



# A PHENOMENOLOGICAL STUDY ON FUTURE TEACHERS' SELF-PERCEPTIONS REGARDING THEIR DIGITAL SKILL DEVELOPMENT IN ACADEMIC SETTINGS

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**Abstract:** This article analyses how undergraduate and master's students from the Faculty of Psychology and Educational Sciences, future teachers, perceive their digital skills. The study uses phenomenological analysis following methods described in the literature review.

The study presents guiding concepts for analyzing communication broadly, integrating cognitive and pragmatic linguistic methods from the perspective of relevance theory, along with logical-aesthetic and formal techniques (stylistic and formal analysis), logical-semantic approaches (thematic-categorical analysis), and semantic and structural methods (co-occurrence analysis, structural analysis, opposition relations analysis, propositional discourse analysis). It also employs techniques like bracketing to help ensure the researcher's objectivity.

The Jaccard index revealed that the students answered honestly, showing little influence from external ideas. The Szymkiewicz–Simpson coefficient indicated that more than one-third of the students provided consistent answers regarding their digital skills.

**Key words:** phenomenological analysis; bracketing; Jaccard index; Szymkiewicz–Simpson coefficient

**Subject classification codes:** 97-02.

## 1. Introduction

The paper aims to conduct an in-depth analysis of future teachers' self-perceptions regarding the development of their digital skills as a result of their participation in undergraduate or master's academic studies.

Digital literacy encompasses four skills: handling digital tools, expanding print-based knowledge, and using copy, delete, or visual techniques (Mifsud, 2006). Digital and media literacy are often confused (Korten & Svoen, 2006). Literacy is a too modest goal given the rapid pace of change. We often discuss information and communication technology, such as digital literacy, which refers to using "TIC tools and networks to access, manage, integrate, evaluate, create, and communicate information to function in a knowledge society." (CETF, 2008).

Media literacy ensures the effective use of information and communication technologies, provides opportunities for practical learning (Belshaw, 2012), and promotes safe and legal personal development and societal progress (Martin, 2008).

Digital literacy describes the ability to "choose a path through digital and information media to find, evaluate, and accept or reject information." (Fieldhouse, Nicholas, 2008). This human-machine interaction is mediated and involves social and psychological processes (Erstad, 2008). Technology-mediated practices are different and may require new literacies, which are far from being considered standard procedures used for knowledge (Lankshear, Knobel, 2006). This situation is due to personality traits that hinder comprehension, the quality of asynchronous messages that are often

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inexpressive and can cause distortions, or the social status of the individual within the community, which can limit access to technology (Belshaw, 2012).

The importance of the research topic is due to the fact that during the COVID-19 pandemic, society and, implicitly, academic activities had to limit face-to-face interactions, which presented a significant challenge for education. Adapting teachers to organize academic instructional activities requires effort, creativity, involvement, responsibility, and ethical competencies (Havârneanu, 2013). Additionally, this online teaching, learning, and evaluation process is essential for advancing students' perception of the need to develop their technological skills. It also provides a new outlook on how modern academic instructional activities are organized, whether online or on-site.

## 2. Literature Review

### 2.1. The phenomenological perspective

The interpretive approach of phenomenological analysis is qualitative psychological research that focuses on how a specific person assigns meaning to the entire phenomenon of communication (Smith & Larkin, 2009), a meaning that extends beyond the descriptive level to reach the understanding of attitude revealed through natural communication of the participants (Ramsøy & Overgaard, 2004).

The phenomenological interpretation approach develops the complexity of the meaning of content expressed either interpersonally or intrapersonally (Smith, Jarman & Osborn, 1999). It is also used to analyze data from one-on-one interviews, with the goal of developing detailed descriptions of individual experiences (Fade, 2004), and to interpret those experiences (Pringle, Drummond, McLafferty & Hendry, 2011).

The methods used for communication analysis cover a broad spectrum, including cognitive and pragmatic linguistic analysis from the perspective of relevance theory, as well as logical-aesthetic and formal methods such as stylistic and formal analysis. They also include logical-semantic methods like thematic and categorical analysis, and semantic and structural methods such as co-occurrence analysis, structural analysis, opposition relations analysis, and propositional discourse analysis (Mucchielli, 1996).

### 2.2. Relevance theory

Relevance theory is a framework for understanding, interpreting, and applying concepts in cognitive and pragmatic linguistics (Sperber & Deirdre, 1986[1995]). Inspired by Paul Grice's work (Grice, 1989), relevance theory has a strong pragmatic focus. It outlines how to decode a text's meanings from cognitive and pragmatic perspectives.

The basic principles of cognitive linguistics state that language is part of general knowledge and is shaped by linguistic structures created through experience that influence our overall knowledge. Conceptualization involves constructing meaning through ongoing interactions with the world. Metaphors and metonymy serve not just rhetorical purposes but also help organize knowledge because both language and reflection are influenced by metaphorical structures rooted in our physical and sensory experiences, as described by conceptual metaphor theory (Lakoff & Johnson, 1980). Grammatical structures can also be understood through general cognitive processes like perception, attention, and memory, which reflect how people conceptualize relationships between entities and events (Langacker, 1987). Conceptual categories play a vital role in shaping meaning (Henderson & Brown, 1997).

Furthermore, utterances can be ostensive (when the sender draws the receiver's attention to the fact that they want to convey information) or inferential (when the receiver deduces the sender's intended message, starting from the literal meaning and interpreting it through contextual clues) (Deirdre & Sperber, 2002).

Pragmatic linguistics, a branch of linguistics, explores how context influences language meaning through the speaker's intentions, whether expressed directly or indirectly, the relationship between sender and receiver, and the environment of communication.

Key concepts in pragmatic linguistics include deixis (words or expressions that specify spatial, temporal, and personal reference) (Schiffrin, 1990; Hanks, 2009), implied meanings in utterances (Grice, 1989), actions supporting explicit statements (such as assertive, directive, commissive, expressive, or declarative acts), and the components of linguistic acts, including the locutionary act (the act of saying something, which produces meaning), the illocutionary act (performing an act by saying something that conveys a specific tone, attitude, feeling, motive, or intention), and the perlocutionary act (which often results in effects on the listener's feelings, thoughts, or actions) (Austin, 1975).

### 2.3. Logical-aesthetic and formal methods

Logical-aesthetic and formal analysis are carried out using logical-semantic techniques that examine how the logical structure of sentences and words contributes to creating the overall meaning of the text and how this meaning is expressed through the author's style. This type of analysis involves studying the author's style, which includes investigating stylistic figures (such as metaphors, metonymies, hyperboles, ellipses, personifications, epithets, repetitions, and enumerations) and how these influence the meaning and tone of the text; analyzing the characteristics of narrative style (including the narrator's perspective, tone, and rhythm) and their impact on the logical structure and meaning; and exploring the stylistic levels of the text (ranging from colloquial to poetic or academic) and how these reflect the author's intentions (Hoover, 2017). Ultimately, understanding how logical and aesthetic elements interact to create meaning emphasizes the connection between logical semantics, cultural context, and historical context.

### 2.4. Logical-semantic analysis methodology

The logical-semantic analysis involves identifying keywords in the text and their connotations, which highlight the connection between implicit meanings and their figurative interpretations; detecting the semantic fields that organize the main themes of the text and the relationships among them; and examining cases of ambiguity and polysemy to reveal the semantic complexity of the text (Rastier, 1997).

### 2.5. Co-occurrence analysis

Framed within the semantic and structural systems, co-occurrence analysis is used to identify and measure the relationships between elements that appear together in the context or data set. In text analysis, the components (words or expressions) that show up are identified, but only by examining the frequency of a pair of words or phrases in a sentence or paragraph.

To determine the strength of the relationship, various measures can be used: the correlation coefficient, which assesses the linear association between two variables; the Jaccard index (Jaccard, 1912), which evaluates the similarity between two data sets and is defined as the ratio of common elements to the total unique elements in both sets; the Chi-square test ( $\chi^2$ ), which tests whether the observed co-occurrence frequencies differ significantly from what would be expected by chance; and graphical representations, such as a co-occurrence matrix, where nodes represent elements and the links indicate the frequency or intensity of co-occurrences.

### 2.6. Propositional analysis of discourses

As a semantic and structural approach, the propositional analysis of discourse involves identifying propositions in the text, determining their types (declarative, interrogative, imperative), and analyzing their logical functions. It also examines the structure of each sentence (subject, predicate, attributes, complements, inversions, subject omissions) and uncovers the logical relationships (causal, conditional, conclusive, concessive, temporal) between these elements (Heil, 2009).

### 3. Materials And Methods

#### 3.1. Teleological Aspects

This paper aims to explore the self-perceptions of a group of undergraduate and master's students in early and primary education at the Faculty of Psychology and Educational Sciences regarding their shared experiences and the meanings they assign to the evolution of their ability to use digital tools in academic activities, whether in on-site or online learning (via the Webex platform).

#### 3.2. Type of Study

In this study we conducted descriptive, reflexive, and dialectical phenomenological research based on content analysis of data collected from volunteer participants, students of the Faculty of Psychology and Educational Sciences, Department of Educational Sciences, who voluntarily expressed their anonymous opinions through responses to an online questionnaire. This questionnaire assessed their self-perceptions regarding the evolution of their abilities to use information technologies in completing didactic tasks related to their academic activities.

The data collection employed a pre-tested questionnaire (similar to Google Forms) to gather rich qualitative data. The analysis was rooted in content analysis (Bardin, 1997), which is well-suited for identifying individuals' opinions (Moliner, Rateau & Cohen-Scali, 2002). The study aimed to identify standard units and categories within participants' experiences, ultimately building a detailed description of the phenomenon from their perspective.

#### 3.3. Study Design

The teaching activities for the bachelor's and master's programs at the Faculty of Psychology and Educational Sciences spanned one semester. During this period, students engaged in exercises during seminars, such as creating presentations using various Microsoft applications or Office programs, developing games with the Scratch language, or solving exercises using Blockly. Some courses during the master's program were conducted online, while others were held on-site, in accordance with the university's scheduling.

Following the first semester, students involved in teaching activities with the researcher were invited to participate in an online questionnaire. The questionnaire was pre-tested and then distributed to voluntary respondents among the students.

##### 3.3.1. Participants

Following the online launch of the questionnaire for 350 students enrolled in Didactics of Mathematics courses (bachelor's or master's), 97 students, aged between 20 and 51, chose to respond. Since 12 students participated in the pretest, they did not take part in the main testing. As a result, the final analysis includes 85 responses.

#### 3.4. Instruments used in the study

##### 3.4.1. Questionnaire

The questionnaire, administered online through Google Forms, served as the tool for collecting information about the opinions of the surveyed students regarding their thoughts, memories, emotions, desires, and personal and formal educational experiences (Mucchielli, 1988).

The advantages of this type of data collection include its versatility, ease of pretesting, and ability to be administered without researcher intervention. Since respondents do not interact with researchers, their reactions tend to be less influenced, providing a more authentic view of their thoughts and feelings. The absence of interaction with researchers or other students also reduces the tendency to conform to social norms. Respondents answering anonymously from the comfort of their homes are more likely to be honest and feel free to express their true thoughts and feelings about their academic experiences. The online format also helped eliminate the Hawthorne effect because participants did not feel monitored. Additionally, having to articulate their thoughts encourages students to formulate

answers consciously, which can lead to more genuine responses depending on each individual's character. The Halo effect was also minimized by framing questions in a general manner, without elements that could lead to specific, standardized answers.

One drawback of this data collection method is that no direct observations can be made; only indirect assessments, based on the expressed content, can be made regarding students' health, well-being, and emotional balance at the time of answering, as well as their level of concentration and motivation. This is not possible through non-verbal cues such as gestures, posture, facial expressions, personal space, tone of voice, involuntary sounds, or bodily tics, nor through para-verbal cues like volume, speech rhythm, pauses, intonation, diction, accent, or pronunciation. Instead, information about factual, conceptual, procedural, emotional, behavioral, attitudinal, or motivational aspects can be indirectly deduced through content analysis of the responses received.

The questionnaire includes an open question to collect information about the short Curriculum Vitae (providing data on age, employment status in the education system, and how this influences academic performance), as well as a question about the Curriculum Studiorum of the subjects involved in the study. Additionally, an open-ended question concerns how students perceive their growth in digital skills during university compared to high school graduation.

### 3.4.2. Indirect Observation

The indirect observation involved analyzing the amplitude of responses and verbal markers indicating sincerity and involvement in writing the answers (the Jaccard index and the Szymkiewicz–Simpson coefficient).

## 4. Results

### 4.1. Specific Methods of Phenomenological Analysis Used

The specific methods of phenomenological analysis serve as a record of the common characteristics revealed by the students' statements as answers to open-ended questions.

The logical-aesthetic method of stylistic analysis involves examining how style and structure contribute to a text's meaning and aesthetic experience (Kevelson, 1994). This structured approach ensures a thorough and balanced analysis, highlighting both the logical and aesthetic aspects of the text through lexical analysis at the register level by examining the degree of formality or informality in the language used.

The primary methods used for analyzing communication range widely, including cognitive and pragmatic linguistic analysis from the perspective of relevance theory, as well as logical-aesthetic and formal methods (stylistic analysis and formal analysis), logical-semantic methods (thematic-categorical analysis), and semantic and structural methods (co-occurrence analysis, structural analysis, analysis of oppositional relations, propositional discourse analysis).

To ensure the validity of a phenomenological study, the researcher's objectivity is essential. One technique that helps maintain objectivity in phenomenological analysis is bracketing (Husserl, 1913[1982]), which involves suspending external assumptions or beliefs, assumptions about reality, and preconceived judgments to analyze what is present in the consciousness of those who produced the analyzed text.

This technique involves suspending one's prejudices, managing personal inferences, being aware of personal values and experiences that can influence data interpretation, reflecting on one's assumptions to preserve objectivity, and focusing strictly on describing and analyzing the phenomenon. The goal is to identify the constant elements that constitute the essence of the phenomenon, regardless of contextual situations.

Planning the process of bracketing, phenomenological reduction, background, and the researcher's own experiences should occur before data collection and analysis (Chan, Fung & Chien, 2013). Moreover, only the researchers (not the participants) should engage in bracketing so that the

researcher can detach from personal lived experiences and better understand the perspectives of the study participants (Giorgi, 1997).

## 4.2. Phenomenological Analysis of the Responses Elaborated by the Participants in the Study

### 4.2.1. Semantic and Structural Methods

A close look at student responses to the question, "What digital skills do you have now compared to when you graduated high school?" reveals that their expressions are very diverse. We encounter expressions of a highly laconic statements formalism ("B1", "B2", "B3"), the occurrence of which is 3.53%, but there are also form announcements that strictly specify the types of applications that the student can use ("Abilities. Work: Prezi, Canva, and the usual Word, PowerPoint, Excel") or semi-formal, in which they use the formulas that specify the programs in which they acquired work skills and the self-perceived level at which you reached ("Much better", "I also work in Canva.", "Much more advanced. I can also work in Canva, SPSS, or other programs."), In total, this occurs at a rate of 15.29%.

Most of the answers are informally formulated, some laconic statements, without being formulated in a sentence (which has a predicate and an expressed or implied subject) and without a characteristic ending ("Better," "Better, but not very good," "Developed," "High," "Much better," "Much more advanced") with an occurrence of 36.47%. Exist also statements expressed in more or less developed and specific sentences or phrases ("They are the same.", "They have not improved.", "My digital skills have remained the same.", "I have reached the same level as after graduating from high school.", "It is easier for me to find information on the Internet.", "I work in Word and PowerPoint, less in Excel." "I use Microsoft Office tools more easily; I manage to use Canva to create presentation templates." "Now I learned to use PowerPoint much better; I discovered Canva, I learned how to create a file in Word correctly, etc.") with an occurrence of 35.29%. However, some answers can be expressed with a personal note ("I consider that I have considerably developed my digital skills in seeing the approach to different applications during the courses/seminars.", "In my opinion, I have supplemented my digital skills [...], especially during the pandemic when we were forced to use them.") or even elaborate, in which the sentences are long and fluid, with several sentences following the flow of consciousness ("When I finished high school, I had no competence digital. Following the completion of some university studies, plus personal interest and the progress of digitalization, I have adapted with interest and pleasure"; "I can write that I have quite developed skills in Word, in Google applications, I can enter communication applications such as Zoom and Webex, I can search on different portals for what I need to find, I can work in certain applications to create boards and sheets that I need at work.", "Compared to the time when I completed my studies. In high school, I believe that my digital skills have developed and continue to evolve. This is also due to the courses from the pandemic period, but also to the assignments we received over time in the seminars, because they forced us to discover the digital world, thus learning to realize various projects, apps, and many valuable things with digital tools.") occurrence of 9.42%.

We must emphasize that the students who answered that they did not make remarkable progress in the digital sphere are in their first semester of undergraduate studies; therefore, they did not have the opportunity to work intensively with digital applications specific to the courses and seminars.

### 4.2.2. Logical-Aesthetic and Formal Techniques

The narrative style is generally expository, with slight descriptive accents, which helps present the narrator's perspective in an informal, optimistic, persuasive, and sometimes humorous tone, which confers confidence in the sincerity of the narrated text.

The statements, used by most students who did not express themselves laconically, were ostensive, a fact marked by the use of the present tense ("I can [...]", "I work [...]", "I create [...]"), respectively the perfect tense ("I learned [...]", "I discovered [...]", "I developed [...]) of some verbs, written in the first-person singular, which assertively expresses the skills acquired through their cognitive effort, of which the students are proud. In the elaborated constructions, different techniques of effective communication are observed: assertive expressions ("I consider that [...]", "in my opinion [...]) and

expressive ones (using different styles figures), constructed to produce a perlocutionary communicative act, which induces positive feelings and thoughts of appreciation from the lecturer.

From the series of rhetorical devices that give originality, depth, and clarity to the conveyed message (Alan, 2007), we find the metaphor ("digital world"; "digital tools"), anaphora ("I have developed my skills and I am still developing them"), metonymy ("the progress of digitalization"), ellipsis ("especially during the pandemic when we were forced to use these [digital skills]"); personification ("as these [pandemic courses and seminar assignments] forced us to discover"); the adverbial epithet ("I adapted with interest and pleasure") (Jakobson, 1960). The repetitions ("I use [...]", "I succeed [...]", "I can use [...]", "Now I learned [...]", "I discovered [...]", "I learned [...]", "I can write [...]", "I can work in Word", "I can access communication applications", "I can search into different portals", "I can work in certain applications") (De Smet, 2023) and the enumerations ("after completing some university studies, plus personal interest and the progress of digitization") accentuate and give an alert rhythm to linguistic expression. In addition, among the cohesive activities, conjunctions, which contribute to the construction of textual coherence and are used to clarify the logical relations of the sentence ("It is also due to the courses during the pandemic period, but also to the homework") or to add nuances and narrative complexity ("[digital skills] have developed and are still developing") (Halliday, 1975).

It should be noted that a few students are reluctant to the information provided by Internet sources and also argue that it is essential to respect ethical criteria for the use of digital resources in the academic environment.

#### 4.2.3. Logico-Syntactic Analysis

The syntactic analysis of the elaborated formal answers reveals the structuring of complex answers, in which punctuation is used correctly, contributing to the fluency of the text, which, however, does not provide very technical information (De Saussure, 1959).

The evaluation of the logical progression of ideas and arguments that ensure the logical flow of the text highlights the use of exposition of the personal point of view as a narrative technique, emphasized by expressions like "I consider that [...]" and "In my opinion [...]."

#### 4.2.4. Logical-Aesthetic and Formal Techniques

The analysis of the emotional atmosphere and the student's attitudes reveals the involvement of the subjects in writing the answers and the desire to express the evolution that brings them joy or even pride, a fact emphasized by the intense use of verbs (Arcand, Bourbeau, 1995), the meaning of which is often emphasized by repetition ("My skills have evolved", "Easy", "I work", "I manage to use", "I have fairly developed digital skills", "I can enter on the platform", "I can work"). Analysis of the occurrences of keywords appearing in all student responses reveals the following results: 12.94% for "Word", 11.76% for "Microsoft Office", 8.23% for "PowerPoint", 5.88% for "Excel", 5.88% for "Canva", 3.53% for "SPSS", 2.35% for "Zoom", 2.35% for "ECDL", 2.35% for "Webex", 1.18% for "Access", 1.18 % for "Classroom", 1.18% for "Adobe Reader", 1.18% for "Moodle", 1.18% for "APA style", 1.18% for "Google Apps", 1.18% for "Paint", 1.18% for "Prezi", 1.18% for "Notepad++", 1.18% for "Oxygen XML."

### 4.3. Logical-Semantic Approaches

A categorial analysis reveals three categories. The first category includes the students who have stagnated or slightly improved digital skills compared to high school level, after one semester of university studies. They express their perception of their digital skills acquisitions but do not provide concrete details. A second category is formed by students who describe that they are searching for information on the Internet through browsers or practical platforms for communication, which helps them understand lectures or participate in seminars. The last category of students gives correct, complete, coherent information about the programs they perform to solve the tasks related to courses and workshops and to carry out the projects necessary in their academic or professional activities as teachers.

Considering that the first category of students does not provide concrete information, we focused on the other two categories, which we used in calculating the Jaccard index.

In the category that we named Information-Communication (Table 1.), we included the set (A) of student answers that refer to searching for information or accessing some communication platforms. The word marks describe search activities on various browsers, the use of applications in teaching, and access to the online communication platforms.

**Table 1.** Themes specific to the Information-Communication category ( $|A| = 22$ )

<b>Theme (1): Search information on various browsers (ten specifications)</b>	<b>Theme (2): Using applications in teaching (two specifications)</b>	<b>Theme (3): Accessing the online communication platforms (ten specifications)</b>
"[...] find information on the Internet";	"[...] use interactive applications in didactic teaching";	"I use various applications";
"I can search different portals for what I need to find.";	"I work on different teaching platforms.";	"I can use communication applications such as Zoom and Webex.";
"I find information much easier.";	-	"I access digital platforms: Zoom, Teams, Webex, Classroom, etc.";
"I search for information.";	-	"I easily use various applications, such as Webex.";
"[...] browsing the internet";	-	"[...] the approach of different applications in courses/ seminars";
"[...] searching for information online";	-	"Apps";
"I know how to use the laptop.";	-	"I use Moodle.";
"I choose more carefully the sites from which I select information.";	-	"I access the faculty's platforms.";
"I am looking for information to compare.";	-	"I use the faculty's platforms.";
"[...] conducting research for the preparation of seminar assignments";	-	"I work in several online programs.";

The category we called the Creation – Operation category (Table 2.) uses set (B) of the answers of students who search and apply on digital platforms, use the Microsoft program package or other content creation or data processing programs, and the verbal markers used are specific to the following themes: doing projects, materials as a teacher in primary or preschool education; operating knowledge with the Microsoft Office package or presentation applications; complex computer knowledge applied in psychology and education sciences.

**Table 2.** Themes specific to the Creation – Operation category ( $|B| = 46$ )

<b>Theme (4): Realization of projects, materials and games as preschool or primary teacher (six specifications)</b>	<b>Theme (5): Operating knowledge of the Microsoft Office or presentation applications (thirty-four specifications)</b>	<b>Theme (6): Complex computer skills applied in psychology and education sciences (seven specifications)</b>
"I carry out various teaching projects."	"working skills: Prezi, Canva, as well as the usual Word, PowerPoint, Excel."	"I use text encoding programs: Notepad++, Oxygen XML."
"I create the teaching materials necessary for my preschool group."	"I work in Word."	"I can also work in Canva, SPSS or other programs."
"I work in applications to	"Basic Power Point presentations."	"I know how to make

create my didactic projects and worksheets in teaching activities."		presentations correctly from the point of view of the academic writing forma."
"I work on online teaching projects."	"I use the Microsoft Office package."	"I make correct academic documents."
"I create interactive activities in the digital environment for the little ones."	"I can handle World, Excel applications."	"[...] data processing skills"
"I know how to work much better in various programs for realizing didactic games and projects."	"I use editing applications much better."	"I also work in SPSS."
-	"I also work in Canva."	"I use the programs necessary for studies."
-	"I use Canva to create presentation templates."	-
-	"I discovered Canva."	-
-	"I use Word faster, merge documents, convert them from Word to Adobe Reader."	-
-	"I use presentation apps much better."	-
-	"Exercise and work with the Microsoft Office package."	-
-	"I improved my work with the Microsoft Office package."	-
-	"I know how to use programs for creating presentations."	-
-	"I use the Microsoft Office package."	-
-	"I use efficiently Microsoft Office tools."	-
-	"I know how to make projects and reports correctly."	-
-	"I have evolved in knowledge about Microsoft."	-
-	"Make a project/ a presentation."	-
-	"Use Microsoft Office applications better."	-
-	"Word, PowerPoint, Excel"	-
-	"I work in Word and PowerPoint, less in Excel."	-
-	"I can use various platforms to make presentations."	-
-	"ECDL"	-
-	"I enriched my knowledge of Microsoft programs, such as: Word, PowerPoint, Excel, Access."	-
-	"Advanced data processing"	-
-	"ECDL only"	-
-	"I use Microsoft platforms."	-
-	"Work in PowerPoint, Word"	-
-	I learned to use PowerPoint much better;	-
-	"I learned how to create a file in Word correctly."	-
-	"I can write a document in Word."	-
-	"I work efficiently in the basic programs PowerPoint, Word, Paint."	-

Given that gamification is an increasingly used alternative method in teaching (Mazuru, Havârneanu, 2023), some students are learning ways to use special teaching-learning-assessment platforms in teaching activities. Some of them are already employed in the educational system, are dedicated, and want to provide quality or are even concerned about how to use such teaching-learning-assessment experiences themselves (Havârneanu, 2020).

Out of the 85 students, 68 provided conclusive answers, which allowed the extraction of concrete information about their digital skills. From these 68 answers, we could structure categories: the Information-Communication category ( $|A| = 22$ ) and the Creation-Operation category ( $|B| = 46$ ), where  $|A \cap B| = 9$  (Table 3.).

**Table 3.** Themes specific for both categories (the co-occurrences) ( $|A \cap B| = 9$ )

The co-occurrences
"I use digital tools to create various projects, applications, and many valuable things." (theme (2), theme (4)).
"I can work in Word and Google apps, use communication apps like Zoom and Webex, search different portals for what I need to find and create lesson designs and worksheets with exercises I need at work using specific apps." (theme (3), theme (5)).
"Use of the Microsoft Office package, digital platforms (Zoom, Teams, Webex, Classroom, etc.), text encoding programs (Notepad++, Oxygen XML)." (theme (3), theme (6)).
"Digital skills further improved, being able to work in multiple online programs." (theme (3), theme (4)).
"I can work with multiple platforms, use Microsoft Office programs more effectively, and find information quickly." (theme (3), theme (5)).
"I make basic PowerPoint presentations and use various applications such as Webex effectively." (theme (3), theme (5)).
"I make basic PowerPoint presentations and use various applications such as WebEx effectively." (theme (3), theme (5)).
"I learned to use editing applications much better and to choose the sites from which I select the information more carefully." (theme (1), theme (5)).
"To search for information, to work in PowerPoint, Word, etc." (theme (1), theme (5)).

In the Information-Communication category, we created themes: (1) Search information on various browsers, with ten specifications; (2) Using applications in teaching, with two specifications; (3) Accessing the online communication platforms, with ten specifications. The Creation – Operation category revealed the following subjects: (4) Realization of projects and materials as a primary or preschool education teacher, with eight specifications; (5) Operating knowledge of the Microsoft Office package, with thirty-two specifications and (6) Complex computer skills applied in psychology and education sciences, with six specifications.

We calculated the Jaccard index and the Szymkiewicz–Simpson (Szymkiewicz, 1934, Simpson, 1960) coefficient to study the categorical analysis results more rigorously.

We calculated the number of students' answers whose characteristic is that in that answer, there are markers specific to both the Information - Communication category and the Creation - Operation category, and we obtained 9 such answers ( $|A \cap B| = 9$ ).

To calculate the Jaccard index, we used the formula:

$$J(A, B) = \frac{|A \cap B|}{|A| + |B| - |A \cap B|}, \text{ where } 0 \leq J(A, B) \leq 1. \quad (1)$$

We obtained the Jaccard index to be 0.152. This value indicates a 15.2% probability that the student's answers are similar, which is a certainty that the answers were honest. In the worst case, there were no or very few attempts to influence the answers, because the similarity coefficient between the two categories is minimal.

To calculate the Szymkiewicz–Simpson coefficient, we used the formula:

$$\text{overlap}(A, B) = \frac{|A \cap B|}{\min(|A|; |B|)}, \text{ where } 0 \leq \text{overlap}(A, B) \leq 1. \quad (2)$$

We obtained that overlap (A, B) is 0.409. This value indicates, that more than one third of answers had elements in common, as they referred to the same content related to the realm of digital skills. This

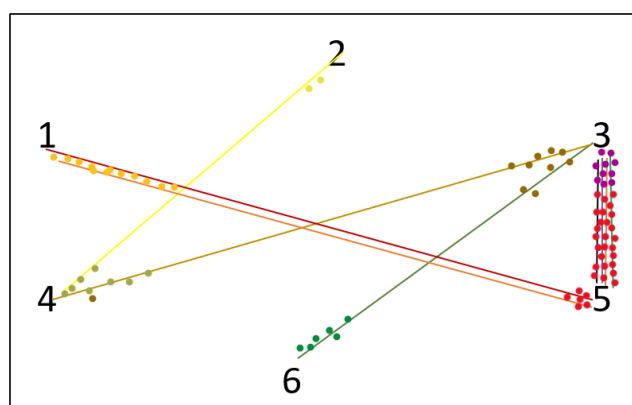
coefficient reveals that not all respondents were involved in the answers given, preferring to provide laconic statements, evasive answers lacking substance.

The analyses of the intensity of the themes encountered in the students' answers (Table 4.) reveals that the theme number five (Operating knowledge of the Microsoft Office package) has the maximum intensity due to the increased frequency of using the Microsoft package to solve themes specific to academic activities.

**Table 4.** Analyses of the intensity of the themes encountered in the students' answers

Theme (1)	Theme (2)	Theme (3)	Theme (4)	Theme (5)	Theme (6)	Total
14.7%	2.94%	14.7%	11.77%	47.06%	8.83%	100%

The minimum intensity is found in theme number two (Using applications in teaching) because only 20 out of the 85 respondents are employed in education. Among them, it is known that few uses digital platforms in teaching activities (in the case of the respondents, only two students stated that they use them in the class where I teach) (Figure 1.).



**Figure 1.** The map of the co-occurrences. The image of the thematic occurrences (dots represent the occurrence of themes) and co-occurrences (lines represent co-occurrences of two or more themes)

## 5. Discussions And Conclusion

Following the analysis of the self-perception of undergraduate and master students from the faculty of Psychology and Educational Sciences, future teachers, we found that their answers were primarily honest and not too much influenced by ideas outside them because the similarity coefficient between the two categories is minimal; the Jaccard coefficient has a value of 0.152. Many were concrete answers, which concerned knowledge of the digital sphere to a greater or lesser extent, the Szymkiewicz–Simpson coefficient being 0.409. Some of the students' answers were laconic statements, without providing consistent information regarding their perception of the evolution of their digital level, thanks to bachelor's or master's programs. Students were engaged in the task and answered the questions, some even getting emotionally involved.

In the context of the phenomenological study, two categories were distinguished: Information-Communication and Creation-Operation.

The Information-Communication category has the following themes: (1) Searching for information on various browsers; (2) Use of applications in teaching; (3) Accessing online communication platforms.

The theme of searching for information on different browsers presents an extensive range of answers, starting from the laconic ones, to the concrete ones that describe the activities that the students can perform, specifying the care for the correctness of the information that select from the internet, the methods of selecting the correct information and the way how the selected information is correctly used.

The essential theme in this category is using applications in teaching, but only 20 of the 85 respondents are employed teachers. It should be noted that even from this phase of training as teachers for primary education, bachelor's or master's students working in education are concerned with using digital teaching applications.

All students address the theme of accessing online communication platforms which aim at the use of platforms specific to online academic study, varying in expression from concise, laconic forms to forms that illustrate the knowledge of the applications used or elaborate forms that describe what digital platforms are used for.

In the Creation-Operation category, we discovered three recurring themes: (4) Realization of projects, materials, and games as a preschool or primary teacher; (5) Operating knowledge of Microsoft Office or presentation applications; (6) Complex computer skills applied in psychology and education sciences.

The essential theme of training future teachers is the Realization of projects, materials, and games as preschool or primary teachers. In this topic, the students' answers aim to present the digital platforms they use in teaching activities. It should be emphasized that there are master's students who have learned to create educational games by themselves, using the programming language Scratch or Blockly.

The students' answers most frequently mention the theme of Operating knowledge of Microsoft Office or presentation applications, and they state briefly or in more detail what work skills they have in this area.

The theme of Complex computer skills applied in psychology and education sciences presents student responses aimed at editing or data processing applications that students use in courses and seminars for academic projects.

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