

## Special needs pre-service teachers digital competencies: an exploratory study at the University of Foggia

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### **Abstract**

*In Italy, K-12 teachers and school institutions' digital competencies were under the average in the OECD Countries (Talis Survey, 2018), and they struggled during the lockdowns due to the Covid-19 pandemic, which has forever changed the way in which the didactic is provided.*

*The University of Foggia Learning Science hub (LSh), in Italy, works on designing and planning new methodologies to teach digital skills to pre-service teachers (especially special needs teachers), in order to enhance their knowledge and use of digital skills in planning and providing interventions, lessons and courses.*

*To guide the designing and planning activities, we have administered the DigComp 2.2, the newest version of the self-report questionnaire of the Digital Competence Framework for Citizens created by the European Commission, to 338 teachers attending a specialization course to become special needs teachers at the University of Foggia in the current Academic Year (2022/2023).*

*In the present study, the collected results of the survey will be analyzed and discussed, becoming the cornerstone of LSh research in this field. At the end of the specialization course, the survey will be proposed again, to compare teachers' digital skills at the beginning and the end of the course.*

**Keywords:** *Digital competencies; pre-service teachers; DigComp 2.2; teaching methodology.*

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## **1. Introduction**

In recent years, especially after the Covid-19 pandemic, educational research has mainly focused on understanding how to improve the digital skills of K-12 teachers. Not only “operational” skills, such as how to use a videocall software, but also a new knowledge about the possibilities offered by the didactic digital software and tools in designing and planning a lesson or a whole study course.

Even though the importance of implementing digital tools in didactic environments, from digital softwares, personal computers and devices (e.g. smartphone or tablet) to the implementation of digital methodologies and environments (e.g. Digital Game-Based Learning, Gamification and Serious Games) has been enhanced by the Covid-19 pandemic, teachers and researchers can’t ignore the impact that the “digital world” has had and is having on the students (Nazempour et al., 2022).

The Digital Natives use technologies and digital tools everyday in every aspect of their lives (Coggi & Emanuel, 2022). All the actors in the school environment – from pedagogists and academics, who research everyday new methods and methodologies in order to help teachers and students, to the teachers themselves, the ones who provide the didactic content and knowledge to students – can no longer continue in providing didactic and pedagogical contents in a tradition and formal way, expecting students to be happy, motivated and committed in the teaching and learning processes.

The University of Foggia and the Learning Science hub (LSH), strongly believe in innovative digital didactic methodologies. For these reasons, the LSH is involved in researching new and more effective ways to teach innovative digital methodologies and technologies to pre-service teachers, like the ones already mentioned: Game and Digital Game-Base Learning, Gamification processes, Serious Games (of which the University of Foggia is also producer) (Di Fuccio et al., 2021), Hybrid and Blended Learning Environments etc.

Nevertheless, improving teachers’ digital competencies and the ways in which those competencies are provided can’t take place without the opinions, thoughts and needs of teachers themselves: the LSH involves pre-service teachers constantly asking for opinions and needs they feel in order to plan new methodologies that can teach digital competencies answering to the teachers’ needs.

## **2. The context and the sample**

The University of Foggia holds the “Tirocinio Formativo Attivo” (active training internship, abbreviated as TFA), a one-year university course aimed at qualifying to teach special needs students in Italian schools. The Italian Ministry of Education plans the course and then it is provided by the single Universities. The course is open to K-12 teachers, and they are divided

into groups according to the school grade they are entitled to teach in. They are divided into *Infanzia* (Kindergarten, 3 to 5 years old), *Primaria* (Primary School, 6 to 10 years old), *Scuola Secondaria di Primo Grado* (Middle School, from 11 to 13 years old) and *Scuola Secondaria di Secondo Grado* (High School, from 14 to 18 years old).

The LSh teachers hold several courses about Psychology and Pedagogy. Among them, there is the Information and Communication Technologies (ICT) course, which is a 150-hours course that aims to provide digital competencies, knowledges and tools to train the teachers in the use of technologies for didactic purposes.

The lectures of the course are provided mostly online. The University of Foggia wants to be an example of good practice about Hybrid and Blended Learning, not only theoretically but practically: even though the lockdowns of the Covid-19 pandemic are over, this doesn't mean that we have to come back to the usual frontal and formal lessons, giving the possibility to attend the course even to people who have not the possibility to travel during holidays (lectures are provided from Friday afternoon to Sunday afternoon, so working people can have the possibility to attend the course as well).

The lessons are structured to be 8 hours long, from 9 am to 2 pm and then from 3 pm to 6 pm; the structure of the single lesson is:

- a first part shaped like a formal lesson, in which the Professor gives theory references and knowledge to the participants (1 hour and 30 minutes);
- a second part in which an innovative didactic methodology, software or tool is presented (30-45 minutes);
- a third part in which the participants must work individually and in groups. In this way, they can not only listen about the digital methodologies, tools, software etc., but they can act like students, doing practical activities with the tools provided (individual exercise and feedback, 2 hours and 30 minutes; group exercise and feedback, 2 hours and 30 minutes);
- in the last part, participants deliver their work to the teaching staff, and there is a moment of immediate feedback: some groups present their work in order to share it with their colleagues and show it to the teaching staff. In this way, there can be a dialogue and a debate among the teaching staff and the teachers attending the course, providing feedback on the methodology of the course itself.

In this edition of the TFA, the ICT course is focused on presenting to the participants innovative digital didactic methodologies. Every group attends to 7 lessons, which topics are:

1. Gamification
2. Serious Games
3. Differences between Gamification and Serious Games

4. Digital Game-Based Learning
5. Hybrid and Blended Learning
6. Elements of Instructional Design
7. Exam and Final Feedback

The macro goal of the ICT course in the framework of the TFA is to provide digital knowledge and competencies to the training pre-service special needs teachers. In order to understand and evaluate the efficacy of the course, the participants have been asked to answer a questionnaire before and after the course. The questionnaire provided before the course and data collection will be shown in the next paragraph.

### **3. The survey**

In the first lesson, participants will be asked to answer a self-assessment questionnaire about digital competencies. The same questionnaire will be administered during the last class, in order to compare the results of the participants and detect if there are any changes in their perceived levels of digital competencies.

#### **3.1. The DigComp 2.2**

The survey used in this study is the DigComp 2.2: The Digital Competence Framework for Citizens, also known as DigComp. It provides a common language to identify and describe the key areas of digital competence. It is an EU-wide tool to improve citizens' digital competencies, helping policy-makers to formulate policies that support digital competence building and planning education and training initiatives to improve the digital competence of specific target groups (Carretero et al., 2017). Digital competence is one of the key Competencies for Lifelong Learning, and it was first defined in 2006 (Ala-Mutka et al., 2008). The European Digital Framework (DigComp) was originally developed by the Joint Research Centre, European Commission, in 2013 to identify and define the digital competence that is relevant for all citizens who live and work in Europe today (Clifford et al., 2020); with the 2.2 update in 2022, the aims of the Joint Research Centre are to include the latest discoveries in the technology field, like Artificial Intelligence, Virtual and Augmented Reality and Internet of Things and to keep the DigComp relevant in the learning field (among other) (Vuorikari et al., 2022).

The DigComp is structured in five main areas, each one divided into competencies (Figure 1).

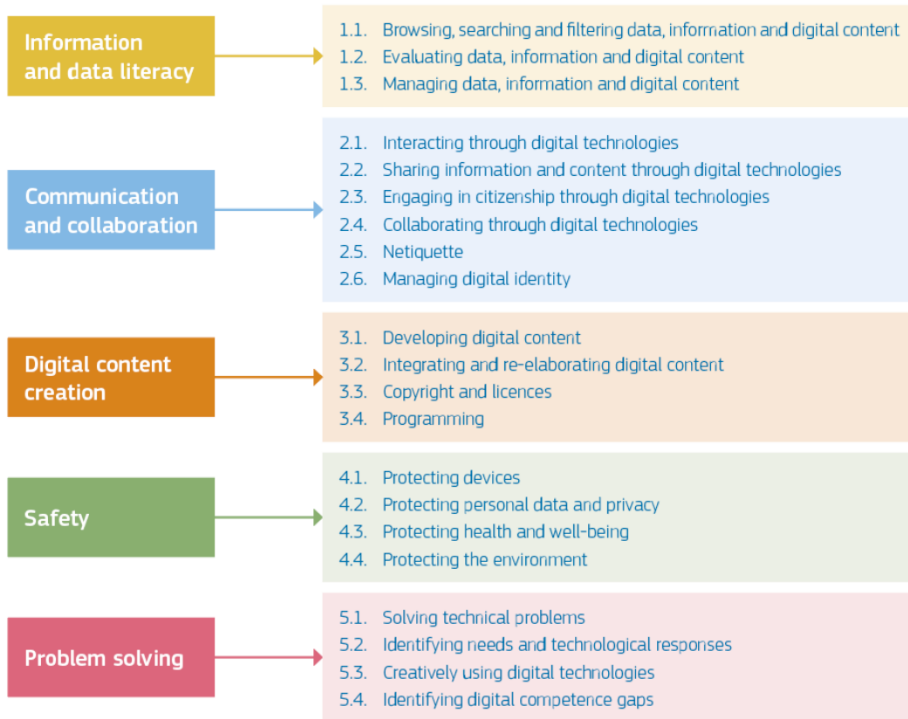


Figure 1. The DigComp conceptual reference model. Source DigComp 2.2, *The Digital Competence Framework for Citizens (2022)*.

Every competence is composed by 4 items, except for competencies 4.3 and 5.3, that are composed by 3 items, for a total of 82 items. Every item is measured on a 4-point Likert scale. Total scores that participants can obtain are: Low, Foundation, Intermediate, Advanced.

### 3.2. Platform and data collection procedure

The participants were asked to answer the Italian version of the DigComp 2.2 on the “mydigiskills” platform (<https://mydigiskills.eu/it/>). They obtain a .pdf file with their results by email. Results showed to participants the total scores that they obtained for every competence, and in every aggregate area. The results are graphic, as shown in Figure 2.

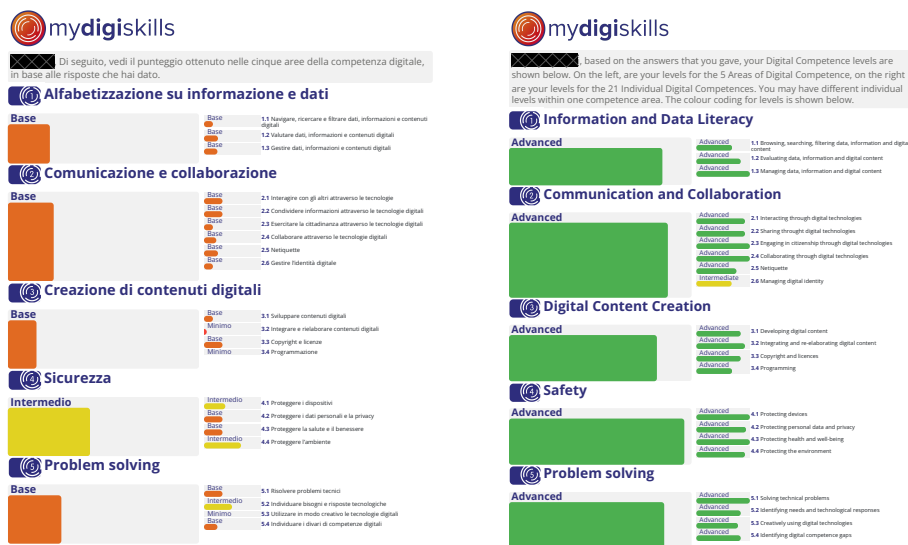


Figure 2. Two DigComp 2.2 results received from the on mydigiskill platform (Italian and English).

Participants were then asked to upload anonymously the .pdf file of their results in a dedicated Google Form. All participants signed informed consent, and they were secured about voluntary participation and anonymity. This study was accepted by the Ethics Committee of the University of Foggia, Italy, and conducted in line with the Declaration of Helsinki.

In the Google Form were uploaded 397 questionnaires. The final sample was composed by 338 teachers (after deleting duplicates). The total scores when then recoded as numbers in order to create an ordinal variable: Low = 0; Foundation = 1; Intermediate = 2; Advanced = 3.

Concerning data analysis, descriptive statistics in terms of means, frequencies and percentages were performed using SPSS 27 (IB Corp., 2020)

## 4. Results

This work focuses on the results of the area 3, Digital Content Creation. The reason of this decision is that the competencies of area 3 (Figure 1) are those that relate most to teachers' use of digital skills.

**Table 1. Results for area 3, mean and standard deviation. N=338, range = 0-3**

<b>Item</b>	<b>M</b>	<b>SD</b>
3.1 Developing digital content	2.15	0.78
3.2 Integrating and re-elaborating digital content	1.71	0.79
3.3 Copyright and licenses	1.75	0.69
3.4 Programming	1.37	0.59
<b>TOTAL</b>	<b>1.74</b>	<b>0.59</b>

## 5. Discussion and Conclusions

As Table 1 shows, in the area 3, Digital Content Creation, pre-service teachers don't feel very much confident. If item 3.1 "Developong Digital Content" has  $M=2.15$ , which is quite a good result on a 0-3 range, the item 3.4, "Programming" with  $M=1.37$  is actually very low. Nevertheless, the item 3.4 result is not unexpected, since it refers to advanced digital competencies. Looking at the answer for every competence, the highest percentage detected certify the generally average result:

- 3.3 Copyright and licence, Intermediate (53.9%);
- 3.4 Programming, Foundation (49.7%);
- 3.2 Integrating and re-elaborating digital content, Intermediate (44.9%).

These results are showing that pre-service Italian special needs teachers should develop more their digital competencies regarding digital content creation, a competence that can really help in planning and design teaching and learning processes for Digital Natives.

There must be said that these results refers to *Infanzia, Primaria and Secondaria di Primo Grado* schoolgrade: the study is currently going on with schoolgrade *Secondaria di Secondo Grado* (High School). This survey will be developed in the next months, in order to collect a wide overview about Italian special needs pre-service teachers. At the end fo the TFA course, the DigComp 2.2 will be administered again, during the last lesson for every schoolgrade, in order to analyze if there will be any changes in special needs pre-service teachers digital competencies self-assessment, thanks to the ICT course. After the analysis, it will be clear if the structure and topics of the ICT course were useful and efficient in enhancing pre-servicespecial needs teachers digital competenciese.

In conclusion, there can be not mentioned that in previous surveys about Italian pre-service teachers digital competencies, Italian pre-service teachers rate their skills higher than other European colleagues, while "they receive slightly lower scores on tests of knowledge about the possibility of using ICT in teaching processes and knowledge" (Tomczyk et al., 2022).

The results of this investigation will be used to reflect and develop new ways to provide ICT and digital competencies courses to Italian teachers and pre-service teachers, in order to allow them to develop and enhance their digital competencies in the educational field.

Further help to this research will be brought by the next OSCE Teaching and Learning International Survey (TALIS), which will be performed during 2023. In the 2018 edition Italian teachers and school institutions digital competencies were rated under the average of the OSCE Countries. The very goal of this research is to provide new methodologies to enhance Italian pre-service teachers digital competencies.

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