# Dependency between digital competence and professional competence of students

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**Abstract**. The report aims to find out the existence of a dependency between the digital and specialized professional competence of students. The acquisition of certain competences is the basis of the effective exercise of a given profession. The role of information and communication technologies in the formation of the necessary abilities for effective professional career of the graduating specialists is analyzed. The primary data for the empirical study has been collected through the use of the survey method. The results show a statistically significant influence of digital competence on subjective assessments of professional competence, language competence and the contribution of university education to professionalisation. It can be concluded that directing learning in higher education to increase digital competence would have a positive effect on increasing the professional competence of future specialists.

## 1 Introduction

The report aims to find out the existence of a dependency between digital and specialized professional competence among students. The acquisition of certain competences is the basis of the effective exercise of any profession. The role of information and communication technologies in education increasingly influences the formation of the necessary skills and experience for effective professional career of recent graduates.

*Competence* is a concept whose etymology is derived from the Latin word "*competens*" and can be translated as "capable". Competence is most often understood as the ability to do something that is based on a given knowledge. It can also be defined as a set of knowledge, skills, attitudes and relations that are associated with human behavior so that one can achieve results in the performance of a given activity or profession [1].

*Professional competence* can be defined as the accumulation of knowledge, skills and experience for a specific type of profession. This process of accumulation, on the one hand, is accompanied by the formation of routine behavioral patterns, excluding multi-significance in the interpretation of professional tasks and situations, and on the other hand, by the formation of a value system that is related to the respective profession [2]. Chantov

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(2012) [3] describes professional competence as a set of different types of competence - functional, intellectual, situational, social, special, personal, individual, subjective and communicative.

The concept of professional competence of the student, according to Sakharova (1999) [4], is expressed in the triad: semiosphere, soulsphere and technosphere. The semiosphere is a body of knowledge, the soulsphere includes emotions, feelings and experience, and the technosphere – skills and experience. According to other researchers, the student's professional competence can be considered as a set of activities related to:

- Acquisition of knowledge defining the professional basis;
- Acquisition of knowledge defining an alternative field;
- Orientation of vital and social values;
- Acquisition of communicative and pragmatic qualities;
- Development of the selectivity of the motivation period when choosing an activity.

Digital competence (DC), on the other hand, is a concept related to the use of information and communication technologies (ICT) for a specific purpose such as work, study, recreation or participation in society [5-6]. Ferrari (2012) [7] defines digital competence as a set of knowledge, skills and attitudes that are necessary to use ICT and electronic media in performing tasks, solving problems, managing information and carrying out communication. This enables effective, efficient, critical, creative, flexible and independent construction of knowledge at work, during leisure, studying, communication and consumption. Van Deursen (2010) [8] defines digital competence as a "vital asset in the information society", and according to Eshet-Alkalai (2004) [9], being digitally competent means having "the skills to survive in the digital age".

The evolutionary model of digital competence assumes the acquisition of digital skills, which leads to the construction of digital literacy, followed by the acquisition of digital competence [5]. In this regard, digital skills are building blocks of digital literacy and are combined with analytical and creative thinking arising from digital competence. Digital skills allow the effective use of ICT in education, including its electronic and distance forms [10-13]. Ala-Mutka (2011) [6] defines the development of DC as a continuous process that begins with instrumental skills and leads to productive personal competence [5], but also to opportunities for the development of language competence [14].

It is important for students to have knowledge and skills in the field of digital technologies, because in this way they will be able to enrich themselves through various types of information sources such as digital libraries, databases, web portals, etc. [15]. Undoubtedly, the learning process these days is related to the selection and mastery of digital information, which allows finding, understanding, evaluating and using the necessary information effectively and ethically, so as to satisfy both the personal needs of the students and the public interest, related to their training. Henriksen (2011) [16] describes digital technology as an instrument: "Digitization, interactivity and virtuality are constantly opening up new possibilities and expanding the boundaries of how learning activities can be organized."

## 2 Methods

The primary data for the empirical study was collected through the use of the survey method. For the purposes of the study we created a questionnaire, consisting of 20 questions organized into three modules. The first module contains 10 questions that examine subjective assessments of the extent to which the learning contributes to creating professional competence. The second module contains 4 questions that address digital competence and language skills, and the third module contains 6 questions that gather the

demographic characteristics of the respondents. The two main variables involved in the study are the level of digital and the level of professional competence.

The empirical study covers 107 students studying in two faculties of Trakia university - Stara Zagora in the academic year 2022/2023. The distribution by faculties is as follows: 22.43 % of the respondents are students from the Faculty of Economics, 77.57 % - from Faculty of Medicine; according to the specialty: 77.57 % - therefore are students from regulated medical specialties, 14.95 % - students from economic specialties, 7.48 % - students from priority specialties (in the field of IT); according to the year in which they study: 29.91 % - freshmen, 19.63 % - sophomores, 13.08 % - juniors, 21.49 % - seniors, 8.41 % - fifth, 7,48 % - sixth year, whereas students in 4$^{th}$ – 6$^{th}$ year of regulated specialties and 3$^{rd}$ and 4$^{th}$ year of non-regulated specialties are of particular interest.

## 3 Results

The first main variable in the empirical study is the level of digital competence among students. Figure 1 shows the results of the survey about the level of digital competence students claim to have. The results show that more than half (51.40 %) of the students claim to a high level of digital competence, 41.12 % to an average level and extremely few (7.48 %) to a low level. Therefore, the very large majority of respondents consider themselves to have a high and average level of digital skills.

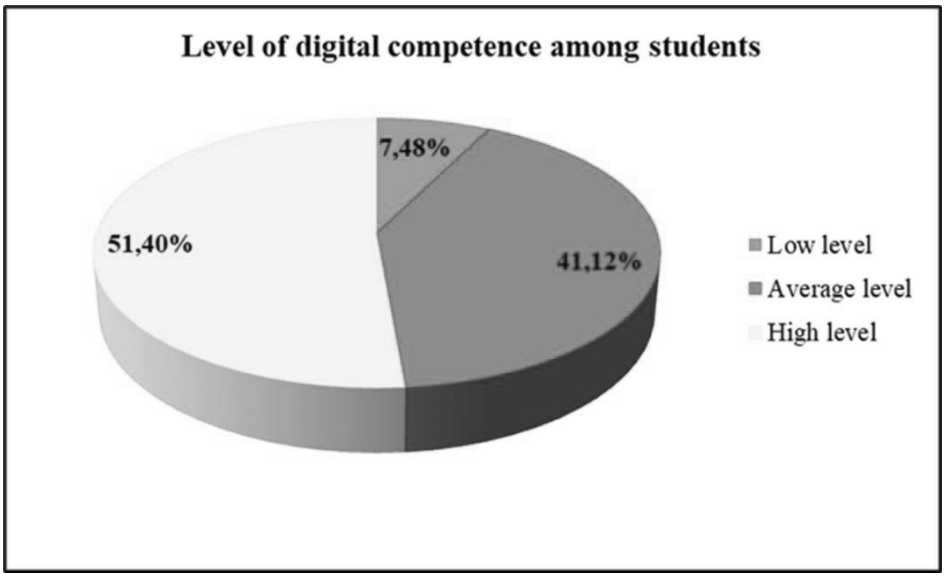


**Fig. 1.** Level of digital competence among students

The second main variable refers to the level to which students consider that they have formed professional competences during their course of study. The data shown in Figure 2 show that the highest mean values are observed for the subjective ratings of organizational skills possessed (2.69) and teamwork skills (2.67), which a significant majority of respondents claimed to possess at a high level. The lowest subjective ratings are given by students for their level of awareness of financial and economic (1.83) and labor-law regulations (1.93). Regarding digital skills as part of vocational skills, the results show that the majority of students define themselves as highly computer literate (2.44).

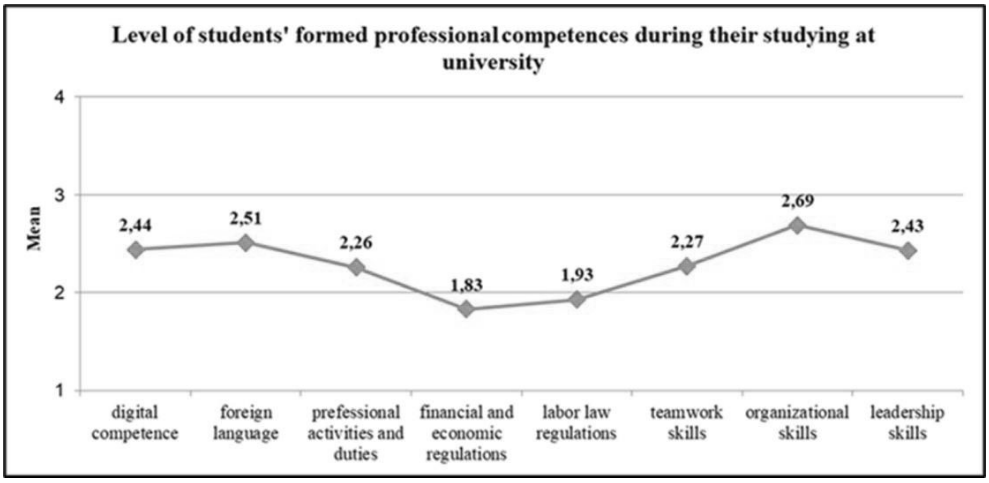


**Fig. 2.** Level of students` formed professional competences during their education

Figure 3 reflects an almost equal average level to which university education contributes to help students become successful professionals (M=2.48), possessing modern scientific knowledge (M=2.36), prepared for successful professional realization (M=2.38), with formed digital skills (M=2.44).

The survey shows that the majority of students (50.5%) believe that the disciplines they study greatly contribute to their development as successful professionals.

It is interesting to note that with regard to the contribution of university studies to the acquisition of scientific knowledge and preparation for successful implementation, the percentage ratio between the respondents indicated "high" (44.9 % - for both questions) and "average" (46, 7% - to the question of scientific knowledge; 48.6% - to the question of preparation for successful implementation) level is relatively equal, which means that for almost half of them the studying at university contributes to their formation as specialists to a high level, and for the other half - to an average level.

At the same time, students to a relatively lesser extent feel prepared for work in their specialty - (M=1.95, Fig. 3).

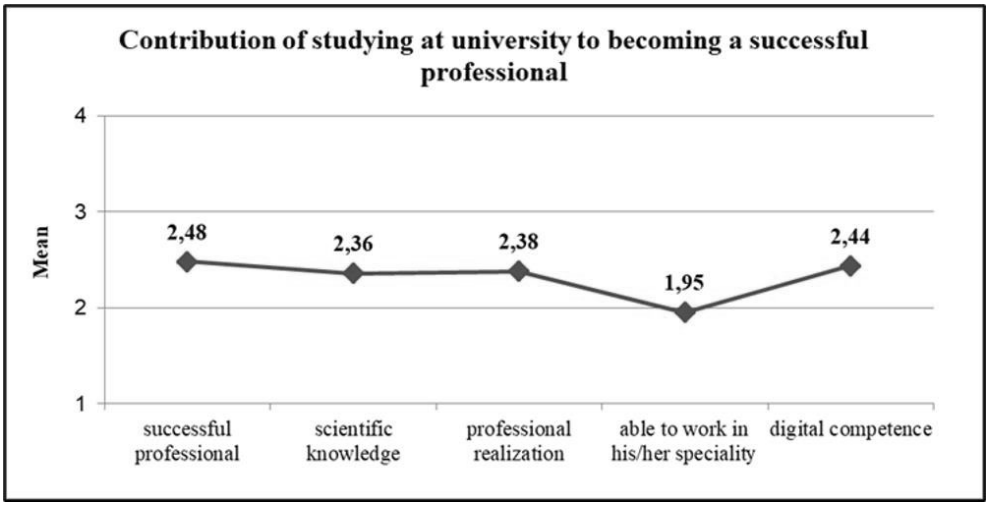


**Fig. 3.** Contribution of university studies to becoming a successful professional

The variance analysis found a statistically significant influence of digital competence on (Table 1):

- Knowledge of financial and economic regulations (F=5.54; p<0.05).
- Knowledge of labor law regulations (F=4.78; p<0.05).
- Teamwork skills (F=7.75; p<0.05). The degree of proficiency in a foreign language (F=3.19; p<0.05)
- The contribution of training as a whole to the development of students as successful professionals (F=3.85; p<0.05).

The statistical significance of the differences shows that the students who claim to have a low level of digital competence, statistically significantly: know less about financial and economic norms for the studied specialty ($t_{1,2}$=3,06 and $t_{1,3}$=3,22, p <0.05) and labor-legal norms in the profession ($t_{1,2}$=2.94 and $t_{1,3}$=3.07, p<0.05), have lower teamwork skills ($t_{1,3}$= 4.17 and $t_{2.3}$=2.65, p<0.05), have lower language competence in a foreign language ($t_{2.3}$=2.48, p<0.05) and believe that education at a low level contributes to their building as successful professionals ($t_{1,2}$=2,03 and $t_{1,3}$=2,95, p<0,05), compared to students who consider themselves to have higher digital competence.

**Table 1.** Impact of digital competence on subjective assessments of professional competence, language competence and education (analysis of variance)

| **Independent variable (factor)** | **Dependent variable** | | **Levels of independent variable** | **Mean of dependent variable** | **F p<0,05** | **t-test p<0,05** |
|---|---|---|---|---|---|---|
| Digital competence | Professional competence | Financial and economic regulations | Low<br>Average<br>High | 1.13<br>1.82<br>1.95 | F=5.54 | $t_{1,2}$=3,06<br>$t_{1,3}$=3,22 |
| | | Labor-law regulations | Low<br>Average<br>High | 1.25<br>1.95<br>2.00 | F=4.78 | $t_{1,2=}$2,94<br>$t_{1,3}$=3,07 |
| | | Teamwork skills | Low<br>Average<br>High | 2.13<br>2.57<br>2.84 | F=7.75 | $t_{1,3=}$4,17<br>$t_{2,3}$=2,65 |
| | Language competence | Foreign language | Low<br>Average<br>High | 2.38<br>2.36<br>2.65 | F=3.19 | $t_{2,3}$=2,48 |
| | Contribution of education to: | Becoming successful professional | Low<br>Average<br>High | 2.00<br>2.45<br>2.56 | F=3.85 | $t_{1,2}$=2,03<br>$t_{1,3}$=2,95 |

The variance analysis establishes a statistically significant influence of the course of study in the regulated medical specialties on (Table 2):

- The contribution of education through the studied disciplines to the development of students as successful professionals (F=3.96; p<0,05). The statistical significance of the differences shows that at the beginning and at the end of their university studies, students of regulated medical specialties are more critical of the level to which the education contributes to their professionalization.

- At the same time, in the last 5 and 6 courses of their studies, to the greatest extent, they claim that they become professionals and know the activities and duties related to their profession (F=2.82, p<0.05; M5=2.44 and M6= 2.88, Table 2).

**Table 2.** Influence of the course of study in the regulated medical specialties on the subjective assessments of digital competence, professional competence, language competence and education (analysis of variance)

| **Independent variable (Factor)** | **Dependent variable** | | **Scale** | **Mean** | **F p < 0,05** | **t-test p < 0,05** |
|---|---|---|---|---|---|---|
| Course of study | Contribution of education to: | Academic disciplines contribute to becoming a successful professional | 1 course<br>2 course<br>3 course<br>4 course<br>5 course<br>6 course | 2,26<br>2,48<br>2,89<br>2,85<br>2,44<br>2,75 | F=3.96 | $t_{1,3}$=3,79<br>$t_{1,4}$=3,97<br>$t_{1,6}$=2,63<br>$t_{3,5}$=2,14<br>$t_{4,5}$=2,09 |
| | Professional competence | Professional activities and duties | 1 course<br>2 course<br>3 course<br>4 course<br>5 course<br>6 course | 2,09<br>2,38<br>2,11<br>2,31<br>2,44<br>2,88 | F=2.82 | $t_{1,2}$=2,15<br>$t_{1,6}$ =3,16<br>$t_{3,6}$=3,14<br>$t_{4,6}$=2,32 |

In the same direction, the course of study affects the formation of professional competence and skills according to the students from the non-regulated economic and IT majors (Table 3).

**Table 3.** Influence of the course of study in the non-regulated specialties on the subjective assessments of digital competence, professional competence, language competence and education (analysis of variance)

| **Independent variable (Factor)** | **Dependent variable** | | **Scale** | **Mean** | **F p < 0,05** | **t-test p < 0,05** |
|---|---|---|---|---|---|---|
| Course of study | Professional competence | Professional activities and duties | 1 course<br>3 course<br>4 course | 1.67<br>1.80<br>2.40 | F=4.08 | $t_{1,4}$=2.60<br>$t_{3,4}$=2,21 |
| | | Teamwork skills | 1 course<br>3 course<br>4 course | 2.22<br>2.80<br>3.00 | F=4.92 | $t_{1,4}$=2.96 |
| | | Organizational skills | 1 course<br>3 course<br>4 course | 2.00<br>2.80<br>2.90 | F=7.84 | $t_{1,3}$=2.27<br>$t_{1,4}$=3.65 |

The variance analysis found a statistically significant influence of the training course in the unregulated professions on (Table 3):

- Knowledge of the activities and duties related to the profession (F=4.08; p<0,05).
- Teamwork skills (F=4.92; p<0.05).
- Organizational skills (F=7.84; p<0.05).

The statistical significance of the differences shows that as the course of study progresses, students statistically significantly better know the activities and duties related to the profession ($t_{1,4}$=2.60 and $t_{3,4}$=2.21, p<0,05), possess more organizational skills ($t_{1,3}$=2.27 and $t_{1,4}$=3.65, p<0,05) and teamwork skills ($t_{1,4}$=2.96, p<0,05), compared to students from earlier years.

## 4 Conclusion

The results of the present study show that there is a dependency between digital and professional competence among the students who took part in the study. The analysis found a statistically significant influence of digital competence on subjective assessments of professional competence, language competence and the contribution of university education to professionalisation. More specifically, digital competence affects the knowledge of financial-economic and labor-law regulations related to work, teamwork skills, linguistic competence in a foreign language and awareness of the contribution of education in general to building as successful professionals. Quite logically, students report increased professional competence in the last years of their university studies, regardless of the nature of their majors. It can be concluded that directing learning in higher education to increase digital competence would have a positive effect on increasing the professional competence of future specialists.

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