

The Digital Competence of Students Preparing to become Primary School Teachers - Perspectives for Development

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Abstract –The analysis of the European Digital Competence Framework for Citizens, outlined the need to study: the digital competence of students - future primary teachers; their attitudes towards the study of required, elective and optional subjects developing digital competence. If students preparing to become primary teachers are offered sufficient and varied required, elective and optional subjects to develop these competences, they will be able to successfully apply digital competences in their future teaching practice. In May 2023, a survey was conducted with 200 students preparing to become primary teachers at the Pedagogical Faculty of Plovdiv University "Paisii Hilendarski", which would establish their attitudes on the issues raised. The results of this study showed: the students' high assessment of the usefulness of the studied compulsory disciplines for the development of digital competences, as well as an increased interest in the offered elective and optional disciplines with the same focus; the importance of primary teacher candidates having a good level of digital competences. The obtained results support the process of updating the current curricula in the disciplines developing digital competences and developing new training courses adapted to the needs of students for an even more complete development of their digital competences.

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Keywords – Students, primary school teachers, digital competences.

1. Introduction

Over the past two decades a rapid pace of development of information and communication technologies (ICT) is witnessed worldwide. Nowadays it is impossible to imagine our personal or professional life without the use of ICT. In order for the modern citizens to be full-fledged members of society and develop successfully in the labour market, they must possess a number of competencies that will allow them to adapt quickly, communicate successfully, make decisions according to the situation and their consequences. These features of life in the 21st century necessitate the introduction of a number of changes in the educational system in order to start shaping citizens with good prospects for personal and professional development from an early age.

2. Digital Competence

One of the main changes that has taken place in the field of education in recent years is the introduction of ICT in the educational process. The school, as well as other educational institutions, must "provide adequate training to its graduates and prepare them for the challenges of information technology that await them not only in their future workplaces, but also in everyday life [7]".

In 2006, the European Parliament and the Council of the European Union adopted the Council Recommendation on Key Competences for Lifelong Learning, which sets out eight key competences that every person needs. These are: Literacy; Multilingualism; Numerical, scientific and engineering skills; Digital and technology-based competences; Interpersonal skills, and the ability to adopt new competences; active citizenship; Entrepreneurship; Cultural awareness and expression.

There are many definitions of the concept of competence in the scientific literature. Competence can be defined as a combination of knowledge, skills and attitudes that learners acquire during their training. It can be developed as a result of high-quality training delivered in an educational environment that meets the educational goals of the trainer and the needs of the learner, gaining experience through a variety of practical activities [11]. In the European Reference Framework, digital competence is defined as "confident, critical, and responsible use of, and engagement with digital technologies for learning, at work and for participation in society [4]". In 2010, the European Commission in its "European Strategy for Smart, Sustainable and Inclusive Growth" recognized digital competence as one of the fundamental basic skills. A few years later, in 2013, the "European Digital Competence Framework for Citizens", also known as DigComp, was published. It proposes a tool to assess and improve the digital competences of citizens. Since the publication of DigComp 1.0 [5] in 2013 until today, its supplemented and improved versions have been periodically presented - DigComp 2.0 since 2016 [9]; DigComp 2.1 from 2017 [2]; DigComp 2.2 from 2022 [10]. The latest version, DigComp 2.2, includes more than 250 new examples of knowledge, skills, and attitudes that citizens should possess.

Based on the Digital Competence Framework for Citizens (DigComp), four sectoral reference frameworks have been developed:

- The Digital Competence Framework for Consumers – DigCompConsumers [1]. It was developed due to the penetration of technology into the everyday life of the common citizen. It is mainly aimed at the protection of the user in online trading; information about goods and services; payment protection etc.
- European Framework for Digitally Competent Educational Organizations - DigCompOrg [6]. The framework was developed to support the process of self-assessment of the integration of ICT in the educational process of schools, colleges and universities.
- European Framework for the Digital Competence of Educators - DigCompEdu [8]. It was developed in response to the need of teachers and university professors for specific digital skills to apply in their administrative work and that with learners.
- European e-Competence Framework (e-CF) version 3.0 [3]. The framework is designed to meet the needs of companies and organizations operating in the ICT sector.

The creation of DigCompEdu is predetermined by the need to develop students' digital competencies, which respectively requires the acquisition of these competencies by the teachers themselves.

DigCompEdu provides educators with tools to assess their digital competency level and determine the specific training they need. This framework supports the updating of the specific policies for the development of the digital competences of the teachers from the countries that are members of the European Union. The current European framework has been developed for the needs of teachers from different levels of education – pre-school, secondary school, university, non-formal education, etc. [8].

3. Purpose of the Study

In order for students to successfully acquire the necessary digital competencies in the course of their studies, the education system must provide teachers who possess these competencies.

A key part of the preparation of any future teacher is the formation of digital competences. They are necessary for every teacher not only to teach subjects such as computer modeling, informatics, and information technology, but also to be able to use the possibilities of ICT to: communicate with colleagues, parents and management; optimally organize the learning process; provide the educational process in various academic subjects with appropriate electronic resources; access information on various topics of the educational content.

In order to ensure the process of developing digital competences among students - future primary teachers, the Faculty of Pedagogy of Plovdiv University "Paisii Hilendarski" offers them three core and three elective courses for the formation of the specified competences for the academic year 2022/2023. The core courses that students are required to cover in their degree plan are:

- Electronic resources for education – the training takes place in the 2nd year;
 - Information and communication technologies in education and work in a digital environment - studied in the 3rd year;
 - Methodology of teaching computer modelling - the training takes place in the 4th year;
- and the elective courses are:
- Development electronic environment lessons (elective course) - studied in the 2nd year;
 - Digital competence and digital creativity (elective course) – training takes place in the 3rd year;
 - The child and the media (elective course) - studied in the 4th year.

As can be seen from the above information, these courses are evenly distributed over the three years of study of the students - future primary teachers. Such disciplines are not intended to be studied in the first year of the students' bachelor degree plan, since then the foundations of their preparation are laid with core courses such as Modern Bulgarian language, Mathematics, Pedagogy, Psychology, etc.

The technological society we live in requires universities training teachers to produce well-prepared staff with a wide range of professional competences, including digital. In order to meet these expectations, the academic board at the Faculty of Education is constantly looking for new solutions to renew and improve existing training courses, as well as to create new ones that meet the needs of students and the primary education system. For this reason, the aim of the present study is to investigate the opinion of students - future primary teachers about their experience in doing courses that develop their digital competences and their opinion about the application of these competences in their future work as teachers. The research participants are 4th-year students at the Faculty of Education, preparing to become primary teachers.

4. Methodology

The research was organized and conducted at the Pedagogical Faculty of Plovdiv University "Paisii Hilendarski" in May 2023.

Two hundred 4th year students took part in an online survey. All of them were students at the Faculty of Education and were preparing to become primary teachers. The survey was conducted using the survey design and analysis application Google Form.

Since some of the questions in the survey examine the experience of students from the courses studied so far in developing digital competences, as well as their interest in being included in future similar courses, it was decided to conduct the survey entirely online and anonymously, so as the students' answers to be as objective as possible.

5. Results and Analysis

The implemented survey includes 11 questions, divided into two groups, which cover: survey of students' experience in doing courses that develop digital competences and self-assessment of the level of their digital competences; attitudes about the need to do the specified type of courses and the application of digital competences in practice. Although the method of collecting information on the problem resembles a demoscopic survey, its results do not claim to be representative of all Bulgarian students preparing to become primary teachers. It is the beginning of a study of the level of digital competence of students with this profile at the Pedagogical Faculty of Plovdiv University "Paisii Hilendarski" and a search for options for its increase.

Questions related to the experience of students - future primary teachers in doing courses developing their digital competences and self-assessment of the level of their digital competences

At the end of the fourth year, when the survey was conducted, the students had already done three core courses for the development of digital competences. Apart from them, however, three elective/optional courses are included in the curriculum of students preparing to become primary teachers. In order to establish the level of interest of the researched participants to similar type of courses, the survey included the question: "How many elective courses that develop digital competences did you choose to do?". The results are presented in Figure 1.

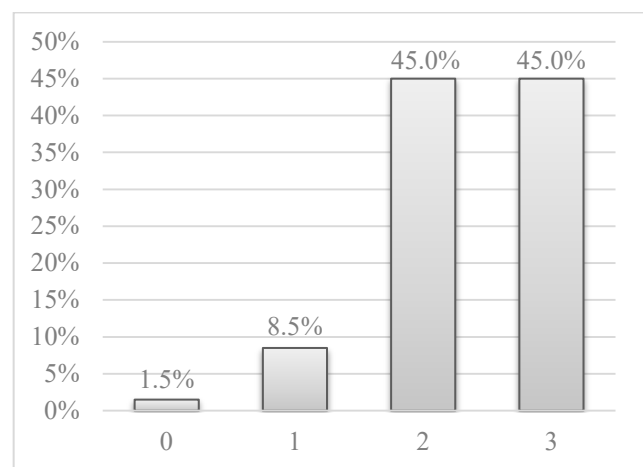


Figure 1. How many elective courses that develop digital competences did you choose to do?

In this question, the respondents have the option to indicate between 0, 1, 2 and 3 elective courses. As can be seen from the diagram, equally represented students indicated that they chose 2 and 3 such courses - 45% each; 8.5% of the students who took part in the survey indicated that they had done one such course and only 1.5% – none. It is important to note that 98.5% of the respondents studied one or more elective courses developing digital competences. Each semester, the students of the Pedagogical Faculty of Plovdiv University "Paisii Hilendarski" have the right to choose one of three elective courses. The fact that such a high percentage of the respondents preferred the specified type of course at least once over the other options offered to them is an indicator of the students' interest in the development of their digital competences.

The next questions in the survey direct students to self-assess their digital competencies before and after choosing the courses that develop these competencies.

The first task set for them is: "Determine the level of your digital competences before entering the University". The responses of the respondents are presented in Figure 2.

42.5% of the surveyed students define the level of their digital competences as "low". This means that the student can use a computer or other digital device to access the Internet and to communicate with others. 46.5% of the surveyed students define their digital competencies as a "medium" level, which represents almost half of the total number of people who took part in the survey. Students who have defined their level of digital competence as "medium" can search for information on various topics using the Internet search engines. In addition, they have basic skills in working with MS Office products. Students defining the level of their digital competences as "high" are 11%. They can independently use a variety of word processing, presentation and image processing programs, and platforms. The indicated results testify that there is a good foundation of digital competences in more than half of the surveyed students, on which the instructors of the Faculty of Education can build on.

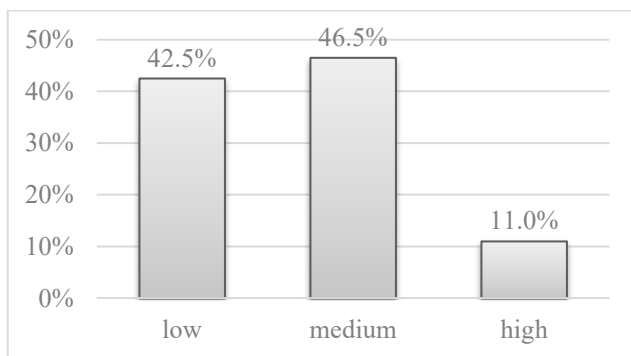


Figure 2. Determine the level of your digital competences before entering the university

Students' reaction to the second task: "Determine the level of your digital competences after finishing the courses (core, elective) for the development of your digital competences" are presented in Figure 3.

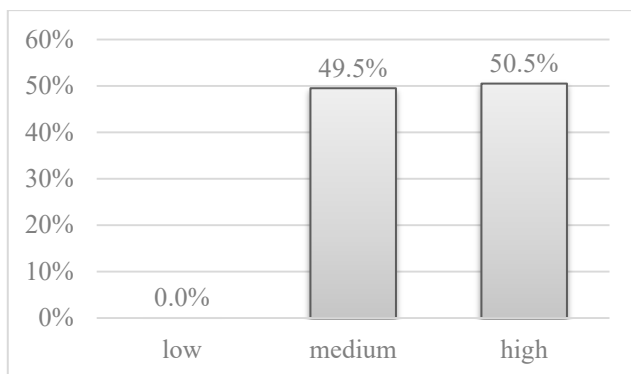


Figure 3. Determine the level of your digital competences after finishing the courses (core, elective) for the development of your digital competences

As can be seen in the chart, the students are almost evenly split, with 49.5% defining their level as 'medium' and 50.5% as 'high'. There are no students who, after doing at least the core courses for the development of digital competences, define their level as "low". The self-assessment of the respondents to this question is an indicator of the benefits of the disciplines offered so far for the development of digital competences.

With the help of the next question of the survey, the aim is to find out to what extent the students think that the courses designed to develop their digital competences were useful to them. The answers of the surveyed students to the question "To what extent were the specified courses useful for the development of your digital competences?" are presented in Figure 4.

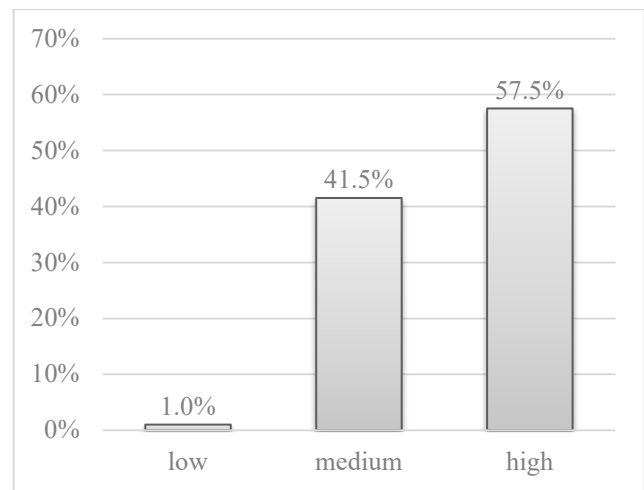


Figure 4. To what extent were the specified courses useful for the development of your digital competences?

Here, the percentage of students who determine that the courses were useful to them to a high degree prevails - 57.5%. They indicate that they have acquired new knowledge and skills in the field of ICT; feel confident that they need to use a new program/platform. In percentage terms, the group of students who define the level of usefulness the courses as "medium" follows - 41.5%. This group of students indicates that they have acquired new knowledge and skills in the field of ICT, but still need help when encountering a new program/platform. The percentage of students who defined the degree of usefulness of the courses as "low" is insignificant - 1%. These students indicated that their knowledge and skills remained at their initial level.

As can be seen from the results obtained for the last question, 99% of the surveyed students consider that the courses studied for the development of their digital competences were useful to them.

However, it is important to investigate whether, based on the acquired competencies, students feel prepared to apply ICT in their future work as teachers. The answers of the respondents to the question "Do you feel prepared to apply information and communication technologies in your future work as teachers?" are presented in Figure 5.

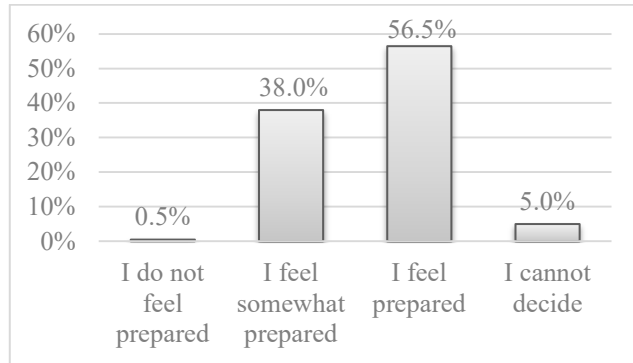


Figure 5. Do you feel prepared to apply information and communication technologies in your future work as teachers?

The suggested options for answering this question are: I do not feel prepared; I feel somewhat prepared; I feel prepared; I cannot decide. It is a positive fact that 56.5% of the surveyed students - future elementary teachers feel prepared, and 38% - feel somewhat prepared. Only 0.5% of respondents indicated that they did not feel prepared, and 5% could not decide. The students' self-assessment shows that less than 5% of them experience uncertainty and hesitation in the acquired digital competences and the ability to apply them in practice.

A large part of the knowledge and skills that students acquire when doing the courses for the development of digital competences is related to familiarization with programs, sites, and platforms for using and creating electronic learning content. In this regard, the students' preferences related to the practical use of electronic educational resources were studied. Their responses are presented in Figure 6.

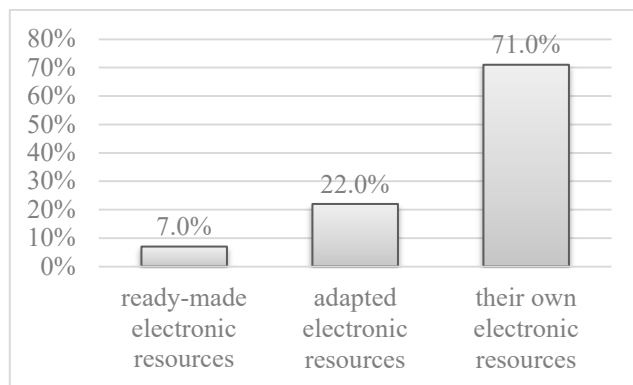


Figure 6. What type of e-learning resources do you prefer to implement in your teaching practice?

Over two-thirds (71%) of respondents indicated that they prefer to create their own electronic educational resources. They are followed by students who prefer to adapt already existing electronic educational resources – 22%. A possible reason for the high percentage of students who indicated these two options is the time devoted to discussions concerning the appropriateness of a specific program/site/platform to the specific educational content; the appropriateness of the time and place when using a given resource; its relation to the educational purpose. The percentage of students who prefer to use ready-made electronic educational resources is the lowest - 7%. There are two possible reasons why students may have indicated this option – they do not feel confident enough in their own digital competences and prefer to trust already existing electronic resources that they consider to be of sufficient quality; they do not find enough time to develop their own e-learning resources. Both reasons are equally likely, but one must take into account the fact that creating one's own resource is a labor-intensive and time-consuming process - selection of appropriate educational content; choosing a program/site/platform that meets the educational goals and the specifics of the educational content; the physical creation of the electronic educational resource; testing it and fixing possible errors.

The next two questions from the survey seek information about students' attitudes towards doing other courses that develop digital competences, as well as their specific educational content. Students' views on these two issues will be taken into account in a future update of the curricula in which students preparing to become primary teachers are trained.

Students' responses to the question "Do you need additional courses for the development of digital competences?" are presented in Figure 7.

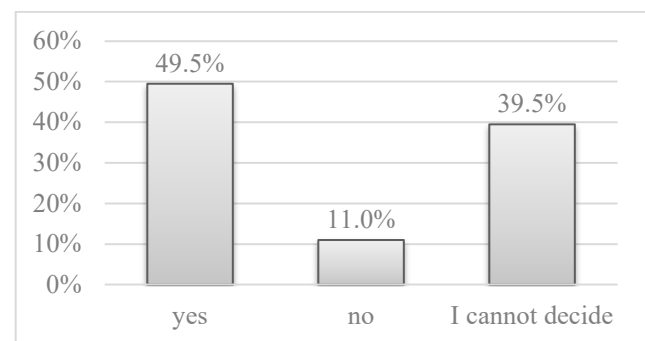


Figure 7. Do you need additional courses for the development of digital competences?

As can be seen from the diagram, almost half of the respondents (49.5%) indicate that they need additional courses. The percentage of students who cannot decide is also high - 39.5%.

A large proportion of students preparing to become primary teachers do not have an accurate idea of the extent to which these competencies will be needed in practice, which may explain their hesitation as to whether the level they have reached is sufficient. The remaining 11% of students state that they have no need for additional courses of the specified type.

When planning the updating of the educational content of the current academic courses or the creation of new ones, the needs of the students who will study them must be taken into account. This also provoked the next question in the survey, in which students had to indicate the topics on which they needed more information. Their preferences are reflected in Figure 8.

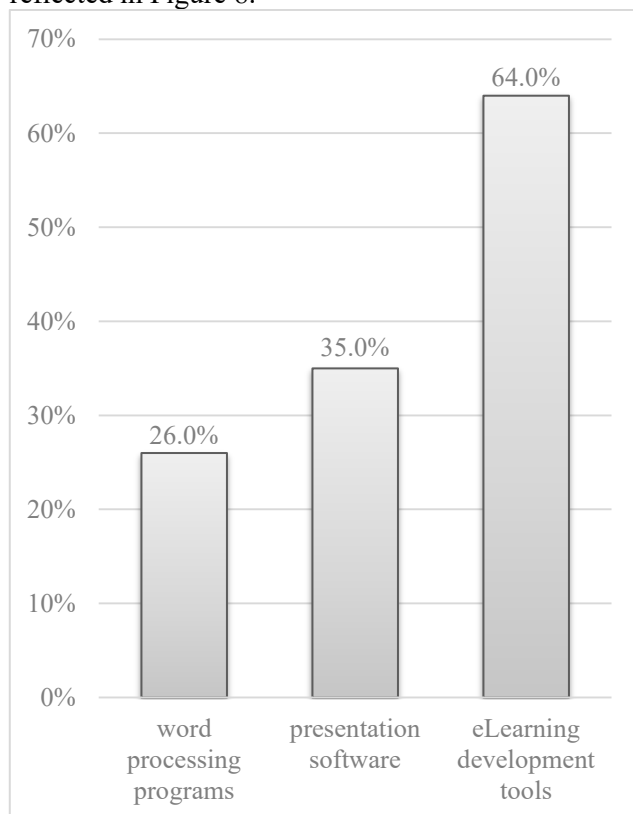


Figure 8. What topic do you need additional information on?

For this question, students have the opportunity to indicate more than one answer, therefore the total sum of the percentages exceeds 100. The largest percentage of respondents (64%) indicated that they need more information about eLearning development tools. In the second place were the respondents who indicated that they needed courses for presentation software - 35%. In the last place was the need for word processing programs - 26%. An explanation for the obtained results can be found in the educational content in the junior high school and high school stage in Bulgarian schools, where students get to know in detail how to work with word processing and presentation software.

That is, students enter the University with basic knowledge and skills for working with such programs, which only needs to be upgraded. On the other hand, electronic educational resources are much more attractive to students, which is an incentive for students to include in their repertoire as many of them as possible to ensure a more interesting and engaging learning process for their future students.

Questions related to the attitudes of students - future primary teachers about the need to do courses for the development of digital competences and their application in practice.

The first question from this group seeks the students' opinion about the necessity of doing university courses for the development of digital competences. Figure 9 shows their reactions to the task: "Determine the importance of university courses for the development of digital competences".

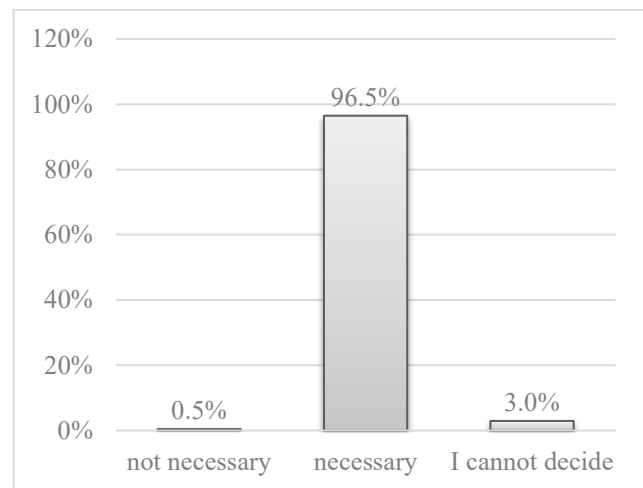


Figure 9. Determine the importance of university courses for the development of digital competences

Not surprisingly that 96.5% of the respondents believe that doing this type of a course is necessary. In our daily life, at the workplace and in educational institutions, we are daily faced with the need to use information technology, therefore it is not strange that such a large percentage of the surveyed participants have a real idea of the need to study this type of disciplines. Among the students, there are also those who indicated that they could not decide, that is 3% of the surveyed students. The percentage of respondents who indicated that they do not consider such courses as necessary is negligibly small - 0.5%. Regardless of the rapid pace of development of ICT and its implementation in almost all aspects of our lives, there are still small settlements where information technology is not so strongly represented in educational environments. This is perhaps also the reason for the presence of students who chose the last two options.

The use of ICT in the educational process invariably depends on the educational environment and state of equipment of the given school, however, another circumstance is the readiness of the teachers to apply ICT in their lessons. In recent years, active primary teachers in Bulgaria have gone through a number of trainings, organized both by their own schools and by the regional administrations of education, some of them dedicated specifically to the development of digital competences. However, being trained to use ICT is no guarantee that teachers will apply them often enough, at the right time in the lesson or with the appropriate educational purpose. A reason for not using ICT can be the lack of adequate knowledge and skills, as well as lack of confidence.

The next question from the survey assesses precisely the students' readiness to apply the acquired digital skills in their practice as teachers. Their reactions to the task: "Determine the extent to which you think you will be able to apply the acquired digital skills in your work as teachers" are presented in Figure 10.

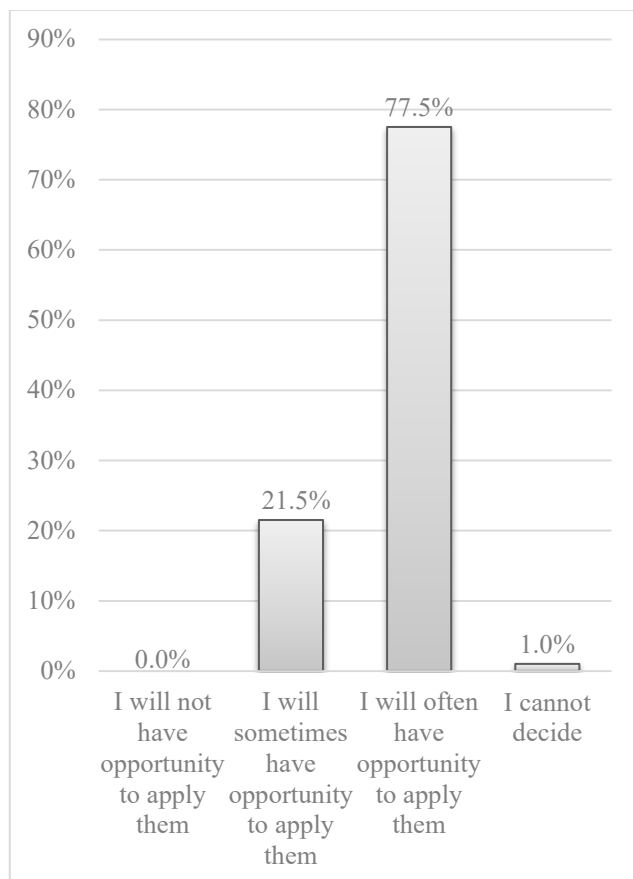


Figure 10. Determine the extent to which you think you will be able to apply the acquired digital skills in your work as teachers

The percentage of students who indicated that they expect to have the opportunity to apply their digital competences often is the highest - 77.5%.

They are followed by those students who think they will have the opportunity to apply these competencies sometimes - 21.5%. Only 1% of the surveyed students cannot assess whether they will have the opportunity to apply their digital competences in practice. It is encouraging that no students indicated that they did not expect to have the opportunity to apply their digital competences in the educational process.

The purpose of the last question in this group is to explore the students' opinion about the importance of having digital competences when applying for a job at school. Figure 11 shows the respondents' answers to the question: "As future teachers, do you think that the directors of institutions will require digital skills from you as job candidates?"

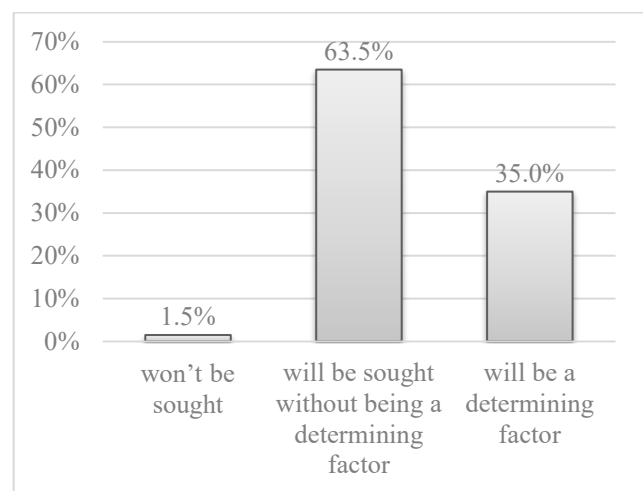


Figure 11. As future teachers, do you think that the directors of institutions will require digital skills from you as job candidates?

A very large part (63.5%) of the surveyed students believe that digital competences will be sought by the directors of institutions, but will not be a determining factor in the selection of candidates. On the other hand, 35% of students believe not only that they are expected to possess digital competences, but also that they will be a determining factor when choosing a candidate for the position of primary teacher. Of all the persons surveyed, 1.5% indicated that, in their opinion, digital competences will not be sought in job applicants as teachers.

6. Conclusions and Recommendations

Based on the results obtained from the survey conducted with students preparing to become primary teachers at the Pedagogical Faculty of Plovdiv University "Paisii Hilendarski", the following conclusions can be formulated:

- Students' interest in developing their digital competences is evident, as 98.5% of respondents at least once in the whole period of their studies chose to do an elective course developing digital competences when they had two other alternatives in different fields.
- The group of the surveyed students is almost equally divided when they have to assess the level of their own digital competences after doing core and elective courses. Students define their level as "medium" or "high", none rate it as "low".
- The percentage of students who consider that the courses were useful to them to an average and high degree, and that they feel prepared to apply the acquired knowledge and skills for using ICT in education, remains high.
- The overwhelming number of surveyed students prefers to create their own electronic educational resources or to adapt existing ones according to the educational goal they have set for themselves, as well as according to the needs of their students.
- Almost half of the surveyed participants report that they need additional courses for the development of their digital competences, and two-thirds of all surveyed students would prefer the content of the disciplines to be aimed at working with platforms/sites for creating electronic educational resources.
- The courses designed to develop digital competences should devote certain time to discuss the appropriate combinations of educational content and site/platform with which to develop an appropriate e-learning resource.
- The majority of students surveyed believe that the development of digital competences at universities is a necessity and will play a role in their application for work as primary teachers.
- The acquired digital competences at the Pedagogical Faculty of Plovdiv University "Paisii Hilendarski", prepare its students to use ICT in the educational process as future primary teachers.

The conducted survey and the analysis of its results are one of the first steps that the Faculty of Pedagogy of Plovdiv University "Paisii Hilendarski" takes in the direction of increasing the digital competences of its students - future primary teachers. It will be followed by updating the current curricula in the courses developing digital competences and designing new training courses adapted to the needs of students for an even more complete development of their digital competences. The aim of the instructors at the Faculty of Education is to prepare future primary teachers who are equipped with up-to-date knowledge and skills, and who are competitive in the labour market and have the opportunity to offer their future students an attractive and fulfilling educational process in which modern information technologies successfully find their place.

Acknowledgements

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References:

- [1]. Brecko B & Ferrari A. (2016). *The Digital Competence Framework for Consumers*. EUR 28133 EN. Luxembourg (Luxembourg): Publications Office of the European Union.
Retrieved from: <https://publications.jrc.ec.europa.eu/repository/handle/JRC103155> [accessed: 04 September 2023].
- [2]. Carretero Gomez, S., Vuorikari, R. and Punie, Y. (2017). *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use*. Luxembourg: Publications Office of the European Union.
Retrieved from: <https://publications.jrc.ec.europa.eu/repository/handle/JRC106281> [accessed: 05 September 2023].
- [3]. E-CF 3.0 - CWA. (2014). *European e-Competence Framework 3.0*. Aicanet. Retrieved from: https://www.aicanet.it/documents/10776/141330/European-e-Competence-Framework-3.0_CEN_CWA_16234-1_2014.pdf/408848f2-a045-4c88-999f-1d7280d12ee8 [accessed: 04 September 2023].
- [4]. European Union. (2018). COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning (Text with EEA relevance). *Official Journal of the European Union*. Retrieved from: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)) [accessed: 05 September 2023].
- [5]. Ferrari, A. (2013). *DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe*. Luxembourg: Publications Office of the European Union. Retrieved from: <https://publications.jrc.ec.europa.eu/repository/handle/JRC83167> [accessed: 06 September 2023].
- [6]. Kampylis, P., Punie, Y., & Devine, J. (2015). *A European Framework for Digitally-Competent Educational Organisations: Promoting Effective Digital-Age Learning*. European Commission. Retrieved from: https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg_en [accessed: 06 September 2023].
- [7]. Radev, V. (2023). *Some applications of block programming in the teaching of mathematics in the second grade [Nyakoi prilozheniya na blokovoto programirane v obuchenieto po matematika vuv 2. Klas]*. Plovdiv: Plovdiv University Publishing House, 117.
- [8]. Redecker, C. (2017). *European Framework for the Digital Competence of Educator*. Luxembourg: Publications Office of the European Union. Doi:10.2760/178382.

- [9]. Vuorikari R, Punie Y, Carretero Gomez S and Van Den Brande G. (2016). *DigComp 2.0: The Digital Competence Framework for Citizens. Update Phase 1: the Conceptual Reference Model*. Luxembourg: Publications Office of the European Union. Retrieved from: <https://publications.jrc.ec.europa.eu/repository/handle/JRC101254> [accessed: 10 September 2023].
- [10]. Vuorikari, R., Kluzer, S. and Punie, Y. (2022). *DigComp 2.2: The Digital Competence Framework for Citizens - With new examples of knowledge, skills and attitudes*. Luxembourg: Publications Office of the European Union. Retrieved from: <https://publications.jrc.ec.europa.eu/repository/handle/JRC128415> [accessed: 11 September 2023].
- [11]. Zwell, M. (2000). *Creating a Culture of Competence*. New York: John Wiley & Sons, Inc.