THE CHALLENGE OF DIGITAL TRANSFORMATION IN SCHOOLS: WHAT CAN WE LEARN FROM THE ESCOL@S DIGITAIS PROJECT?

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Abstract

This study evaluates the qualitative effects of the Escol@s Digitais Project, a program implemented between 2021 and 2024 in 12 school clusters in the municipality of Amadora, Portugal, aimed at promoting the curricular integration of digital technologies in the first cycle of basic education. Data was collected between November and December 2023 through focus group sessions and an alternative form, involving 31 teachers who participated in the project. The content analysis conducted, based on categories and thematic relationships, revealed significant patterns and divergences across three key areas of analysis: (1) importance, participation, and involvement of teachers; (2) the project's impact on learning and school dynamics; and (3) motivations, challenges, and recommendations. Among the main results, the recognition of the project's importance stands out, both in reinforcing teachers' confidence and comfort using digital tools and in expanding their knowledge of pedagogical innovation practices using digital technologies. Additionally, results show very positive perceptions regarding the project's impact on student learning, with explicit references to the development of essential learning goals outlined in the official curriculum, including the development of digital skills and other transversal ones, such as autonomy and critical thinking. Some aspects of school dynamics are also highlighted, namely the project's contribution to strengthening collaboration between teachers and improving school-family interactions. Concerning the factors for adopting digital technologies in the classroom, pedagogical reasons and specific training in technology stand out as central. Despite the various benefits associated with the project, infrastructure limitations and the management of curricular and pedagogical time were widely mentioned by teachers as barriers to the implementation of technology-based pedagogical practices. Looking ahead to improvements in future projects supporting digital transformation in schools, it is recommended that technical-pedagogical support be strengthened, with increased investment in adequate infrastructure, continuous support for teacher professional development, and greater involvement of students and families. Altogether, results suggest that projects like Escol@s Digitais can drive pedagogical transformations and facilitate the digital transition in the school context. However, the effective success of such projects remains dependent on structural and cultural conditions that favor the intentional and systematic integration of digital technologies into teaching and, above all, into students' learning processes.

Keywords: Digital transformation, digital technologies, primary education, teacher professional development, Escol@s Digitais project.

1 INTRODUCTION

Technological advances and the digital transition have led to profound changes in the field of education, challenging schools, teachers and education systems to effectively integrate digital technologies into teaching, learning and assessment processes. This process, as Mishra and Koehler [1] point out, goes far beyond a technical issue and involves a complex interrelationship between pedagogical, technological and content knowledge - the framework known as TPACK (Technological Pedagogical Content Knowledge). Thus, the meaningful integration of digital technologies requires an articulated investment that considers not only the tools, but also the educational practices and contexts.

Digital integration in schools is often associated with a solution to educational problems, a view strongly rejected by authors such as Selwyn [2] who argue that the true potential of technologies depends on the social, cultural and political factors that shape their use in an educational context. In addition, Fullan [3] argues that successful digital transformation requires systemic change, both in terms of teaching practices and educational leadership, emphasising that for innovation to take place it needs to be aligned with pedagogical goals and collaborative processes in schools.

In this context, the Escol@s Digitais project, implemented in Portugal between 2021 and 2024, is particularly important. Developed in all the school clusters in the municipality of Amadora, this project was designed to support the digital transformation underway in public primary schools. Specifically, it aims to boost the quality of teaching and learning processes, improve school performance and promote more robust educational results [4].

Similar projects at international level have been the subject of research, but critical questions remain about the real impact of these initiatives and the lessons we can learn from them and apply to future developments [5]. The seminal study by Ertmer e Ottenbreit-Leftwich [6] shows that the effectiveness of these initiatives depends essentially on epistemological and cultural factors that interfere with teachers' pedagogical practices, which the authors organize around four key determining variables: knowledge, self-efficacy, pedagogical beliefs and school culture. Reinforcing the importance of these variables, other studies show that even in cases where teachers have a positive perception of the educational use of digital technologies, the effective implementation of technology-based or technology-enhanced activities remains limited [7].

On the other hand, the issue of access to appropriate technologies and resources continues to stand out in literature as a significant obstacle. For example, research by Nikolopoulou et al. [8], based on teachers' perceptions of the barriers to using mobile technology in the classroom, shows that the lack of resources emerges as a very relevant constraint, appearing as the barrier most mentioned by teachers, regardless of the type of device used in the classroom. At the same time, this study also highlighted other relevant challenges related to issues such as lack of support, lack of time, lack of teacher confidence, classroom conditions and concerns about students.

In the same line of thinking, Hidayah et al. [7] conclude that concrete incentives, adequate support and structured opportunities are essential to increase teacher motivation and improve the quality of the use of digital technologies in pedagogical practices. Permata and Purnawarman corroborate this view, indicating that a continuous effort is needed to support the realisation of pedagogical adjustments, making teaching practices more dynamic and diverse [9]. The authors stress the importance of offering regular and diversified training, to be developed in the schools themselves (internal training) and/or by external organisations. Voogt and Roblin [10] also emphasise that 21st century skills, such as collaboration or communication, can be promoted with the integration of digital technologies, but that this requires not only access to resources, but also rich learning environments and contextualised support for teachers.

Based on this framework, this study aims to assess the qualitative effects of the Escol@s Digitais Project, contributing to the debate on the factors that condition the success of interventions of this type. The aim is to explore teachers' perceptions of the relevance, impact and challenges associated with the initiative in question, offering contributions to the development of future projects aimed at digital transformation in the educational context.

2 METHODOLOGY

This study is part of the overall evaluation of the Escol@s Digitais Project and focuses on the results of the qualitative analysis of data collected by qualitative survey in the final stage of the project. The methodology adopted was predominantly based on Focus Group Sessions[1], supplemented by an Alternative Form[2] which was used only in situations where, due to scheduling difficulties, it was impossible for the respondents to take part in previously scheduled sessions. The main aim of this data collection was to capture teachers' perceptions of the project's effects on school and pedagogical dynamics, as well as on the learning of students attending the network of schools covered by the project.

[1] Access the Focus Group Session Guide at: https://drive.google.com/file/d/10wP4gXL5Q9qGc0FijP6VhCQ1ggce1y9V/view?usp=sharing

[2] Access the Alternative Form for Teachers at: https://drive.google.com/file/d/1ShI4Iy-AVXS9-zCy8CvQ2hjSScGM7VMH/view?usp=sharing

Data collection took place between November and December 2023, with the participation of 31 primary school teachers from 11 of the 12 school clusters that make up the project's network. It should be emphasised that the Escol@s Digitais Project was designed and implemented in strict compliance with rigorous ethical standards, having obtained prior approval from the Ethics Committee of the Institute of Education of the University of Lisbon. In the context of this specific study, all the participating teachers signed an Informed Consent Form[3], in which the conditions of their participation were clearly specified, with emphasis on completely voluntary adherence, the right to withdraw without any kind of penalty or prejudice, and the anonymity and confidentiality of the participants' data.

To analyse the data, specific reflective content analysis procedures were used (Nicmanis,2024), based on identifying analytical categories and establishing relationships between them, with the aim of creating a content analysis matrix with the potential to capture the aspects that stood out most in the discourse of the respondents who took part in the study. This process involved three researchers and culminated in the establishment of a Content Analysis Matrix, organised into themes, categories, subcategories, an operational definition for each subcategory accompanied by examples of references taken from the surveys carried out for this study[4].

With regard to the procedures used to systematise the results, we opted for the binary analysis method which, instead of focusing on quantifying the frequency of the categories identified, values the identification and analysis of the presence or absence of certain characteristics, themes, patterns or references in the data collected. In this way, we chose to take the context in which the interviewees work as the unit of analysis, rather than the interviewees themselves, as shown below.

3 RESULTS

In this section, we present the results of the analysis of the data obtained from the qualitative teacher surveys, highlighting the patterns, regularities or divergences found based on analysing the presence or absence of certain references in the corpus of data for each of the 11 school clusters represented in the study. The following analysis is structured around three thematic axes considered central to an overall evaluation of the Escol@s Digital Project: (1) Importance, participation and involvement of teachers; (2) Impact of the project on learning and school dynamics; and (3) Motivations, challenges and recommendations.

3.1 Importance, participation and involvement of teachers

With regard to the first theme, "Importance, participation and involvement of teachers", two central categories emerged: i) "Importance of activities" promoted by the Escol@s Digitais Project or similar; and ii) "Most highlighted activities" by teachers, in terms of their participation and involvement in the actions triggered by the different structuring axes of the project.

Table 1. Importance and activities most emphasised by teachers.

Categories	***Subcategories***	***Examples of references***	***School clusters***										
			A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***K***
Importance of activities	Confidence in digital	*"Because I really (...)... don't feel very comfortable with digital yet and I think they force us out of our comfort zone"*	1	0	0	0	1	1	1	1	1	1	1
	Recognising the value of digital	*"It's like this, I think the project first forced us, in inverted commas - isn't it - to see this aspect that didn't exist or that wasn't valued as much as it is now."*	1	1	0	0	0	0	0	1	0	0	0
	Pedagogical innovation	*"(...) I think it forced them to inform us more about the platforms that exist, how we can innovate our lessons, how we can motivate the children more, right?"*	1	1	0	0	0	1	1	0	0	0	1

[3] Access the Informed Consent Form at: https://drive.google.com/file/d/1snSmyzmIaSfleXgPYW6tH4eDTLdLkPul/view?usp=sharing
[4] Access the Content Analysis Matrix at: https://drive.google.com/file/d/1akzpFf1iFOupWSfVOcPDburVdiCHbBHd/view?usp=sharing

Most highlighted activities	Teacher meetings	*"I remember the meeting we had, which I thought was very good because the colleagues shared with us what they had done in the classroom and I think that was an added value."*	1	1	1	0	0	0	0	0	0	1	0
	Training dynamics	*"(...) I really enjoyed it too, I can't forget to mention our little Google Forms training course"*	1	0	0	0	1	0	0	0	0	0	0
	Practical experimentation with the students	*"(...) with my class, I worked with Plickers which I loved and the kids loved it too, Socrative ah... That's what I remember mosto which I really worked with the class, that's it."*	1	0	0	0	0	0	0	0	0	1	0
	Direct support in the classroom	*"In fact, one of the activities that I thought was most positive was when I had people in the room. They could see the dynamics and were supportive."*	1	1	0	0	0	0	1	0	0	0	0
	Meetings with interlocutors	*"In the meetings we had, those who were most involved in the project, us, the interlocutors, these meetings were also important because they were moments of discussion, also of practice, (...) They always bring important things to all of us who are present."*	1	0	0	0	0	0	0	0	0	1	0
	Community in action	*"By the way, let me just say that you added another dynamic, which was that platform. [the virtual school communities] which, at the time, seemed to me to be a good tool."*	1	0	0	0	0	0	0	0	0	0	0
	DC framework for students	*"I'm already in the third year, I consider this the third... I continue to use the referential as a great reference for technology and for applying it to my ICT..."*	1	0	0	0	0	1	0	0	0	1	0

Source: Elaborated by the authors.

About the first category, 3 subcategories were identified related to the importance of the activities developed within the scope of this project (or similar), which are closely related to teachers' professional development: "Confidence in digital", "Recognising the value of digital" and "Pedagogical innovation". The perceived importance of the activities carried out within the framework of the project (or similar) in promoting and reinforcing a gain in confidence in relation to the pedagogical use of digital technologies stands out, with references in 8 of the 11 school clusters, and even represents a departure from the comfort zone for some teachers who previously felt less comfortable exploring technologies in their classes.

Regarding the second category, it was noted that among the activities most highlighted by the teachers surveyed (4 out of 11 school clusters), the Teacher Meetings, organised annually by the project, stands out as a relevant opportunity for teachers to share good practices in relation to digital. With the same number of mentions (in 3 of the 11 school clusters), we highlight the direct support provided by the project team in the classroom and the dynamic of building a Digital Competence (DC) Framework for students, which was developed in collaboration between the project team and a group of 1st grade teachers.

3.2 Impact of the project on learning and school dynamics

As far as the "Impact of the project on learning and school dynamics" is concerned, three categories stand out, which together enable a holistic understanding of the effects of the project's initiatives on the intervention context itself: i) "Impact on learning", which brings together references that allude to the effects perceived by teachers on the learning of 1st CBE students who took part in the project; ii) "Motivation and school success", which focuses on the effects perceived by teachers on student motivation and academic results; and iii) "Other aspects of school dynamics", which brings together additional elements mentioned by teachers and allows us to gain a broader understanding of the effects on pedagogical and organisational dynamics.

Table 2. Perceptions of the impact on learning and school dynamics.

Categories	Subcategories	Examples of references	School clusters										
			A	B	C	D	E	F	G	H	I	J	K
Impact on learning	Development of 'essential learning'	*"(...) I've been with them since the first year. (...) Maths, the level of reasoning and logic…. Through games and spatial orientation, I think so. (…). In Portuguese, at least a few words more in writing"*	0	1	1	1	0	1	1	1	0	1	1
	Improvements in digital area	*"(...) [it] encouraged the implementation of digital practices in the classroom, deepening students' digital competences, with a view to the Profile of Students Leaving Compulsory Schooling"*	1	1	0	1	1	1	1	1	0	1	1
	Improvements in other areas of learning	*"They became more motivated, autonomous and initiative-minded students, because many of the learning strategies used digital technologies. (...)."*	1	0	1	1	1	0	1	1	0	1	0
	Articulation of areas of knowledge	*" (...) Of course, the development of competences and learning in different areas. For example, we did a project on endangered animals. It was an interdisciplinary project in which we worked on environmental studies, citizenship, maths, Portuguese and digital communication techniques."*	0	0	1	0	0	0	1	0	0	0	0
Motivation and school success	Motivation for learning	*"I had a case, for example, of another kid who was unmotivated at school, but from the moment he started giving presentations, it was a spectacle. In other words, from the moment I told him more or less what it was like, he started doing everything himself. He would do the research and then make the passages, make the animations, without telling him anything. So the kid discovered it in a way that, perhaps, if it had only been in books, it wouldn't have happened, because he wouldn't have had that motivation"*	0	1	1	1	0	1	1	0	0	1	1
	School success	*"This positive impact is evident in the very good grades the students have obtained in 5th grade and in the very positive feedback received from the 2nd cycle teachers regarding the class."*	0	0	1	0	0	0	0	1	0	1	1
Other aspects of school dynamics	Collaboration between teachers	*"This project and the training courses we've all been on, I think that, in terms of the school and among colleagues, there's actually been a lot of sharing of experiences, of knowledge without it being, it doesn't need to be formal moments, coffee time, outside: (...) "look, in the project they've mentioned that there's a Google Forms workshop now"*	1	1	0	1	0	1	1	1	0	1	1
	New pedagogical approaches	*"(...) with this type of project, we're able to provide a wide range of application activities that are much more pedagogical, they can also be fun, obviously, but much more pedagogical, and that transpose the reality that they know, I think that's what's important.*	1	1	0	0	0	1	1	0	0	0	1
	Creation of specific spaces for ICT (curricular autonomy)	*"[This led to something being done], including in the curriculum, in which our complementary offer in the 3rd and 4th year now has an ICT workshop with its own teacher, using cases and digital resources."*	0	1	0	0	0	0	0	1	0	0	1
	School-Family Interaction	*"(...) I also favoured contact via e-mail. The booklet is just to reinforce it, because they tear up the booklet and the digital one stays there, don't they? It's a way for parents to go to the post office. When there's a fun activity, I publicise it to the parents, so that they get interested and motivated."*	1	0	1	1	0	1	1	1	0	1	1

	Resources and facilities	*"(...) our group tried to operationalise it with another plan, with PADDE at the same time, [it] tried to equip the schools. In addition to the tablets, which initially came in digital briefcases, a few computers were placed in each primary school. They're not enough, yes, but this has led to something being done (...)*	1	1	0	0	0	0	0	1	0	1	1
	Valuing the work of schools	*"The activities organised helped to consolidate existing knowledge and practices, adding value to the work already carried out in the context of the digital transition..."*	0	0	0	0	0	0	0	0	0	0	1

Source: Elaborated by the authors.

The "Impact on learning" category comprises 4 subcategories, which represent the effects of the project on students' learning as perceived by the respondents: "Development of essential learning", "Improvements in digital area", "Improvements in other areas of learning and development" and "Articulation of areas of knowledge". It should be noted that the subcategory "Improvements in digital area" was the most mentioned (9 out of 11 school clusters), indicating possible impacts of the actions developed under the Escol@s Digitais Project on the pedagogical use of technologies and on students' digital competences.

In relation to the second category ("Motivation and school success"), there was a significant response from the teachers surveyed (7 out of 11 school clusters) in relation to the "Motivation for learning" stimulated by the actions developed as part of the project. Based on the teachers' words, it is possible to conclude that the use of technology has proved to be an asset for students who have difficulties learning in a more traditional way and who are unmotivated to carry out the activities proposed by their teachers.

The third category ("Other aspects of school dynamics") brings together a set of 6 subcategories that represent the Project's contributions in other areas of school dynamics, namely: "Collaboration between teachers", "New pedagogical approaches", "Creation of specific spaces for ICT (curricular autonomy)", "School-family interaction", "Resources and facilities" and "Valuing the work of schools". It's important to note that among these impacts of the Project on school dynamics, there is a significant perception (8 out of 11 school clusters) of the Project's effects on "Collaboration between teachers", with respondents highlighting the favourable environment for sharing practices and learning together provided by the Project. With quantitatively identical references, there is the category "School-Family Interaction", which brings together mentions of the effects on communication between the school and the family resulting from the dynamics established within the scope of the Project, such as sharing work and activities with parents or guardians via e-mail.

3.3 Motivations, challenges and recommendations

In this part, we present the results relating to the third thematic axis, entitled "Motivations, challenges and recommendations" it comprises three categories: i) "Motivations for integrating digital technologies into the classroom"; ii) "Challenges to the curricular integration of digital technologies"; and iii) "Recommendations for future digital education projects".

Table 3. Motivations, challenges and recommendations for future projects.

Categories	***Subcategories***	***Examples of references***	***School clusters***										
			A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***K***
Motivations	Pedagogical reasons	*"(...) Then it's about wanting to know, isn't it? I think teachers are never satisfied, they're never at ease, they're never satisfied with their knowledge and they always want more and more. Teaching better, in essence, is about being better teachers and also learning. I need information, because I can't stay at the tail end. We have to keep up, there are always new and interesting things and then we like them, don't we? I think we enjoy what we do."*	1	0	1	1	1	1	1	1	1	1	1

	Opportunity created by the Covid-19 pandemic	*"(...) then came the pandemic, computers, so there was no reason not to do something with this material. Before it was more complicated, because we didn't have computer rooms, if we'd had a computer room, I would have gone there with the kids to do something."*	1	0	1	0	1	1	0	0	0	0	0
	Support from school management	*"For now, we're in a school where our headteacher enjoys challenges and projects, so it's a first. (...) When we have someone in charge, a school leader, who likes challenges from the outset and (...) because we know we're going to have his support for these big challenges. This showed itself in 2016, when our school group entered the project for the first time and the three primary schools won the competition."*	0	1	0	0	0	0	0	0	0	0	0
	Specific training	*"I'm speaking for myself now, because I wanted to do a lot and I still didn't have the mastery I thought I should have. In the meantime, the four of us also went to the psychology faculty to train with a professor. (...) We went and it helped us a lot. And it worked out very well. (...) The big click was this project, wasn't it? This project launched us into the digital world (...) "*	1	1	1	1	0	1	1	1	0	0	0
	Commitment to students' integral education	*"Firstly, today's world demands digital skills from students so that they can thrive in contemporary society. By including digital in teaching, I'm preparing my students to face the challenges of the future and empowering them to be proficient in relevant technological tools."*	1	0	1	0	0	0	1	0	0	1	1
Challenges	Infrastructures limitations	*"The difficulties have already been reported several times, namely: Computers without an OFFICE licence, which prevents some activities from taking place; Inadequate internet speed, due to the undersized network for daily use and internet access for several computers simultaneously; Weak WiFi signal with constant breaks;"*	1	1	1	1	1	1	0	1	1	0	1
	Resistance and difficulties in adapting	*"There have been some improvements in the teaching staff, but there has been poor adherence to the implementation of some tools. Each teacher manages the digital tools that best suit their reality in the classroom."*	0	0	0	1	0	1	0	0	1	1	1
	Active involvement of school leaders	*"I think the challenge also lies in the fact that this isn't fluid yet, it's all still a bit adhoc. Some go this way, others go that way. (...) I think that School X was very lucky to have... some teachers who set up the room and... overrode the management and set up the room (laughs) and imposed the computers they wanted and not what the management wanted, that's it. (...)"*	0	0	1	1	0	0	0	1	0	0	0
	"Management of curricular and pedagogical time	*"(...) time management in the classroom can be a challenge when integrating technology. To this end, I have been working on creating a detailed plan, setting aside time to explain and exploit digital tools efficiently, ensuring that they complement and enrich the curriculum content. "*	1	1	0	1	0	1	1	0	0	0	1
Recommendations	Continuous encouragement of teacher professional development	*"(...) continuous training is essential. Investing in training for myself and my teaching colleagues is a valuable strategy for overcoming the challenges of integrating technology. (...)."*	0	1	1	1	0	1	0	1	0	0	1
	Investment in infrastructure	*"I'm really looking forward to my students having a laptop, because I really want to start working with them and I want them to have the experience of working with a computer and then, in the second year, the assessment tests are with a computer. So it's important for them to start working with computers in the first year"*	1	1	0	0	1	1	0	1	0	0	1

	Reinforcement of (diversified) support in context	*"More than theory, teachers feel the need for more systematic and practical support, not only technical, but also in direct work with students in the classroom"*	1	1	1	1	1	0	1	1	0	1	1
	Training for Students and Parents	*"On the other hand, we also need to work on the care of materials. Even in families, computers often go missing,* *break and get damaged. Then, whether we like it or not, these are aspects that condition our work, aren't they?"*	0	0	1	0	0	1	1	0	1	0	0
	Intensified meetings with all teachers	*"I think it would be good to hold some Escol@s Digitais Team meetings with all the teachers at the school."*	0	0	0	0	0	0	0	1	0	1	0
	Creating an online platform	*"And maybe, for example, a place to share good practices online too, so that those activities that are done in the project, for example, are available in a certain place for people to consult and use, I think that could be very useful."*	0	0	0	0	0	0	0	1	0	0	0
	Institutionalising municipal meetings	*"I know that the Council's meetings are sometimes difficult to please God and Trojans, I know, but if an annual technology meeting to demonstrate what is being done in the Council were to be suggested in the school calendar, it would be an asset."*	0	1	0	0	0	0	0	0	0	0	0

Source: Elaborated by the authors.

When asked about their motivations for using technology in the classroom (Category 1), the teachers surveyed mentioned different aspects that the content analysis allowed us to organise into 5 subcategories: "Pedagogical reasons", "Opportunity created by the Covid-19 pandemic", "Support from school management", "Specific training" and, finally, "Commitment to students' integral education". The first subcategory "Pedagogical reasons" emerged as the predominant motivation, with the teachers surveyed in 10 out of 11 school clusters indicating the desire to renew their practices and the desire to update their pedagogical practice as reasons for using technology in the classroom. Corroborating this discourse, the subcategory "Specific training" brings together references from teachers in 7 out of 11 school clusters, suggesting that training activities in the digital field and projects dedicated to the pedagogical integration of technologies are motivating factors for using digital in the classroom.

Regarding the second category, which covers the challenges of using technologies, the subcategory "Infrastructure limitations" stood out (mentioned by 9 out of 11 school clusters), indicating that, despite the efforts already made at national and local level, there are still challenges to overcome, such as the lack of equipment and insufficient internet access in schools, in order to carry out activities with technologies in the classroom. Added to this is the difficulty perceived by the teachers surveyed in managing time to use technology with students, as indicated by the references gathered in the subcategory "Management of curricular and pedagogical time", present in the reports of teachers belonging to 6 of the 11 school clusters.

Finally, concerning recommendations for future digital education projects (Category 3), the subcategory "Reinforcement of (diversified) support in context" stands out among the various suggestions made by teachers, with references emphasising the importance of support and monitoring in the classroom context to help teachers implement activities using digital technologies. Also, in line with the results obtained in the previous category, teachers in more than half of the school clusters (6 out of 11 school clusters) emphasise the importance, in future projects, of investing in the technological infrastructure of schools for the success and sustainability of initiatives aimed at digital education.

4 CONCLUSIONS

The results of this study show that the Escol@s Digitais Project has played an important role in supporting the digital transformation underway in Portuguese public schools, in the context of the first years of schooling (1st Cycle of Basic Education). The valorisation of collaborative practices between teachers, the strengthening of confidence in the use of digital technologies and the positive impact reported by teachers on student learning are expressive indicators of the transformative potential of initiatives like this.

However, when comparing the results with the existing literature [7], [8], [9], it become clear that initiatives like this need more consistent support and concrete conditions if they are to become real drivers of change. Thus, the need to guarantee effective access to technologies within the framework of an integrated approach, fostering an educational transformation that is sustainable and equitable, becomes clear. An approach that considers technical factors, but also epistemological and cultural ones, prioritising strategies that combine systematic support for teaching practice with the provision of adequate resources (human and technological).

Future research could expand this study, exploring the application of the Escol@s Digitais model in a variety of contexts and assessing the long-term impact of these initiatives. We also suggest further analysing the role of school leadership and inter-institutional collaboration in strengthening the digital transition in the school context.

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