Technologies as learning mediators in interactive and conversational teaching approaches: A research study on the lesson's co-construction in the training of special education teachers

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Abstract
This paper presents the results of a study aimed at exploring the potential of technologies as learning mediators enabling the adoption of interactive and conversational teaching approaches for nurturing engagement and participation, to the benefit of the learning quality. The study was carried out at the University of Florence, involving 138 teachers attending the course of Special Pedagogy and Integrated Management of the Class Group. The empirical study adopted a mixed approach based on an online survey combined with participant observation. The elaboration of the questionnaire data and the transcribed observations indicate positive aspects such as increased levels of participation in the lessons, a more relevant and meaningful learning experience and increased motivation to follow and learn. Although the results of this study are promising, further investigation should be carried out to understand participants' perspectives and thus improve learners' engagement, in favour of pedagogical innovation.
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1. Introduction

Over the last years, educational research has invested significant effort in the study of the pedagogical affordances of interaction and feedback to support active learning, meant as a student-centred approach where students take an active role in the learning process through discussion, practice, problem solving, group work etc. (Prince, 2004; Winstone *et al.*, 2017). In fact, learner-centred pedagogies are viewed as crucial to develop higher-order cognitive skills such as critical thinking, problem solving and design thinking. Scholars from different fields have underlined the value of feedback and interaction in active learning environments (Ranieri *et al.*,; Rossi *et al.,* 2019), especially to activate prior knowledge (Hattie and Shirley, 2019; Carless and Winstone, 2020), to balance cognitive overload (Sweller, 1994), to diminish the "discrepancies between current understanding or performance and a desired goal and knowledge" (Laurillard, 2012, p. 83), to promote the awareness of cognitive conflicts as well as the production of a network of meanings (Rivoltella and Rossi, 2019) for favouring self-regulation processes and revision of conceptual knowledge (Laurillard, 2012). Therefore, suggestions are provided to align teachers and students' perceptions of feedback in order to make it more effective (Hattie and Timperley, 2007; Hattie and Yates, 2013). The interaction between the learner and the environment designed and implemented by the teacher, instead, is in the center of the Laurillard's (2002) conversational framework and, more generally, of interactionist models: from this point of view, teachers are responsible to design and create an appropriate environment for the learning task assigned to the learner, and to provide appropriate feedback.

In line with these theoretical and empirical advances, researchers, instructional designers, and educational researchers are adopting digital technologies to reshape the learning spaces, including physical and virtual classrooms, to transform teaching and make learning more engaging (Ranieri *et al.,* 2021; Rossi and Pentucci, 2021). Indeed, technologies are increasingly ubiquitous, allowing educators to promote unprecedented forms of interactivity regardless of location.

Based on this background, this paper presents the results of a study aimed at exploring the potential of technologies as learning mediators enabling the adoption of interactive and conversational teaching approaches for nurturing engagement and participation, to the benefit of the learning quality.

The Research Questions (RQs) that guided the study were:

RQ1: What were the effects of the pedagogical strategy adopted on participation's level and teachers' learning processes?

RQ2: How did teachers react to the use of digital technologies during the training course activities?
RQ3: How did teachers perceive the evaluation strategies used in the training course?

2. Context of the study

The study was carried out during the first semester of the 2021/2022 academic year within the course of Special Pedagogy and Integrated Management of the Class Group (30 hours) in the Specialisation Programme for Special Education Teachers of the University of Florence. The course was delivered in a face-to-face mode to 138 participants, who were either kindergarten or primary school teachers.

The course aimed at promoting the development of knowledge and skills related to the inclusive management of the classroom, with a particular focus on the communicative, organizational and relational aspects, as well as on peer tutoring techniques and cooperative learning.

Usually, the high number of students and the duration of the course, which is mostly concentrated in a short period, push the teacher to adopt a traditional transmissive approach of content delivery to cover all the relevant topics. Yet, transmitting educational contents, especially with educational practitioners who already have a professional experience, risks demotivating them and facilitating disengagement. To conciliate the pedagogical need of ensuring active learning and participation, with the constraints connected to the high number of students, **digital technologies** were introduced during the lesson to involve students in content construction. More specifically, lessons were designed by combining different teaching moments, i.e., an initial theoretical session to introduce the main concepts, followed by reflection on the topics covered through individual or group activities and, lastly, a concluding session centred on guided interactions and plenary discussion.

During the second session, which was dedicated to individual and/or group activities, **technologies played a central role**. In particular, the Google Forms application was used with different purposes to engage students in the conversation and content construction: for example, a video was shown in the first part of the lesson and then a closed-question questionnaire was administered to analyse the video; or also a school autobiography exercise was proposed based on the ‘long answer text’ option. Google Forms was chosen for three main reasons: it is available for free, it allows students to easily access the activity via the QR Code (the whole class is equipped with a PC, smartphone or tablet) and it enables teachers to handily share the aggregated answers with

the whole class synchronously and to discuss with them for providing and receiving feedback. The activities served the purpose of stimulating the discussion, triggering interesting exchanges of experiences and point of view, and transforming the lecture into a dialogical activity where the contents emerged from the interaction. These activities were also part of the evaluation strategy used which was based on the idea of *evaluation as a learning activity*, aimed at promoting a shared meaning of the evaluation process to allow students' involvement in it (Murai *et al.*, 2019).

3. Methodology

3.1 Research tools

To investigate the effects of the learning activities carried out with the support of digital technologies, the empirical study adopted a mixed approach based on an online survey combined with participant observation.

An online questionnaire, indeed, was administered at the end of the second lesson through the Google Forms in order to collect participants' feedback on the interactive and conversational approach used through the mediation of technologies. The first part of the online questionnaire was designed to collect respondents' personal information and their educational/professional background, while the second part aimed at investigating teachers' perceptions of the teaching approach adopted during the lessons, particularly referring to four main themes: participation level, satisfaction and usefulness of digital technologies, interplay between interaction/conversation and learning processes, and effectiveness of the evaluation strategy. The questionnaire included closed and open questions that have been analysed.

As far as the participant observation is concerned, it was carried out by a researcher present during lessons and was direct, semi-structured (i.e., with specific themes to be investigated in a loosely predetermined or systematic) and "participant-as-observer" (the researcher observed and sometimes interacted with the class). The data description reported in this paper refers to the annotations of two lessons. The integration of participant observation with the survey improved the validity of the data collected through the "live" annotation of the behaviour, words and dynamics spontaneously created in the classroom (Cohen *et al.,* 2007, p. 396).

3.2 Sample

The questionnaire survey has been filled by 97 school teachers, of which 31 were kindergarten teachers and 66 primary teachers. More details about the sample are reported in Tab. 1.

Tab. 1 - Sample description

Age	M = 41,8 σ = 9,3	
Genre	Female	93
	Male	3
	Not specified	1
Degree	Diploma	45
	Bachelor's Degree	11
	Master's Degree	41
Training course(s)	Last year	59
	2 years ago	10
	More than 3 years ago	14
	Never	14

4. Results

In this paragraph, teachers' responses to the questionnaire are examined and commented on by referring also to the notes transcribed by the researcher during the participatory observation. This will provide a more complex picture of the impact on the class of the interactive and conversational approach supported by technologies.

4.1 RQ1: What were the effects of the pedagogical strategy adopted in the course on participation's level and teachers' learning processes?

Regarding the first dimension analysed (i.e., participation level), the majority of teachers (85/97 respondents) declared to participate in the course activities, describing their involvement as active (71/97) or very active (14/97).

Examining the open answers provided by the teachers, this active involvement seems to be due to the teaching approach adopted which favoured engagement (from teachers' answer: *Very engaging lessons; the course is well structured and interactive*), to the interest toward the topics dealt with in the course (from teachers' answer: *I believe that the subject is full of interesting topics*), to the strict connection with the professional practices through the sharing of participants' experiences (from teachers' answer: *I actively participate since I'm able to link the topic faced to my actual (and previous) working experience*) and finally to the provision of tools and methods for the daily teaching practice (from teachers' answer: *Provides useful tools to implement effective strategies*). Looking at the less or no active participants (12/97), motivations reported are linked to personal characteristics such as being "contemplative" rather than active (from teachers' answer: *I am contemplative. I prefer to listen to others and reflect*), to the high number of participants that does not allow everyone to express themselves (from teachers' answer: *We are too many participants*).
Furthermore, teachers confirmed that the proposed activities, including questionnaire and discussion allowed them to:

- activate prior knowledge on the topic (89/97);
- balance the cognitive overload due to the information acquired in the first part of the lesson (82/97);
- decrease the stress due to mismatch between current knowledge/skills and desired knowledge/skills (67/97);
- recognize and accept different opinions on a topic or issue (87/97);
- building networks of meanings with respect to previous and newly acquired knowledge (87/97);
- activate processes of reflection and revision of knowledge (95/97).

Finally, the majority of participants (85/97) declared their willingness that all lessons were structured in the same way, making them satisfied with the interactive and conversational approach used for conducting the teaching (85/97).

These results were confirmed by the observation performed. It must be noted that participants in the course are school teachers who have decided to continue their training and specialise to become special needs teachers. The intrinsic motivation behind their choice of professional growth together with their adult age, already provide a good foundation for good average levels of participation. However, we also have to take into account the tiredness of the class group at the time of the lesson due both to the duration of the lesson (i.e., five hours) and to the previous job activities carried out by participants in the morning (all participants are in-service teachers).

Despite this, it was observed a gradual increase of more informal and relaxed behaviour during the lesson, probably due to the positive atmosphere

that the teacher tried to build with the group. From the outset, it was possible to note the group's interest in the subject and the high level of participation during the plenary discussions after the digital activity (often some people exposed themselves more frequently than others). The contributions of the students were either informative (requesting clarification of an aspect/concept of the lecture) or experiential (experiences were reported with respect to the lesson, e.g., experiences of clashes with colleagues or difficulties in classroom management).

4.2 RQ2: How did teachers react to the use of digital technologies during the course activities?

Concerning the use of technologies for course activities, 83 out of 97 participants accepted them positively. Specifically, from the analysis of the open answers, it emerged that technologies played a positive role in promoting interaction and participation (from teachers' answers: *A new way to interact*; *Because it still gives me the opportunity to be active and participate in the lesson*), in facilitating and nurturing the learning process (from teachers' answers: *It can be useful to improve learning*) and in stimulating their interest towards integration in the teaching practice (from teachers' answers: *Because it intrigues me and I would like to learn more about its use and how to manage it better*).

The main reasons for participants declaring a neutral (12/97) or negative (2/97) attitude towards technologies are related to the negative perceptions associated to their use (from teachers' answers: *I welcomed the use of technology but with a lot of fear of not being able to carry out the activities, not for the contents, but for my personal insecurity with technological tools*) and to the technical problems may be encountered (from teachers' answers: *I often have connection problems*).

Despite these few initial concerns, participants found technology to be enough (56/97) or very (39/97) motivating and enough (44/97) or very (49/97) useful for their learning experience. They also considered the use of technology not (39/97) or less (44/97) stressful and not (36/97) or less (42/97) complex. In fact, 19 out of 97 found the task much easier than expected (from teachers' answer: *Since the request was clear, the execution of the task was stimulating*), 42 out of 97 respondents declared that the task turned out to be easier than expected (from teachers' answer: *Technological performance anxiety is always present, but in fact everything turned out to be simpler and more accessible than initial expectations*) and 31 out of 97 found the task neither simpler nor more difficult than expected (from teachers' answer: *I didn't have particular expectations because in any case I know that the use of technology can only*

favour the execution of the task). Finally, participants considering the task much harder than expected (5/97) claimed some technical difficulties related to their digital competence (from teacher's answer: *The task turned out to be more difficult than expected because I didn't have enough material and knowledge especially about many apps and sites*).

The uncertainty about the use of technology and the awareness of its importance were two aspects also confirmed by the observation results: when it was announced, during the course presentation, that the use of technology would have been necessary in each course activity, participants' reaction leaked uncertainty. However, emotions such as anxiety and fear related to the use of technology were expected by the research team, in light of the average age of participants (around 42 years old) and the low use of technology in Italian schools (Ranieri *et al.,* 2020). Nevertheless, all teachers managed to access all online activities, also thanks to the support among classmates, especially from younger versus older teachers. It was also observed a gradual increase in familiarity with the filling of the Google Forms since the second lesson.

Moreover, during the second lesson, participants requested for less technological support than in the first lesson.

4.3 RQ3: How did teachers perceive the evaluation strategies used in the training course?

Coming to the evaluation strategies, participants declared that a final evaluation taking into account the overall participation during the course as well as group work and the final test was useful (63/97) for their training and fair (58/97). Beyond this general observation, during the course it has been observed that evaluation is a subject that always puts those who have to be evaluated in a state of anxiety. Even in our case, when the course evaluation methods were shared during the first lesson, a certain anguish could have been perceived from the silence and the attentive, nervous glances. Yet, the course lecturer already tried to make it clear to the class that the evaluation process would have been part of the overall learning process. This approach certainly helped the class perceive the evaluation as a formative process, negotiable in nature, and not as a punitive moment. In particular, the evaluation strategy included two different tasks, one based on the design of a learning scenario on prosociality and the other on a closed-ended test to be administered at the end of the course. The first one was carried out in groups, while the second individually. As well known, if a test could be useful for the evaluation of knowledge outputs, it can be limiting to evaluate other knowledge dimensions. Therefore, the adoption of a design-based task for evaluation was felt as

motivating approach evaluation for an interactive process of knowledge building.

5. Conclusions

The interactive and conversational teaching approach, with the support of technology, within the course of Special Pedagogy and Integrated Management of the Class Group (30 hours) in the Specialisation Programme for Special Education Teachers of the University of Florence, made it possible to carry out sustainable teaching both in terms of commitment and cognitive load, but also effective teaching in terms of learning and engagement, on a class of 138 students.

The elaboration of the questionnaire data and the transcribed observations indicate positive aspects such as increased levels of participation in the lessons, a more relevant and meaningful learning experience and a higher motivation to attend the course and learn. Specifically, the adoption of a student-centred, technology-supported and feedback-oriented approach has enabled almost all of the sample to: activate their pre-knowledge on the subject of Special Pedagogy (Hattie and Shirley, 2019; Carless and Winstone, 2020), balance cognitive overload caused by the integration of new knowledge (Sweller, 1994), and encourage the production of a network of meanings between old and new acquaintances (Rivoltella and Rossi, 2019).

Furthermore, the open-ended responses of the questionnaire showed an appreciation by teachers of the subject matter of the lessons, which, thanks to the didactic approach adopted, seems to have facilitated links with practical work experience. Participatory observation indicated that the exchange triggered by the lecture and, subsequently, by the plenary discussion stimulated the participants to transfer the acquired knowledge to their own professional context. A 'situated cognition', closely linked to the specific context in which it develops, leading to deeper reflection through the transfer of what has been learnt into a particular situation (Smith and Semin, 2004).

Also, the analysis of the questionnaire results showed that technology played a crucial role in the lessons because it enabled interaction and participation of the majority of the participants. Indeed, the use of digital technologies has allowed, despite some initial concerns, a collaborative construction of the lesson, increasing personalisation's level of the educational offer. Still, an unexpected result of the approach that emerged from the questionnaire concerns teachers' didactic innovation: some respondents stated that the use of teaching technologies during Special Pedagogy lessons

reflexively allows them to become familiar with new digital tools and to use them in their teaching practice.

Furthermore, teachers appreciated the use of a dual mode of learning evaluation, considering it both useful and fair, despite an initial tense moment. This dual mode of assessment (which consisted of a group activity and an individual test) allowed the class to implement an assessment-as-learning, a form of evaluation that is itself a moment of learning as well as verification of the learning acquired (Murai *et al*., 2019; Trinchero, 2018).

Lastly, it is also worth mentioning some limitations of the study: firstly, limitations concern the heterogeneity (i.e., age, sex, type of school) and the small size of the sample, that prevent the generalization of the results. Moreover, while the results of this study highlighted the potential of technologies as learning mediators for the conversational approach even in large classes, the reasons behind teachers' engagement and participation have not been deeply investigated. In this perspective, future qualitative research should be carried out to understand participants' perspectives and thus improve learners' engagement and pedagogical innovation.

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