Digital Competence in Teacher Education Curriculum- from Objectives to Assessment

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Abstract

This article presents and analyzes some of the results of a large-scale study on the level of digitalization in Bulgarian education under the SUMMIT project in the context of the European Framework DigCompEdu. The focus of this stage of the study is on the syllabuses of courses included in the Bulgarian state requirements for teacher qualification. The main goal is to study the reflection/conceptualization of pedagogical digital competencies at the level of planning the educational process in the teacher education at the institutional level. The syllabus of courses in all faculties of Sofia University "St. Kliment Ohridski", which are engaged in the preparation of teachers in different content areas and at different educational stages, were studied. The research questions are focused on the key competencies from the framework for the studied courses and the possible influences in defining them as such. The results show that the courses mostly emphasize the selection of digital resources, teaching and assessment strategies, while the inclusion of competencies in the programs and their interpretation is influenced by the content of the university courses and the specificity of the subjects that the students will teach.

Keywords: Teacher Education Curriculum, DigCompEdu

1. Introduction

In recent years, the issue of future teachers' digital competency development and educational digital competencies, in particular, has become relevant due to several factors resulting from the growing influence of digitalization on all spheres of life. These factors are provisionally considered into three groups or levels:

- changes external to education – the impact of digitalization on economic, social, and political concepts and processes;

- socio-educational borderline changes – new strategies in educational policies – instruments and practices on an international and national level;

- changes in educational theory and practice.

Discussions abound both in the field of reflecting upon the economic changes and in the field of policies. Some authors believe in the existence and multilayer dimensions of digital economics by contending that: "Advances in communication and IT have ushered in a digital revolution that is reshaping how the world works, learns, communicates, and does business. Scientific research has shifted its focus to digitalizing social and economic systems" (Xu et al, 2022, p.9); other authors expound that the modifier "digital" shifts the focus onto the network and ever more autonomous processing of enormous amounts of digitally encoded data and information. However, this has not yet resulted in the creation of essentially new economics as it does not change the extant method of distribution and appropriation of publicly created products (Gradinarov, 2020, p.209). Research findings on the relationship between digital policy and digital democracy are also ambiguous (Prodanov, 2012; Boevska, 2022)

There is no doubt, however, that the very existence of discussions is indicative of change in people's thinking and the growing confidence that: "A bright spot on the horizon is the development of digital technologies, which has the potential to direct and spark the transformation necessary to achieve all 17 of the Sustainable Development Goals "(Xu et al, 2022, p.12)

Educational policies on different levels reflect this understanding to a certain extent. Both Europe and Bulgaria have elaborated strategic instruments whose comparative analysis shows similar stages of developing the idea and specific challenges.

The outlined policies, practices and studies raise the requirements for future teacher preparation and, thus, prompt researchers to pay even closer attention to reconsidering educational paradigms and practices. In particular, researchers have to answer the question about future teachers' readiness to prepare their students for living in a digital world and about the approach that is to provide a common language and a common method for comparing and correlating the results.

Against this background, and as part of a large-scale research project of the digitalization of Bulgarian education, a study was conducted to examine the courses' programs under the state requirements included in the curricula of different faculties at different educational stages.

1.1 Contextual Specifics of the Study

Regarding educational policies and practical solutions for teacher preparation

State policies regarding teacher preparation and qualification in Bulgaria align with European and global trends in this field, yet they also possess their unique characteristics. The central policy vision is provided in the Pre-School and School Education Act. Still, the specific requirements are outlined in the Ordinance on the State Requirements for Acquiring the Professional Qualification of a Teacher, dated 7 November 2016, which took effect as of the 2017-2018 school year. As is well known, this ordinance determines the structure and level of student preparation in terms of types of courses and the required number of study hours. The regulated preparation includes four types of courses: educational, psychological, methodological and ICT-based. It is carried out in various faculties at higher educational institutions at different levels of education, including bachelor's, master's, and postgraduate diploma qualification programs.

Regarding the selected DigCompEdu Framework model

Most countries consider the unique characteristics of the national context and use different digital literacy and/or competency models. Bulgaria is no exception – no national decision has been adopted to use a uniform approach. Yet, due to the growing popularity of supranational frameworks such as DigCompEdu (Peters et al, 2022), it serves as a starting point of interest

in the current research. The framework is known to contain 22 competencies grouped into six areas: professional engagement /here, category 1 in the data/, digital resources /category 2/, teaching and learning /category 3/, assessment /category 4/, learner empowerment /category 5/ and facilitating learners' digital competency /category 6/ (Punie & Redecker, 2017).

Regarding the location of the study

The study was conducted at Sofia University "St. Kliment Ohridski" – the oldest and most authoritative higher education institution in Bulgaria. The main reasons for the choices made can be found in the specific features of the teacher preparation courses offered at the University:

- Sofia University "St. Kliment Ohridski" conducts teacher preparation and qualification programs in different faculties, covering five areas of higher education: educational sciences, the humanities, social sciences, business management and legal sciences, natural sciences, mathematics, and informatics. The areas of higher education are sampled from the Classifier of Areas in Higher Education, Council of Ministers' Decree 125, effective as of June 24, 2002, by selecting only those offering teacher preparation.
- The basic tendency in teacher preparation has been considered, opening wide doors for everyone who wishes to obtain teacher qualification in one of the three possibilities – bachelor and master programs and postgraduate diploma qualification courses.

2. Research Methodology and Design

In the above outlined context, the **aim** at this stage of the study is to determine and analysis the impact of faculty subject fields on implementing the DigCompEdu competencies in the syllabuses of courses specified in the state requirements for teacher qualification.

The formulated two research questions are as follows:

- Which framework competencies are most widely covered by the course syllabuses in the natural science faculties and the other faculties?

- Is there an influence of the subjects the students will teach on the competency fields covered by the course syllabuses?

For the analysis of the course syllabuses, **a specially constructed instrument—a checklist**—has been elaborated and applied (Mizova et al, 2025). The checklist covers all framework competencies traced in terms of two variables: the aims and content of the courses and assessment. Each of the two fields includes three options – the explicit presence of a competency, the possibility for the competency to be applied or demonstrated, and the absence of the competency in the course syllabus.

Research Sampling and Testing

In total, 49 course syllabuses were analyzed based on different educational degrees. Of these, 27 were in the natural sciences, and 22 were in other fields. The syllabuses are based on courses that comply with educational, psychological, methodological, and ICT-based requirements and adhere to the University's standard structure.

The study was conducted from August to December 2024.

3. Results and Discussion

Regarding the first research question

As the first question aims to establish the influence of faculty specifics on the inclusion of framework competencies into course syllabi, it is noteworthy that the feature under observation

does not influence the inclusion of competencies of ranks 1, 2, and 4 –4.5. The selection of digital resources ranks at 1 in both groups. Rank 2 in both groups is for teaching. Assessment strategies rank 4 and 4.5. The only difference occurs regarding the ranking of competencies at 3. For the natural sciences faculties, it is for creating digital resources, whereas for faculties in other fields, it is for organizational communication. The latter may be interpreted in terms of the faculties' specifics. As far as the subject specifics in natural science faculties require a higher level of abstract knowledge, whose acquisition may be facilitated by digital resources, the necessity for a more significant number of and more original digital resources may be reasonable. The content in faculties of other fields is primarily oriented towards developing and implementing communicative competencies, which requires an interest in organizational communication.

Without underestimating these specifics, from our perspective, it is of particular interest to explore the prevailing emphasis on digital resources and teaching. These findings reconfirm, on a university level, the triangulated and previously published data within the same project, showing that the DigCompEdu fields of digital resources and teaching and learning play a leading role in course syllabuses, interviews, and observations. It is evident that university professors, regardless of their expertise and faculty, consistently prioritize individual competencies in their conceptualizations, planning of academic activities, and actual practice. These competencies include selecting and evaluating digital resources based on their educational purpose and context, as well as their practical application in real-world settings. A reasonable explanation for this can be found in the widely shared understanding that digitalization in education acquires meaning only insofar as it is not pursued for its own sake and enables the improvement of educational efficiency.

Regarding the second research question

The data on the competencies covered by the course syllabuses are presented as absolute frequencies (Figure 1) and relative frequencies (Figure 2) for aims and content, as well as absolute assessment frequencies (Figure 3). Their analysis is conditional to a certain extent because, in all faculties, only the syllabi of courses specified in state requirements were included in the study sample: educational, psychological, methodological and ICT-based courses. They share a common foundation, and this, in a way, predetermines the similarity of findings, but it also makes their unique characteristics become even more significant.
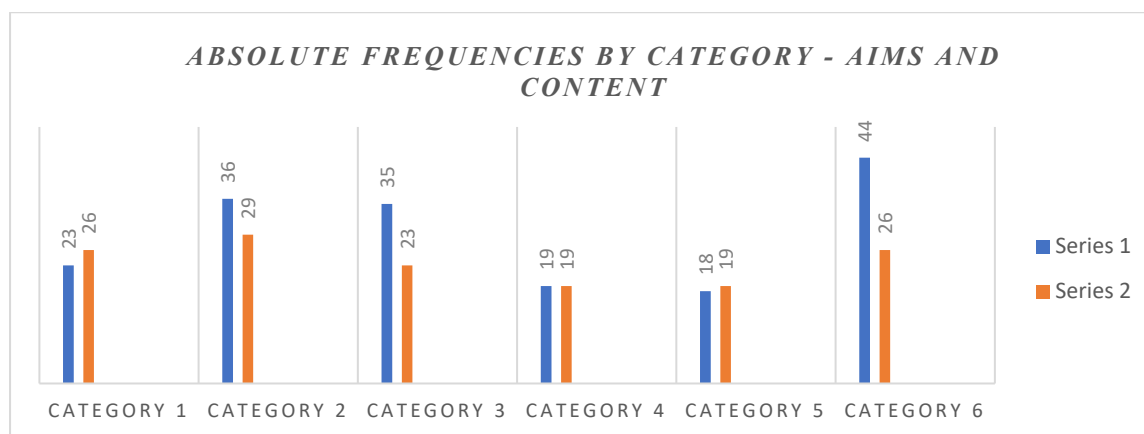

Figure 1. Data on the competencies as absolute frequencies

The data presented in Figure 1 /series 1 – data from natural science faculties; series 2 – data from faculties of other fields/ show that from the perspective of absolute frequencies, similar results are registered regarding category 4 – assessment. Regarding professional engagement /1/, and to e lesser extent regarding empowering learners /5/, the results in natural sciences

faculties measure much lower. However, if, despite these differences, it is possible to pose the question of their significance, then regarding the facilitation, there seem to be more reasons to examine the impact of faculty specifics. The reason underlying this statement is that this category encompasses competencies that, to a certain extent, cover the subject field of the Faculty of Mathematics and Informatics more comprehensively.

Evidence supporting the impact of faculty specifics can also be found in the category ranking differences, reconfirmed by the relative frequency analysis /Figure 2/.
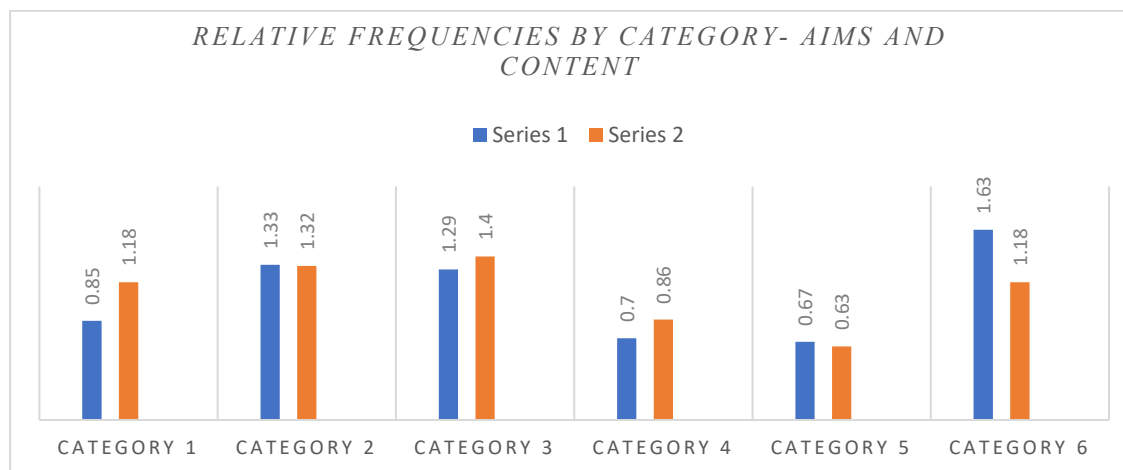

Figure 2. Data on the competencies as relative frequencies

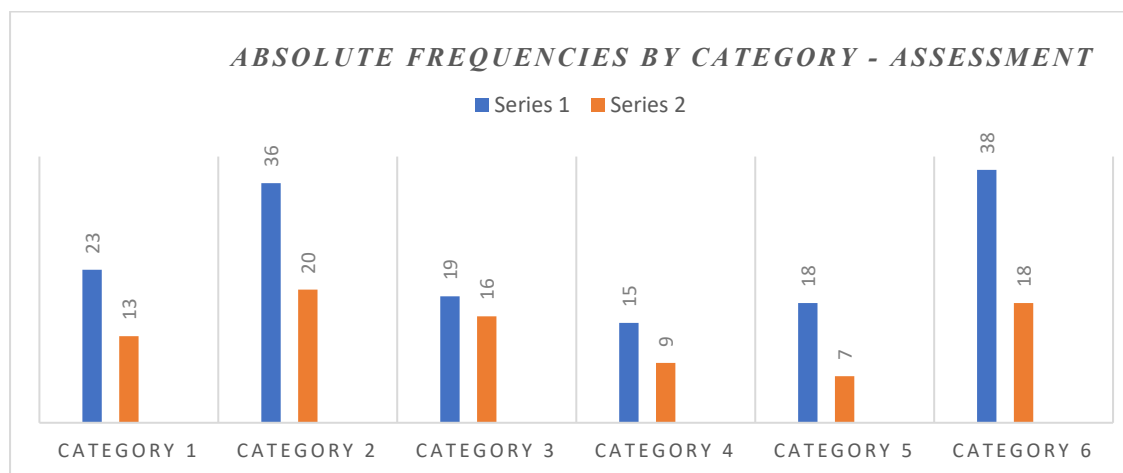What are the results regarding assessment?

Figure 3. Data on the competencies as absolute assessment frequencies

The data in Figure 3 show that, unlike the other faculties, the competencies are present to a greater degree in assessment in the natural sciences faculties. More importantly, an absolute predominance in the data from the natural sciences faculties is established concerning all categories. What is also impressive is the difference in the ranking of the categories. The two groups differ in ranking but do not repeat regarding content. It becomes apparent that professors tend to assess competencies not acquired in the courses they teach. University professors' interview data reconfirmed this fact. Professors express the opinion that the responsibility for digital competency development falls mainly on their colleagues who teach ICT-based courses. However, the same competencies are also used and developed in activities in other classes.

This finding results not only from faculty subject specifics but also from the course groups specified in the state requirements. In one case, we are interested in the quality of the created

resource from an educational perspective. In contrast, in the other, we examine the skills themselves for creating and evaluating the quality of the resource, not merely as an educational resource but also as a digital one.

4. Conclusion

The current study essentially confirmed the data obtained in the previous stages of the project. The DigCompEdu framework, although not yet established as a primary working model for developing digital competencies on a national level, finds its place in the work of teacher preparation professors at Sofia University. In the current study, it can be argued that the course syllabuses have covered all framework competencies, albeit to varying degrees and scopes, within the two faculty groups.

Neither the subject area in which students will be teaching nor the faculties in which they are being prepared have an impact on the competencies that the academics identify as key - teacher preparation and competence in terms of the choice of digital resources, teaching, and assessment strategies. Mainly, these are related to answering the question of 'how' to teach. This result corroborates the findings of our other researches within this project (Aleksieva & Bakracheva, 2024) and the emerging understanding that developing digital competencies is not and cannot be an end in/by itself.

Despite the partial divergence between the aim-content-results/assessment alignment, it can reasonably be inferred that they are sufficiently strongly correlated in all programs.

The difference in the subject field is more sensitive in the ranking of competency area inclusion in general than in determining specific key competencies. Therefore, it may be argued that particular competencies, rather than framework groups or areas, have a leading role in syllabus design.

A further research limitation to note is that the predetermined structure of course syllabuses does not require the detailed formulation of all elements, which may lead to some skewing of the results.

References

Aleksieva, L., Bakracheva, M., (2024). Pre-Service Primary Teachers' Digital Competences: How Do University Teachers Foster Them?, Proceedings of EDULEARN24 Conference 1st-3rd July 2024, Palma, Mallorca, Spain, 2024, pages:2266-2277. https://doi.org/.10.21125/.edulearn.2024.0636

Boevska, I. (2022). Digital Democracy – Essence and Tendencies in the Dynamic Communication Environment **Rhetoric and Communications Journal, Issue 53,** p. 28. https://doi. 10.55206/UMLX5963

Gradinarov, B. (2020). Digitalna ikonomika ili digitalen stadiy – edna (ne)terminologichna vaprositelna?. Nauchni trudove na UNSS, tom 3, IK – UNSS, Sofiya.

Mizova, B. Peycheva-Forsayth, R. Mellar, H. (2025). Multi-faceted approach to research the level of digitalization in initial teacher preparation. Strategies for Policy in Science and Education. 1.pp.28-53. https://doi.org/10.53656/str2025-1-2-mul

Peters, M. A., Elasri-Ejjaberi, M. J., Martínez-Argüelles & Fàbregues, S. (2022). Teacher digital competence development in higher education: Overview of systematic reviews. Australasian J. Educ. Technol. 38(3), 122–139. https://doi. 10.14742/ajet.7543

Prodanov, H. (2012). Digitalnata politika. Sofiya: Faber.

Punie, Y., editor(s), Redecker, C. (2017). European Framework for the Digital Competence of Educators: DigCompEdu , EUR 28775 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-73718-3 (print),978-92-79-73494-6 (pdf), https://doi.10.2760/178382

Xu, J., She, S. & Liu, W. (2022). Role of digitalization in environment, social and governance, and sustainability: Review-based study for implications. Front. Psychol. 13:961057. https://doi. 10.3389/fpsyg.2022.961057