

Article

From Digitalisation to Digital Transformation: A Qualitative Study of Educational Centre Management

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Abstract

Educational centres face new challenges in adapting to digital transformation. While the majority of scientific studies have focused on the individual perspective, fewer have examined it from an organisational perspective. This research addresses this gap. This paper analyses the digital transformation of secondary educational centres from the organisational psychology field, thus overcoming the traditional approach focused on teachers' individual competencies. This study follows a thematic qualitative methodology based on Co20 semi-structured interviews from secondary educational centres, including questions related to the process and level of digitalisation, the difficulties encountered, and the main practices implemented, among others. The analysis identifies four overarching themes that emerge from the dynamic interplay between the digital culture, perceived resource availability, digitalisation practices and strategies. Considering the interrelations among these themes and the digital transformation pattern, three models are identified: reactive, driven by internal initiative, and integrative, each representing a distinct level of maturity in the integration of digitalisation. Overall, the findings suggest the existence of different patterns of digitalisation across educational centres, identifying a typology of digital maturity profiles based on organisational configurations. This framework provides a pathway for secondary educational centres to undertake critical self-diagnosis, strategically design interventions, and continuously enhance their digitalisation processes.

Keywords: digital transformation; qualitative analysis; teaching staff; models of digital transformation

1. Introduction

The development of technology has widely disrupted every area of our lives, producing significant changes in the way we work and interact across a wide range of contexts, with particular relevance in the labour market. In the educational context, the systematic introduction of the digital transformation process was significantly accelerated by the emergence of COVID-19 and continuous changes and advances in artificial intelligence [1,2]. The pandemic revealed that many educational organisations have a limited digital capacity for response [3]. This highlighted that digital transformation is not only a technological challenge but also an organisational one, requiring changes in leadership,

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management, and decision-making processes within schools to ensure the sustainable development of schools. Indeed, the scientific literature reflects an exponential trend in research concerning the management of digital transformation, highlighting that for this process to be sustainable, a paradigm shift is required where technology is conceptualised as a complex, interconnected environment that prioritises learning experiences over the tools themselves [4]. Previous research has highlighted the importance of technological equipment, teacher training, and the development of digital competence [5]. Beyond modifying the tools and content used in teaching and learning models, digital transformation also entails changes in the management of secondary educational centres, the role of teachers, and the interaction among educators, students, and families. Educational institutions, therefore, face new challenges that require proper adaptation and the ability to take full advantage of the opportunities offered by the digital era.

Different governmental institutions have developed regulatory frameworks and initiatives designed to integrate technological, pedagogical, and disciplinary knowledge. These frameworks have focused primarily on the individual perspective, for instance, by emphasising teachers' digital competences. However, in general, they have not considered the perspective of the school or employed an overall organisational vision. In other words, they have failed to adopt a more comprehensive view of the digital transformation. The scientific literature has also predominantly approached technology from the workers' perspective, such as teachers' attitudes, self-efficacy, individual readiness to accept technology, and competencies they should develop [6–8]. However, fewer studies have examined digitalisation from an organisational-level approach, particularly from the field of organisational psychology. This perspective will allow each educational institution to be able to understand and implement effective improvements in its own digitalisation process.

This paper addresses this gap. Although a growing body of research has examined digital transformation in education from a holistic perspective, much of this work has concentrated on educational policies, institutions' levels of digital readiness, organisational culture, or specific dimensions of leadership, frequently using quantitative designs or high-level conceptual analyses [9–13]. Moreover, much of this research has been developed in contexts other than Spanish. Consequently, there is still limited knowledge about how digital transformation is experienced and managed within schools, particularly regarding the day-to-day organisational processes involved and the evolving role of school leadership over time. By adopting a qualitative approach, this study explores the experiences and actions of school management teams throughout the digital transformation process, paying particular attention to the trajectory of change and the factors that have shaped it within the Spanish educational context. From an organisational perspective, the main objective is to analyse how educational institutions conceptualise the role of digitalisation in the educational context and how they manage the comprehensive digital transformation process. The study seeks to provide practical insights and best practices to guide the successful management of digital transformation, ensuring a high-quality teaching and learning process.

In this paper, we begin by reviewing the literature addressing both the concept and the process of digitalisation and the management of digital transformation. The subsequent methodology section outlines the sample, procedure, and data analysis approach. The results are then presented and supported by explanatory tables to enhance clarity and interpretation. Finally, the discussion integrates the main findings, offering conclusions, practical implications, and limitations of the study.

2. The Role of Technology in Digital Transformation in the Educational Context

The terms technological change, digital innovation, and digital transformation are often used interchangeably to describe the digitalisation process in education, which has sometimes led to conceptual ambiguity [14,15]. Related concepts should also be clarified. Digitisation refers to the conversion of analogue information into digital formats, and digital innovation refers to the implementation of new digital practices within educational organisations. Digital transformation refers to a change in organisational processes resulting from digital innovations and the development of new competencies through digital technologies, distinguishing it from digitisation and digitalisation [16,17]. In the present study, digitalisation refers to the adoption of digital technologies to improve existing educational and administrative practices, while digital transformation is viewed as a broader organisational process involving changes in leadership, management, organisational culture, and school practices. From this perspective, digitalisation provides the basis for digital transformation but does not necessarily lead to it. In the context of education, several authors refer to Education 4.0, which responds to the needs of an innovative society that goes beyond formal education, among other aspects, including the use of digital technologies, personalised data, and high-level connectivity [18]. Within this framework, digital transformation acts as a driver for sustainability by facilitating the development of curricula that integrate systems thinking and complex problem-solving, which are essential competencies for students to adapt to the technological demands of modern society [19]. At the organisational level, implementing the principles of Education 4.0 also requires changes in school management, including new leadership practices, strategic planning, and organisational processes that support innovation and the effective integration of digital technologies. More specifically, digital transformation requires adapting educational models to effectively engage students, teachers, school leadership, and families within today's digital environment, while also preparing for future technological innovations [20].

Technocentrism and technological solutionism have been central concepts of the initial stages of digital transformation, but the current dynamics of this process extend far beyond these approaches. A balance between technical, social, and pedagogical dimensions is necessary to achieve an effective digital transformation process in the educational context [21]. In this sense, the use of technology should not determine the methodology or the learning content; instead, it should support them. Thus, methodological strategies and an innovation-oriented learning culture have to be established before choosing the most appropriate digital tools, thus ensuring alignment with the specific objectives and contextual needs [22,23]. This change also has important implications for school management. Digital transformation requires leadership that goes beyond choosing technology; it means driving organisational change, encouraging collaboration, and creating the conditions for sustainable innovation within schools.

Consequently, educational institutions are investing resources in equipping centres technologically, in parallel with the training of teachers in the digital competencies required to effectively integrate technology into the learning process. Additional efforts have focused on providing both teachers and school leaders with the necessary support to build confidence in technology use, and institutional strategies have been promoted to advance digital transformation across the educational context [24–27].

Several theoretical and normative frameworks guide and support digital transformation processes in education. Here, we highlight three illustrative examples. First, at the European level, the Digital Education Action Plan (2021–2027) supports the adaptation of education and training systems in EU Member States to the digital era. Second, the

TPACK framework promotes the intersection of Technological, Pedagogical, and Disciplinary Content Knowledge within the teaching/learning processes [28]. It constitutes an integrated and dynamic conception of teachers' knowledge rather than the sum of different knowledge domains [29]. Similarly, this framework is considered a holistic transformation of teachers' expertise for successfully using technology in the classroom [30]. Finally, the Common Framework for Digital Teaching Competence, produced by the Government of Spain, is undergoing continuous transformation to align with the constantly evolving educational scene.

As described above, the digital transformation in education is focused on teaching and learning processes and primarily centred on teachers' competencies. Although these dimensions are quite important, they are not sufficient to fully address the rapid and ongoing advances in the digital landscape in a sustainable way without the strategic leadership and organisational culture required for systemic transformation. Noteworthy gaps remain related to the capacity to respond to the constant evolution of these innovations.

3. Towards Effective Management of Digital Transformation

Several factors, such as acquiring technological-pedagogical competencies and strong teaching skills and developing an adequate infrastructure, have contributed to the effective implementation of the digital transformation process. This approach, addressed from a micro-level perspective, has overlooked many important aspects of this complex process. The development of educational policies that effectively foster digital competence has not yet reached a sufficient level of maturity to produce meaningful impacts [31,32].

To truly understand digital transformation, we have to look beyond the teachers' competencies or the technological equipment. Although these aspects could represent a first step towards achieving technological maturity and development, digital transformation is a gradual organisational process that requires "substantial resources, strong institutional support, and well-developed policy frameworks" [33] (p. 4). Consequently, its success depends not only on the technology itself, but also on organisational conditions that enable change, particularly organisational culture [34]. This broader perspective calls for the integration of micro, meso, and macro levels of analysis [35].

From this perspective, previous research has identified several organisational dimensions that shape digital transformation in educational centres, including leadership, organisational culture, strategic planning, technological infrastructure, and professional development. Leadership has consistently been identified as the decisive factor, particularly through the development of a shared vision, effective communication, professional development, coordination of change, and promotion of innovation [20,36–38]. Organisational culture is equally important, as the successful transformations are often driven by a fundamental shift in mindset at the individual, leadership, and organisational levels, collaborative practices, openness to change, and continuous learning [34,37,39,40]. Strategy involves the alignment of digital initiatives with institutional goals, long-term planning, and decision-making processes to connect people, experience, leadership, and technology. Strategic deployment of digital tools and a shared vision communicated to stakeholders are central to advancing transformation goals [20,35,36,39]. Other studies emphasise the importance of technological infrastructure, professional development, stakeholder collaboration, workforce empowerment, and teachers' digital competence as complementary conditions for successful transformation [29,36,38,40].

Taken together, these studies show that digital transformation should be understood as a multidimensional organisational process in which leadership, organisational culture, strategy, infrastructure, professional development, and teachers' digital competence are closely interconnected. Understanding how these dimensions interact within schools re-

mains essential for explaining how digital transformation is implemented in practice. However, aligning these dimensions remains a major challenge for educational institutions. Common barriers include resistance to change, limited leadership support, insufficient digital competencies, misalignment between digital initiatives and organisational strategy, and the absence of a shared vision for transformation [17].

To address these challenges, several key aspects must be considered, all of them related to the effectiveness of digital transformation in the educational context. This process depends on teachers' active engagement, supported by participatory cultures and continuous professional development in digital technologies [34,41]. The role of school leaders is equally essential, given that their capacity to embrace risk-taking, referring to the willingness to introduce and support innovative initiatives under conditions of uncertainty, creativity, and collaboration, enables the development of shared visions for future-ready education [42]. This leadership role is critical, as empirical evidence suggests that the probability of success and the maintenance of digital formats increase significantly when there is a perception of robust institutional and professorial support [43].

Digital transformation is a complex process that requires different changes [38]. Moreover, the present models often fail to consider the cultural, pedagogical, and structural complexities of the education sector, specifically in higher education [33]. This situation calls for the realignment of educational models through digital technologies to strengthen stakeholder engagement and enhance institutional effectiveness [20].

Although the literature recognises that digital transformation should be approached from an integrative and holistic perspective, there are important gaps in our understanding of this broader process. Most of the previous studies on this topic have focused on specific dimensions, particularly the level of teachers' competency development or student training. Moreover, a large percentage of studies have been conducted in the higher education context, and many others have been limited to a single organisation [33,44,45].

For this reason, in this paper, we focus on the organisational perspective rather than the individual point of view to analyse how educational institutions interpret digitalisation, how they have navigated the digital transition so far, and how they envisage this future, by examining the short- and medium-term consequences that have emerged from the significant technological changes. Understanding the challenges that lie ahead is crucial for anticipating future needs and identifying the necessary conditions for sustainable progress. Accordingly, the general objective of this research is to explore how secondary schools have experienced digitalisation and digital transformation from an organisational perspective. The study is guided by the following research questions:

RQ1. How do secondary school management teams understand digital transformation in their centres, and what challenges do they perceive need to be addressed?

RQ2. Which organisational factors influence digital transformation in secondary schools?

RQ3. How do these organisational factors interact throughout the digital transformation process?

4. Materials and Methods

4.1. Sample and Procedure

This study uses a qualitative approach to investigate how secondary educational centres manage the digital transformation. Centres were recruited purposively using a convenience and snowball sampling technique, facilitated by the Municipal Department of Education of cities in three Spanish autonomous communities of eastern Spain: Catalonia, the Valencian Community, and the Balearic Islands. This sampling strategy may contribute to the transferability of the findings in similar contexts.

Specifically, a total of 20 interviews were conducted with headteachers of secondary educational centres. In two cases, the headteacher was accompanied by the ICT (Information and Communication Technology) coordinator, who provided information on technology-related issues because the headteacher had only recently taken up the position. All of these centres offered secondary-level studies and had a medium–large size based on the number of teaching units per grade (specifically, the medium-sized centres had one or two classes, while the larger ones had more than two). All centres were located in urban areas, with half being either fully public or state-subsidised, so they operate in a similar way.

The data collection took place during the 2022 to 2023 academic year, ensuring that all schools were in the same post-COVID-19 period. Interview transcription and subsequent data analysis were undertaken between September 2023 and March 2024. A semi-structured interview guide was created that included the main aspects related to digital transformation in the educational context. It included questions related to the digitalisation process at the centre level (e.g., characteristics of the centres and informants), as well as factors related to the development of this process (e.g., reasons and motivations for digitalisation), the level of progress (e.g., use and spread of technology), the difficulties encountered (e.g., pandemic effects, underuse, and overlooked technology), and the identification of main practices, among others.

Data on the digital transformation process were collected from each educational centre following a protocol of research steps: (1) initial meeting with several municipalities in the area to identify and recruit educational centres; (2) telephone contact with each centre to arrange a meeting; (3) development of a script for these semi-structured interviews in advance, supported by the previous literature review and three pilot interviews. Next, the script was adjusted, and the final version was prepared, along with a socio-demographic data sheet and an informed consent form; and (4) a synchronous online interview via videoconference between two researchers and the person in charge at the educational centre; this interview lasted approximately one hour and was recorded, after obtaining permission.

4.2. Data Analysis

The information obtained during the interviews was transcribed verbatim and subsequently analysed by three researchers using a qualitative method to understand the digital transformation process followed in each centre. Specifically, data were analysed through thematic analysis, a method widely used in psychology [46].

In this research, we aim to conduct a qualitative analysis that is not based on the frequency of behaviours, but rather on seeking codes that reveal the essential elements of the digital transformation process. In our work, we had only one informant per centre. Rather than being interested in the frequency of the data, we were interested in carrying out an interpretative analysis that is closer to the content and the cases studied. We sought a more open and exploratory analysis that would enhance our understanding and provide models for digital transformation within the educational context. We followed a systematic procedure for coding the information by using text editing applications (Microsoft Word and Microsoft Excel) to record and document emerging codes, in order to have more direct and personalised control of the analytic process. Data analysis followed the phases proposed by [46]. As Braun and Clarke point out, one of the strengths of thematic analysis is its methodological flexibility. Accordingly, the present study adopted a hybrid approach, combining deductive coding (guided by the broad topics addressed in the semi-structured interview protocol) and inductive coding (allowing codes and themes to emerge from the data). The analytical process therefore unfolded step by step, following the method's guidelines. First, once the interviews were transcribed for a comprehensive

analysis of the information, three researchers familiarised themselves with the data. They read and reread the contextualised information and took initial notes on the key aspects of the research. These descriptions were progressively grouped into initial and primary codes (phases 1 and 2 of the thematic analysis), which subsequently gave rise to the most significant common categories or themes. In this way, the researchers drew up some preliminary coding notes, which were subsequently refined to produce broader codes and themes, as well as their interrelationships (phases 3 and 4). During the early stages of the thematic analysis, disagreements mainly concerned the level of abstraction and code naming. These were resolved through regular discussions, during which researchers justified their coding decisions by referring to the original text extracts. Codes representing the same phenomenon were merged, whereas those capturing distinct aspects were retained as separate codes. Finally, higher-level categories or overarching themes with more conceptual content and a more holistic nature were defined after refining the specific aspects of each topic (phase 5). Thus, the final report was produced (phase 6).

To ensure the proper coding of the information, three researchers met weekly until 30% of the conducted interviews had been analysed. That is, six randomly selected interviews were analysed (read and reread) by the three researchers. A few differences in coding were found that the judges, after discussion, were able to reconcile as noted above. Once agreement on the substantive codes and themes had been reached, the remaining fourteen interviews were divided among the judges for individual coding. The three researchers held regular meetings to check, refine codes and themes, and resolve questions.

In this article, quotes by participants are followed by a parenthesis containing the identified number of the centre (1 to 20), and any data or characteristics that could potentially identify them have been removed.

5. Results

5.1. Overview of Results

The qualitative analysis led to various results that were subsequently revised and gathered into three different levels: codes, themes, and overarching themes proposed by [46]. The application of this method resulted in 29 codes, organised into 13 themes that were subsequently grouped into four overarching themes. The resulting hierarchical structure of codes, themes and overarching themes is synthesised across the thematic tables embedded in this section, which function as an integrated coding tree.

From a deeper organisational level to a more external one, four interconnected main themes are interrelated through reciprocal influences. These overarching themes are introduced in an interpretative order, reflecting a narrative decision by the authors to move from the educational centre's internal culture to broader external strategies to provide greater coherence in the digital transformation process. Themes resulted from the conceptual aggregation of discrete codes to capture institutional interrelations as active components of a broader system. Thus, final models represent configurations where institutional perceptions underpin specific practice and strategy patterns.

The findings are grounded in the identification of recurring patterns across participants' accounts. Consequently, the identified configurations represent dense and recurring institutional patterns within the sample. Table 1 provides an overview of the themes clustered into the four overarching themes. Each overarching theme is described in detail in the following sections and illustrated with representative quotes from the participants.

Table 1. Summary of themes.

Overarching Themes	Themes
Digital culture	Beliefs about change
	Beliefs and vision about teaching digitalisation
Perception of resource availability	Personal characteristics of the teaching staff
	Tangible characteristics of the centre
	Intangible characteristics of the centre
	External context
Digitalisation practices	Proactive practices
	Relational practices
	Normative practices
	Reactive practices
Digitalisation strategies	Digital transformation
	Digital innovation
	Digital management

5.2. Digital Culture

This first overarching theme encompasses aspects related to deliberate intentions and beliefs at the centre to establish the internal reference for the educational centre's digital maturity. Two themes are included: beliefs about change and beliefs and vision (conceptualisation) about digitalisation. Their codes can be found in Table 2.

Table 2. Summary of themes and codes included in Digital culture.

Themes	Codes
Beliefs about change	Resistance to change
	Openness to change
Beliefs and vision about digitalisation	Continuous vs. disruptive innovation
	Shared stakeholder vision
	Digitalisation as a means vs. an end

On the one hand, the digital culture addresses beliefs about the nature of change and its integration into the organisational culture. Mainly, this theme considers values and underlying assumptions about the role of technology from two different perspectives. First, as a complementary and imposed element for the development of the teaching function (technological distance), some teachers may show technological indifference or technological fatigue.

[...] it was not a rejection in itself... but, simply, a little indifference; that is, they thought it was okay that it was there (referring to the technological resource), but they were sure they were not going to use it. (C11)

[...] What is observed is fatigue; people think, another change, and now for what? (C5)

Second, those who report the existing values in the centre consider technological resources an opportunity to advance and improve the educational project.

[...] We seek to maintain the spirit of change and continuous learning and flexibility in our ways of doing things at school. (C4)

[...] In our centres, we use the expression “creative loyalty,” which means staying faithful to our educational project, but being creative and taking advantage of the new opportunities the context gives us, and digital has an important role here. (C3)

On the other hand, the digital culture involves beliefs, values, and a shared vision about how the digital transformation process in the educational sector should unfold.

Viewing the process as a way to change the organisation, some people link it to a kaizen culture of continuous incremental improvement, considering innovation either a disruptive or a continuous phenomenon (e.g., technology used especially in times of crisis, such as during the pandemic, vs. technology embedded in the institution's DNA).

[...] It is a step that has been taken progressively, in which, increasingly, first, in terms of registration and management of documentation, everything is digitised. And then with the students, it is also a process, although they are already natives in the digital world, but from school we have to help them make good use of these digital tools... Digitalisation would be the usual use of computer tools by the entire educational community. (C13)

Additionally, this culture addresses assumptions about how strongly the digitalisation process is supported by the managers and shared by other main stakeholders. This code refers to the extent to which managers are committed to and lead digitalisation.

[...] there may be a teacher who has a little more difficulty; I think they are all very clear; they are very clear that the school wants to innovate and improve, and so the way you can innovate the most is digitally. (C14)

In summary, the perspective used to approach digitalisation involves the way it is viewed and what the role of teachers should be. Understanding digitalisation as a means or an end refers to the way digitalisation is integrated into the formal organisational culture of the school. Whereas some centres that consider digitalisation an end in itself and focus on increasing the spread of technological devices, other centres view digitalisation only as a means in the process of improving educational results.

[...] Digitalisation has to offer opportunities to learn at different rates and with different tasks. It is not so much an academic structure, but rather it must be integrated within the subjects themselves and promote personalization and inclusion (for all students), autonomy, and individualization of learning. (C3)

[...] A use of technological and knowledge tools, for all the school's uses, ... and for us it is a work tool, not a knowledge objective in itself, but an application... it's that students learn to use all the tools for their daily use in reality. (C7)

5.3. Perception of Resource Availability for Digitalisation

The second overarching theme has to do with the perceived availability of several types of resources for digitalisation. Rather than the resources themselves, the perception of their availability or insufficiency is what exerts an enabling or limiting effect. Obviously, having up-to-date equipment facilitates digital teaching. However, it is the use and exploitation of this equipment that allows centres to fully benefit from it and achieve meaningful educational results. Linked to the previous overarching theme, depending on the institutional culture, the same objective resource level can be perceived differently across centres.

This overarching theme comprises four themes: personal characteristics of the teaching staff, tangible characteristics of the centre, intangible characteristics of the centre, and the external context. The codes for each are shown in Table 3.

First, the interviewees mention different personal characteristics of the teaching staff. They include aspects related to the demographic profile, such as age, seniority, or academic background, attitudes towards digitalisation and change, or teachers' digital competences. This theme emphasises the importance of the readiness and willingness of staff members to adopt digitalisation.

Table 3. Summary of themes and codes included in Perception of resource availability.

Themes	Codes
Personal characteristics of the teaching staff	Demographic variables
	Attitude towards digitalisation/change
	Digital skills
Tangible characteristics of the centre	Educational level
	Infrastructure, technical and human resources (ICT personnel) (hard/soft)
	Economic resources
Intangible characteristics of the centre	Work organisation
	Management and faculty support
External Context	Socioeconomic level of families

For instance, it includes aspects related to age and gender,

[...] There is no difference between men and women either. (C15)

[...] Age has an influence at the beginning; when it takes hold, it functions much better... But despite age, the person's willingness also has an influence... their attitudes. (C13)

academic background (apparently, humanistic profiles have greater difficulties with digitalisation),

[...] in general, all (teachers) are from more humanistic branches ... maybe it makes the use of new technologies a little more difficult for them, and they do not use them. (C13)

or attitudes of teachers beyond these specific defined profile features.

[...] In the process of selecting teachers, the important thing would not be basic training, but rather to "detect the attitude, the ability to assimilate change, teamwork, donation..." (C3)

The second theme refers to the tangible characteristics of the centre, which constitute the material and human baseline—encompassing infrastructure, technical and human resources (e.g., ICT personnel), economic resources, and educational levels—that must be balanced to meet the centre's specific digital demands. In this theme, the key lies in the perceived balance between tangible resources and demands. Informants sometimes discuss not only the availability of devices, but also their underuse.

There seems to be agreement that the critical level of education, in terms of digitalisation, is secondary education, and it is different from other stages.

[...] In secondary and baccalaureate, teachers were more prepared or more open to entering this change (compared to other educational levels). (C13)

However, when faced with economic or infrastructure limitations, the centres' responses vary. Whereas some centres are highly dependent on infrastructure to carry out their digital transformation,

[...] In the end, if there is no money, whatever you do, it has to be paid for. Therefore, the big problem is economic. Maybe it doesn't happen in other places, but for me at least, my big problem is the economic issue. (C19)

others integrate and optimise these tools.

[...] When students start to have their own devices, we start to dismantle computer classrooms... And they don't make much sense anymore (C3)

Intangible organisational characteristics form the third theme. Codes such as work organisation and support structures highlight how institutional management practices can mediate resource availability. Specifically, these intangible factors function as organi-

sational management systems that operationalise material assets; thus, their efficient performance ensures that identical resources are perceived as sufficient facilitators rather than barriers.

[...] The backbone of all of this always comes from the management team because, logically, the entire faculty works together as much as possible, with similar or equal criteria and in one direction ... (C18)

[...] The strategy has simply been, on the part of management, which has always done this, to encourage us to use digital media ... (C10)

Moreover, an inefficient organisation can generate overloads that deter teachers from investing time in digital learning. Conversely, faculty support fosters a culture conducive to experimentation, peer learning, and sustained digital innovation.

[...] Then there is a part of management that produces some boredom in the teaching staff, that is ... the bureaucratization of all processes or ... or having to keep control or records of everything, prepare reports, do paperwork for every little thing, and bureaucracy (e.g., guidelines from the Ministry of Education). This is something that leads to ... fatigue. I don't know, we have also been aware of that and trying to elude or ... or to avoid the teachers or, rather, certain procedures if we did not see very clearly what they were for". (C3)

[...] something new always involves more work, and, therefore, people have to go through this process of acceptance... When you're used to a program... but they change it, then there was a lot of dissatisfaction, but it is a new change that we have to learn, so we have to reposition ourselves, right? And it generates more work in the sense that you have to be familiar with the tool and the processes are slower. (C5)

Finally, the external context emerges as a fourth theme influencing both access to and use of digital resources at home. Families' socioeconomic disparities may heighten the digital divide, thus affecting equal opportunities for digital learning within the centre's community.

[...] The families were used to their children going with the book; they knew which page they were on, what they were going to do in class... they lost control of their child's learning. (C7)

5.4. Digitalisation Practices

This overarching theme encompasses different practices or actions implemented in centres to advance the digitalisation process. A wide variety of practices were identified. Considering their nature (more or less formal and structured) and their priority (focused on means or ends), four types of practices were distinguished. Table 4 provides a detailed list of the themes and codes included.

Table 4. Summary of themes and codes included in digitalisation practices.

Themes	Codes
Reactive practices	Self-training
	Trial and error
Normative practices	Planned external training
	Technical support staff
	Formalised follow-up
Relational practices	Informal support (individual or group)
	Formal support (individual or group)
Proactive practices	Strategic coping with emerging needs
	Integration of technology in education

The first theme is reactive practices to address specific problems. Normally, these are isolated activities that occur occasionally at the individual level, such as self-training or searching for solutions to issues that have already happened. These activities tend to be unstructured and result-oriented, and they are sometimes based on trial-and-error learning, which is indicative of a low digital maturity where technological adoption lacks systemic institutional alignment.

[...] People have trained on their own. (C10)

[...] Look, I've used this specific tool, and I use blogs in this way, and I did this and that, and we've shared that in terms of methodological issues... It has been at an individual level, above all, focusing on each one's needs and interests. (C20)

The second theme consists of normative practices that are formally established by the centre. They include activities such as planned external training,

[...] In terms of training, we emphasise it a lot. Analysis of needs of "gaps in teachers' competences" due to many factors, such as age and subject matter, a core team is created to provide one-to-one support. (C2)

support for teachers from the internal ICT team,

[...] There is an ICT team. This team is made up of three or four teachers who are in charge of all ICT-related matters. At the same time, let's also say that they report to the management team. The management team assesses, studies, and entrusts them, but regarding the issue of what training and knowledge consist of. (C18)

and regular meetings for advancement.

[...] We hold regular meetings to work on specific issues within our schools. And from these meetings emerges the process of a shift in the educational paradigm, from the teacher who transmits knowledge through a book to incorporating new tools, which in this case was the computer in the classroom. (C1)

Basically, training leads to digitalisation. Normally, these practices are structured, influenced by the economic means of the centre and decided by the managers.

The third theme is composed of relational practices. These activities are based on support among teachers and the creation of synergies. These practices are usually more informal than the normative activities. For example, WhatsApp or Telegram groups can be established to share tips and advice, but these practices also include more formal activities such as ICT awards, digital mentorship, cloisters of good practices, or meetings with colleagues from other centres. The following quote exemplifies this kind of practice.

[...] Teachers who in the teachers' room helped each other or asked the management team for help, and I think that was the most relevant factor in making this work... [...] specific working groups have been created to deal with different aspects of digitalisation... There isn't a single member leading all the sessions that are held; instead, in that working group, each one shares what they know. (C11)

[...] We created a method where an expert teacher was the tutor of the most inexperienced teacher and supported them along the way. When we did this, the teachers gained a lot of confidence, and this helped us a lot in the process. (C13)

Finally, the fourth group refers to proactive practices to deal with emerging needs, such as developing policies for the management of e-mails and WhatsApp messages or strategies to improve occupational health,

[...] the management team does not send emails on the weekend; we all schedule them to be sent at 8:00 in the morning on Monday ... So, the scheduling of the email has helped us a lot as well, and it seems that, little by little, the colleagues are also doing the same thing among themselves, as they try to avoid (overloading) as much as possible. (C5)

integrating technology in education through ad hoc training, allowing more time to learn about the digital tools,

[...] Basically, on the one hand, external training that has come to the school to teach it... Another is the specific training that the ICT team provides to teachers explicitly... At the end, they are asked what training needs they have, and depending on the requests, some years it happens and others it doesn't. It depends on the needs. (C13)

[...] Before starting with the students, it was important to train the teachers and provide them with enough tools so that the change would be effective and could become a reality. And we understood that this meant ... a long-term project, which was not going to be achieved from one year to the next, but had to be insisted on with training. (C3)

and introducing a person with digital skills at each educational level. In other words, some activities are based on deliberate and anticipatory strategies, but also on emerging strategies. As in the case of normative practices, both are decided on by the centre and tend to be formal and structured, but unlike normative practices, they tend to focus on solving specific problems.

5.5. Digitalisation Strategies

From the themes of concrete activities and practices, a new overarching theme emerges that has to do with the vision of the organisation, specifically related to the purpose of digitalisation at the centre, and it is labelled strategies. According to the level of impact on the educational model, three types of strategies are grouped into three complementary themes. Each theme corresponds to a different approach to the use of technology in educational institutions. These categories map the conceptual continuum identified in the literature, where digital operations and innovation align with digitalisation, while digital transformation denotes a deeper systemic change of organisational models and culture [15,17]. Table 5 provides a comprehensive overview of the identified themes and their constituent codes.

Table 5. Summary of themes and codes included in digitalisation strategies.

Themes	Codes
Digital operations management	Procedure management Communications management
Digital innovation	Integration of technology in education Digitalisation of the teaching and learning process
Digital transformation	Teaching and learning process towards UDL New faculty role

On the one hand, digital operations management refers to strategies oriented towards focusing on the operational and administrative optimisation of schools. Digitalisation here aims to improve internal processes and school management services, such as the use of web functionalities for booking uniforms, books, meals, or appointments with tutors. It also includes institutional communication through corporate e-mail, educational platforms, and school websites, or automation of administrative and academic processes, facilitating interaction with families and students.

[...] This year, the option to buy the uniform online through our website has been added. And now we want to make it possible to buy books and food and digitalise all that. (C14)

[...] The goal is that 100% of parents, even if from a mobile phone, can do it; there is no problem, but no one should be without connection. (C20)

However, the following statement underlines that changes do not affect the teacher's role in centres focused only on this operational level.

[...] The methodology has changed, yes, but today the teacher's role remains the same. (C11)

On the other hand, digital innovation involves the integration of technological tools into teaching practice, with added value for teaching and learning. This group of strategies can include the introduction of digital whiteboards, multimedia resources, and digital environments, such as a virtual classroom. Beyond the tools, this theme also includes the improvement of the learning process through the creation of proprietary digital materials and the use of databases, forums, online quizzes, and digital portfolios. Generally, among these strategies, digital devices coexist with traditional textbooks but extend the didactic possibilities.

[...] The introduction of computers in the classroom caused a change that was instrumental at first, but ended up moving and creating synergies of change, and then the institution's commitment to a more significant transformation in terms of educational, administrative, and spatial structures. Not only was what happened inside the classroom changed at a pedagogical level, but also the way administration and spaces were organised. (C4)

[...] In 2017, we started working with a new pedagogical model, using project-based learning and with an environment enriched with technology from the Google ecosystem, with tools adapted to each age and each grade level. (C9)

Finally, the educational services transformation through digital transformation represents the most advanced strategy, where digitalisation is articulated with the pedagogical strategy to redefine education. Focusing on the promotion of the Universal Design for Learning (UDL) for inclusion and attention to diversity, this strategy is oriented towards the personalisation of learning to use technology, with individualised experiences.

[...] We want to implement UDL (Universal Learning Design) to be able to better address the diversity we have in our classrooms, which is a lot. (C13)

Consequently, there is a reconfiguration of the teacher's role from transmitting knowledge to facilitating and designing learning environments. This point is illustrated in the following examples:

[...] The teacher, in theory, should be part of what would be the advisor, the one who supports ... They're no longer the centre of this process, and it is the student who is at the centre of the teaching/learning process. (C1)

[...] Digitalisation has been a tool that has allowed us to discover all the possibilities teachers have as learning companions and not as instructors, which is the change we needed. Teachers are essential, but their role is not to instruct and fill students' minds with information, but to assist students' learning, each one at their own pace... (C7)

[...] The role in our institution has changed radically... we are working on it intensively... For us, the teacher is no longer a source of knowledge... They have to be able to lead each person to discover the particularities and those other aspects that are not as innate to them. (C8)

In summary, technological innovation and pedagogical transformation converge when they are systematically aligned with the school's educational project.

5.6. Synthesis of Digital Transformation Profiles

The interaction between the identified overarching themes converges into three digital transformation profiles. These configurations synthesise the recurring institutional patterns identified across participants' accounts, illustrating the transition from individ-

ual headteachers' perceptions to broader institutional profiles. Table 6 summarises the defining features of each model.

Table 6. Configurations of digital maturity models.

Attribute	Reactive Model	Internal Initiative Model	Integrative Model
Defining features	Passive adoption focused on solving immediate, isolated problems; technology as a functional tool at the service of the educational project.	Proactive but fragmented growth driven by teacher motivation and goodwill; technology complementary to the educational project.	Systemic, transversal transformation with a clear market and external orientation; digitalisation fully integrated into the educational project and institutional management.
Cultural assumptions	Technology perceived as a secondary add-on, not yet aligned with institutional pedagogical objectives.	Innovation viewed as a voluntary and individual commitment to pedagogical improvement, lacking systemic integration.	Shared institutional vision based on collective commitment.
Resource perceptions	High dependency on tangible assets; perceived lack of investment is seen as a barrier.	Emphasis on internal expert support and staff readiness over infrastructure.	Strategic optimisation of available assets and institutional synergy.
Practices	Unstructured, individual self-training through trial and error.	Relational support, ICT awards, and informal peer mentoring initiatives.	Deliberate planning and proactive implementation of emerging strategies.
Strategic purpose	Problem-solving for immediate, isolated needs; technology used as a functional tool to support existing routines, without structural integration.	Classroom-level pedagogical innovation without structural embedding.	Full institutional transformation aligning administrative and pedagogical goals.
Typical Risks	Technical stagnation, teacher fatigue, and misalignment with institutional goals.	Burnout of “enthusiast” teachers and lack of systemic continuity.	High organisational complexity and demands for continuous sustainability.

Each profile in Table 6 is grounded in the empirical data collected from the participating schools. The reactive model describes how technology was adopted to solve isolated problems, and staff relied on unstructured, trial-and-error self-training. The internal-initiative model refers to teacher-driven innovation sustained through informal peer mentoring and relational support, yet not embedded in the educational project. Finally, the integrative model describes a shared strategic vision, an external and market orientation, and the redefinition of the teacher as a learning companion rather than a source of knowledge.

6. Discussion, Practical Implications and Limitations

The present study aimed to examine the digital transformation process from the institutional management perspective. A qualitative analysis allowed us to achieve more in-depth, comprehensive knowledge by asking managers directly and specifically about how educational centres consider the role of digitalisation in their educational projects and how they manage its implementation. The findings of this study suggest that digitalisation in educational centres unfolds as a multifaceted process structured around four interconnected overarching themes: digital culture, perception of resource availability, digitalisation practices, and digitalisation strategies. Whereas the previous results section examined the themes in detail, this section provides a broader analysis that highlights the theoretical and practical implications for the digital transformation process in the educational context.

On the one hand, our results from this thematic analysis respond to a recurrent call in the literature for an integrative and holistic perspective to examine transformation processes of educational centres [20,35,46]. Thus, several insights have been refined from the perspective of change management within educational institutions. First, collective beliefs about change and attitudes towards innovation shape digital culture and the shared pedagogical vision, serving as a foundation for digital transformation. In accordance with previous studies, the results point to the relevance of having a positive attitude towards training in the digital learning process [41]. Second, our study reveals that the perception of resource availability acts as an enabling or constraining factor, highlighting the role of organisational management in optimising resources. Thus, for digital transformation to be successful, technology must be integrated with social and pedagogical facets [21]. In addition, it is necessary to achieve an adequate fit between the objectives and needs of the centre [22,23]. Third, digitalisation practices encompass a wide range of actions implemented in centres, with emphasis on their origin, goal, and scope. The findings suggest that schools with higher levels of digital maturity—consistent with the maturity continuum and the innovation mindsets—are characterised by the integration of proactive and relational activities into their regulatory practices [33,42]. Decidedly, digitalisation strategies provide direction and coherence, spanning from operational digital management to pedagogical innovation and, ultimately, to comprehensive educational transformation.

On the other hand, together the four overarching themes illustrate that school digitalisation is not driven by a single model, but rather it emerges from the dynamic interplay between culture, resource perceptions, practices, and strategies in distinct patterns and models of digital transformation across educational contexts depending on the level of digital maturity of each centre [38]. Thus, as an interrelation among all the previous overarching themes, and considering the digital transformation pattern of the centre and how it is related to the educational project, three models have been identified: *reactive*, *driven by internal initiative*, and *integrative*, with each model representing a distinct level of maturity in the integration of digital technologies. In this regard, sustainable digital transformation requires a holistic perspective in which technology is embedded within pedagogical and organisational processes rather than treated as an isolated tool [4]. This embedding is what Education 4.0 demands: innovation that reaches beyond formal instruction [18]. Our contribution lies in specifying the organisational condition under which that embedding takes hold (the integrative configuration), where digitalisation begins to serve sustainability, supporting curricula built around systems thinking and complex problem-solving to face the growing technological demands [19].

The *reactive model* is more frequently characterised by a low level of digital integration, where digitalisation is merely a tool at the service of the educational project. There is a lack of in-depth reflection on the digital transformation process, and technology is not yet fully aligned with institutional pedagogical objectives. The school's response is mostly passive, adopting technologies without integrating them into its educational project, and oriented towards solving specific problems. The *internally driven or proactive model* is characterised by high teacher motivation and the complementary use of digital technologies to enhance professional development. Although there are internal proactive initiatives, digital resources are not structurally embedded within the overall educational project. In this configuration, digital initiatives are primarily sustained by the attitudes and goodwill of certain stakeholders. In this case, digitalisation is a result of reflection and maturation of experiences (detection of challenges), and technology is complementary to the educational project. In the *integrative model*, digitalisation is fully integrated into both the educational project and the management of the institution. It is effectively market-oriented, responds to external demands, and aims for institutional competitiveness with a generalised scope of digital transformation. All stakeholders share a strategic vision, and technol-

ogy is used transversally to support both pedagogical and administrative processes, consolidating a culture of innovation and continuous improvement.

This study also makes two relevant empirical contributions. First, it identifies a typology of maturity profiles. These configurations reflect distinct levels of pedagogical and organisational integration, providing a useful framework for institutional self-diagnosis and mapping the diverse configurational patterns through which digital maturity manifests across schools. Second, the research supports educational centres' ability to recognise themselves within one of the identified models, thus enabling them to pinpoint specific gaps and strengths. This self-assessment framework provides a pathway for schools to conduct critical self-diagnosis, strategically design interventions, and continuously improve their digitalisation processes in alignment with their current position and developmental needs. For instance, headteachers can operationalise the characteristics detailed in the results tables as a framework for reflecting on their own school's digital transformation. By mapping their current status across the four overarching themes, management teams can identify their specific profile within the reactive, internal initiative, or integrative models. This process facilitates the detection of institutional indicators, converting the study's findings into a practically oriented strategic resource for institutional self-diagnosis. In this sense, the configurations synthesised in Table 6 provide school managers with an actionable guide to identify management priorities and align their digital culture with long-term strategic purposes.

Despite the insights provided by this study, several limitations should be acknowledged that also suggest avenues for future research. First, the findings should be interpreted in relation to educational contexts comparable to those included in this study. Future research should incorporate different types of centres and educational levels to help to determine whether the proposed digital transformation models are transferable across diverse contexts. Second, future studies should consider the perspectives of different stakeholders involved in the digital transformation process for a complete and complementary analysis (i.e., families, students, teachers...) [20]. Finally, it would be advisable to triangulate with other methodologies, such as self-reports, focus groups, and observations, in order to strengthen the validity and depth of these findings.

7. Conclusions

In summary, digital transformation is currently an unavoidable challenge for educational centres. Although more research is necessary, this paper provides three models that will help them to face the process from a holistic perspective. These guidelines and the identified organisational patterns will be especially useful for schools seeking to align their digital culture and practices with higher levels of organisational maturity.

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