learning outcomes in the Turkish ICT curriculum, 33 are relevant to the DigComp standards but the other 34 are mostly related to the technical aspect of ICT. Some issues regarding netiquette and civic participation are ignored and some of problem solving competences are not attributed in the curriculum as well.

Keywords Curriculum, Digital Competence, ICT, Middle School

1. Introduction

Educational practices have been in a constant quest as a result of innovations in information communication technologies, globalization of education and social change. Changes in educational practices naturally change teaching and learning approaches. These changes also shape the learning and teaching paradigms that have emerged to explain the nature of learning and how it is being realized [1]. The basic paradigms have offered frameworks that guide learning and teaching for centuries, especially in the era of industrialization, in which memorization, specialization and segmentation have increased productivity and profit. In recent years, the lives of the end-users of micro-electronics under the influence of everyday life, as well as the functioning of 21st century industry and professions have changed. Every industry organization has to adopt technology or stay out of the race in order to continue the competition. This necessity has led to the introduction of new tools into the production processes, and therefore new skills have begun to be demanded from employees. Therefore, the basic skills of the 21st century have emerged [2].

The most decisive feature of the 21st century is that much information is presented by different digital technologies via multiple means of communication. With the Internet, people are able to reach the amount of information with the speed they cannot imagine before. The impact of digital media has expanded considerably, not only in computers, but also thanks to portable media tools in the last 20 years. The generation born after 1980s is able to communicate with each other by means of technology, reach information and media instantly through the Internet. The indispensable part of educational agenda is that the use of media and technology as a bridge between real life and school life can be a factor that will meet the interests and expectations of today's students called digital natives. Students of the 21st century are able to access, communicate and follow the media by using countless technology-based tools. Given the prevalence of the use of the Internet, smartphones, computers, tablets, gaming systems, and multimedia devices, it has become very important for students to accurately assess and interpret technology and use it effectively. In the realm of information technology, the role of the educational community must be to support technology, to use technology in classrooms, and to teach students how to use technology properly (3,4,5).

Students' understanding, using and evaluating the 21st century multimodal texts that media and technology contain can only be achieved by integrating technology into the learning and teaching processes. Facilitating

students with information, media and technology skills can bridge the gap between real-life experiences and school experiences [6]. It is thought that integrating technology skills into school or learning environments is likely to enhance students' academic background and academic achievement. For this reason, it is important to promote the use of knowledge in learning environments rather than ignoring or inhibiting new technologies [7]. Information, media and technology provide enough power for students to increase their skills of thinking, learning, communicating, collaborating and producing. However, in order to use this power, students must first learn the skills necessary to understand direct and use this information, media and technology [8]. Most students know how to use technology, but they do not have the understanding and application skills of technology use and impact [9]. By integrating technology into teaching learning processes and curricula, it has become the task of schools to teach students how to use information effectively, interpret and use technology effectively, to benefit from technology in the classroom by supporting technology and teaching the correct use of technology as a learning tool [4]. A number of studies have been conducted on the positive and negative consequences of the use of educational technologies on the educational outcomes, and the use of ICT in classrooms has focused on innovations in 21st century learning and teaching environments [10,11,12]. Access to computers and Internet in schools can be reflected positively in the outcome of education; with the help of computer software, individualized teaching can give better results than teaching with groups, in the same way the content of teaching according to strengths and weaknesses of students can be arranged. Internet can serve as a potentially valuable source for reaching a wide range of information on educational content. Computers, internet, software and other technologies according to their interactive qualities can keep the interest of students alive when compared with the traditional methods [13].

Realizing the importance of using digital technologies to live, work and learn in today's knowledge-based society , in 2006, the European Parliament and the Council adopted digital competence as one of eight essential competences for active citizenship and social life. As a result, The European Digital Competence Framework (DigComp) was developed by the European Commission to create a unity and contribute to a better understanding of digital competence and was presented as a tool to enhance the digital competence of citizens. The framework, published in 2013, has become a reference for the development and strategic planning of digital competence initiatives [14]. The framework has also been endorsed by the education ministries of the European Union Member States as a guide for curriculum development and professional development of teachers [15]. DigComp is also used in educational practices of schools, for example, in Slovenia; it appears that the DigComp framework was used to assess the digital knowledge and skills of students at different levels of learning. In Belgium, Estonia, France, Poland and Northern Italy, education and courses in the field of information communication are also organized, especially in the adult education and university level, using the DigComp framework [16]. In Flanders, Belgium, the framework was used as a reference for the curriculum development of adult education courses. The DigComp standards are used as a reference to compare with the outcomes of "Digital Literacy" curricula in primary and secondary schools in the Netherlands, this framework is used to assess and document French citizens' digital competences. In Estonia, studies are being conducted using the DigComp framework to investigate the digital competences of 6th and 9th grade students. These studies are partially financed by the European Union [17].

As well as in Europe, in Turkey since the 1980s digital technologies have been integrated into education and projects have been implemented to increase the quality of education and to provide students with necessary knowledge and skills in the information economy. The steps taken for this purpose can be listed as Computer Assisted Education (1989-1991), Computer Laboratory Schools Project (1993-1997), Basic Education Project (1997-2007), Secondary Education Project (2006-2010) and the Movement of Enhancing Opportunities and Improving Technology (FATIH) Project (2010). These initiatives clearly show that integration of digital technology into schools is a priority for Turkey. For this reason, a significant budget and time has been invested for years. In the official papers and national curricula the utmost place of digital competence can be seen.

With recent changes particularly in middle school curricula some ICT related courses are said to have objectives for the students to be digitally competent. The aim of this study is to compare and contrast the standards of DigComp with the outcomes of Information Technologies and Software Development course curriculum of middle schools.

1.1. Digital Competence

The concept of digital competence is a multi-faceted, moving concept that covers many areas and develops rapidly as new technologies emerge. Today it means to be competent digitally, to understand the media, to access the information, to take a critical attitude toward the information that is accessed, and to communicate with others by using various digital tools and applications [18]. The concept of digital competence is a developing concept and concerns the development of technology as well as political aspirations and expectations for citizenship in the information society. It consists of a variety of skills and competences and covers a variety of areas such as media and communication, technology and literacy and information science. Digital competence can be defined as

the technical skills required to use digital technologies, the ability to use digital technologies to work effectively in a variety of activities for study, education and daily life in general, the ability to critically evaluate digital technologies and the motivation to participate in digital culture [19].

1.2. European Digital Competence Framework (DigComp)

In 2013, The European Commission launched a project to develop a Digital Competence Framework to produce digital competence descriptors for all levels of learners. This framework consists of five digital competence domains and 21 competences namely: Information and Data Literacy, Communication and Collaboration, Digital Content Creation, Safety and Problem Solving as illustrated in Figure 1.

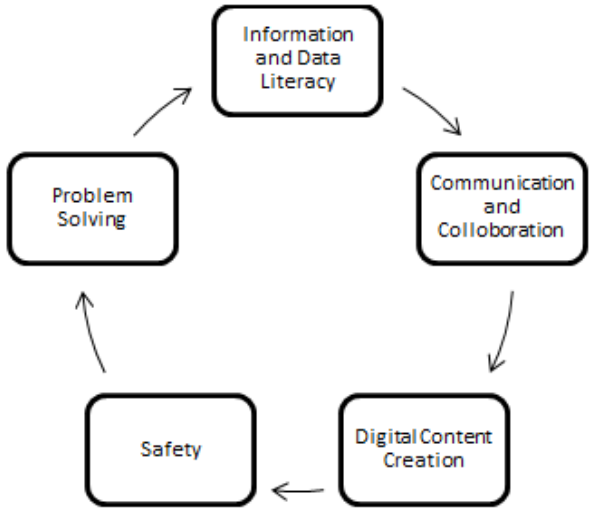

Figure 1. Digital Competence Domains

In the context of the DigComp framework, the term 'digital competence' refers to the use of ICT to achieve goals related to citizens' work, employability, learning, leisure time, citizenship participation, skills and attitudes [17]. From 2013 to now, DigComp has been used extensively in the context of employment, education and training and lifelong learning [14]. One of DigComp's key objectives is to plan educational and training initiatives to increase the digital competence of specific target groups. DigComp also offers a common language for identifying key areas of digital competence and a common reference at European level [18]. It is a framework that is expected to serve as a guide for accessing, evaluating and using information, communicating through various channels, producing and sharing digital content, and using digital technology in a reliable and critical way in every aspect of life [20]. The Framework provides detailed descriptions of all the qualifications required to be sufficient in the digital environment and explains these competences in terms of knowledge, skills and attitude. Although the framework was developed for rather different purposes, it aims to describe *what* and *how*, students acquire, use, adapt to, and learn with technology [21]. The framework underlines students' ability to retrieve and understand information; to produce information; to communicate digital information; and to search, produce, and communicate in a safe and responsible way. The competence area Information and data literacy includes identifying, retrieving, and analysing digital information [18]. The competence area Communication involves students' awareness, knowledge, and understanding of communication with others. The Content Creation competence area refers to students' use of digital tools for production, publishing. The fourth area Safety captures personal protection, data protection, digital identity, and security issues. Problem Solving is related to the ability to identify and solve various problems [18].

1.3. Digital Competence in Turkey

In Turkey, especially with the launch of FATIH Project digital technologies have placed an important statue in educational practices. The FATIH Project in Education, which was implemented by the Ministry of National Education (MONE) in 2010, was initiated in order to equip the tools of information technology for the use of digital technologies in schools. The FATIH Project in Education will finance services such as facilitating other activities, including project implementation support, by providing hardware and broadband internet for all classes, providing e-content for the topics, creating platforms for teachers to integrate IT technologies and product development. The Project aims to bring 21st century skills to all students. These skills are: to think critically and solve problems, to find effective solutions to problems, to work based on cooperation, to gain sense of responsibility, to gain information literacy, to reach to an effective level, to acquire media literacy, to gain literacy of information and communication technologies, to use digital technologies and communication tools to investigate, organize and evaluate information [22].

"Information Society and Action Plan" issued by the Turkish Ministry of Development [23] includes various actions related to digital education policies. In this development plan, "providing individuals with basic skills necessary for the information society" is defined as the main objective of the education system. To achieve this, it is planned to improve the ICT infrastructure of schools, to support the production of digital content, to train teachers on using this infrastructure and content effectively by 2018.

The first step to be taken to provide students with digital skills may start with curriculum development process. In Turkey, curriculum studies fall primarily in the hand of the Ministry of National Education. The course curricula and books are set at national level by the Ministry of Board of

Education, teachers use methods and techniques they choose. Recent curriculum reforms have encouraged the use of many digital technologies in many areas. ICT classes are offered for students in middle school (5-8th grade) and high school (9-12th grade). In the 5th and 6th grades, two hours of ICT classes per week are mandatory and 7th and 8th grades are elective. At the primary and secondary level, ICT is taught as a separate course and is expected to be used as a general tool in other courses. It is stated that teachers and students use ICT for complementary activities in all lessons except painting at primary and secondary level.

Digital competence has now a significant role in Turkish official papers as in the Turkish Qualifications Framework. In this framework there are eight core competences defined that each individual is expected to win in the context of lifelong learning; one of these is digital competence. According to 2017 new curriculum reform for primary and secondary education, digital competence is part of the new national curriculum. In 2013 a new course for middle schools took place in middle school curricula, the Information Technologies and Software Development Course. The aim of course is "using ICT productively, effectively and in an ethically correct way". The Course consists of five categories, namely: Information Technologies, Ethics and Safety, Communication, Research, and Collaboration, Content Creation, Problem Solving and Programming.

In this study, it has been tried to reach the data about how the digital competences are integrated into the Turkish educational system. For this purpose, it is aimed to compare the outcomes of Information Technologies and Software Development course, whose objective is to prepare future generations for digital competences, with the DigComp and to reveal similar and different aspects.

2. Method

In the study document analysis as one of the qualitative research data collection methods, was used to compare and contrast digital competence standards to the outcomes of Information Technologies and Software Development course. The document analysis is a research method used for systematically analysing the contents of written documents. [24]. Document analysis includes the process of finding and analysing facts or trends in existing documents. In the study, the curriculum was examined as a document in order to examine the outcomes that emphasize digital competence standards. The document analysis process is summarized as; 1. Access to related documents 2) Creation of an organization chart 3) Controlling the authenticity of documents 4) the discovery of the content of the documents [25]. The last step is expressed as the content analysis by which the researcher measures the use of certain words, idioms and concepts. Content analysis is carried out through four stages as; 1) Sampling from the data subject to analysis, 2) Category development, 3) Determination of the unit of analysis and 4) Digitization.

2.1. Materials

Information Technologies and Software Development course curriculum for 5th grades was analysed using DigComp framework to compare and contrast learning outcomes. The curriculum was obtained from the website of Turkish MONE. The originality and reliability of the document were also checked.

2.2. Instruments

A document analysis was conducted in order to compare and contrast the DigComp Framework and Information Technologies and Software Development course curriculum in Turkey. For this purpose, a Document Analysis Form was created including the categories and sub-categories of the DigComp Framework namely: data and information literacy, communication and collaboration, digital content creation, safety and problem solving.

2.3. Procedure

The learning outcomes of Information Technologies and Software Development course curriculum were analysed according to the research themes. Research themes have been defined as information and data literacy, communication and collaboration, digital content creation, safety and problem solving, which are defined by DigComp framework, as digital competence dimensions. The sentences were chosen as the unit of analysis in document analysis, and were used to digitize the data using the exist or not technique according to the status of the category in the document. Two ICT teachers participated in the analysis of the documents.

2.4. Data Analysis

Different analysis approaches can be followed during document review. In this study, content analysis is adopted as data analysis technique. Data analysis involved using coding of learning outcomes of the relevant curriculum. Using DigComp conceptual framework as an initial starting point, data were organized and coded according to the five major categories and sub categories of the conceptual framework. The outcomes were chosen as the unit of analysis in document analysis and the sentences were used to digitize the data using the exist or not technique according to the category's presence in the document. It is emphasized that the validity and reliability of the results obtained with content analysis is directly proportional to the systematization of the coding and categorization process monitored during the analysis as

much as possible. To be able to achieve this, first of all, it should be decided on the quality of the data to be obtained. In this study, the outcomes are described in detail, as it is tried to determine whether the determined standards are represented in the curriculum and if so, how they are represented. The processes and application principles performed during content analysis can be summarized as follows:

1. A preliminary study was conducted in the curriculum and areas to be excluded from the analysis were determined. The category of analysis of the curriculum is identified as the outcomes.
2. It was taken into account whether the existing outcome was within the scope of DigComp during the coding. In order to decide whether or not the outcomes are covered by the standard, the explanations are taken into account and the concepts are coded if they are related to the content standards in the explanations.
3. If the related categories are included in the program, 1 is coded and given 0 if not. Frequency values for the obtained data are calculated using Microsoft Excel 2010 package program. In order to determine whether the agreement between the two encoders and the reliability were acceptable, the percentage and coefficient of agreement between the encoders were determined by using Cohens Kappa statistics. Cohen Kappa values were found to correspond to values between .82 and 1 showing that experts make almost perfect evaluations on the determination and classification of learning outcomes in curriculum [26].while analysis is being carried out curriculum outcomes similar to the standards in the framework were found out and then put into the proper dimension. As an example the outcome "Making simple research using search engines" is located under the category of Communıcatıon, Research And Cooperatıon in the curriculum, however similar standard in the framework "Browsing, searching and filtering data, information and digital content" is placed under Information and Data Literacy dimension. On the other hand almost the same categorisation can be observed between two as in "Executing editing operations on images" situated in Content Creation in the curriculum and "Integrating and re-elaborating digital content" in the Digital Content Creation in the framework.

3. Findings

The findings of the study were presented in the form of an analysis of the learning outcomes in Information Technologies and Software Development course curriculum.

3.1. Findings Concerning the Comparison between the DigComp and the Turkish ICT Curriculum

Learning outcomes of Information Technologies and Software Development curriculum for 5th grades were analysed according to the standards and dimensions stated in the DigComp framework in Table 1.

In the curriculum of Information Technologies and Software Development Course for 5th grades 77 learning outcomes grouped in 14 competences and 5 categories are set out. These competences are: A. Information technologies, B. Ethics and Safety C. Communication, Research, and Collaboration, D. Content Creation E. Problem Solving and Programming. The DigComp framework consists of 5 digital competence domains and 21 competences: Information and Data Literacy, Communication and Collaboration, Digital Content Creation, Security and Problem Solving.

When the outcomes of the curriculum considered, there are 33 outcomes, which are closely related to the framework. These outcomes are mostly in the digital content creation dimension; a total of 18 outcomes, fifteen of which are related to programming are included in this dimension. There can be seen 6 related outcomes referring to communication and collaboration; data and information literacy dimension captures 4 of the outcomes. 3 outcomes for problem solving and 2 outcomes for safety dimension are involved in the curriculum.

Table 1. A comparison between the DigComp Framework and the Turkish ICT Curriculum

Information Technologies and Software Development Course Categories and Outcomes	DigComp Competence Areas and Competences
Information Technologies Explaining the effects and possible symptoms of using information technologies on body and mental health	**Safety** Protecting health and well-being
Information Technologies Performing basic file and folder management operations mental health	**Information and Data Literacy** Managing data, information and digital content
Information Technologies Solving technical problems related to hardware and software	**Problem Solving** Solving technical problems
Ethics and Safety Showing respect the rights of others in an online environment	**Safety** Protecting personal data and privacy
Ethics and Safety Recognizing the risks to arise as a result of violation of ethical principles	**Digital Content Creation** Copyright and licences
Ethics and Safety Realizing that digital sharing is permanent and leaves traces behind	**Communication and Collaboration** Managing digital identity
Ethics and Safety Making decisions about the information to be shared or not	**Communication and Collaboration** Managing digital identity
Communıcatıon, Research And Cooperatıon Making simple research using search engines	**Information and Data Literacy** Browsing, searching and filtering data, information and digital content
Communıcatıon, Research And Cooperatıon Questioning the authenticity of the information accessed from different sources	**Information and Data Literacy** Evaluating data, information and digital content
Communıcatıon, Research And Cooperatıon Organizing the sources by using references	**Information and Data Literacy** Managing data, information and digital content
Communıcatıon, Research And Cooperatıon Creating e-mail account and use it to communicate	**Communication and Collaboration** Interacting through digital technologies
Content Creation Executing editing operations on images	**Digital Content Creation** Integrating and re-elaborating digital content
Content Creation Organizing the document using a word processor program.	**Digital Content Creation** Developing digital content
Content Creation Sharing the document	**Communication and Collaboration** Sharing through digital technologies
Content Creation Preparing presentations	**Digital Content Creation** Developing digital content
Content Creation Presenting content for collaboration	**Communication and Collaboration** Sharing through digital technologies
Problem solving and Programming Bringing solutions for the problems encountered in daily life	**Problem Solving** Creatively using digital technologies
Problem solving and Programming Solving a given problem using appropriate steps	**Problem Solving** Creatively using digital technologies
Problem solving and Programming Developing an algorithm for solving a problem	
Describing the components and functions of flow chart	
Drawing a flowchart for an algorithm	
Drawing a flowchart in electronic form using word processing programs or other drawing programs	
Sorting out the error by testing an algorithm	
Building the correct algorithm to reach the targets presented in the block based programming environment.	
Performing algorithm operations on simple samples in block based programming tool	**Digital Content Creation** Programming
Explaining the structure of linear logic	
Creating algorithms that contain loop structure. Shedding out the errors by guiding the result of the algorithms for different constructions	
Developing algorithms with linear logic structure	
Explaining the structure and functions of decision	
Developing algorithms involving decision making	
Explaining the loop structure and its functions	
Emphasizing the necessity of loop structures for repeated operations	

4. Conclusions and Discussion

This study aims to identify and analyse the outcomes of Turkish ICT curriculum in order to understand how digital competence is conceived in the middle schools in Turkey. To achieve this, outcomes of 5th grade ICT course were compared with the categories and subcategories of the DigComp framework. Data was collected through document analysis. The document analysis followed in this research can be summarized as follows:

1. Access documents: Since the document used in this study is ICT curriculum developed by the Turkish Ministry of National Education, this curriculum was reached on the website of the Ministry.
2. Checking the originality: It has been accepted that the curriculum is original as it is downloaded from the official website of the institution and reached through the institution.
3. Developing the framework for understanding and analysing document: Prior to the analysis, the curriculum was subjected to a preliminary examination. Although there is an analysis framework (code and category list) which is already defined in the form of DigComp Standards, it was necessary to understand the general structure of the texts and to establish a common analysis framework for analysis as the structure of each curriculum differs. In this study, outcomes of the curriculum were chosen to compare with the standards of the framework. Analysis of the elements such as learning-teaching processes and the role of the teacher, learning-teaching approaches (such as theories and methods, constructivism, multiple intelligence approaches, learning styles), examples of measurement and evaluation were excluded because they differ in form.
4. Analysing the data: ICT curriculum for 5th grades was subjected to content analysis.
5. Using the data: The phase of using the data, which is the final stage of the document analysis, includes the phase of using and analysing the implications as a result of the analysis to answer the research question.

As the results show that, the general comparison between the DigComp framework and the Turkish ICT curriculum indicates that the competence areas in the DigComp framework are generally covered in the Turkish ICT curriculum. Considering the general structure of the curriculum it is observed that the names of the categories differ and also some outcomes are included in different categories compared to the framework. However, this may be caused by the intersectional characteristics of the competence domains. As stated by Reference [14], in the DigComp framework there are many overlapping and cross-references between areas and competences. For instance the "Problem solving" dimension can be found in all the other intersectional areas and therefore in all other areas of competence. There can be found more examples of this intersection such as in the dimension of "data and information literacy" which includes the ability to "evaluate information" as part of the cognitive dimension to problem solving. Communication and content creation involves various aspects of problem solving (interaction, collaboration, content development, and programming). Therefore, that the nature of the areas stated in the framework and the curriculum is not similar makes no literary sense. Some of the competences listed in framework can also be mapped differently in the Turkish ICT curriculum as a matching standard. For instance, the standard “Protecting health and well-being” placed in the safety domain in the DigComp matches with the outcome “Explaining the effects and possible symptoms of using information technologies on body and mental health” placed in Information Technologies domain in the curriculum although the first is about knowledge while the latter is about implementation. Programming as well is situated in different domains, as it is a described as a competence to create digital content in the DigComp framework however in the curriculum it is situated in the dimension of problem solving. By all means, programming is finding its place in the Turkish compulsory education. The curriculum mostly emphasizes programming skills, as it has become a state policy for the government to facilitate students with programming skills from the very beginning of middle school. Programming is viewed as part of the basic skills of the 21st century, developing problem-solving skills and analytical thinking, attracting students to the ICT industry and strengthening ICT employability. In addition, programming knowledge is important for a better understanding of current technology-rich environments [27].

Even though there is too much emphasis on programming, safety issues can be said to be ignored throughout the curriculum. In the report issued by the Turkish Ministry of Development [23] it is stated that awareness-raising content would be added to the curriculum against risks of inappropriate use of ICT. Copyright infringement over the internet would also be considered in the context of update of the curriculum. However, current ICT curriculum refers to only 3 outcomes related to safety issues. Meanwhile the curriculum ignores skills based on protecting the environment and devices, which is thought to be a matter of safety in the framework.

Problem solving is another domain, which lacks some subcategories in the curriculum, which are “Identifying needs and technological responses” and “Identifying digital competence gaps”. In the curriculum, problem solving merely indicates the competences of solving technical problems and creatively using digital technologies. These two competences are equally important in order for an individual to engage in cognitive processing to understand and resolve problem situations;

they should have the willingness and awareness to engage with such situations in order to achieve one's potential [28]. The curriculum refers to data and information literacy dimension with four of the outcomes. Outcomes related to this dimension cover all the subcategories in the framework even though they are held together with communication and collaboration domain. Two other frameworks namely, the Computer and İnformation Literacy (CIL) defined by Reference [29] and P21 Framework by Partnership for 21st Century Skills, also covered the competence area Information by identifying, retrieving, and analysing digital information, in the Turkish curriculum it was chosen to be used together with communication domain.

For the communication and collaboration dimension, six outcomes out of 77 are related to sharing through digital technologies, interacting through digital technologies and managing digital identity. Three subcategories, engaging in citizenship through digital technologies, collaborating through digital technologies and Netiquette are missing in the curriculum. Especially the lack of netiquette, being aware of behavioural norms and know-how while using digital technologies, is a big shortcoming for the curriculum as some countries like Wales and Sweden support the appreciation of the need to show respect towards others integrating netiquette in their curricula [30,31]. The curriculum also has no outcomes focusing on civic participation, which is meant to provide students with the competences that relate to students' identity both as individuals and as members of their community, society, and the world [32].

The Turkish ICT curriculum can be said to be sufficient to meet the demands of digital competence standards of the DigComp framework with some subcategories ignored and can be described as detailed as the DigComp considering descriptions of competences.

This study has identified the differences and similarities between the DigComp framework and the Turkish ICT curriculum for 5th grades. It can be said that some of the categories and subcategories are similar, others are differentiated. It has been observed that the standards determined for the students to acquire the digital competence are closely related.

For the Turkish ICT curriculum out of 77 learning outcomes 33 are in line with DigComp but the other 34 are mostly related to the technical aspect of ICT. Some issues such as netiquette and civic participation are neglected and most outcomes tend to be narrower focusing only the technology itself. For the students to gain such competences more emphasis should be given to the development of students' understanding of how digitalization has impact on development of both the individual and society.

There has been a series of changes in ICT education in Turkey due to the introduction of educational reforms related to ICT. Although it was stated in official documents that primary and secondary school curricula would be enriched to emphasize positive economic, psychological, social and cultural implications of effective usage of ICT, rather than compulsory ICT courses throughout the primary and secondary school, more elective courses are offered. If students are expected to acquire specific ICT skills from primary school, a new ICT curriculum should be compulsory from primary school thorough secondary school and ICT is to be integrated in their learning or in different subject areas. Schools and teachers are to be encouraged to engage in projects, which demonstrate innovative ways of using ICT in classroom learning for promoting digital competence of students.

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