

DIGITAL COMPETENCES OF YOUNG PEOPLE: THE RESULTS OF A STUDY OF SECONDARY-SCHOOL STUDENTS IN THE GREATER POLAND PROVINCE

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Purpose: The main purpose of the study is to present the results of the assessment of secondary-school students' competences in the Greater Poland Province in the field of creating digital content and the ability to search for information using information technology (IT).

Design/methodology/approach: The main inspiration for developing the research tool was the assessment center method. Participants faced tasks that simulated real-life challenges possibly encountered by young people.

Findings: The results of the study indicate that most of the participants had average or high competences in these areas. At the same time, several areas have been identified in which the process of mastering the discussed competences should be improved.

Research limitations/implications: The main limitation of the study is its regional scope, which means that the results cannot be generalized to the whole of Poland.

Practical implications: The results presented in this article may be used to modify secondary-school curricula and implement educational activities aimed at developing specific skills and attitudes.

Originality/value: The results presented may suggest how to modify secondary-school curricula and implement educational activities aimed at acquisition specific skills and developing proper attitudes. Therefore, main findings may be particularly valuable for educators and policy makers.

Keywords: economy 4.0, new generation, labor market, digital competences.

Category of the paper: Research paper.

1. Introduction

The socio-economic challenges of our times, the dynamic advances in technology and the emergence of more and more advanced technologies do not allow for an accurate vision of the future labor market. As a result, planning a career path becomes a real challenge. This applies especially to young people who are faced with the choice of a future profession. This choice

includes the knowledge and skills that are needed to master the profession, which in turn influences the decision on the future path of education.

The new, very dynamic environment influenced by information and communication technologies requires future employees to have competences¹ that will allow them to remain professionally active under changing conditions. It is emphasized that the competitive labor market exerts pressure on employees to acquire higher qualifications so as not to be pushed to the margin of unemployment (Messyasz, 2021).

According to many experts (for example, Aulbur, Bigghe, 2016; Ferrari, Punie, Redecker, 2012; Włoch, Śledziwska, 2019), the possibilities of building a career as well as making professional and personal development will to a large extent depend on achieving at least the basic level of digital competences. These are of a cross-sectional nature, enabling individuals to acquire other skills (Ferrari, Punie, Redecker, 2012). The possession and development of digital competences will therefore be particularly important in the context of the accelerating digitization of Polish enterprises observed in recent years (Cyfryzacja..., 2018), which will create demand for competences of the future.

This article describes the results of a study carried out by a team of researchers from the Poznań University of Economics and Business (PUEB) as part of the ‘Economics in the face of the New Economy’ project. The main aim of this article is to present the results of the assessment of the level of competences entitled ‘Digital content creation and the ability to search for information using IT’.

The structure of the article is as follows. The first part of the study describes the essence of digital competences. Then, the research method is presented and the research sample is characterized. The most important results are then outlined. Conclusions are provided in the final part of the article.

2. The essence of digital competences

The latest communication of the European Commission entitled “The 2030 Digital Compass: The European Way for the Digital Decade” (2021) indicates “a digitally skilled population and highly skilled digital professionals” among the main directions of the digital transformation of the European Union (EU) countries. It is assumed that by 2030, 80% of EU citizens aged 16-79 will have at least a basic level of digital skills (Europe’s Digital Decade..., 2021). Thus, the importance of digital competences of an individual in the social life and

¹ The European Centre for the Development of Vocational Training defines the term “competences” as a combination of knowledge, skills, attitudes and values (Cedefop, 2010). In turn, in the reports prepared by the OECD, “competence” is understood as “mobilisation of knowledge, skills, attitudes and values to meet complex demands” (OECD, 2018, p. 5).

functioning under new conditions is emphasized. Having a minimum level of digital competences has been found to be among the fundamental skills in addition to mathematical reasoning, reading and writing (European Commission, 2016).

Digital competence is a complex concept. The Recommendations of the Council of the European Union of 22 May 2018 on key competences for lifelong learning contains the following definition: “Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking” (Recommendations..., 2018, p. 10). This approach to understanding the essence of digital competences indicates that they should be considered in close connection with other interpenetrating skills (including social ones).

In order to understand the multidimensionality and complexity of the definition of the concept of digital competence, it is worth mentioning that so far at least several indicators, models and standards for shaping these competences have been developed. The DigComp model (*Digital Competence Framework*) developed by the Institute for Prospective Technological Studies can serve as an example. As part of DigComp, 21 digital competences have been distinguished in five areas: information, communication, content creation, security and problem solving (Carretero, Vuorikari, Punie, 2017). It is also worth quoting the “Framework catalog of digital competences”, which is a specific supplement to the DigComp model. It emphasizes the practical dimension of using digital competences by proposing a list of functional competences. In the discussed document, digital competences are considered from the point of view of their usefulness in various areas of life: education, everyday matters, finances, relationships with relatives, work and professional development, health, rest and hobbies, civic involvement and religion (Klimczuk et al., 2015b).

The existing definitions of digital competences, although very diverse (Klimczuk et al., 2015a; Gallardo-Echenique et al., 2015; Van Laar et al., 2017), go far beyond the use of technological tools and navigating the online environment. They include “... both basic skills allowing for communication, obtaining information, generating content in a digital environment, and more advanced skills related to specific ICT applications in various areas of business activity ...” (Śledziwska, Gabryelczyk, Włoch, 2015, p. 7). Therefore, it seems clear that digital competences are a liquid concept, and the approach to their definition will depend on different types of users performing tasks of varying complexity (Curtarelli et al., 2016). Digital competences are a very wide set of knowledge, skills and attitudes, which is constantly enriched owing to the emerging new possibilities of using IT.

Previous empirical analyses have primarily focused on selected elements of digital competences: risky online behavior (Tomczyk, Kopecký, 2016); use of social media (Doniecki, 2013); communication on the internet (Dyczewski, 2020); problematic use of the internet and

social networking sites (Tomczyk, 2019); and digital exclusion (Ćwiek, 2018; Jedlińska, 2018). The use of digital competences in the context of solving specific problems has been studied less frequently (Mikowska, Skalna, Siwiński, 2018). The issue of online activity prevails in research conducted among Polish young people (Bochenek et al., 2019; Kłak, 2020; Lange et al., 2021), while there are few attempts to capture other elements of digital competences. This article assumes that the process of acquiring the discussed competences takes place throughout life; however, mastering them at the stage of receiving education in a secondary school may, to some extent, condition the results of educational and professional decisions made.

3. Research method

Due to the complexity and multidimensionality of digital competences, the empirical study decided to focus on the assessment of the competences of school students in the field of creating digital content and the ability to search for information using IT. The main inspiration for developing the research tool was the assessment center method, which is widely used in the selection of job candidates and employee evaluation (Błoński, 2019). This method differs from the Eurostat quantitative approach to measuring digital competences, which assumes the assessment of the level of individual digital skills based on the scope of activities performed² (Eurostat, 2021). Instead, participants in this study faced tasks that simulated real-life challenges possibly encountered by young people.

In order to assess to what degree school students have mastered these competences, the author's research tool was developed, which required each participant in the study to perform an individual task, which involved preparing a multimedia presentation on a given topic. Moreover, the presentation was to meet certain requirements in terms of volume and content, which were described in the task instruction. In total, each student could receive 20 points for a correctly performed and completed task. The evaluation criteria included the following aspects:

- the ability to create digital content in various formats (0-5 points),
- awareness of and compliance with copyright (0-3 points),
- relevance of the presentation content to the selected topic and substantive content (0-2 points),

² These activities are as follows: using a text editor; using spreadsheet software; editing photos, video or audio files; copying or moving files (such as documents, data, images, videos) between folders, devices (via e-mail, instant messaging, USB, cable) or in the cloud; creating files (for example, documents, images, videos) containing several elements such as text, image, table, figure, animation or sound; using advanced spreadsheet functions (functions, formulas, macros and other programming functions) to organize, analyze, structure or modify data; and writing code in a programming language (Eurostat, 2021).

- the ability to create new content based on graphic, music or video files available on the internet, as well as to modify the content created by other users (0-2 points),
- the volume of the presentation (0-1 point),
- saving and sending the presentation in a different format (0-1 score),
- technical aspects of the presentation (including the title of the presentation and information about the author(s), clear layout of the presentation, linguistic correctness) (0-6 points).

To assess the level of competences mastered by the students, a descriptive scale was used in the study: very low, low, average, high and very high. The achieved level of competences was determined depending on the range in which the participant's result was: 1 to 4 points – very low level; 5 to 8 points – low level; 9 to 12 points – average level; 13 to 16 points – high level; and 17 to 20 points – very high level.

4. Characteristics of the research sample

The population studied in the project consisted of students attending secondary schools in the Greater Poland Province and born after 2006 (that is, representatives of the Z generation, (Messyasz, 2021). A class was adopted as a sampling unit. The following aspects were taken into account while sampling: the type of locality, the type of secondary school and the quality of education at the school (based on the Perspektywy 2020 ranking of schools). Participation in the study was voluntary. Due to the ongoing COVID-19 pandemic, the study was conducted online via the Moodle platform in late May and early June 2021.

Formally, a total of 396 students took part in the study.³ Ultimately, 334 students were subjected to assessment. Moreover, 62 works that were identified as containing overt plagiarism and those that contained empty files or content inconsistent with the task instructions were rejected. The studied group consisted of people aged 15 to 21 (Figure 1). The mean age of the participants was 17.2 years, and the median was 17 years.

³ Formal participation in the study should be understood as uploading at least one file on the Moodle platform as part of the performance of a given task.

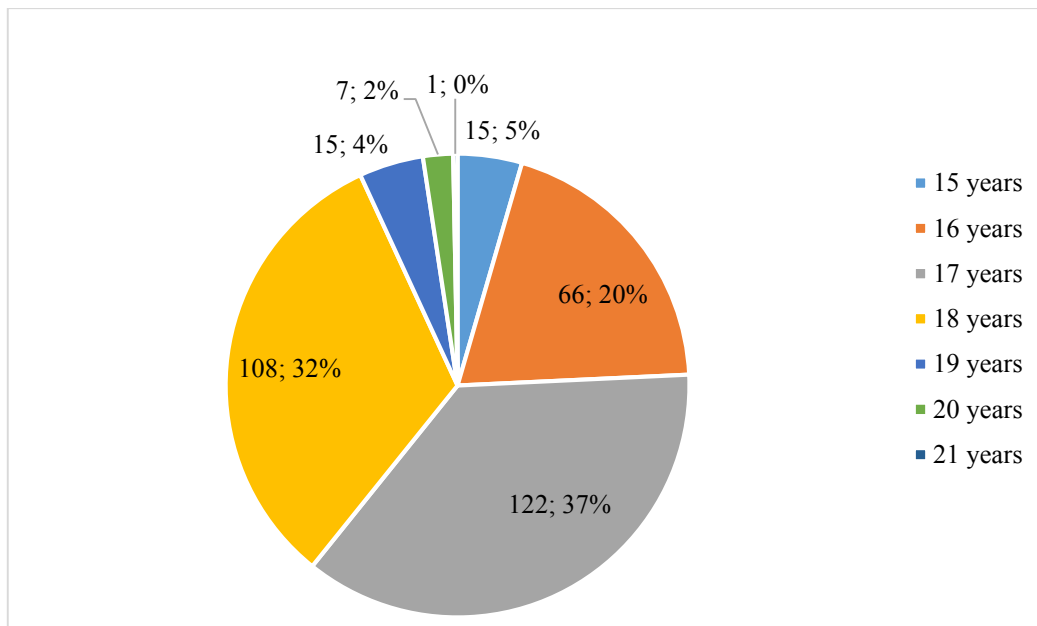


Figure 1. Structure of surveyed students by age. Source: own elaborations.

The research sample consisted of 229 women (68.6%) and 105 men (31.4%) attending three different types of secondary schools (Figure 2).

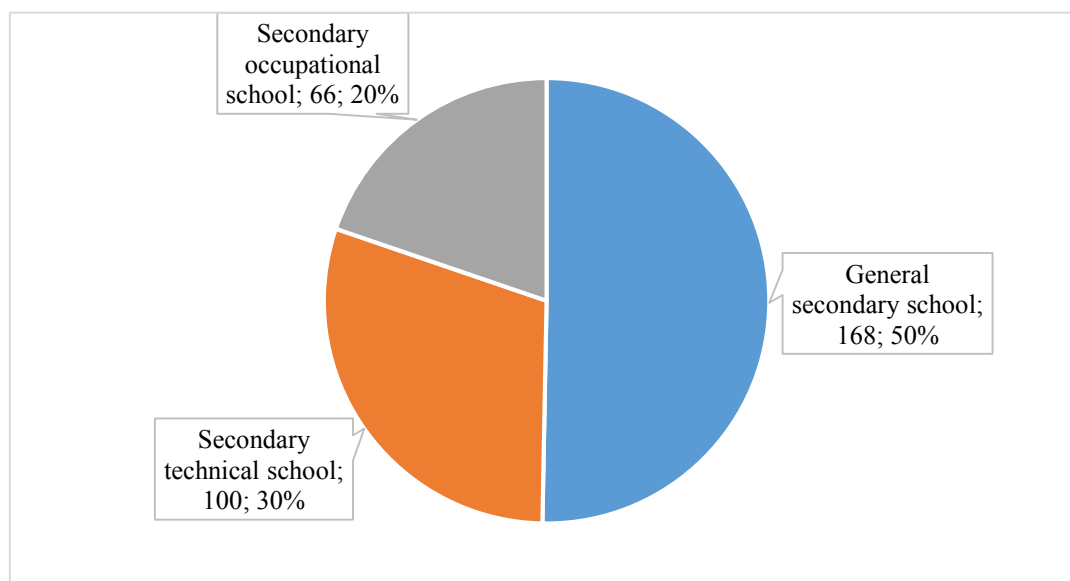


Figure 2. Structure of surveyed students by type of school. Source: own elaborations.

Most of the surveyed students represented secondary schools located in the Poznań powiat⁴ (58%). The most important research results are presented and discussed further in the article.

⁴ A powiat is the second-level unit of local government and administration in Poland, equivalent to a county, district or prefecture in other countries. The term “powiat” is most often translated into English as “county” or “district” (translator’s note).

5. Empirical study results

Participation in the study required each participant to complete a questionnaire and self-assess to what degree they mastered the ability to work in a digital environment. Students could assess their competence level on a ten-point scale.

The results showed that the individual level of this ability was assessed as lower by female students. In this group of respondents, the average assessment was 6.19 points. On the other hand, men obtained an average of 7.19 points. Self-assessment results varied depending on the type of school. Young people studying in technical schools assessed their digital competences as the highest. Students of vocational schools assessed them as the lowest (Table 1).

Table 1.

Student self-assessment results by gender and type of school (pts)

Type of secondary school	Female	Male
General secondary school	6.00	7.05
Secondary technical school	6.56	7.86
Secondary vocational school	5.90	6.90

Source: own elaborations.

The data on the average number of points obtained for individual studied groups (Table 2) show that female students attending general secondary schools coped with the task better than male students. This applies to general secondary schools located in both Poznań and the Poznań poviát. In the case of secondary technical schools located in Poznań, women obtained higher results than men, but they scored worse than men in secondary technical schools outside Poznań. The situation was different in the case of vocational schools. Here, better results were recorded among men, regardless of the school location.

Table 2.

Results of competence assessment

Type of school	Poznań		Poviát	
	Female	Male	Female	Male
General secondary school	11.86	11.00	10.58	9.95
Secondary technical school	11.78	10.12	9.26	9.75
Secondary vocational school	12.26	12.52	8.83	9.00

Source: own elaborations.

When comparing the above data with the results of the students' self-assessment, some discrepancies can be observed. For example, students from secondary vocational schools rated their skills in working in a digital environment at the lowest. This is in line with the results of competence assessment in schools located in the poviát, while students representing this type of school in Poznań achieved the highest results (both male and female). The highest self-assessment results were recorded in the case of secondary technical schools, but students of secondary technical schools in Poznań performed the worst.

The analysis of the survey results shows that the vast majority of secondary school students (58.08%) have mastered an average degree of competences in creating digital content and searching for information using IT. Almost a quarter of the respondents (23.65%) have a high level of competences, while a sixth of survey participants (17.07%) has a low level of competences (Figure 3).

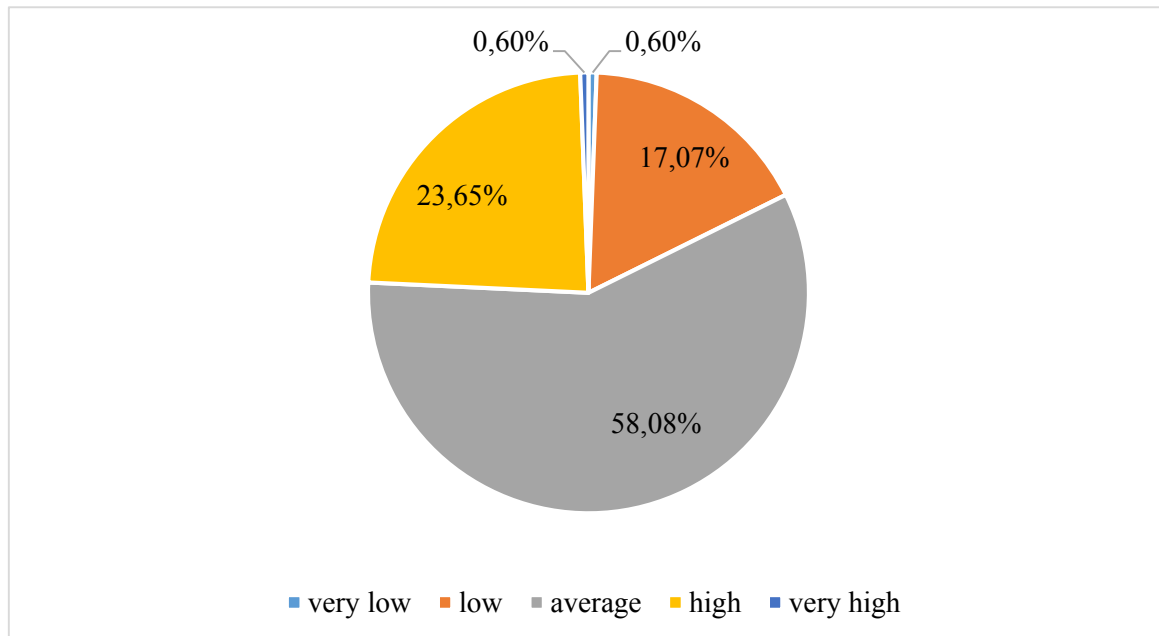
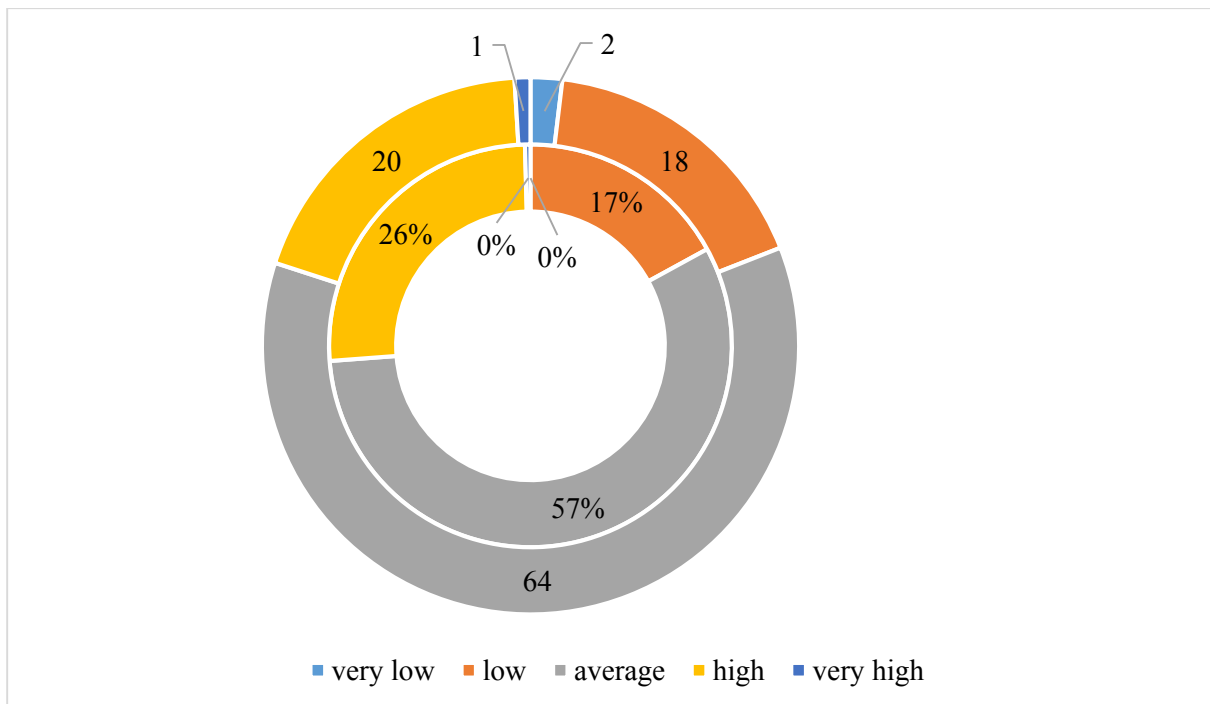


Figure 3. Competence assessment of surveyed students. Source: own elaborations.

The analysis of the achieved level of competences by gender showed that a higher percentage of women had a high level of competences. On the other hand, a higher percentage of men had an average level of competences. The percentage of individuals with a low level of competences in both groups of students was identical (Figure 4).



Notes: inner circle refers to female participants, while outer circle refers to male participants.

Figure 4. Competence assessment of students by gender. Source: own elaborations.

The distribution of competence assessment depending on the type of secondary school (Figure 5) shows that the highest percentage of students presenting a high or very high level of competences is present in secondary vocational schools. In secondary technical schools, on the other hand, the highest percentage of students assessed the level of their competences as low.

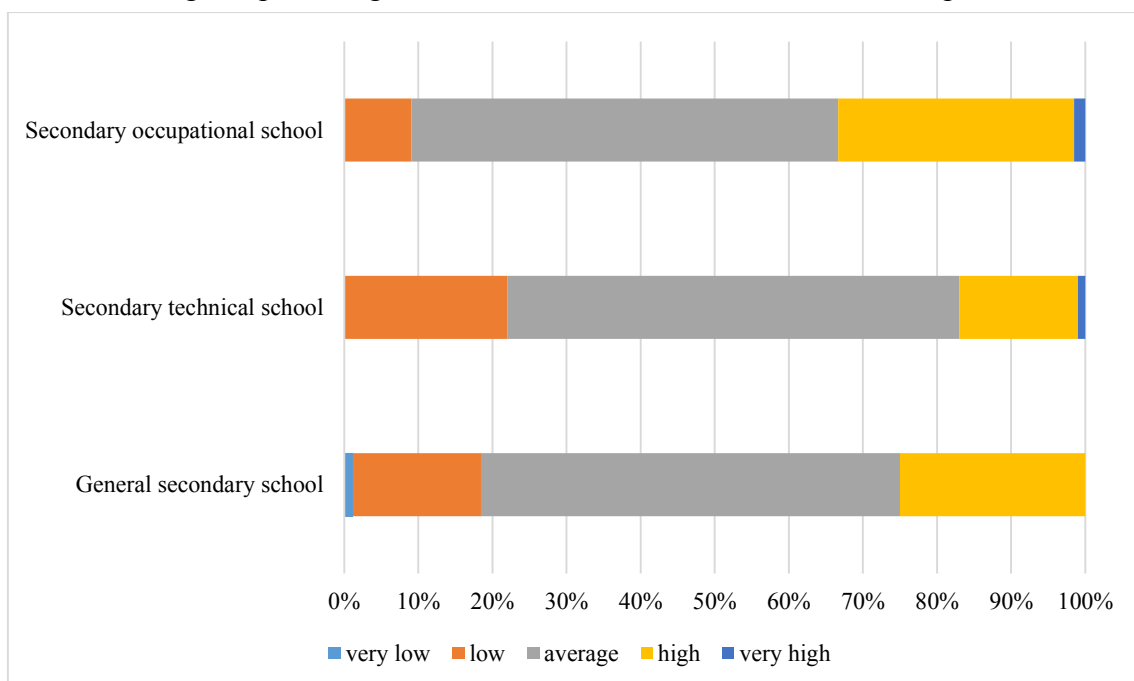
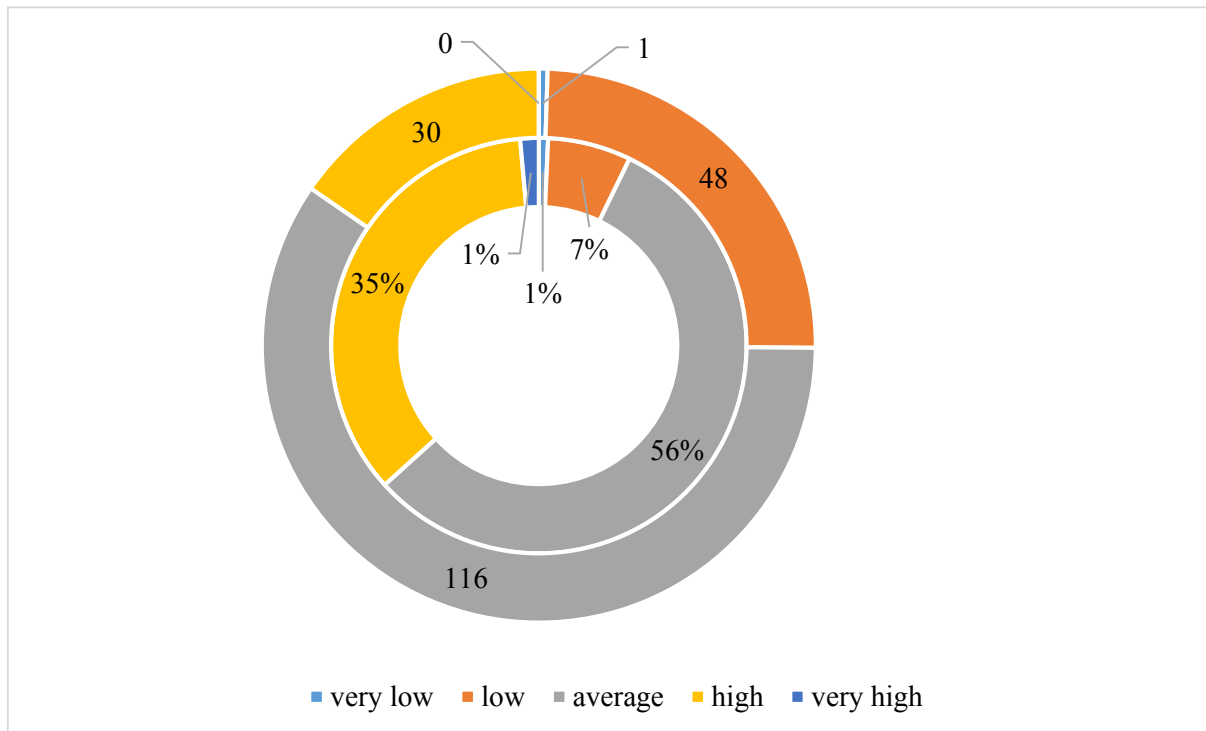


Figure 5. Competence assessment of students by type of school. Source: own elaborations.

The distribution of competence assessment depending on school location (Figure 6) demonstrates that schools located in Poznań are characterized by the highest percentage of students presenting high or very high levels of competences. On the other hand, the highest percentage of students whose level of competences was assessed as average or low was recorded in schools located outside Poznań.



Notes: inner circle refers to Poznan, while outer circle refers to Poznan powiat.

Figure 6. Competence assessment of students by school location. Source: own elaborations.

Microsoft PowerPoint was the most common program used to create presentations. The study participants also used free software quite often. The digital content of most multimedia presentations prepared by students included text and graphics. A fifth of presentations (21.6%) had video content and a third of participants (32.34%) used animation. Only 4.78% of the prepared presentations contained soundtracks. This may suggest insufficient skills in creating content in more advanced formats, or insufficient ability to search for information on the web or integrate it into multimedia presentations.

The results obtained highlight the gaps in the students' knowledge of compliance with the copyright law. In most cases (86.23%), of the graphics taken from the website freepik.com (additional instruction) were not marked in the appropriate way despite the fact that the website clearly stated that using the photos was possible only provided that information about the author was given. Only a third of respondents (34.43%) put footnotes to the internet sources used to create the presentation. Moreover, there were cases where several students did not create their own works, but copied them from someone. The presented observations coincide with the results of previous studies, which highlighted the problem of knowledge deficit in the field of copyright (Kwiatkowska, Dąbrowski, 2012; Tomczyk, Srokowski, 2016), which occurs at earlier stages of education (Tomczyk, Srokowski, 2016).

Almost a tenth of the works (9.3%) did not meet the technical criteria included in the instructions (the presentations contained less than ten slides each). Additionally, not everyone coped with the instruction to save and transfer the presentation in a different file format. Two-thirds of the students (65.57%) completed this task correctly. It should be noted that this does not necessarily indicate gaps in digital competences, but may suggest difficulties in understanding the instructions read.

The participants in the study were not always able to properly modify the content found on the web and adapt it to the subject of the presentation. Therefore, they applied the “copy-paste” principle, reducing the substantive value of the presentation. This may be because adolescents usually assess information found on the internet by confirming the presence of search terms (Nicholas, 2010).

It is also worth noting that a negligible percentage of presentations (4.78%) contained the name and surname of the original author(s) of the work. This may suggest that school students are little aware of the factors that influence the credibility of information.

6. Conclusions

This article presents the results of an empirical study on the assessment of students' competences in creating digital content and searching for information using IT. The results showed that over 80% of the studied participants had an average or high level of these competences. Students with the average level of competences had the largest share in the group of respondents (slightly over 58%). The worst average results were recorded for students attending secondary vocational schools located outside Poznań (8.83 points). The best average results were observed among female students representing general secondary schools in Poznań (11.86 points). The type of school and location also differentiated the results of the competence assessment. Male students scored better results in secondary vocational schools, while female students scored better results in general secondary schools. In the case of secondary technical schools, women obtained, on average, higher results in Poznań, while their results were worse than those of men in secondary technical schools located in the poviat.

The greatest limitation of the study is its regional scope, which means that the results cannot be generalized to the whole of Poland. However, based on the conducted analysis, it is possible to notice certain areas in which the process of developing competences requires strengthening and improving. In particular, it is necessary to point out the gaps in the knowledge of copyright compliance and the limited skills in modifying the content found on the web in accordance with the task performed. Skills in creating digital content in more advanced formats were also insufficient.

The results presented in this article may suggest how to modify secondary-school curricula and implement educational activities aimed at acquisition specific skills and developing proper attitudes. The appropriate level of digital competences, which is a “(...) key to active and functional participation in contemporary society” (Gallardo-Echenique et al., 2015, p. 12), will enable the young generation to enter the labor market with greater confidence and will also be useful in coping with the problems of everyday life.

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