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Using digital technology in the classroom adds new professional tasks for (student) teachers

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ABSTRACT

This article discusses a study conducted among final-year undergraduate students preparing to become primary school teachers. These students participated in an eight-week module on digital technology, working in pairs to create, test and analyse pedagogical scenarios using and not using digital tablets. The study aimed to address two main questions: (1) How do the views of pre-service teachers change as a result of a technology instruction programme? (2) What new professional tasks emerge when they use digital technologies in their internship teaching practices? Various data sources were collected and analysed. The findings revealed that none of the pre-service teachers held entirely negative views on digital technologies after the module. They became more comfortable using them in their classrooms, especially for teaching oral language, while for mathematics they found them less useful. Furthermore, the results showed that eight new professional tasks appeared when teaching with digital technologies.

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Introduction

Being a teacher is a complex job. Indeed, a teacher's status has now shifted from being a teacher to being part of a functioning school organisation (Coppe et al., 2020; Marz et al., 2019). Teaching means: (1) taking into consideration the teaching/learning of content, know-how and skills, (2) dealing with societal transformations and responding to new education policies, and (3) working in synergy with colleagues (Colognesi et al., 2020; Fullan et al., 2006; Lessard & Tardif, 2004). To this complexity is now added the need for teachers to be able to integrate digital technology into their teaching. Digital technology is becoming omnipresent in the classroom (Sung et al., 2016). And this is even more true since COVID-19, owing to which teachers have had to adapt and use digital technology to make their lessons possible (Darling-Hammond & Hyler, 2020; Kidd & Murray, 2020).

The widespread use of technology has led teacher education programmes to train pre-service teachers to use digital technology in their classrooms (Galway et al., 2020; McCoy & Lynam, 2022; Qiu et al., 2022; Rock et al., 2016; Thomas, 2016), without reducing such technology use to superficial and instrumental activities (Ottestad et al., 2014). Hodges et al. (2022) even argued that, by 2025, all teacher education programmes will prepare teacher candidates to be able to teach in online and blended modalities. It has been shown that pre-service teachers' experience of training in relation to digital technology use is decisive for whether they successfully implement it at school (Instefjord &

Munthe, 2016; Siddiq et al., 2016). This is done to support student success (Aldhafeeri et al., 2016; Clark et al., 2016; Kjallander & Frankenberg, 2018; Neumann & Neumann, 2014).

Yet, despite this, in our context of French-speaking Belgium, there are still only a few initiatives addressing training teachers in the use of technology. As a result, there is little research associated with this. In particular, research about how future teachers use digital technology in the courses they are teaching for the first time as trainees is lacking (Røkenes & Krumsvik, 2014), especially when their mission is to add value to classroom sessions, and to carry out actions that would be impossible without the contribution of digital technology (Al-Huneini et al., 2020; Tay & Wang, 2016). That is the ambition of this contribution: to document French-speaking pre-service teachers' evolving beliefs about digital technology, and to see the new professional tasks they engage in when they are teaching as interns. To do this, we followed a group of 24 primary school pre-service teachers¹ who were receiving instruction in the use of digital technologies for eight consecutive weeks. We analysed information from their logbooks and reflective portfolios, lesson planning for pupils and self-confrontation interviews.

Future teachers' beliefs about digital technology

Much research has shown that teachers' and pre-service teachers' beliefs are strongly related to their teaching practices (e.g. Hanin et al., 2020, 2022; Kim et al., 2013; Pajares, 1992). Several studies have examined pre-service teachers' views about digital technology in schools. It appears that their beliefs about digital technology have a large impact on their successful use of such technology in the classroom (Ertmer et al., 2012). Beliefs about technology can explain intentions to use it and thus possible shifts in views about technological innovations in two main ways.

The first way is to consider that there are two types of beliefs that enable individuals to accept technology: perceived ease of use and perceived usefulness. According to Scherer et al. (2019), this is the most powerful way to describe user acceptance of technology in education. These two beliefs are central to the technology acceptance model (TAM; Davis, 1989) and explain individuals' behavioural intentions and attitudes. *Perceived ease of use* is defined as 'the degree to which a person believes that using a particular system would be free of effort' and *perceived usefulness* as 'the degree to which a person believes that using a particular system would enhance his or her performance' (Davis, 1989, p. 320).

Sadaf et al. (2012) studied the beliefs of nearly 200 pre-service teachers in the United States regarding technologies and their possible use in their teaching practices. The study found that preservice teachers' intentions to use technology were indeed linked to believing it is easy to use and several beliefs related to usefulness: believing they will be more effective when using technology; believing technology can improve student learning and engagement; believing technology will satisfy students' needs and expectations; and believing in the potential benefits that technology can offer students, such as easier access to information.

The second way to explain intentions to use technologies is to consider that pedagogical beliefs may determine beliefs about technologies and their use. Han et al. (2017) investigated how the technology-centred practicum teaching experiences of 55 pre-service teachers in Texas could impact their self-efficacy and their technology use intentions. In addition to showing that the technology-centred internship increased all participants' self-efficacy for using digital technologies, the study provided information related to pedagogical beliefs. Pre-service teachers with traditional teaching beliefs had low levels of technology use intention at the beginning, but the technology-centred practicum significantly increased their intention to use technology in the future. However, intention levels did not change for pre-service teachers who had constructivist teaching beliefs and were already in favour of technology use at the beginning. A similar result was also shown by Gurer and Akkaya (2022) among 714 future mathematics teachers. These authors recommended adding the variable of pedagogical beliefs to the TAM.

We conclude that for future teachers to be willing to change their practices and use digital technology, they must, on the one hand, believe that it is easy to use and useful, and, on the other hand, hold constructivist pedagogical beliefs or participate in a training programme.

Implementing digital technology in the classroom: a multi-phase process

Integrating digital technologies into the classroom for optimal effect requires consistency between the content to be taught, the pedagogy and the technology. This is the basis of the technological pedagogical content knowledge (TPACK) model (Mishra & Koehler, 2006). In short, content and pedagogy must be the basis of any effective integration of digital technologies. Technology, by communicating content and supporting pedagogy, aims to enhance the learning experience of students.

However, it seems that this is not so simple; several models have identified the phases through which (future) teachers can progress. In this respect, Karsenti's (2013) ASPID (adoption, substitution, progress, innovation, deterioration) model and Puentedura's (2013) SAMR (substitution, augmentation, modification, redefinition) model generally include the same phases. First is adoption (Karsenti, 2013), which consists of becoming familiar with the tool. Second is substitution, which consists in reproducing the usual work with the same efficiency, but using technology instead. Third is progress, where the use of technology allows for more effective teaching, either through a functional improvement brought about by the technology or a reconfiguration of the teaching task. Fourth is innovation, where it is possible to carry out school tasks with technology in ways that would never have been possible without it. This involves the creation of new, previously inconceivable school tasks. Karsenti (2013) added the deterioration phase, in which the technology has a negative impact because it is not used appropriately. For example, McGarr and Ó Gallchóir's (2020) study, based on 24 Irish pre-service teachers, showed that they used digital technology as a tool to enhance existing teaching practices rather than to facilitate more student-centred learning.

Teachers' professional tasks

Professional tasks are referred to as 'professional standards' (Jorro & Croce-Spinelli, 2010). They require the skills that are common to all teachers. These common tasks are adapted and adjusted according to context (Bucheton & Soulé, 2009).

In our context of the Wallonia-Brussels Federation of Belgium, Van Nieuwenhoven et al. (2014) conducted focus-group discussions to determine the professional tasks of primary teachers, which were divided into three main categories: acting in the educational community, developing themselves personally and professionally, and managing learning. We used this last category in our study, to question the impact of digital technology. Managing learning is divided into two sub-categories of professional tasks. The first sub-category is related to socio-emotional aspects (Figure 1). It includes: (1) discipline management (creating and ensuring a positive climate), (2) student education (developing interpersonal skills, citizenship, socialisation, autonomy, critical thinking), (3) knowledge of students in their family and cultural domains (observing and analysing behaviours), and (4) communication with students outside of learning situations.

The second sub-category is cognitive (Figure 2). It involves the professional tasks of (1) planning (organising content and its evaluation), (2) preparation (using resources such as textbooks and encyclopaedias, analysing the subject matter to be taught, choosing a methodology, thinking about the material, thinking about differentiation, thinking about evaluation and writing the lesson plan), (3) making learning happen (implementing the activity, reacting and making students think), and (4) reflecting on practice.

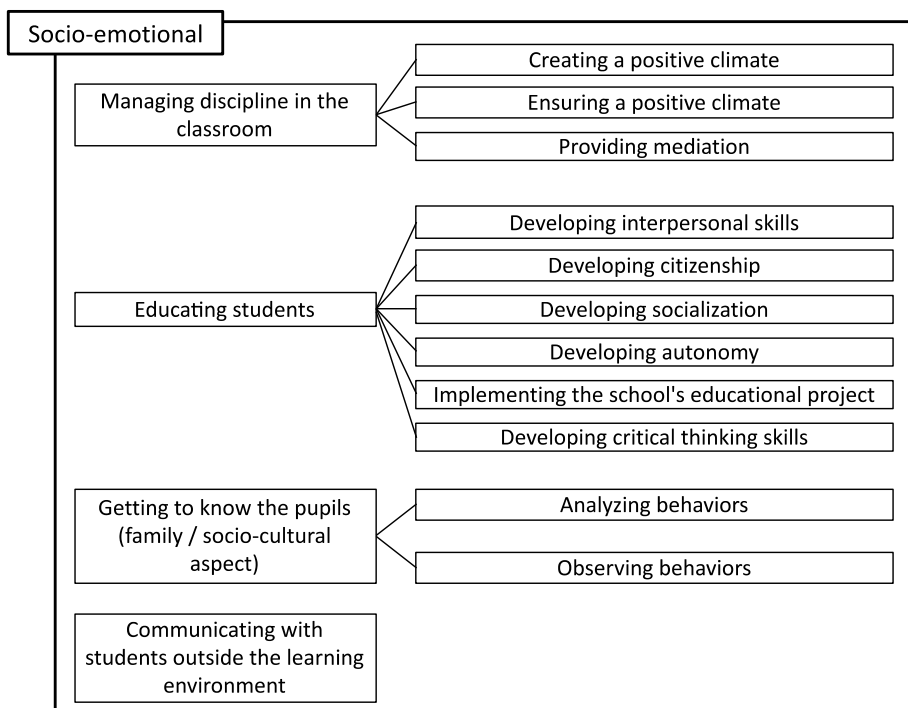


Figure 1. Teachers' professional tasks concerning managing learning: social-emotional aspects (adapted from Van Nieuwenhoven et al., 2014).

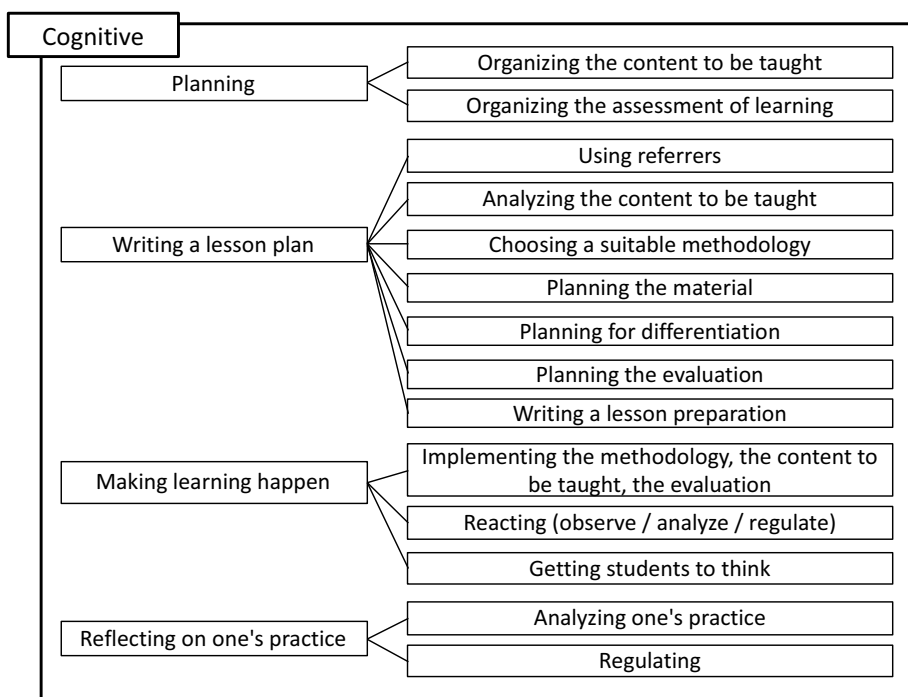


Figure 2. Teachers' professional tasks concerning managing learning: cognitive aspects (adapted from Van Nieuwenhoven et al., 2014).

Purpose of this study

This study has two goals. The first is to identify the initial views of pre-service teachers on the use of digital technology in the classroom, and to see whether and how those views changed over the duration of a technology-related training module combining theory and classroom practice. The second is to document how their current professional tasks evolve and redefine themselves with the use of digital technology in the classroom. Therefore, we formulated two research questions:

RQ1: How do the views of pre-service teachers on the use of digital technology in the classroom change as a result of a technology instruction programme?

RQ2: What new professional tasks emerge when they use digital technologies in their internship teaching practices?

Methodology

Context of this research

Our research involved part of teacher training in French-speaking Belgium. More specifically, our investigation concerned eight consecutive weeks of intensive and specific training that pre-service teachers receive on digital technology use in their final year of initial training (from April to June). At the end of this training time, each pre-service teacher involved in the module has developed, tried out and analysed the effects of an instructional programme. This programme is about 12 hours long. The pre-service teachers teach either mathematics (geometry, measurement, operations) or oral skills. The whole process is part of pre-service teachers’ end-of-study work. The module is further explained elsewhere (Colognesi & Balleux, 2018; Colognesi et al., 2019).

Participants

Twenty-four pre-service teachers were followed throughout the module. Their average age was 23.87 years (*SD* = 4.01). [Table 1](#) provides an overview of the participants.

Table 1. Participant details.

	Females	Males	Classic training	Additional training
Teach mathematics	12	0	4	8
Teach oral skills	11	1	9	5

Procedure

This module includes three distinct steps.

The first step is the institute training (two weeks). Pre-service teachers first engage in a 90-minute debate, for or against digital tools in the classroom. Then, they receive training in either ‘how to teach math’ or ‘how to teach oral language’. This depends on what they have chosen to learn in this module. They also receive specific training on digital tablets (how to use them, possible applications for teaching activities etc.). Then, in pairs, they develop learning activities, based on the training they have received. They have to develop two versions of their instructional programme: one with and one without digital tablets. There are 35 hours scheduled to complete this work. Each duo teaches

the same content in two primary school classes that are at the same level, without digital tablets in one class, with digital tablets in the other. The trainers support the development of these instructional activities (especially the didactic and pedagogical aspects and the possibilities offered by digital tablets). In our study, just before they engaged in classroom experimentation, the pre-service teachers were given instructions about collecting information. They were also trained in self-confrontation techniques (Leblanc, 2018), allowing them to review their teaching and improve.

The second step is experimentation in their classes (three weeks). Pre-service teachers implement the designed activities in both classes, and are videorecorded. While some teach, others observe and collect the data needed to measure the effects of teaching activities. Every day, pre-service teachers record their thoughts in a student journal. This journal is intended to allow them to keep a memory of their reflections. These will be used to create a portfolio that shows their perceived development through their teaching activities. Pre-service teachers are asked to address five areas: me as a teacher, me collaborating with partners, my pedagogical progress, the integration of technology in my classroom and my research posture. For more details on the portfolio and the results of the students' reflective analysis, see Colognesi et al. (2019) and Colognesi and März (2022). In addition, they are led to take a critical step back from their teaching activities through self-confrontation interviews (Leblanc, 2018). These interviews are conducted with three people: the two student teachers who carried out the teaching activity and another who filmed. They view the video of the activity together, freezing it at important moments for them to clarify what is happening at that moment, to say their degree of comfort/discomfort, their concerns and so forth. These moments can be chosen by any of the three participants in the interview. All self-confrontation interviews are recorded. In our study, there was one self-confrontation interview per teaching activity, and an average interview lasted 45 minutes.

The third step is again at a training institute (three weeks). The pre-service teachers take a critical look back at the whole experience, led by the trainers. They analyse the data collected, with the help of researchers. The 90-minute debate 'for or against' digital tools in the classroom is conducted a second time. Finally, they write a research report showing the results of implementing their two instructional programmes (with and without digital tablets), and create their personal portfolio that highlights what they felt and learned from the experience.

Data and data analysis

For this study, several types of data were collected throughout the module.

In order to capture pre-service teachers' views of the digital world and how those views may have changed, the 'for or against' debates were recorded. These data were transcribed. We applied a mixed-coding content analysis following the recommendations of L'Ecuyer (1990). Thus, categories from our theoretical framework on change were used, while others emerged from the data. The starting categories were from the TAM (Davis, 1989; Scherer et al., 2019) and Enhanced TAM (Gurer & Akkaya, 2022): ease of use, usefulness and pedagogical beliefs.

In order to identify the new professional tasks caused by technologies, first, pre-service teachers were recorded when working in pairs to develop teaching activities. This allowed access to the pre-service teachers' conversations and exchanges when planning teaching activities. Second, logbooks and portfolio records were collected. In addition, the pre-service teachers' statements during self-confrontation interviews were recorded. This provided access to the pre-service teachers' experiences of what happened in class, both with and without digital technology.

All of the data were transcribed, and content analysis was applied. We used the job tasks determined by Van Nieuwenhoven et al. (2014) to categorise the different information. This could result in emerging categories of new job tasks related to the use of digital technology, relative to the a priori categories. We proceeded, at first, to a double coding. This made it possible to classify the verbatim transcripts according to existing professional tasks and to reduce the number of new categories by targeting permeable and redundant categories. Then,

in a second step, we stabilised these new categories definitively, with three researcher colleagues, by jointly coding a series of statements.

Findings

The results are presented according to the two research questions. Quotes from participants translated from French illustrate what is reported.

How do the views of pre-service teachers on the use of digital technologies in the classroom change as a result of a technology instruction programme?

Initially, 10 out of the 24 pre-service teachers (six taught mathematics, four oral language) expressed that they favoured the use of digital technology in the classroom. Their first argument, offered nine times, was that technology will be useful for their students. In particular, the pre-service teachers thought that it would allow their students to work at their own pace and independently during the exercises.

I am in favor of using tablets in class because they allow the child to do exercises independently and allow everyone to progress at their own pace. (VY)²

Their second argument, offered six times, was that knowing how to use digital technology to teach was for them one of the skills today's teachers need.

Teachers need to be current and in their generation, all students are faced with the use of a tablet. (AR)

In contrast, of the other 14 participants, three (taught maths) had a nuanced but rather sceptical opinion, while 11 (three taught maths, eight oral language) were completely negative towards digital technologies from the start of the module (i.e. almost at the end of their teacher training). All thought that it is not easy to use, both for them (12 occurrences) and for their students (four occurrences). These participants explained that they are not familiar with the technologies themselves. They said they use them in their daily lives (to go on social network sites or take pictures, for example), but no more than that.

Having never used technology in my internships, I have a very negative opinion about its use. It scares me. I didn't know anything about it. (IM)

In addition, four of these participants felt that students are already overexposed to screens in general and that it is not a good idea to over-expose them further for their health.

I am against the use of tablets in class. I find that the students are already too often in front of a screen at home. (EM)

Changes developed in these perceptions over the course of the module, notably through classroom practice. At the end of the module, 16 of the 24 pre-service teachers were in favour of using digital technologies for their teaching. Among these 16, eight were already positive at the beginning (four taught maths, four oral), and eight completely changed their minds. This positive change was seen among the pre-service teachers who taught oral language. They seem to have adopted the technology more quickly, as they expressed that they saw its usefulness for developing students' skills. They all noted that having digital tablets allowed students to film their performances, see each other's performances again and comment on videos. They felt that this was an advantage that was not possible in the classrooms without the technology. In short, technology allowed them to stabilise the volatile aspect of the oral language and to teach differently, with a view to innovation.

For the oral [language], getting the tablets was great. The students were able to review their oral performance. And also write comments directly for the others in the film, at the right moments! The tablet also served as a prompter when they spoke. (AL)

I have been for it ever since I had this experience. [...] I like the audio, video and positive reinforcements that can be conveyed by the tool on the videos [...] it's attractive and multifunctional [...]. (MO)

There was no longer any aspect related to the difficulties of using digital technologies in these participants' comments.

The remaining eight pre-service teachers reported having a mixed view of digital technologies at the end of the module. Either they started with a mixed opinion at the beginning (three pre-service teachers), or they had a negative opinion at the beginning (five) or they were in favour at the beginning (two). However, they did not have a totally negative opinion. These eight participants all taught mathematics during their classroom practice time. They essentially expressed two difficulties. First, these students all mentioned that they did not see how to teach the maths content they needed students to learn with technology. Despite the training they received, they considered that digital tablets were 'too much' and could not replace the usual educational materials.

It was very difficult to find an innovative use. The only contribution was the creation of a video or the recording of the students. The other activities were achievable without technology, although the tablet facilitates execution. (AM)

For what we had to teach, manipulatives were necessary. There was no real interest in having the technology, to the contrary. (VI)

Second, five of these eight participants stated that it was not easy for them to help students use digital tools. Thus, they said that they were embarrassed by the difficulties of managing the group at times when the students had to use the tablets, because they had little knowledge of the tool and had to answer questions from students who asked for help.

I don't feel ready to use it alone in my classroom. (CL)

It was really complicated to manage the children. They were asking me questions about the applications. I didn't know how to do it myself. It was definitely an inconvenience and a stressor for me. (ME)

What new professional tasks emerge when they use digital technologies in their internship teaching practices?

The analysis conducted on the collected data revealed changes in professional tasks, in both the socio-emotional aspects of the profession and its cognitive component. More precisely, two new tasks appeared at the socio-cognitive level, while at the cognitive level, five tasks were reconfigured and one new task emerged.

Changes in the socio-emotional dimension of the profession

Figure 3 provides a summary of the adapted professional tasks related to the socio-emotional aspects of the use of digital technology in the classroom, based on the analysis we conducted.

The first new professional task that emerged from the analysis was educating pupils in digital skills. The pre-service teachers mentioned that, contrary to what they expected, the vast majority of the primary students they worked with did not know how to use digital tablets.

I'm super surprised. I thought they knew how to use the tablet at their age. They don't know any more than we do! In my class, almost all of them have a tablet at home, but when you ask them what they do with it, they go on Facebook or they play games. So using a particular application, or making video montages, for example, is another thing. (AL)

In my class, a lot of people didn't know how to use it, the basic moves and all that. I'm doing an introductory activity on the tablet, and the applications we're going to use afterwards, so that it doesn't become a problem. (MO)

The second professional task highlighted by our results was the establishment of class rules regarding the use of digital technology. It appears that all of the pre-service teachers were confronted with questions related to managing the group, which was complicated by the use of digital technology. It thus seems necessary to think in advance about how the children are going to use the technological tools, and thereby foresee the rules needed to avoid problems.

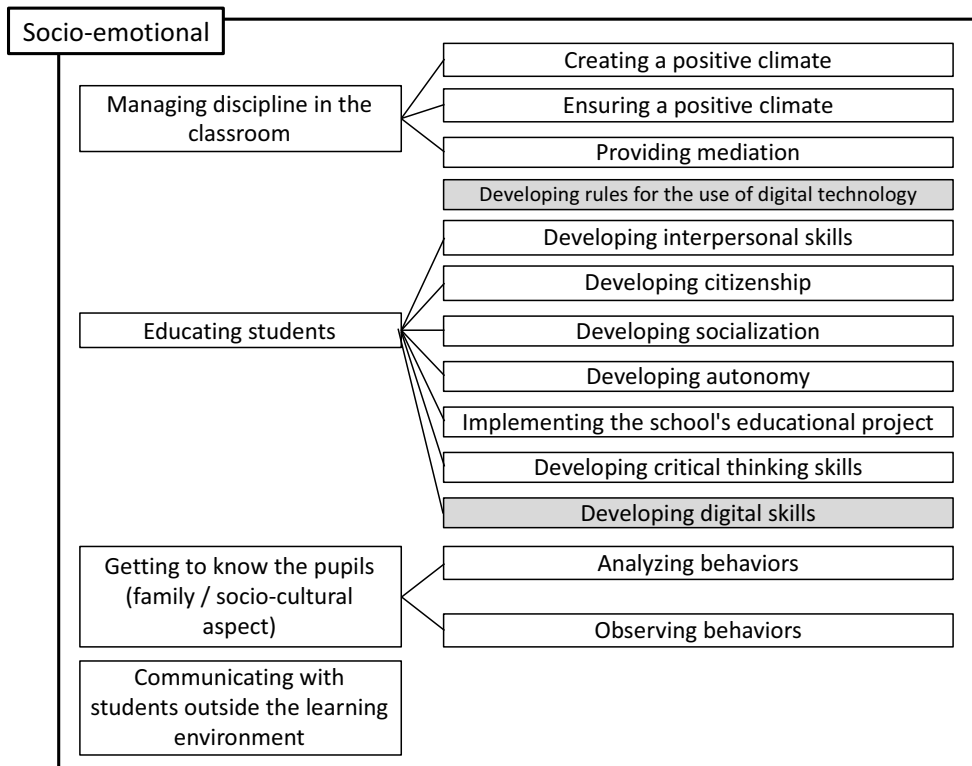


Figure 3. Teachers' professional tasks concerning managing learning: socio-emotional aspects, adapted to the use of digital technology.

What worries me? We had decided to put them in pairs, so that they could discuss before choosing the answer... But now I'm realising that it's not working... [...] No, I don't think I won't do it again. I still think it was a good idea to get them to think together. I just need to frame it better, they're children and the tablet is new to them. (JO)

I will make a chart with the children for use of the tablets. I was too afraid of losing control. So I let them try a little bit with the material, without instructions, and then we discussed it and thought about it. Now I want them to tell me what they can and can't do. It's important, otherwise I'm going to spend a lot of time making comments, and that's going to stress me out. I'm already stressed out because as soon as you give the tablet out, there are a lot of people calling to you, who can't find it, who have questions. (AR)

Changes in the cognitive dimension of the profession

Figure 4 provides a synthesis of the adapted professional tasks related to the cognitive dimension of the use of digital technology in the classroom, based on the analysis we conducted. With regard to the cognitive aspects of teaching, six professional tasks were reconfigured with the use of technology, while a new one emerged.

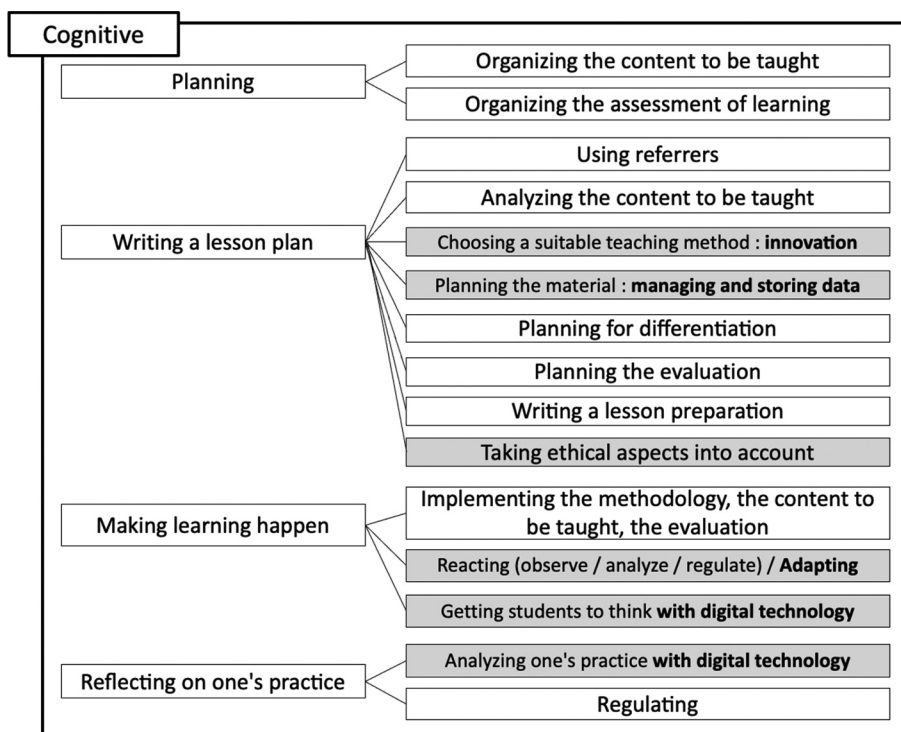


Figure 4. Teachers' professional tasks concerning managing learning: cognitive aspects, adapted to the use of digital technology.

In the 'writing a lesson plan' component of the cognitive axis, three changes were observed. First, the task of choosing a teaching method was somewhat reconfigured. The pre-service teachers' discussions strongly emphasised the choice of a teaching method when planning to use using digital technology, compared to what they said when they carried out their preparations for classes where they did not use digital technology. Indeed, the majority of the discussions went in the direction of searching for an adapted teaching method in order to innovate, that is, to be able to offer students something that would not be possible without digital technology.

The tablets should not be used all the time anyway. Wouldn't we try to give them the application where we see in 3D there? So they can see the solids moving? (RO)

Second, the task of planning the materials was redefined, and now extended to the management, conservation and storage of the products made by the pupils. It also meant providing ways to enable students to find these products easily during subsequent activities.

There are many things to think about. At times it wasn't easy to manage the tablets and its problems as well. This was the situation when we had to transfer the videos that the students had made. They needed them in the next lesson to analyse themselves. The tablets did not have enough memory to store them. The transfer was only possible on one application. (MI)

Third, a new professional task emerged: considering the ethical aspects related to image, video and so forth, in the context of the work of the group. This concern was present in almost all participant discussions.

- As we film them, we have to ask their permission!
- Yes, we have to make a document for the parents.

- And if they say no, how do we do it, because we need them to film themselves . . .
- It's just for the class, they erase it afterwards.
- I don't know, we really need to find out about this, otherwise some pupils will not be able to participate. (LO & SO)

At the level of the 'making learning happen' component, two professional tasks were redefined. First, pre-service teachers found themselves in situations where they had to readjust the instructional programme several times during the course of the activity. This redefined the professional task of 'reacting' as 'reacting and adapting'. This was mainly due to technical problems such as lack of an internet connection, lack of space to record the students' products, a 'forced' update of an application that prevented the students from working and the like. These problems appeared in all the self-confrontation discussions we analysed. Thus, even more than usual, digital technology forced pre-service teachers to find alternatives when conducting the teaching activity.

The wi-fi was not fast enough. Seeing the time scrolling and the end of the period getting closer, I opened each student's video on my computer and filmed it with the iPad. The quality was not very good. But it was the only possible solution. The students were able to analyse their video. This allowed me to become even more attentive to the problems that could arise with the tablets. And also to keep in mind for the future that it's always good to have a plan B for a lesson with tablets. (VY)

Second, the analysis showed that the pre-service teachers used the technologies to benefit pupils' reflective analysis. In this way, they implemented strategies through which students could see each other at work and/or review their products and those of others, so that they could give an opinion on them. In addition, metacognitive questions were planned by the pre-service teachers, and they asked the pupils to find ways to illustrate their answers, for example, by taking pictures of their pride. Some stated that this reflective and metacognitive work supported by the digital technology allowed them, as teachers, to improve their understanding of the students and how they work.

There, I ask them to use Book Creator. We've planned a meta notebook. It took a long time to think about it, to make it more effective than on paper. In fact, when they are working, the students take pictures of their pride, stress, etc. [significant moments for them], and then I ask them to use Book Creator. They also put the videos of their presentation in as they go along. Then they write down what they did, how they did it, what they think about it. (JO)

I ask the students to review what they have filmed, their products. They give their opinion on what they do and have done. It's great for their self-evaluation. It also helps me with feedback. (KA)

Finally, pre-service teachers used technology to analyse their own practice. As requested in the instructions related to supervising the internship time, they carried out self-confrontation interviews. They saw themselves again on video, and explained what they were experiencing and doing. It is interesting to note that after the module, the pre-service teachers mentioned the benefits they found in this practice. All said that it was formative for them, while some even put forward the idea of reusing it when they are in their own class as a teacher.

Thanks to the videos, I was able to see myself as a teacher. I found it very interesting. I am used to questioning myself, but only on the basis of my impressions and feelings. For the first time, I had the opportunity to have a more objective look. In particular by analysing my own way of being, also by observing the behaviour of the children. (VY)

It was really beneficial. It's very interesting. I think I'll do it again when I have my class. It's easy to do. You put up a tablet or a computer that films you during one activity or another, and then you watch at home. (RO)

Discussion and conclusion

Our first objective was to identify views of future primary school teachers in their final year of training regarding the use of digital technology in the classroom. We also wanted to show whether these views changed as a result of a training module combining theory and practice and the use of digital

technology. To observe the change, we used the criteria from the adapted TAM (Davis, 1989; Gurer & Akkaya, 2022; Scherer et al., 2019): ease of use, usefulness and pedagogical beliefs.

Prior to the module (i.e. almost at the end of their teacher training, because the module was during the last months of their training), fewer than half of the participants had a positive opinion about using digital technologies. Students in favour of digital technologies advanced two arguments. They believed it is useful for teaching (e.g. for students to work on different tasks at the same time or independently). And they thought that these days, a teacher should be able to use technology to teach. The first argument refers to perceived usefulness and the second to pedagogical beliefs (Davis, 1989; Gurer & Akkaya, 2022; Scherer et al., 2019).

The others, for their part, based their negative verdict on the fact that they find digital technologies difficult to use (Davis, 1989; Gurer & Akkaya, 2022; Scherer et al., 2019). They expressed their unfamiliarity with digital tools and the fears these tools generate. But they also thought that such use is difficult for pupils in the classroom. Note also another element that led a few students to a negative opinion: the fact that they think that digital technologies are not good for one's health and that pupils already have too much exposure to screens.

At the end of the module, no one was negative about digital technologies. More than half of the participants were in favour of using digital technologies, while the others had a mixed opinion. No participant considered that the use of digital tools was difficult for them anymore (Davis, 1989; Gurer & Akkaya, 2022; Scherer et al., 2019). This suggests that the training for and through practice was helpful in this sense.

Changes from a negative to a positive view occurred only for students who taught oral language in the practical classroom parts of the module. They claimed that digital technologies were useful (Davis, 1989; Gurer & Akkaya, 2022; Scherer et al., 2019) in developing students' language skills. These students truly believed that technology enhanced student learning, as did the participants in Sadaf et al. (2012). More specifically, they had the opportunity to experience the innovation phase of technology use and acceptance (Karsenti, 2013). Indeed, as previous work has shown, the use of video makes it possible to preserve, revise and enhance one's own products (Miskam & Saidalvi, 2020). The use of digital tablets to teach oral communication skills facilitates 'reoralisation' (Colognesi & Dolz, 2017), defined as the opportunity to redo one's oral performance and improve it. Thus, the digital tablets make it possible to not only to preserve oral products, but also to rework and improve them, at the very least, in the voice and body aspects (Colognesi et al., 2023).

In contrast, the pre-service teachers who did not have a positive review at the end of the module were those who taught mathematics. They said they did not see how to teach mathematics with technology, which speaks to their pedagogical beliefs about teaching the subject. This had already been shown for mathematics by Gurer and Akkaya (2022). Several other studies have underlined an approach to mathematics in the classroom that is still very traditional/transmissive (Gattuso & Bednarz, 2000; Hanin et al., 2022). In this sense, these students remained in a substitution phase (Karsenti, 2013), without really using digital technologies for learning purposes. Nevertheless, like any tool in education, digital technology is not relevant for all teaching content. It is therefore advisable for teachers to reflect on the possible relevance of using technology when they are thinking of doing so (Al-Huneini et al., 2020).

In the end, our results nuance those of Amadiou and Tricot (2014), who showed that pre-service teachers use technologies for personal purposes but are helpless when it comes to exploiting them for classroom learning purposes. This was indeed true for our participants before the training module. But we showed that it was no longer true at the end of the training module, specifically for the students who taught oral language.

Our second objective was concerned with the way professional tasks evolve and reshape themselves with the use of digital technology in the classroom. The analysis allowed us to refine and evolve the model of professional teacher tasks for primary school teachers proposed by Van Nieuwenhoven et al. (2014), specifically with regard to management of learning.

Indeed, at the socio-emotional level, two new tasks were observed: training students to use digital tablets and establishing class rules adapted to the use of digital technology. Our results show a strong link between socio-emotional skills and digital skills in several regards. Our observations were shared by other authors as well (Galway et al., 2020; Han et al., 2017). First, we found that the use of digital technology in the classroom for learning purposes requires the teacher to create a specific working environment. Because the students are not familiar with the learning features of the tablet, establishing specific class rules is necessary to ensure correct use of digital technology and a favourable climate for the development of the targeted skills. Second, particularly for French oral skills instruction, the tablet is a powerful communication tool (social skills) by allowing students to keep track of their oral performance and discuss it with their peers. Third, concerning pre-service teachers, having to organise an entire lesson around a tool with which they are not familiar gives rise to negative emotions such as anxiety, fear of losing control, not being up to meeting the needs of the students and a feeling of low competence. In relation to this last point, this contribution shows that with a specific instructional programme, it is possible to modify pre-service teachers' negative relationship with digital technology. Finally, the counterpoint to the previous argument is that scaffolding pre-service teachers' use of a tool that is new to them with collaborative prompts within the instructional programme encourages exchange, discussion and debate and thus the development of their social and communication skills.

At the level of the cognitive component, essentially clarifications and extensions to existing tasks were observed. Thus, concerning preparation, we saw the search for an appropriate teaching method to enhance the use of technologies. In addition, the planning of the material became more precise, since it was now necessary to think about the management and storage of the students' products. Moreover, the use of digital technology in the classroom may involve taking into account ethical aspects. Indeed, if it is a question of filming students at work or keeping records of what is happening in class, the use of the students' image becomes a question to consider. It is therefore a matter of obtaining the consent of parents and pupils themselves (Bélanger & Richard, 2017).

Regarding the tasks related to 'making learning happen', the use of digital technology requires the ability to adapt to the unexpected and, therefore, to anticipate the lesson better, notably by imagining several alternatives (Colognesi & Gouin, 2022). In addition, our results also showed that digital technology can be used to engage pupils' metacognition and critical thinking. Indeed, it allows students to keep tangible evidence of what they are doing and how they are doing it (they can review themselves at work, capture moments in their process etc.) and engage in critical reflection about that evidence. This undoubtedly benefits them, as adopting a metacognitive stance can be challenging for students (Demorsy et al., 2023). In this respect, it is in line with child-centred recommendations to give children greater agility and more control over their learning (Côté et al., 2021).

Moreover, while the new tasks highlighted in this contribution support novice teachers' preoccupation with self, group and materials management, in short, surviving in the classroom (Day et al., 2006; Huberman, 1993), our results emphasise another outcome of the training: trainees' reflective analysis of their teaching practices initiated by the trainer's 'imposed' self-confrontations. In this way, digital technology provides a means for reflective analysis by the pre-service teachers themselves (Blondeau et al., 2021; Roue et al., 2019).

These observations have direct implications for initial teacher training. First, our findings are consistent with work on beliefs about the importance of challenging and shaking up teachers' misconceptions and attitudes about technology (Safrudiannur & Rott, 2020; Stordeur & Colognesi, 2020; Voss & Kunter, 2019). Thus, in order to convince the more resistant pre-service teachers, we must offer them modules that highlight the added value of using digital technology in the classroom, namely, that allow them to experience the phases of progress and innovation in Karsenti's (2013) model.

Moreover, McGarr and Ó Gallchóir (2020) suggested that initial training should focus on the pre-service teachers' allegiance to traditional pedagogical practices and their traditional view of

teaching. According to our results and to previous research, this seems to be especially relevant for mathematics content. Second, since not all educational content lends itself to teaching with digital technology, it is necessary to develop among future teachers a critical perspective on digital technology use (McGarr & Ó Gallchóir, 2020). To do this, the use of digital technology both as a medium for developing a reflexive posture and as an object of reflexivity as such is promising.

This study has several limitations that open the way for future research. The first important limitation is sample size. Indeed, we worked with a group of only 24 participants. It would therefore be interesting to survey more widely what future teachers in our context think about digital technologies. It would also be necessary to further investigate updated professional tasks related to the digital technologies, replicating the methodology employed by Van Nieuwenhoven et al. (2014). The second limitation to mention is the brief length and low intensity of each stage of the intervention. In this case, halo or Hawthorne effects cannot be ruled out. Finally, while the future teachers' views of digital technology and the new professional tasks pinpointed are very instructive, from a more in-depth perspective, it would be interesting to see if they are specific to the grade levels and school subjects being taught.

Notes

1. Students who already have a kindergarten teacher's diploma, and do an additional year to obtain a bachelor's degree in primary education.
2. Each pre-service teacher was assigned a code, in order to anonymise the data.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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