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Teaching agency e competenza digitale

Il caso studio di un istituto tecnico italiano

Teaching Agency and Digital Competence

A case study of an Italian technical high school[1]

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Riassunto: Il contributo analizza la *teaching agency* in relazione alla competenza digitale degli insegnanti attraverso un'analisi di un casi studio condotta presso un Istituto Tecnologico Grafico in Italia. Le basi teoriche dello studio si fondano sulla prospettiva dell'agency come *continuum* tra caratteristiche intrinseche, capacità di agire e dinamiche contestuali degli insegnanti in un contesto didattico di trasformazione digitale. La ricerca, condotta nell'a.s. 2023/2024 in collaborazione tra l'Istituto Universitario Salesiano di Venezia e il Dipartimento di Informatica dell'Università di Torino, si è svolta presso un istituto tecnico salesiano nel nord-est dell'Italia, dove è stata studiata l'applicazione della piattaforma digitale *FirstLife* nell'insegnamento dell'educazione civica digitale. Lo studio mirava a indagare le dimensioni della competenza digitale degli insegnanti in termini di agency didattica, esplorando la loro preparazione e predisposizione ai

1. The research and paper are the result of shared work between the authors. Specifically, they contributed to the following paragraphs: Matteo Adamoli: 2. Material and Methods; 4. Results: focus group with the teacher; 5.1. Awareness and user experience of digital platforms; Elisa Carraro: 3. Results: student questionnaires; Marco Emilio: 5. Conclusions; Enrico Miatto: 1. Introduction; 5.2. School role between digital competence and TA.

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cambiamenti che la professione docente deve affrontare in relazione alla letteratura. A tal fine, è stato utilizzato un approccio metodologico misto. Gli strumenti di indagine includono un questionario sulla competenza digitale somministrato a 60 studenti (di età compresa tra i 16 e i 19 anni) prima e dopo l'intervento didattico e un focus group condotto con sei insegnanti. I risultati indicano un uso critico delle tecnologie da parte degli insegnanti, che considerano sia le opportunità sia i rischi nello sviluppo delle competenze digitali e della loro agency.

Parole–chiave: Teaching agency, competenza digitale, educazione civica, cittadinanza.

Abstract: The paper investigates teaching agency in relation to teachers' digital competence through a case study analysis undertaken at the Graphic Technological Institute in Italy. The theoretical underpinnings of the study draw on the perspective of agency as a *continuum* between intrinsic characteristics, capacities to act, and contextual dynamics of teachers in a teaching context of digital transformation. The research, conducted during the S.Y. 2023/2024 in collaboration between the Salesian University Institute of Venice and the Department of Informatics at the University of Turin, took place at the at the Salesian technical high school in the north-east of Italy, where the application of the digital platform *FirstLife* was investigated in the teaching of Digital Civic Education. The study aimed to investigate the dimensions of the teachers' digital competence in terms of teaching agency, exploring their preparation for and predisposition to the changes facing the teaching profession in relation to the literature. To this end, a mixed-methods approach was used. Survey instruments included a digital competence questionnaire administered to 60 students (aged 16–19 years) before and after the teaching intervention, and a focus group undertaken with six teachers. The results point to a critical use of technologies by teachers, who consider both the opportunities and risks underlying their professionalism in the development of digital competencies and their agentivity.

Key–words: Teaching agency, digital competence, digital platform, civic education, citizenship.

1. Introduction

Teachers work within institutional structures shaped by national policies and strategic documents, while maintaining a certain degree of autonomy in implementing pedagogical and instructional practices. This autonomy is also reflected in their digital competence, a key dimension in contemporary educational contexts.

The integration of technology into teaching and learning processes does not follow a single predetermined model. It depends on teachers' professional choices and initiative, through which they interpret and redefine their role by exploring the educational potential of digital tools. These dynamics open new research perspectives on how teachers exercise their agency in relation to technology.

Interest in *teacher agency* (TA) has only recently emerged within Italian educational research (Ferrari & Taddei, 2017; Sibilio & Aiello, 2018; Morselli & Ellerani, 2021; Fabbri, 2025). Studies have mainly focused on the meaning and forms of agency among special education teachers (Lascioli, 2018; Gulisano, 2019; Andreoli *et al.*, 2022; Andreoli *et al.*, 2024). There is no single, universally accepted definition of TA (Fabbri, 2025). Ferrari and Taddei (2017) describe it as a *continuum* linking teachers' personal characteristics with the contextual conditions that shape their capacity to act.

Three main perspectives emerge from the literature. Calvert (2016) views TA as the teacher's ability to act intentionally and constructively to promote both individual and collective professional growth. Biesta and Tedder (2007) adopt an ecological view, in which agency arises through the interaction of individual efforts, resources, and structural factors—always situated within specific contexts. Priestley *et al.* (2015) conceptualize agency as a context-dependent capacity to act, closer to a situated *savoir-faire* than to an abstract competence (OECD, 2005).

Across these perspectives, context appears as the constitutive element of agency, involving multiple levels of action (Sloan, 2006): individual (the agency of the single teacher), collective (among teachers, students, and colleagues), and institutional (the school and educational policies). Ferrari and Taddei (2017) emphasize that agency emerges from the ongoing interaction between personal initiative and structural conditions, within a reflective and negotiated process that can either expand or constrain professional action.

TA, understood as a dialectical *continuum* (Hays, 1994; Emirbayer & Mische, 1998; Ferrari & Taddei, 2017), exerts a significant influence on the educational context. It can reproduce existing practices or generate transformative change, fostering dialogue between past experiences, present engagement, and future perspectives (Sibilio & Aiello, 2018; Andreoli *et al.*, 2022).

This study examines the relationship between artificial intelligence and teachers' digital competence, aiming to understand how the latter operates as a form of TA within processes of educational innovation.

The theoretical framework adopted conceptualizes agency as a *continuum* that intertwines individual dispositions, capacity for action, and institutional dimensions (Ferrari & Taddei, 2017). The empirical investigation was conducted within a training program on Digital Civic Education that employed *FirstLife*, an open-source platform for civic participation developed by the Department of Computer Science at the University of Turin. Preliminary results (Adamoli *et al.*, 2023) highlight how the conscious use of digital technologies can become an opportunity for professional reflection and the development of TA in the face of transformations reshaping the role and identity of teachers (Starkey, 2020; Aagaard *et al.*, 2022; Menter, 2023).

2. Materials and Methods

In this context, the research then focused on AI and teachers' reflections.

The study was articulated in two phases. The first investigated the level of digital competence of 60 third-grade students at the Graphic Technology Institute of the Salesian Institute San Marco in Venice (Adamoli *et al.*, 2023).

The second phase, on which this contribution concentrates, involved teachers and analysed their reflections on TA within the digital competence framework. The teacher sample consisted of 6 participants out of a total of 28, selected because they were responsible for the curriculum in the classes where the activities took place and were involved, in different ways, in the Civic Education programme.

A mixed-methods approach was adopted for data collection (Tashakkorri & Teddie, 2003). Two instruments were used: a questionnaire on students' digital competences and a focus group with the teachers (Creswell & Plano Clark, 2017). The questionnaire, administered before and after

the educational intervention, was based on the SELFIE device (*Self-reflection on Effective Learning by Fostering the use of Innovative Educational Technologies*), an *ad hoc* self-reflection tool designed to assess the degree of digital competence in European schools.

Its aim was to probe students' initial level of competence in order to interpret their developmental trajectories in relation to participatory citizenship and the appropriate use of digital technologies (Buckingham, 2019), including the management and protection of the data they produce (Selwyn, 2022).

The questionnaire explored four dimensions:

— students' daily digital use and habits;
— the adequacy and safety of infrastructure and equipment;
— the use of digital technologies for teaching and learning;
— students' digital skills.

The choice to focus on these four dimensions is justified by their connection to the theoretical framework of TA. The first dimension reflects the individual dimension of TA, particularly teachers' dispositions and professional reflectivity. Knowing students' digital habits allows teachers to adapt their strategies and integrate these habits into the educational process. The second dimension relates to the institutional level of TA, as digital infrastructures represent organisational constraints and opportunities within which teachers act.

The third and fourth dimensions lie on a continuum between individual and collective forms of TA. Individually, they concern teachers' digital skills and ability to recognise students' competences as resources.

Collectively, they involve collaboration among teachers and shared meaning-making processes that shape practices and dynamics within the classroom and teaching teams.

Methodologically, the questionnaire was administered at two points—before the training meetings and at their conclusion—allowing for comparison of results in light of the content addressed during the course. The second instrument, the focus group (Vaughn *et al.*, 1996), was employed to deepen and enrich the findings that emerged from the questionnaires (Adamoli *et al.*, 2023). It fostered dialogue among teachers with different levels of reflective maturity on the dimensions explored during the training pro-

cess (Zammuner, 2003). Six teachers participated: two teaching *History* and *Italian*, two teaching *Production Process Technologies* and related laboratories, one teaching *Communication Theory*, and one teaching *Physics*.

The focus group discussion was guided by a semi-structured map coherent with the TA framework (Ferrari & Taddei, 2017), understood as a continuum encompassing individual, institutional, and collective dimensions. This framework informed both the formulation of the questions and the analytical process. The four sections of the interview map—educational level, user experience, awareness, and the role of the school—were read through the lens of the three forms of agency:

— *the individual dimension*, related to personal dispositions, digital competences, and professional reflexivity;
— *the institutional dimension*, referring to the constraints and opportunities offered by the school organization and educational policies;
— *the collective dimension*, linked to collaboration, exchange, and the co-construction of shared meanings within the teaching community.

Content analysis was carried out through thematic coding inspired by these levels, using the paragraph as the textual unit of analysis (Schreier, 2012). Based on the full transcription of the focus group, analytical categories were identified corresponding to the three dimensions of agency, and representative excerpts were selected for each. The adopted approach, descriptive and interpretive in nature, privileged the depth of narratives over the quantification of occurrences, aiming to capture the complexity of the *continuum* among the different forms of agency (Schreier, 2012; Braun & Clarke, 2022).

Data were collected and processed in accordance with qualitative research ethical standards (Silverman, 2013), ensuring voluntary participation, anonymity, and confidentiality, as well as fostering a climate of mutual trust between participants and researchers.

3. Results: student questionnaires

The two classes involved in the research comprised a total of 60 students, aged between 16 and 19 years. The sample included two classes out of a total of eleven at the Technical Institute, selected for their specific relevance to

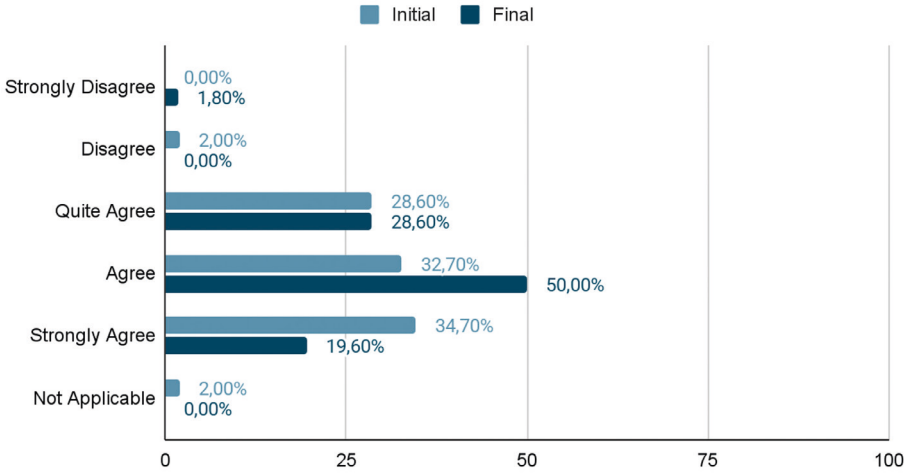


Figure 1. Responses to the statement: "Our teachers use online platforms to which we can also contribute to facilitate our learning".

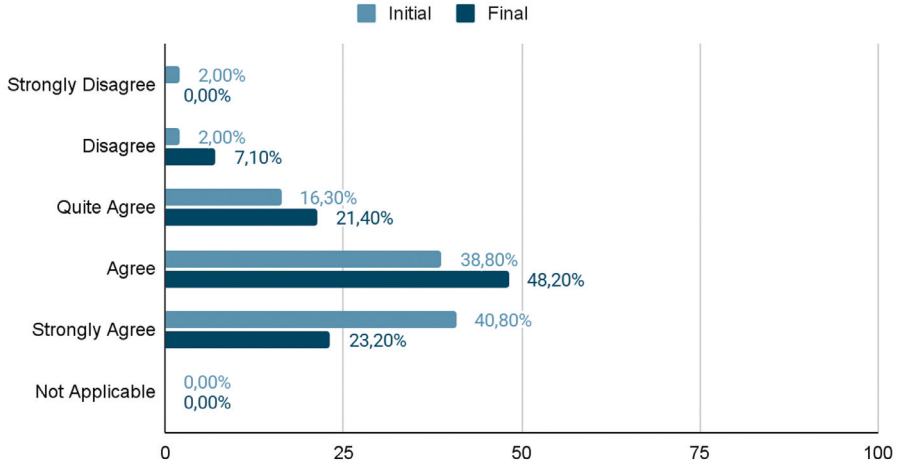


Figure 2. Responses to the statement: "In our school, I use technology for creative activities".

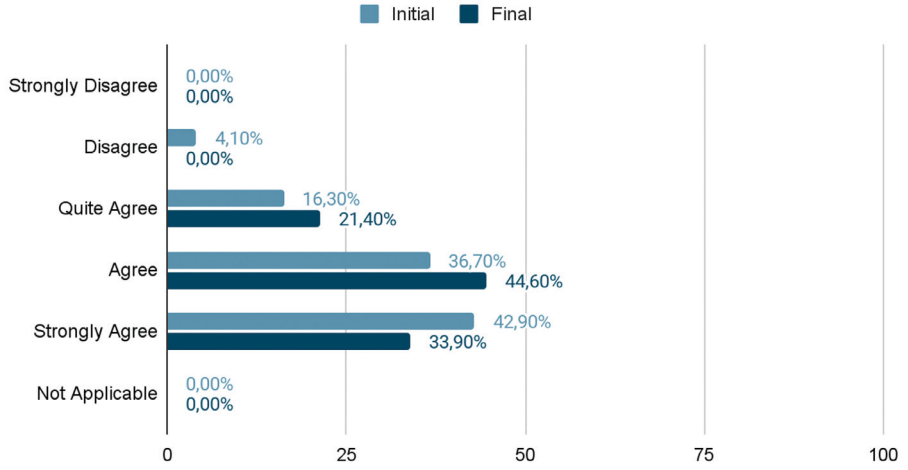


Figure 3. Responses to the statement, "In our school, I use technology in different subjects".

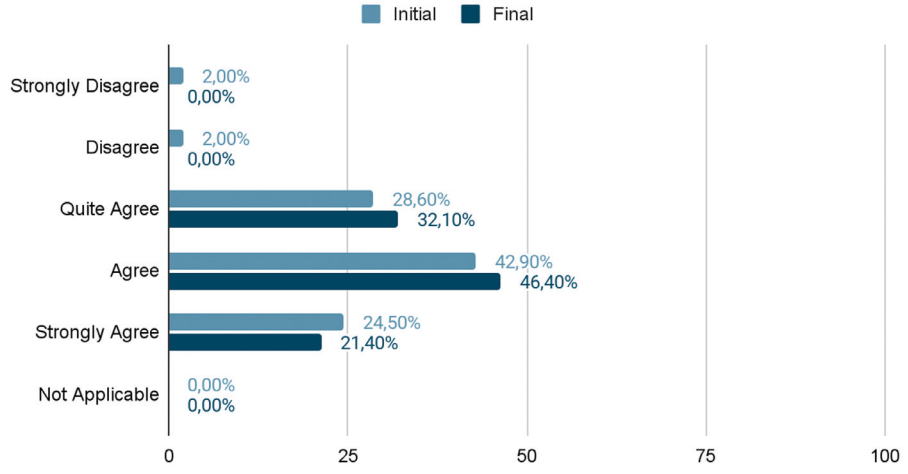


Figure 4. Responses to the statement, "In our school, I develop digital skills specific to my field of study".

the subject (graphics, communication and marketing) and for their affinity with the objectives of the Civic Education programme developed by the teaching staff. For the first administration of the questionnaire, 11 students were absent. Of the students who completed the questionnaire, 49% were female. Four students were absent for the second administration.

The results that emerged from the questionnaires, administered before and after the training, were analysed in terms of the two dimensions focused on in this study: the use of digital technologies for teaching and learning, and digital skills at school.

Figure 1 provides an overview of the student responses to the statement: "Our teachers use online platforms to which we can also contribute to facilitate our learning".

Figure 2 summarises the responses to the statement: "In our school, I use technology for creative activities".

For both items, most respondents to the first and second questionnaires agreed or strongly agreed that teachers use digital platforms and technologies in the classroom to facilitate learning processes and to develop creative teaching activities.

Figure 3 presents an overview of the student responses to the statement regarding the dimension of digital skills training at school: "In our school, I use technology in different subjects". The results indicate that for the first questionnaire, 4% of students disagreed, whereas in the second questionnaire no students disagreed. Greater awareness was observed among students regarding the use of technology in school for teaching and learning.

Figure 4 provides a summary of responses to the statement, "In our school, I develop digital skills specific to my field of study".

For this item on developing digital skills specific to fields of study, the students' agreement increased between the first and second questionnaires, and the percentage of disagreement regarding specific digital competencies for the graphic and communication studies area decreased.

4. Results: focus group with the teachers

The qualitative analysis of the focus group made it possible to explore in depth how teachers' digital practices are distributed along the *continuum* of TA (Schreier, 2012; Braun & Clarke, 2022), identifying different confi-

gurations of individual, institutional, and collective agency in relation to technology integration in teaching. The results reveal a complex and dynamic picture in which the use of digital tools becomes an expression of professional identity, negotiation with institutional structures, and shared educational responsibility.

At the level of *individual agency*, teachers describe their technological practices as a space for personal experimentation and pedagogical adaptation, where mastery of digital tools intersects with reflective awareness. They acknowledge the functionality and immediacy of digital resources in supporting instructional organization and efficiency:

> In technical laboratories there is a massive use of software, especially the Adobe package, which is necessary for teaching because it is an integral part of the curriculum. I have used Photoshop, Illustrator, Lightroom and other programs like Camera Raw […]. In more frontal lessons, I make extensive use of Acrobat […] and of the entire Google suite—from Google Drive […] to Google Classroom, where I assign simple tasks […] that allow for immediate correction on my part and let students see those corrections in real time (FG3).

In other cases, *individual agency* emerges through teachers' ability to design digital environments consistent with their personal teaching style:

> For classroom lessons I use Pages and Keynote to create the content to be shared with students. I use Numbers, mainly for myself, to manage a grade register. […] I keep using Google Classroom to structure Italian courses, even without a printed textbook, creating the entire annual course there. […] I have a unified collection box for the whole class (FG2).

The pandemic experience strengthened this operational agency but also triggered critical reflection on the risk of losing didactic control when the tool takes over the process:

> The pandemic confronted us with new needs, and having a certain familiarity with digital tools helped us a lot and solved several problems. […] One of the issues that emerged in the teachers' council was the question of controlling the tool, which often slips away. And when the control of the tool slips away, teaching itself often slips away (FG1).

Individual agency also takes on an inclusive and responsive dimension, aimed at supporting students with specific learning needs:

> And then there are some more specific tools for students with learning difficulties: I often work with them on Inspiration Maps (FG1).

Finally, teachers show a growing awareness of the pedagogical implications of digital learning, questioning how technology can genuinely foster educational processes:

> The recurring question is: how can these tools facilitate learning processes? […] How can they guide, support, and enhance learning? (FG5).

At the *institutional level*, agency takes shape in the negotiation between teachers' professional autonomy and the structural, political, and technological constraints of the school system. Participants expressed clear awareness of the school's dependence on private digital platforms and reflected on the ethical and educational implications of this condition:

> I don't care who owns the platforms, as long as they work and are suitable for my goals. […] If these tools we use in schools were born in the business world, it means they work—and knowing how to use them also prepares young people for the world of work, since they already know them and don't need a further learning process (FG4).

> We can't live on the mountain and not use what students encounter outside; this is the big issue of privacy. […] It's not just an educational space; it's a space that is appropriate for education but is still managed by a company that makes revenue (FG2).

These reflections illustrate a dialectical tension between *reproductive* and *transformative agency* (Hays, 1994): on the one hand, teachers adapt to institutional constraints; on the other, they question their legitimacy and call for pedagogically grounded forms of governance. Some participants suggested the need for shared and transparent validation mechanisms for software use in schools:

> It could be interesting to have a range of software options approved by a committee […] that can declare a program suitable because it ensures attention retention […] and adaptability to different age groups and contexts (FG3).

In this sense, *institutional agency* appears as the capacity to critically engage with the regulatory and technological context, assessing its limits and reorienting it toward educationally meaningful purposes. *At the level of collective agency*, the focus shifts to teachers' dialogic and cooperative dimension, aimed at co-constructing meaning and fostering shared educational responsibility within the teaching community. Teachers emphasized the need to educate students toward critical and responsible digital citizenship:

> First of all, students need to know what they are using and what's behind it. […] I would like us to formalize this, to make them really participate in what's behind a platform, in what they use—and this is also necessary for us (FG5).

> Many use technologies simply because they've become self-taught and therefore don't know the risks behind them. […] Our goal is to develop their critical thinking (FG4).

This shared awareness translates into the desire to go beyond technical competence toward a broader understanding of the social and cultural implications of technology:

> We need specific competences to talk about these issues […] It would be essential to bring out the topic of software use from the mere technical dimension of knowing how to use them […] to understand what consequences their use has on us, and to be able to see it from different perspectives, not only in terms of functionality (FG3).

Teachers therefore call for structured and collaborative training programs involving external experts and partnerships with the local community:

> I feel I need training myself—or that there should be a project with external experts coming to meet the students, to involve them in understanding what they hold in their hands, how and when they use it, and why (FG2).

> So, starting from what they already have in their hands […] I would think of a project with a lot of sharing, with partners, and with a clear structure. […] But I believe that the school, in the world we live in, must take charge of this (FG2).

> So first, I'd say we need to train ourselves to be aware, and then I'd like us to train the students and talk with them about it because, unfortunately, it's their world—it's the world we're in. Knowledge comes first (FG5).

In this last movement along the *continuum*, TA takes on a social and transformative value: it evolves from the individual and instrumental use of technology to the collective construction of a critical, participatory, and ethically grounded educational culture.

5. Discussion

5.1. *Awareness and user experience of digital platforms*

The focus group analysis revealed that all the teachers use digital software and applications in their teaching activities, but with different purposes. Five of them use the applications to support teaching (e.g., *PowerPoint*, *Keynotes*, *Acrobat Reader*, and *Google Jam Board*). Three noted that they use them to support student learning (e.g., *Notability*, *Pages*, and *Inspiration Maps*). The two lab teachers reported that they integrate specific software for teaching graphic design skills (e.g., *Adobe*, *Photoshop*, *Illustrator*, *Lightroom*, *Social Network*, *Google Analytics*, and *Meta Business Suite*). All the teachers employ digital applications to organise and manage grades and to share material, assignments and tasks (e.g., *electronic gradebook*, *e-mail*, *Numbers*, *Google Drive*, and *Google Classroom*).

It should be noted that since 2016, the school where the participants teach has been an *Apple Distinguished School*, i.e., an institution certified by Apple as a centre of educational innovation and experimentation. All students and teachers use tablets to facilitate learning and teaching, and for developing skills such as creativity, collaboration, problem-solving, and critical thinking. As in the present case, the applications and software typically used in the classroom are owned by private companies, and literature shows that the design and operation of digital platforms are not

neutral and influence teaching (Olsen *et al.*, 2023; Rahwan, 2018; 2020). Such pervasiveness of proprietary media in education was boosted by the COVID-19 pandemic in which platforms such as *Microsoft Teams*, *Google Meet*, and *Zoom* were used to make up for physical distancing and ensure continuity of teaching activities. The teachers' perspectives on the use of proprietary digital platforms emerged in a polarised manner from the focus group. Some stated that the main objective is to train students through a primary focus on the teaching methodology, and secondary emphasis on the tools chosen. Other teachers expressed concern regarding the economic and commercial aspects of proprietary applications, taking a critical view and showing themselves refractory to an apparently neutral use of technology. In both positions, teachers' awareness was high for this dimension. They all agreed on the need to prepare students for the working world, where knowing how to use digital tools and software is a fundamental skill. The pedagogical perspective of media education helps to understand these dynamics, as media education should develop a critical awareness of the technologies and cultural logic behind them, so that teachers can integrate reflective and not merely instrumental skills (Rivoltella, 2020). In this sense, teachers become cultural mediators and designers of learning environments capable of guiding the use of digital platforms in an educational and value-based way, not limiting themselves to functional efficiency but questioning the devices and their social and ethical implications (Ranieri, Nardo & Fabbro, 2019).

The issue of privacy and the use of students' data for commercial purposes by digital corporations was also addressed by teachers, who recognise the risk of digital technologies reducing teacher autonomy when the development of complex computer systems transfers part of their decision-making power to software developers. Indeed, programmers and designers of the main applications used in teaching activities use student metadata to analyse learning outputs, predict educational outcomes and determine recommendations and performance evaluations (Berendt *et al.*, 2020). Literature points out that TA should always be analysed in a broader context, given that software, algorithms and databases transcend the classroom context (Knox, 2017; Priestley *et al.*, 2015). Teachers and students are often invited to use the data processed by digital platforms without, however, being involved in the processes that determine their production. This trend threatens to undermine some professional skills of teachers, progressively

transferring these activities to the developers of increasingly advanced and generative technologies and platforms (Regan & Jesse, 2019).

Faced with this challenge of preserving or increasing TA, the teachers involved seem to converge on the need to receive adequate training in the development of digital competencies in education to ensure that they are equipped to educate students in active and aware citizenship.

5.2. *School role between digital competence and TA*

For Biesta and Tedder (2007), TA is realised through engagement in specific contexts of action. In schools, these contexts refer to the dynamics in the classroom group and those related to the school structure in which the political guidelines for the management of activities are expressed. Investigating TA is problematic in relation to digital competencies, and both TA and digital competence are difficult to survey precisely. Given their mobility in unpredictable contexts, they require a strong capacity for negotiation in terms of meanings, affordances and levels of learning, and related objectives (Brynildsen & Haugsbakken, 2023). New technologies for teaching affect the didactics of the discipline, and the teaching and learning approaches. They also raise ethical and epistemological questions, as revealed by the teachers surveyed in the focus group (Adamoli & Miatto, 2022; Miatto, 2021; Nagel *et al.*, 2023). TA is affected by such complexity at both individual and collective levels (Ferrari & Taddei, 2017; Sloan, 2006). Two fundamental elements clearly emerged from the focus group discussion: the perspective of digital competencies and the levels of agentivity understood, and the opportunity and ability to act and influence something (Calvert, 2016; Emirbayer & Mische, 1998; Goller & Paloniemi, 2022). Both aspects need to be consciously thematised in everyday teaching work. The focus group represented an opportunity to survey in situ experiences and perceptions regarding the use of digital competencies in teaching practice, and a moment of reflection on the agency of the teachers surveyed. Focusing on the former, it is possible to identify a position for the teachers with respect to the level of personal and collective agency, and the school structure in which they operate. In this way, elements emerge that understand agency as a multiform construct with transformational, dispositional and relational characteristics, each related to the learning and professional development of teachers and the school (Goller & Paloniemi, 2022).

These characteristics are part of the same phenomenon that can be considered from the perspective of a *continuum* between individual and collective dimensions (Ferrari & Taddei, 2017), where reciprocal shaping of the context and the people who inhabit it occurs. This makes it possible to approach the development of digital competencies and their devolution in the school context by considering TA from a transformative and negotiating perspective. Thus, the figure of a teacher emerges who is oriented toward renewed dynamics of action through the continuous dialogue between pedagogical intentionality, didactic innovation, professional action and the school system in which political choices and organisational-managerial dynamics unfold. Nevertheless, this transformative action requires a high level of attention on the part of the school to the ongoing training of teachers, a finding that emerged from the focus group.

6. Conclusions

From the perspective of TA as a *continuum*, this study identifies several directions for further exploration concerning the relationship between digital competence and teachers' professional agency. The focus group analysis shows that teachers feel a need for support and training to strengthen their agency within the classroom and learning processes. This confirms that agency develops on multiple interdependent levels, especially when digital artefacts and platforms become integral to teaching practice. From this perspective, three complementary forms of agency emerge: an *operational* agency, related to the ability to act within digital environments; an *epistemic* agency (Schlosser, 2019), concerning the capacity to reshape pedagogical knowledge in response to the challenges of the *Fourth Revolution* (Floridi, 2014); and a *moral* agency, linked to the ethical awareness of how technology affects attention, memory, and privacy. This latter dimension also extends to shaping students' future agency as persons and digital citizens.

The introduction of digital artefacts transforms the ecology of teaching and learning, making schools increasingly *hybrid* (Brouwer *et al.*, 2021) and *heterogeneous* (Turilli & Floridi, 2009). This complexity justifies teachers' call for structured and continuous professional development to support the growth of their digital agency.

Two main challenges emerge for future research. The first concerns promoting agency in evolving hybrid educational contexts through shared reflection and the iterative revision of teaching practices. The second involves developing forms of collective and institutional agency (List & Pettit, 2011; Hindriks & Guala, 2019) to sustain the design and use of open and public educational platforms —such as *FirstLife* — that can counterbalance the commercial logic of proprietary technologies and foster teachers' *social* agency.

This study has some limitations. The sample, consisting of 60 students and six teachers from a single technical school in Northern Italy, limits the generalizability and transferability of the findings. The mixed-methods design, with a qualitative focus for teachers and a smaller quantitative component for students, is consistent with the exploratory nature of a case study but does not allow broad inferential conclusions. Future studies could expand the sample and compare different school contexts to refine and validate the proposed interpretive framework.

Rather than offering definitive answers, this research highlights the need for further inquiry into TA and digital competence, exploring how teachers' reflective, collective, and ethical engagement with technology can sustain authentic and conscious educational innovation.

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