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Research Insights
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VISION OF DIGITAL COMPETENCES OF PRIMARY SCHOOL STUDENTS AND TEACHERS IN BULGARIA IN EDUCATIONAL DOCUMENTATION OF ALL SCHOOL SUBJECTS

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Abstract. The paper presents the second part of a more extensive study on the vision of digital competences of primary school students and teachers in Bulgaria according to the educational documentation. It explores the place and the approaches for developing digital competence in the curricula of all primary school subjects where this competence is integrated as transversal. The necessary competencies for primary school teachers to develop the digital competencies of students are also indicated. The research methods employed in the study are curriculum mapping and comparative analysis of educational documentation. Additionally, more than 70 students' textbooks and their corresponding methodological guides for primary school teachers are reviewed for further clarification. The results of the study demonstrated a deficient consistency and balance among the curricula regarding the development of digital competence. There seems to be a lack of a shared vision for the digital competencies that students should acquire in primary school, and their development as a separate subject is not aligned with their development in other subjects. Moreover, the results implied a need for conceptualization of the integration of digital competences as transversal in the curricula, referencing appropriately the Digital Competence Framework for Citizens. There is also an emerging necessity to develop specific instructions for teachers on how to integrate the various key competences into the teaching of respective subjects.

Keywords: digital competence; primary school; Bulgarian curricula; DigComp; DigCompEdu

Introduction

The present paper is part of a more extensive study that investigates digital competencies of primary school students and teachers which are prioritized in the Digital Education Action Plan[1]. It examines the status of digital competencies in the existing educational documentation for primary education in Bulgaria. In the first part

of this study, the focus was on the curricula of the subject "Computer Modelling" (CM), which is fundamental for the development of these competencies in Bulgarian primary education, while this second part of the research explores the curricula of all subjects in primary school in terms of digital competences. As a starting point for the analysis of the curricula in both the previous and current studies, the European Framework for Digital Competence of Citizens, DigComp 2.2 (Vuorikari et al. 2022), is utilized, encompassing the following 5 areas: (1) Information and Data Literacy; 2) Communication and Collaboration; 3) Creating Digital Content; 4) Safety; 5) Problem Solving. Additionally, the European Framework for Digital Competence of Educators, DigCompEdu (Punie 2017), is employed, outlining 6 competence areas: (1) Professional Engagement; 2) Digital Resources; 3) Teaching and Learning; 4) Assessment; 5) Empowering Learners; 6) Facilitating Learners' Digital Competence. These frameworks serve as widely accepted benchmarks for the digital knowledge, skills, and attitudes required by all citizens in the 21st century, particularly educators in our rapidly evolving digital society.

Approaches to cultivating digital competencies in EU countries involve their acquisition as a separate subject, as is the case with the CM subject in Bulgaria, as a cross-curricular theme taught across all subjects, or as integrated into other subjects by becoming part of their curricula[2]. The current curricula in Bulgaria, resulting from the educational reform in 2015, were developed through a competency-based approach. They outline activities for mastering the eight key competences, including the digital competence, across every school subject. According to the Bulgarian Ministry of Education and Science (MES), digital competence is not a "school subject", nor is it taught in isolation in a particular "subject". Instead, it is viewed as a competence acquired through educational content and the applied approaches in teaching across all subjects. The acquisition of digital competence begins in preparatory groups before 1st grade and continues throughout one's lifetime[3]. In other words, digital competence is developed not only through the subject "Computer Modelling" but also as a transversal competence through the teaching of all other school subjects. From our previous study, it became evident that the development of digital competencies among students within the subject CM is not balanced in accordance with DigComp 2.2, and the anticipated competencies primarily focus on the programming domain (Aleksieva & Racheva 2024). This requires the search for the necessary balance in developing digital competencies across other school subjects.

The concept of key competences, including digital competence, as part of the European Qualifications Framework for Lifelong Learning (EQF)[4], is embedded in the Bulgarian Pre-school and School Education Act[5] and is accordingly reflected in the sub-legislative regulations. The National Educational Standard (NES) defines the expected learning outcomes expressed as competencies, with a primary focus on the eight key competences[6]. The NES "standardises" the knowledge, skills, and

attitudes required for Bulgarian students by specifying competencies for each subject and educational stage, which are further "decomposed" in the curricula by grade. In the NES, each learning outcome is linked to a competence area specific to the subject and is explicitly connected to one or more key competencies, with these connections clearly indicated in the tables in the annexes to the standard. Thus, in the curricula for all primary school subjects in Bulgaria, there are proposed activities for acquiring digital competencies. Meanwhile, the use of digital technologies to support teaching, learning, and assessment is not clearly regulated in the existing educational documentation, although in the Ordinance on the state requirements for acquiring the professional qualification "Teacher"[7], several competencies related to digital technologies necessary for obtaining the professional qualification of "primary school teacher" are specified. These include:

– Competencies related to *Teaching* – the primary school teachers should be familiar with the possibilities of applying information and communication technologies (ICT) in the learning process in an electronic environment for *the development of digital media competencies.* They should use and be prepared to use ICT in the process of teaching in an electronic environment through developed digital media competencies, including in distance learning. The primary school teachers should also be aware of the possibilities for conducting training in an electronic environment, be able to implement it effectively, and be ready to participate in it. Another essential competency involves effectively utilizing ICT to assist students in electronic or blended learning environments, demonstrating a proactive readiness for its application. The primary school teachers should also be familiar with the opportunities to facilitate independent and group work through ICT, fostering the development of students' digital media competencies. Moreover, the competency extends to engaging with students for assessment and skill support, employing educational techniques to promote active participation in learning, both in an electronic environment and in a blended format.

– Competencies related to *the Relationships with the Students* – the primary school teachers should "adhere to ethical and legal norms in relationships with students, both in direct and mediated interpersonal interactions (when using various communication technologies, including synchronous learning in an electronic environment); be prepared for effective and ethically grounded communication with primary school students during in-person and synchronous distance learning"[7].

The correlation between these stipulations in the Ordinance and the provisions of DigCompEdu, Part 3: Teaching and Learning, is apparent. Therefore, within the same Ordinance, alongside the compulsory integration of the discipline "Information and Communication Technologies in Education and Work in a Digital Environment" (ICTEWDE) into the university preparation for all prospective primary teachers, two optional disciplines aimed at fostering digital competencies are also included: "Digital Competence and Digital Creativity" and "Development of Les-

sons for Learning in an Electronic Environment". This raises the question of how pre-service teachers who have not chosen these courses are cultivating their digital competencies and whether the content of the ICTEWDE discipline holds the potential to develop digital competencies, particularly within a pedagogical context.

Another important consideration regarding teaching practice is whether the methodological guides for primary school teachers across various subjects offer explicit methodological guidance and support for integrating digital technologies into teaching, learning, and assessment.

Clear guidelines for assessment of digital competencies are also lacking. With the Ordinance amending and supplementing Ordinance No. 8 of 11.08.2016 on the information and documents for the system of pre-school and school education[8], the National Electronic Information System for Pre-school and School Education is introduced, allowing assessment to be conducted solely through an electronic diary. Though, electronic assessment and the use of digital technologies for assessment purposes are not mentioned anywhere beyond the purely administrative aspect. In practice, many teachers frequently utilize e-resources for ongoing assessment or quick feedback within a single lesson across various school subjects. Yet this is neither regulated nor traceable in official documents, and field studies are necessary to explore these practices. Assessing the digital competencies of students and teachers is also not outlined in regulatory and educational documentation.

Related to all the above issues, ***the research questions (RQs),*** posed by the current theoretical study are as follows: RQ1: What is the place of digital competencies in the educational documentation across all subjects in primary school in Bulgaria? RQ2: What are the approaches for developing digital competence in primary school students according to the educational documentation of the different school subjects? RQ3: What competencies should primary school teachers possess to develop the digital competencies of students within the different school subjects? As a logical continuation of the previous study, in this paper we attempt to find the answers to these questions.

Research Methodology

The primary ***research methods*** employed in this study are curriculum mapping, document and content analysis and comparative analysis of educational documentation. For the purposes of the study in the context of digital competencies, the NES for primary school education[9] has been analysed. A total of 35 curriculum programs[10] for all subjects taught in primary school in which digital competence is incorporated as a transversal were examined. Their content has been compared with the two competence frameworks – for citizens and for educators (DigComp 2.2. and DigCompEdu). The table 1 below outlines the school subjects categorized by grades, whose curricula are analysed.

Table 1. Primary school subjects which curricula are analysed

1st Grade	2nd Grade	3rd Grade	4th Grade
• Bulgarian Language and Literature • Mathematics • Homeland Studies • Music • Art • Technology and Entrepreneurship • Physical education and sport	• Bulgarian Language and Literature • Foreign Language[11] • Mathematics • Homeland Studies • Music • Art • Technology and Entrepreneurship • Physical education and sport	• Bulgarian Language and Literature • Foreign Language • Mathematics • Computer Modelling (CM)[12] • Man and Society • Man and Nature • Music • Art • Technology and Entrepreneurship • Physical education and sport	• Bulgarian Language and Literature • Foreign Language • Mathematics • Computer Modelling (CM) • Man and Society • Man and Nature • Music • Art • Technology and Entrepreneurship • Physical education and sport

To clarify the role of digital competence in educational documentation as transversal and to identify the existing methodological support for teachers, in addition to the curricula, over 70 electronic textbooks[13] and their corresponding teacher guides for various subjects and grades have been reviewed. The results of the study are presented in the following paragraphs.

Integration of digital key competence as transversal, embedded in the curricula across all subjects in primary school

As one of the eight key transversal competences expected to be acquired by students at the end primary school, digital competencies are incorporated in the curriculum for each mandatory primary school subject, where the respective activities that foster their development are detailed. The activities outlined in the curricula to achieve the digital key competence are examined and analysed below in comparison with the digital competence framework for citizens, DigComp 2.2. It should be noted that supplementary activities for enhancing digital competence as transversal are also integrated into the CM curriculum. This approach is not well justified, as digital competence is the focus of CM education, and it is not clear how it would be implemented as a transversal competence in this context.

In the presentation of each area of DigComp 2.2 and its place in the curriculum across different subjects, the textbooks for the respective subjects were also considered for additional orientation. Following these descriptions, the digital competencies necessary for teachers to teach the corresponding topics are outlined according to DigCompEdu. It is important to note that each competence area of DigComp 2.2, which students are expected to develop at the Foundation level, requires teachers to have developed at least at the Advanced level. Additionally,

they should possess specific pedagogical competencies necessary for fostering digital competencies in students, as described in DigCompEdu.

The following paragraphs delve into each of the competencies identified in the curricula, providing examples of activities suggested for their development. Some examples from corresponding textbooks and guides are also briefly overviewed.

Competence Area 1: Information and Data Literacy

1.1. Browsing, searching and filtering data, information and digital content (articulating information needs for searching data, information, and content in digital environments, accessing them, and navigating between them. Creating and updating personal search strategies). At basic level and with autonomy and appropriate guidance where needed, the primary school students can:

- identify their personal information needs, find data, information and content through a simple search in digital environments;
- find how to access these data, information and content and navigate between them;
- identify simple personal search strategies.

This area is addressed in the activities designated for the development of digital competence in the curricula for Bulgarian Language and Literature (with the exception of 3rd grade), Foreign Language, Mathematics, Man and Nature (only in 4th grade), Man and Society, Music (3rd and 4th grade), Arts (excluding 1st grade), Technology and Entrepreneurship (excluding 3rd grade), and Physical Education and Sports (3rd and 4th grade). The activities outlined in the curricula related to Topic 1.1 are as follows:

Table 2. Activities in the curricula related to 1.1: Browsing, searching and filtering data, information and digital content

School Subject	Key Activities
Bulgarian Language and Literature	• Utilizing electronic sources of information - dictionaries and others.
Mathematics	• Utilizing multimedia technologies for extracting, storing, creating, presenting, and exchanging information. • Using current and reliable information from electronic sources. • Searching for information (data) on the internet for the formulation of a mathematical problem.
Foreign Language (English)	• Using e-learning systems during English language classes, with the teacher facilitating safe internet use for completing educational tasks and connecting with all subjects.

Homeland Studies/ Man and Society/ Man and Nature	• Searching the internet for information about significant natural objects, historical events, and personalities; narrating about key state institutions, utilizing information from electronic media and print. • Using digital devices to search for additional information on the studied curriculum.
Technology and Entrepreneurship	• Utilizing various contemporary information sources for searching information on a topic or investigating technical issues; gathering diverse information on a specific subject.
Music	• Using computer technologies for searching and storing audio information; getting acquainted with contemporary musical instruments.
Art	• Virtual visits to galleries/exploring virtual galleries. • Using a computer to collect, organize, and use information to support the creative process in creating various types of images (pictures, symbols).
Physical education and sport	• Utilizing information technologies to search and find the necessary information related to sports activities/Physical Education and Sports.

In ***Bulgarian Language and Literature*** textbooks, tasks like "Check in a dictionary" are included, but it is not always clearly indicated that the check can be done in an online dictionary. E-textbooks feature an icon for checking a word in an online dictionary, but this activity is primarily facilitated in the classroom by the teacher, as students often lack access to these resources. The lack of direct interaction between students and online resources hinders the development of the competence in working with them. Textbooks do not provide specific guidance and instructions for teachers regarding work in this direction. Some textbooks include tasks for research and information retrieval, but clear instructions for internet searching and the development of digital skills in students through such tasks are missing.

In ***Mathematics*** textbooks and the instructional guides for teachers, tasks are included where students are required to search for information on the internet, often aiming the creation of math word problems. However, the teacher's books do not provide specific guidance on how to instruct students, nor do they suggest suitable websites for information searches.

The use of e-learning systems is incorporated into the ***English Language*** curricula for all classes, yet no instructions are found in the textbooks or supplementary materials. It remains unclear which e-learning systems are intended to be used, in what context, and for what educational purposes.

In textbooks for ***Man and Society*** and ***Man and Nature***, activities often involve students researching information about various natural objects, historical

figures, etc., either as part of projects or tasks labelled "Investigate". When the task description is simply "Investigate," this may include research beyond the internet. However, in most sets, specific guidance or suggestions for websites to conduct searches are not provided. This is not an ideal approach when working with primary school students, considering their safety on the internet. Nevertheless, in some textbooks, specific websites are suggested (e.g., Wikipedia). It is notable that as one of the activities involving information from e-resources the curriculum includes, for example, '*discussing* state institutions.' Even though it is based on e-resources, it may not be considered an activity for forming digital competence. Clarity and specificity in the proposed activities in this area within the curricula are necessary.

In ***Technology and Entrepreneurship*** textbooks, primarily in 4th grade, tasks for inquiry or projects are included that require the exploration of specific information, including information for digital devices and their usage. However, the textbooks do not provide guidelines about specific websites where students are expected to seek information, and, in general, there are no recommendations for internet searches. In the methodological resources, brief instructions are given to teachers, the main one being that students should search the internet with the help of their parents.

In ***Music*** textbooks, there are tasks related to exploring customs, preparing concert programs, recording sounds and melodies, and listening to examples from e-resources. While the explicit use of digital technologies by students is not mentioned in the textbooks, such guidelines are proposed in the teacher's guides. In 4th grade, some textbooks include tasks for installing a sound playback application and creating playlists, as well as getting acquainted with digital devices for playing music. There is an introduction to contemporary music technologies, along with practical application for creating and recording music, including visual explanations. Musical projects created through mobile applications are also presented. It can be stated that, in this subject, certain textbooks and methodological guides encompass the most activities with the potential to effectively develop students' digital competencies. However, this is not universally applicable to all textbooks and materials, emphasizing the importance of the author's interpretation of the curriculum and focus on developing students' digital competence.

In ***Art*** textbooks, tasks such as "Search the internet for pictures..." (with specified parameters), "Find information about..." (artists, deities, paintings, museums, coats of arms, old cities, treasures), creating a digital class encyclopaedia (gathering information with pictures of various cultural monuments, instructions for organizing in folders, in a booklet to be printed), exploring virtual museums and galleries, including online games in them, and projects for online games are included. Some textbooks feature an icon for "Internet Research". Suitable activities are outlined in the textbooks and teacher's guides to develop digital competencies, accompanied

by some guidelines in this area. This subject, along with music, incorporates diverse activities in the curriculum that can contribute to students' digital competencies.

The activities outlined for the development of area 1.1. of DigComp in ***Physical Education and Sports*** are meaningful and practical, but it is not entirely clear how they should be implemented in an instructional context, whether during lessons or as homework, etc. Since there are no textbooks for this subject, and the methodological guides (teacher's books) lack such information, the specific details regarding the execution of these activities within the learning framework remain unclear.

The competencies of teachers for teaching this area of competence

In order to teach effectively and develop students' knowledge, skills, and attitudes, teachers need to possess the aforementioned Competence 1.1. at the Advanced level, as well as the following specific competencies from DigCompEdu:

From the area of ***Facilitating Learners' Digital Competence****:*

– *Information and media literacy* – level of Explorer (A2) – the teacher should encourage learners to use digital technologies for information retrieval, e.g. on assignments

– *Digital communication and collaboration* **–** level of Explorer (A2) – the teacher should encourage learners to use digital technologies to interact with other learners, with their educators, management staff and third parties.

– *Responsible use* – level of Explorer (A2) – the teacher should: foster learners' awareness of how digital technologies can positively and negatively affect health and wellbeing, e.g. by encouraging them to identify behaviour (of their own or of others) that makes them happy or sad; foster learners' awareness of the benefits and drawbacks of the openness of the internet.

From the area of ***Digital Resources:***

– *Managing, protecting and sharing* **–** level of Integrator (B1) – the teacher should effectively share and protect resources using basic strategies; share educational content on virtual learning environments or by uploading, linking or embedding it e.g. on a course website or blog.

From the area of ***Teaching and Learning***

– *Self-regulated learning* – level of Explorer (A2) – the teacher should encourage learners to use digital technologies to support their individual learning activities and assignments, e.g. for information retrieval or presenting results.

1.3. Managing data, information and digital content:

- identify how to organise, store and retrieve data, information and content in a simple way in digital environments.
- recognise where to organise them in a simple way in a structured environment.

This area is only found in the CM curriculum for the 3rd grade. The specified activity there is "Information Processing," which, despite sounding quite general,

can be attributed to this competence area based on the included educational content in the textbooks. The inclusion of digital competencies as transversal in CM education, however, remains unjustified.

The competencies of teachers for teaching this area of competence

For developing Competence 1.3. in the students, teachers need to possess the corresponding competency from DigComp 2.2. at the Advanced level, as well as the following specific competencies from DigCompEdu:

From the area of ***Facilitating Learners' Digital Competence****:*

– *Information and media literacy* – level of Explorer (A2) – the teacher should encourage learners to use digital technologies for information retrieval, e.g. on assignments.

– *Digital content creation* – level of Explorer (A2) – the teacher should encourage learners to use digital technologies for creating content and express themselves using digital technologies, e.g. by producing texts, images, videos.

– *Responsible use* **-** level of Explorer (A2) – the teacher should encourage learners to use digital technologies safely and responsibly; foster learners' awareness of how digital technologies can positively and negatively affect health and wellbeing.

Competence area 2. Communication and Collaboration

2.4. Collaborating through digital technologies – the student chooses simple digital tools and technologies for collaborative processes.

2.5. Netiquette – the student differentiates simple behavioural norms and know-how while using digital technologies and interacting in digital environments.

This competence area through the specified subdomains is only found in the Bulgarian Language and Literature curriculum for the 4th grade. The envisaged activities through which these competencies can be realized include participation in team activities for creating presentations related to studied literary works (2.4); application of rules for speech politeness in online communication (2.5). However, in textbooks and methodological guides, there are no guidelines for their implementation, nor are specific tasks provided for their formation. There are sufficient number of activities related to collaboration, but not specifically through digital technologies (or at least such instructions are lacking), as well as activities related to etiquette in communication, but not specifically online netiquette. This means that the teacher could facilitate such activities, but he should be provided with support and guidelines for their effective implementation.

The competencies of teachers for teaching this area of competence

In order to teach effectively and develop students' knowledge, skills, and attitudes for this competence, teachers need to possess the aforementioned competence at the

Advanced level, as well as the following specific competencies from DigCompEdu:

From the area of ***Facilitating Learners' Digital Competence***:

– *Digital communication and collaboration* – level of Explorer (A2) – the teacher should encourage learners to use digital technologies to interact with other learners, with their educators, management staff and third parties.

– *Collaborative learning* – level of Explorer (A2) – the teacher should encourage learners to use digital technologies in their collaborative activities and when implementing such activities or projects, the teacher should encourage learners to use digital technologies to support their work, e.g. for internet search or to present their results.

Competence area 3. Digital Content Creation

3.1. Developing digital content (to create and edit digital content in different formats, to express oneself through digital means.). At basic level and with autonomy and appropriate guidance where needed, the student can:

- identify ways to create and edit simple content in simple formats;
- choose how to express oneself through the creation of simple digital means.

This competence area is present in the activities outlined in the Bulgarian Language and Literature curricula (except for 3rd grade), Mathematics, Homeland Studies (excluding 1st grade), Man and Nature, Man and Society, Arts, Technologies and entrepreneurship (3rd and 4th grade), Physical Education and Sports (3rd and 4th grade), and CM. The activities specified in the curricula and associated with this area include:

Table 3. Activities in the curricula across various subjects related to Topic 3.1: Developing Digital Content

School Subject	Key activities
Mathematics	• Utilizing multimedia technologies for extracting, storing, creating, presenting, and exchanging information; • Employing modern ICT for visualization, presentation, and problem-solving; • Utilizing age-appropriate educational software with a focus on mathematics; • Solving tests and mathematical problems in a virtual environment.
Bulgarian Language and Literature	• Writing letters and words in Cyrillic script, composing text for SMS and greeting cards, and crafting letters through electronic means, including for communication
Homeland Studies / Man and Society / Man and Nature	• Presenting project activities using digital tools; • Creating presentation slides on a given topic; • Using ICT for visualizing educational content; • Visualizing objects and phenomena from the natural environment; • Presenting project activity artefacts in electronic format.

Technology and Entrepreneurship	• Utilizing tools for creating and presenting information about products, services, models, and technical objects.
Art	• Drawing images and symbols resembling icons in digital tools; • Using a computer to create various types of images (pictures, symbols); • Presenting results from artistic activities and projects; • Interactive use of information and communication technology with the assistance of the teacher for interpreting artistic works.
Physical Education and Sports	• Using ICT for visualizing educational content
Computer Modelling (CM)	• Creating digital content; • Selecting suitable applications (visual environments, graphic editors) for generating and presenting ideas, feelings, and thoughts.

In ***Mathematics*** textbooks and teacher guides, the activities related to competence area 3 are focused primarily on utilizing resources in the e-textbook (various games and software applications, including those for mathematical modelling). However, most publishing houses do not provide free access for students to these resources, limiting the effective development of this competence. On the other hand, teachers, who have unrestricted access, can use these resources in the classroom. Yet it is doubtful to what extent frontal work in the classroom with educational software or teacher demonstrations through such tools or multimedia presentations supports the development of students' competence for digital content creation.

In textbooks for ***Bulgarian Language and Literature***, particularly within the Speech Development section, there are educational tasks focused on text creation, designed for sharing through electronic platforms. Despite that, students write these texts in their notebooks, and there is no real integration of technologies. In certain school primers, authors include visuals of a computer keyboard featuring symbols, facilitating students' understanding of its layout. Nevertheless, it is challenging to talk about the actual creation of digital content in traditional lessons, although during COVID-19 emergency remote teaching, students actively generated textual artefacts.

In textbooks for ***Man and Society and Man and Nature*****,** there is a widespread emphasis on project-based learning, incorporating numerous projects that provide students with the opportunity to create presentations on various topics. However, the lessons in the textbooks and teacher guides lack specific requirements for the nature of the presentation, indicating that it does not necessarily have to involve electronic means. Specific guidelines for implementing the aforementioned activities with regard to digital technologies are not evident in the methodological guides.

In ***Technologies and Entrepreneurship*** textbooks, particularly in the 4th grade, project-type tasks involving research and presentations are included. Yet specific instructions or requirements for teachers and students regarding the type, format, and

resources related to presentations are not provided.

In ***Art*** textbooks, assignments such as "Create a presentation about..." are presented, frequently paired with tasks like "Research information and create a presentation about...," covering topics such as artists, customs, cities, crafts, traditional clothing, etc. Activities involving printing pictures of buildings for collage purposes are also included. As with the textbooks mentioned above, there are no specific guidelines for creating presentations, nor are there any other instructions related to the development of digital competencies using various technologies.

Activities and guidelines for the use of ICT in ***Physical Education and Sports*** are not evident in the teacher's methodological guides. Overall, it is unclear what using ICT for visualization means – who will visualise, and what will be visualised? Formulated in this way, it seems more like visualization by the teacher, an activity that is quite distant from developing digital competencies in students.

The competencies of teachers for teaching this area of competence

To teach effectively and develop students' knowledge, skills, and attitudes for this competence, teachers need to possess competence in the same area at the Advanced level, as well as specific competencies from DigCompEdu in the following areas:

From the area of ***Facilitating Learners' Digital Competence****:*

– *Digital content creation* – level of Explorer (A2) – the teacher should encourage learners to use digital technologies for creating content and express themselves using digital technologies, e.g. by producing texts, images, videos.

From the area of ***Digital Resources:***

– *Managing, protecting and sharing* **–** level of Integrator (B1) – the teacher should effectively share and protect resources using basic strategies; share educational content on virtual learning environments or by uploading, linking or embedding it e.g. on a course website or blog.

From the area of ***Teaching and Learning:***

– *Teaching* **–** level of Explorer (A2) – basic use of available digital technologies for instruction. The teacher should use available classroom technologies, e.g. digital whiteboards, projectors, PCs; and choose digital technologies according to the learning objective and context.

Competence Area 4. Safety

4.2. Protecting personal data and privacy – the student can:

- identify simple ways to use and share personally identifiable information while protecting myself and others from damages;
- distinguishes simple ways to avoid health risks and threats to physical and mental well-being when using digital technologies;
- chooses simple ways to protect oneself from potential dangers in the digital environment.

This competence area could be implemented through activities included in the CM curriculum for the 3rd grade, such as "Applying rules for safe work in the digital environment." Lessons in CM textbooks address various internet threats, rules and methods for protection, the specifics of digital identity, safety in using digital devices, and related regulations (ergonomic, etc.). However, these topics are integral to the core competencies aimed at students in CM education, and it is not clear how they are distinguished from the transversal competencies.

The ***English language*** curriculum implies that students use e-learning systems in English classes, with the teacher assisting in the **safe** use of the internet during educational tasks. Yet descriptions and guidelines for such activities are not provided in the existing textbooks and teacher guides for English, making it unclear how such assistance is planned to be implemented.

The competencies of teachers for teaching this area of competence

In order to teach effectively and develop students' knowledge, skills, and attitudes for this competence, teachers need to possess need to possess the mentioned competence at the Advanced level, as well as the following specific competencies from DigCompEdu:

From the area of ***Facilitating Learners' Digital Competence****:*

– *Responsible use* – level of Explorer (A2) – the teacher should encourage learners to use digital technologies safely and responsibly; foster learners' awareness of how digital technologies can positively and negatively affect health and wellbeing, e.g. by encouraging them to identify behaviour (of their own or of others) that makes them happy or sad; foster learners' awareness of the benefits and drawbacks of the openness of the internet. It would be more appropriate if the teacher possesses this competency at the Integrator level (B1) and implements measures to ensure learners' wellbeing of learners by giving practical and experience-based advice on how to protect privacy and data, e.g. using passwords, adjusting the settings of social media; assists learners in protecting their digital identity and managing their digital footprint; advises learners on effective measures to confine or counter the impact of inappropriate behaviour (of their own or their peers). This competency is necessary for teachers to instruct CM in primary classes, while the A2 level would be sufficient as a transversal competency in other subjects.

Competence area 5. Problem Solving

5.2. Identifying needs and technological responses: the student can identify needs, and recognise simple digital tools and possible technological responses to solve those needs.

5.3. Creatively using digital technology – the student shows interest individually and collectively in simple cognitive processing to understand and resolve simple conceptual problems and problem situations in digital environments.

This competence area is represented in the curricula through variety of activities in Music (excluding the 3rd grade) and in CM. The envisaged activity for realizing these competencies in the ***Music*** curriculum involves the use of digital sound reproduction equipment and contemporary musical instruments (5.2). In ***CM***, such activities include selecting suitable applications (visual environments, graphic editors) for creating and presenting ideas, emotions, and thoughts (5.2); problem-solving using digital technologies (5.); and leveraging the capabilities of digital technologies to support analytical thinking and creativity (5.3).

In ***Music*** textbooks, students are expected to work with various applications, generating playlists, selecting different types of music, and arranging them while choosing the instruments themselves. These activities, along with those outlined in other competence areas in music education, position music as one of the subjects that provide excellent opportunities for building students' digital competencies. In ***CM*** textbooks, there are assignments that demand students to autonomously choose appropriate tools for crafting a project, game, or image, engaging in the creative utilization of digital technologies either individually or collaboratively in teams. Though as it becomes clear, these activities are integrated into a subject with the principal aim of fostering students' digital competence, rather than it being a supplementary objective.

The competencies of teachers for teaching this area of competence

To teach effectively and develop students' knowledge, skills, and attitudes in Area 5, teachers need to possess competence at the Advanced level in it, as well as the following specific competencies from DigCompEdu:

From the area of ***Digital Resources:***

– *Managing, protecting and sharing* **–** level of Integrator (B1) – the teacher should effectively share and protect resources using basic strategies; share educational content on virtual learning environments or by uploading, linking or embedding it e.g. on a course website or blog.

From the area of ***Facilitating Learners' Digital Competence****:*

– *Digital problem solving***-** level of Integrator (B1) – the teacher should implement learning activities in which learners use digital technologies creatively, expanding their technical repertoire; encourage learners to help each other in developing their digital competence.

Apart from the activities described above, it appears that there are activities included in the curricula that cannot be directly related to DigComp 2.2, and it is not entirely clear how they contribute to the development of digital competence. Examples of such activities are 'Observing phenomena and processes presented through digital means' (Homeland Studies, 1st grade) and 'Reading from a display' (the only activity included in Bulgarian Language and Literature curriculum for 3rd grade). Both activities involve only passive use of technology by students to perceive information and they do not directly contribute to the development of

their digital competence and therefore their place in the curriculum needs to be reconsidered. This does not mean that such activities should not be present in the classroom, but their presence in the curricula raises questions about the expertise of the curriculum authors in the field of digital competence and indicates a lack of final expert assessment regarding integration of digital competence in the curricula of all subjects.

To offer a more lucid overview of the development of digital competence in primary school as transversal across various subjects, Table 4 below presents the competence areas according to DigComp 2.2 and the inclusion of activities related to their implementation in the curricula.

Table 4. Activities for the development of DigComp 2.2. areas across various subjects

At basic level and with guidance		**Information and Data Literacy**			**Communication and Collabration**						**Digital Content Creation**				**Safety**				**Problem Solving**			
School Subject	Grade	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	5.3	5.4
Bulgarian Language and Literature	1	X									X											
	2	X									X											
	3																					
	4	X						X	X		X											
Foreign Language (English)	2	X																				
	3	X																				
	4	X																				
Mathematics	1										X											
	2										X											
	3										X											
	4										X											
Homeland Studies	1																					
	2										X											
Man and Nature	3										X											
	4	X									X											
Man and Society	3	X									X											
	4	X									X											

Music	1																		x		
	2																		x		
	3	x																			
	4	x																	x		
Art	1										x										
	2	x									x										
	3	x									x										
	4	x									x										
Technology and Entrepreneurship	1	x																			
	2	x																			
	3										x										
	4	x									x										
Physical Education and Sports	1																				
	2																				
	3	x									x										
	4	x									x										
CM	3										x								x		
	4			x							x				x					x	

As evident from the table above, the curricula for various subjects primarily include activities for the development of digital competencies which can be associated with the following two areas of digital competence from DigComp 2.2 – 1. Data and Information Literacy and 3. Digital Content Creation, specifically in sub-domains 1.1. Browsing, searching and filtering data, information and digital content, and 3.1. Developing digital content. Activities in these areas are expected to be conducted at a foundational level, either with guidance or independently. Activities addressing sub-domains of competence areas 2. Communication and Collaboration, 4. Safety, and 5. Problem Solving are explicitly outlined in only three subjects. Notably, activities in areas 4 and 5 are drawn from the CM curricula, for which it has been repeatedly emphasized that it is lacking rationale and clear differentiation between activities intended for developing the subject's primary goal and the supplementary activities.

In a summarized manner, the competencies that primary school teachers should possess to integrate digital competence as transversal in education are presented in Table 5. It is evident that the emphasis is on areas related to facilitating the digital competence of learners, as well as teaching and learning, which coincides with the required competencies for teaching CM (Aleksieva & Racheva 2024). The question of how teachers acquire these competencies remains open.

Table 5. Competencies of teachers for developing digital competence as a transversal skill

	Professional Engagement				Digital Resources			Teaching and Learning				Assessment			Empowering Learners				Facilitating Learners' Digital Competence				
	1.1.	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	3.4	4.1	4.2	4.3	5.1	5.2	5.3	5.4	6.1	6.2	6.3	6.4	6.5
A2								x			x								x	x	x	x	
B1							x															x	x

Conclusions

The review of educational documentation for primary grades in Bulgaria indicated a lack of consistency among the curricula regarding the development of digital competence. This competence is integrated in Bulgarian primary school curricula both as a separate subject (CM) and as a transversal competence embedded in the curricula of all subjects. In the CM educational documentation imbalances were noted concerning the predominant areas of digital competence outlined in the curricula, emphasising on the Digital content creation, specifically programming. One of the possible approaches for a more comprehensive development of competencies across different areas could be through their incorporation into other subjects. However, the analysis of educational documentation reveals that even in the instruction of other subjects, the emphasis is once again placed on Digital content creation, while activities in areas Communication and Collaboration (2.1 Interacting through digital technologies; 2.3 Engaging citizenship through digital technologies) and Problem Solving (5.1 Solving technical problems; 5.4 Identifying digital competence gaps) are lacking. The inclusion of sub-domain 2.4 Collaborating through digital technologies and 2.5 Netiquette (outlined in the Bulgarian Language and Literature programs) is a positive aspect, but unfortunately, the concept for their implementation is not clearly defined in textbooks and methodological guides. Thus, ***there seems to be a lack of a shared vision for the digital competencies that students should acquire in primary school, and their development as a separate subject is not aligned with their development in other subjects***. Although many activities indicated in the curricula related to digital competence are meaningful, they are not explicitly linked to the existing European frameworks for digital competence. The activities' descriptions suggest that an expert assessment of the integration of digital competence in the curricula of all subjects is not conducted. Furthermore, the existing textbooks and methodological literature do not provide systematic or specific guidelines for the development of digital competencies. Some ideas are suggested, and there is a reliance on the creativity of the teacher which gives him an absolute freedom of interpretation. Nevertheless, the primary document for teachers is the curriculum, and regardless of the information in textbooks and teacher guides, teachers should follow it.

It can be concluded that teaching, learning and assessment with the use of technology are not regulated effectively in the existing educational documentation. The opportunity for electronic assessment through an electronic diary is introduced with the Amendment to Ordinance No. 8 of 2016[3], but electronic assessment through digital technologies for this purpose is not mentioned. There is also no provision for assessing students' digital competences at the end of the primary education stage.

The analysis underscores ***the need to conceptualize the integration of digital competences as transversal in the curricula, referencing appropriately the Digital Competence Framework for Citizens. Only after this conceptualization should it be specified for individual subjects*.** Also, the necessity of unified approach in developing the curricula and corresponding guidelines for teachers in a suitable document is evident. In other words, when developing the curricula for each of the key competencies, activities in various subjects should be purposefully and interconnectedly envisaged, so that specific targeted results are achieved by the end of the 4th grade. There is also a need to develop specific instructions for teachers on how to integrate the various key competences into the teaching of respective subjects.

Moreover, a key factor for the successful development of students' digital competences is the professional competence of the teacher. This encompasses advanced-level digital competences according to DigComp 2.2, as well as pedagogical competences necessary for their formation in students, described in DigCompEdu, especially in the area "Facilitating Learners' Digital Competence." This area is pivotal in the context of teaching the CM subject, emphasising that proficiency in it should be an inherent component of teachers' university education. To propose precise strategies for enhancing the digital competences of both teachers and students, it is necessary to conduct an unbiased assessment of their current digital competences. Such an assessment can be conducted as part of future empirical research in Bulgarian primary schools.

Finally, teachers and students can enhance their competencies informally through sources that are challenging to trace – various online materials, educational resources, software, video tutorials, and other resources, available for them to leverage in the development of their digital competence.

From this point, several research questions for future work emerge: 1) What pedagogically relevant approach should be applied to integrate digital competences into the curricula of primary school? 2) How can a well-balanced development of digital competences, encompassing the five areas of DigComp 2.2, be achieved through their integration into primary school subjects? 3) What is the level of development of digital competences in students at the end of the 4th grade? 4) Do primary school teachers possess the necessary competences to cultivate students' digital skills through integration across individual subjects? Answers to these questions will be sought through additional analytical studies as well as empirical research involving teachers and students from primary school.

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NOTES

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9. MES, Ordinance No. 5 of November 30, 2015 on General Education.

10. MES, Curricula by Grades, available at https://web.mon.bg/bg/28, [viewed 10.10.2023].

11. For Foreign Language the curricula of English Language were examined, as the most common language of study in the primary grades in Bulgaria.

12. CM is a separate subject, the focus of which is digital competence, but its curricula also include its integration as transversal.

13. TEXTBOOKS AND LEARNING RESOURCES FOR PRIMARY SCHOOL STUDENTS, available at https://web.mon.bg/bg/100428. [viewed 10.10.2023].

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