Evolution of non-university digital teacher training in Spain: a comparison among different regions.

Evolución de la formación digital docente no universitaria en España: una comparación entre distintas regiones.

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Abstract
In recent decades, Information and Communication Technologies (ICT) have increased in relevance in education due, among other factors, to their potential to transform teaching and learning methodologies, environments, and processes. The provision of digital infrastructure is crucial for the integration of technology, but it is also necessary for teachers to know how to use it in a didactic and pedagogical manner. Generally, teacher digital training has focused more on the knowledge of tools than on their pedagogical use within the classroom. This study analyzes the number and themes of digital training courses offered to teachers by Spanish educational authorities between 1980 and 2022, classifying them into two main areas: (i) knowledge of tools and initiation, and (ii) didactics and curriculum content. Out of a total of 34,069 courses, simple linear regression tests and comparison of slopes were conducted to understand the evolution experienced by each theme and compare them between regions. The results show that the content of these training programs, regardless of the regions compared, has changed over time: while courses on tools and initiation prevail in all time series, there has been a more pronounced rise in those on pedagogy and didactics in recent years.
Key words: teacher training courses, teacher digital competence, Spain, autonomous community, information and communication technologies

Resumen
En las últimas décadas, las Tecnologías de la Información y la Comunicación han aumentado su relevancia en la en la educación, debido, entre otros, a su potencial para transformar las metodologías, escenarios, y procesos de enseñanza y aprendizaje. La dotación de infraestructuras digitales es crucial para la integración de la tecnología, pero no más que la formación del profesorado para utilizarlas. Generalmente, la formación digital del profesorado se ha centrado más en el conocimiento de las herramientas que en su uso pedagógico dentro de las aulas. Este estudio analiza el número y la temática de los cursos de formación digital ofrecidos al profesorado por las administraciones educativas españolas entre los años 1980 y 2022, clasificándolos en dos grandes áreas: (i) conocimiento de las herramientas e iniciación, y (ii) didáctica y contenidos curriculares. Sobre un total de 34,069 cursos, se realizaron test de regresión lineal simple y de comparación de pendientes para conocer la evolución experimentada por cada temática y compararlas entre regiones. Los resultados muestran que el contenido de estos programas formativos, con

independencia de la región, ha cambiado con el tiempo: si bien predominan los cursos de herramienta e iniciación en todas las series temporales, se produce un ascenso más pronunciado en los de pedagogía y didáctica durante los últimos años.
Palabras clave: cursos de formación docente, competencia digital docente, España, comunidades autónomas, tecnologías de la información y comunicación.

1. Introduction

Over the past few decades, Information and Communication Technologies (ICT) have been steadily and relentlessly integrated into classrooms in various countries worldwide (Area et al., 2013; Emejulu & McGregor, 2019; Ministerio de Educación y Formación Profesional, 2019). According to Derlukiewicz & Mempel-Śnieżyk (2019) and Sánchez-Antolín & Paredes (2014), the earliest European documents highlighting the importance of providing technological infrastructure, educating, and empowering members of the educational community can be traced back to the "Europe and the Global Information Society" report (Bangemann, 1994), the "White Paper on Education and Training: Teaching and Learning - Towards the Cognitive Society" (Comisión Europea, 1995), and the European proposal launched in 1999 (Comisión Europea, 2000), although these objectives are still valid in our days (European Commission, 2020; ISTE, 2016; U.S. Department of Education, 2017).

In Spain, the initiation of this digitalization process can be pinpointed to the year 1985 when the Ministerio de Educación y Ciencia initiated the Atenea and Mercurio projects (Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado (INTEF), 2017). Due to its territorial organization (autonomous state divided into 17 autonomous communities, each with full educational competencies transferred by the central government, and 2 autonomous cities, whose educational competencies still depend on the central government), there have been numerous projects aimed at digitalization the school system in this country, which is why we focus on it for this study. For example, there is the Zahara Plan in Andalusia, the Basque Plan for Educational Informatics in the Basque Country, or the Educational Informatics Program in Catalonia (Comisión de las Comunidades Europeas, 1993). Following these initial projects, a series of national and regional plans were devised to introduce technology into classrooms and ultimately promoting methodological innovation and educational progress (Gobierno de Canarias, 2019; Gros et al., 2020, Junta de Extremadura, 2022). Thus, each region had the autonomy to design and execute its own digital education path, considering its unique circumstances and following its own criteria. Although different regions pursued individual approaches, they also adhered to common principles defined by European reference frameworks and strategies advocated by the central government (Comisión de las Comunidades Europeas, 1993, Gobierno de las Islas Baleares, 2022, Junta de Andalucía, 2023).

One of the initial objectives of all these plans was to provide the necessary infrastructure. This concern was not limited to Spain and its regions but was widespread (Feijoo et al., 2021; Jara, 2015; Kozma, 2008, UNESCO, 2005). From the outset, these plans aimed to achieve the 1:1 model, meaning one computer device per student or teacher (Area et al., 2014; Gobierno de la Provincia de Buenos Aires, 2022; Government of Maine, 2023; Hayes & Greaves, 2008; The Abell Foundation, 2008; Rivoir, 2020; Zucker, 2004), in order to bridge the initial digital divide or access gap (Cabero & Ruíz-Palmero, 2018). In fact, many authors argue that ICT can help reduce social inequalities (Aguaded et al., 2015; UNESCO, 2014, 2020; UNESCO et al, 2009) as they remove barriers to accessing

knowledge without being restricted by economic status or location (Barroso & Cabero, 2013; Cabero & Ruiz-Palmero, 2018; UNESCO, 2014, 2020).

Furthermore, ICT can improve the quality of teaching (Castro & Tumibay, 2021; Lei & Zhao, 2008; Lowther et al., 2003) and enable students with disabilities, such as motor, visual, or auditory impairments, or those with specific educational support needs, to access knowledge more easily (Alexopoulou et al., 2019; Budnyk & Kotyk, 2020; Cook & Polgar, 2000; Mendoza-González et al., 2019; Suriá, 2011). Finally, this effort could simply be a response to the recognition that the future employment prospects of students require them to be proficient with technology (Penuel, 2006; UNESCO, 2020; Williamson et al., 2019).

However, it is evident that the mere presence of ICT doesn't guarantee these positive impacts. For this reason, along with the provision of infrastructure, teacher training must be addressed, and not just in its most basic form, as this will enable the full utilization of all the possibilities offered by technology (Liu et al., 2020; Sailer et al., 2021). In fact, it has been demonstrated that ICT can increase academic performance, but only when they are used effectively in teaching processes (Gulek & Demirtas, 2005; Van der Spoel et al., 2020; Zheng et al., 2016; Zucker & Hug, 2008). If this dimension is not addressed, the investment in digital infrastructure can be worthless (Backfisch et al., 2021; Dawson et al., 2008; Rutledge et al., 2007; Scherer et al., 2021).

Among the factors affecting the effective integration of technologies in the classroom are not only the availability of resources, technical support from the institution, or the support from the school management team (Antonietti et al., 2022; Dawson & Rakes, 2003; König et al., 2020; Li & Ma, 2010; O'Dwyer et al., 2004), but also the level of teaching competence and the teachers' vision and willingness to incorporate these tools in the classroom (Adarkwah, 2021; Hermans et al., 2008; König et al., 2020; Lowther et al., 2008; Murphy et al., 2007; Scherer et al., 2021). Furthermore, Sivin-Kachala and Bialo (2000) point out that the most important factor for the effective use of ICT in the classroom is the digital competence of the teachers. Indeed, the differences in digital skills give rise to the second digital divide, or the *usage* divide (Cañón et al., 2016; Castaño, 2008; De Benito-Castanedo, 2017; Soomro et al., 2020; Van Dijk, 2017), both among teachers and students. In this endeavor, the European Community and its member states have progressed hand in hand: in 2014, they published the DigComp framework, which identified the areas and target levels of digital competence of the general population. In turn, DigComp served as a basis for the DigCompOrg framework, a guide that outlines various paths for the effective integration of ICT in educational systems (Kampylis et al., 2015). DigCompOrg was the driving force behind the SELFIE tool - currently active - which allows schools to carry out self-reflection on their starting point (European Commission, 2018).

Finally, in 2017, the European Commission published the European Framework for Digital Competence for Educators (DigCompEdu), (Redecker & Punie, 2017), with the intention of establishing a common framework for the definition of teacher digital competence and raising awareness about the importance of acquiring digital skills to take advantage of the possibilities offered by technologies, as well as serving as a reference for designing other national frameworks for digital competence for educators, such as the Common Digital Competence Framework For Teachers v 1.0 (INTEF, 2017). Currently,

the latest regulatory provisions in Spain address the need to ensure the digital competence of active teaching staff, as a means to guarantee the full integration of students into the digital society according to the Resolution of July 1, 2022, from the Directorate General for Evaluation and Territorial Cooperation of the Ministry of Education of Spain, which publishes the Agreement of the Sectoral Conference on Education regarding the certification, accreditation, and recognition of teaching digital competence. This resolution is based on the DigCompEdu Framework. In addition to this regulatory provision carried out in Spain, neighboring countries such as Finland, Romania, and Austria have also participated in the pilot test for the European Digital Competence Certification, based on DigComp. With this certification, governments, companies, and educators can accredit their level of digital competence (European Commission, 2023).

The national plans mentioned earlier have enabled the incorporation of infrastructure into educational centers and simultaneously the training of teachers responsible for their use. However, as mentioned elsewhere, each region approached teacher capacitation independently, not following a coherent framework. Analyzing the content of these training programs over time is interesting because they are directly related to the level of technological integration in educational centers, which in turn impacts the quality of teaching and learning processes. Different rhythms and priorities in teacher training might impact the integration of ICT into teaching, which might, as a consequence, vary among regions. However, to the best of our knowledge, no study has examined the existence of this heterogeneity across regions, which might be responsible for different digitalization of the classrooms and thus differences in educational outcomes. As a consequence, and to close this gap in the existing literature, the objective of this work is to characterize the digital training courses offered to teachers from different regions of Spain, in order to determine whether they are mainly focused on understanding technological tools, or if over time, in addition to this purpose, they have also aimed to enable teachers to use technology in a didactic and pedagogical manner in the classrooms. Or, in other words, to analyze what volume of teacher training courses in digital matters, offered in the digital plans developed in different territories over time, focus - following the TPACK model proposed by Mishra and Koehler (2006) -, on technological knowledge (TK), or on the combination of technological content knowledge (TCK) and technological pedagogical knowledge (TPK). This will involve gathering information from training plans developed over decades and providing examples of selected cases.

2. Method

Information search.

A bibliographic review of documents related to successive digital education plans in the 17 autonomous communities of Spain and the autonomous cities of Ceuta and Melilla was conducted during the period from 1980/1981 to 2019/2020. This review encompassed general search engines like Google, Official Bulletins of the Autonomous Communities, and websites of the Education departments or councils. To enhance the gathered information, telephone contact was established with the responsible personnel in the educational technology area of each autonomous community's education department or council.

From these documents, information about the content of successive training activities included in each plan was extracted. The courses were categorized, based on their titles, into two major groups: "tools and initiation" and "teaching and content" (see Table 1). Subsequently, the number of courses offered per category and year was counted for each of the studied autonomous communities. Courses with the same title conducted in different educational centers were treated as separate units, considering the administrations' interest in expanding such training throughout their respective territories. Due to the varying quality of available data from each autonomous community, a detailed analysis was exclusively performed on the data from Andalusia, Aragon, the Canary Islands, and the Autonomous Community of Navarre. In total, 34,069 courses were analyzed.

Table 1
Typology of courses included in each category of training activities. Based on the course titles, content or keywords

Tool and initiation (T/I)	**Didactics and content (D/C)**
Office Suite (Word, Power Point, Excel...) and operating systems (Windows, Linux...)	Titles containing the terms "Didactics": "For Educational Use", "Its Educational Application", "Educational Utility".
Management tools for school centers, libraries, and educational platforms like Moodle, Classroom, and those specific to the autonomous community...	"Teaching and Learning Processes" and "Pedagogical"
"Introduction to Computing, the Internet, and Networks."	Development of curriculum content, school newspaper, and press...
Use of tools like Tablets, digital whiteboards, Chromebooks...	Utilization of audiovisual resources in subjects.
Creation and design of the educational center's website and blogs.	Project-Based Learning/Problem Solving, Flipped Classroom, Gamification, Virtual Reality.
Google Workspace Tools (Drive, Gmail, etc.).	Curricular Subjects and ICT (Mathematics, Language, Music, Robotics, and Computational Language...) Subjects applied to special educational needs, socio-emotional education...
"Teacher's notebooks (attendance recording, evaluation...)."	Educational blogs focused on teaching subjects, educational social media platforms, innovation workshops, technological conferences...
Digital resources for the classroom (without specifying the tool).	Courses for advisors and coordinators and most seminars.

Source: Own elaboration

Statistical analyses.

In terms of statistics, the data were analysed using GraphPad Prism versions 7 and 9.5.1 (developed by GraphPad Software in San Diego, California, USA). A linear regression analysis was carried out for each category (T/I and D/C, as shown in Table 1) and for each autonomous community. Afterwards, the regression lines per group and region were compared using slope and intersection tests with the same program.

3. Results

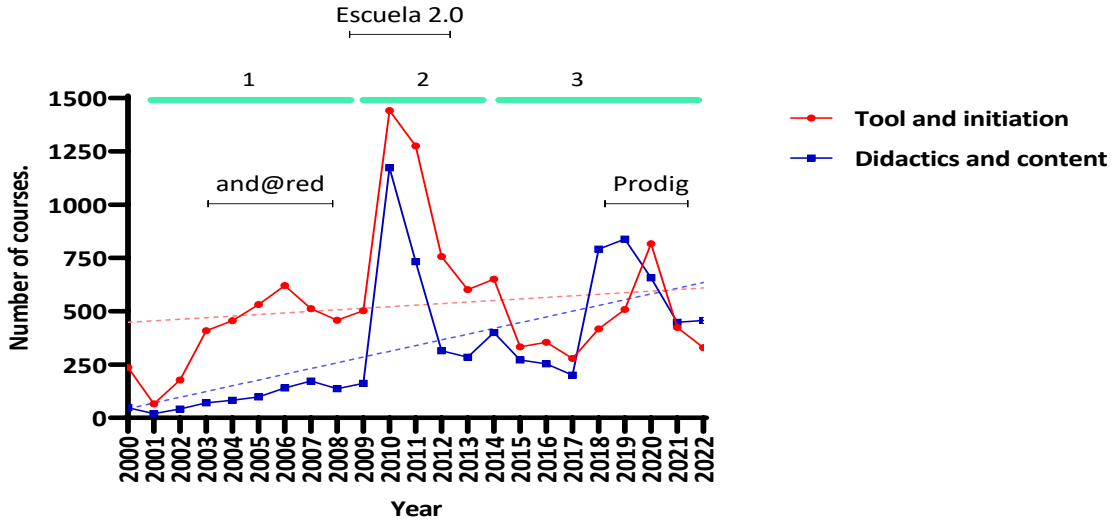
The analysis of digital training programs provided to teachers in various regions under study reveals a variety of courses falling into two main categories: (i) understanding technological tools and becoming familiar with their applications, and (ii) using digital devices and resources as instructional and pedagogical methods.

In broad terms, the examined autonomous communities display two distinct phases: one characterized by a predominance of courses centered on understanding these tools and their fundamental functions (such as office software, internet basics, operating systems, etc.), and another phase marked by a balance or even a greater emphasis on courses related to teaching methods and content (Figure 1, 2 and 3). Examples of these pedagogy/content-focused courses can be found in the "ucticee" project in the Canary Islands, conducted between 2016 and 2020 (Gobierno de Canarias, 2019, 2023): "Integration and Educational Use of Digital Tablets in the Classroom," "Flipped and Collaborative Learning," or "Introduction to Computational Thinking and Robotics in the Classroom." Also, in the Digitalization Program for Schools (PRODIG), developed between 2018 and 2022 by the Junta de Andalucía (2023), one can find courses such as "Robotics, Design, and 3D Printing" and "Augmented Reality, Video Games, Artificial Intelligence, and Robotics". Similarly, within the IkasNova Program in Navarre, currently active since 2017, there are activities such as "Programming with Scratch 3.0" and "Programming Mobile Applications with App Inventor", among others (Gobierno de Navarra, 2023).

In Andalusia (Figure 1), three distinct periods can be identified. The first period (2000-2009) coincided with the Andalucía Plan and was characterized by a clear emphasis on technology-focused courses (T/I) compared to courses on teaching methodology and curriculum content (D/C). This was partly due to the initial phase of providing devices to educational centers. The second period (2009-2013) witnessed a significant increase in courses related to both digital topics. This shift aligned with the introduction of the Escuela 2.0 Plan and the integration of interactive digital whiteboards into classrooms. There were well-differentiated training sections: Module 0 and Module I, focused on basic knowledge and the use of infrastructure. Module II, focused on content. Module III, is dedicated to teaching techniques using these tools. The third period (2014-2022) saw a decrease in the number of courses focused on tools and initiation, with a higher prevalence of courses on teaching methodology and content between 2018 and 2019. This coincided with the Center Digitalization Program (PRODIG), which was based on the DigCompOrg Framework (Junta de Andalucía, 2023).

Figure 1

Evolution of the number of digital training courses offered to teachers in Andalusia (2000-2022)

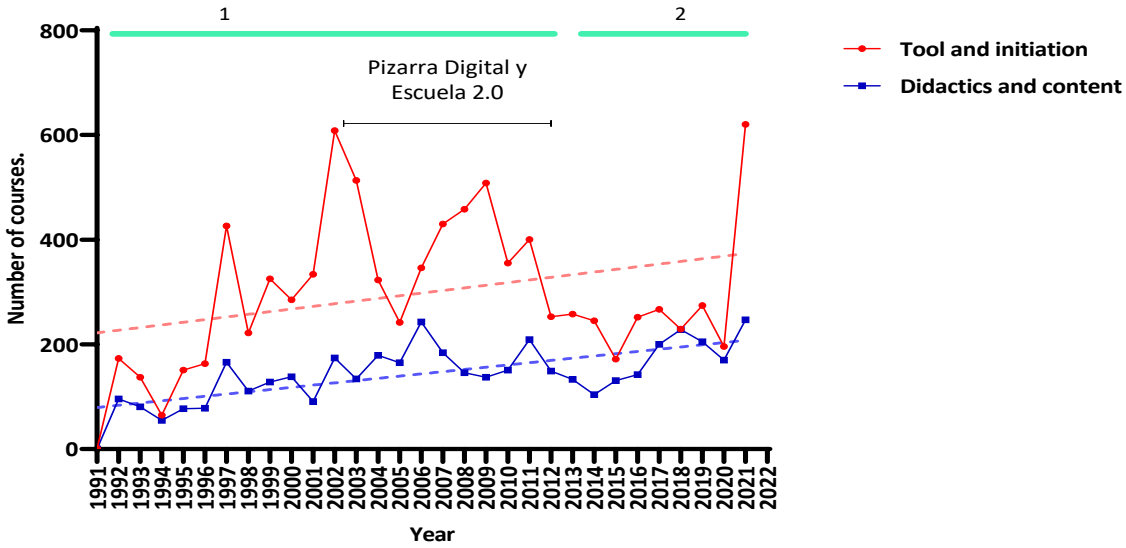


Note. The labels within the graph indicate educational digital projects conducted in these regions and their respective durations. The green lines marked as 1, 2, and 3 define the time periods. The parameters of the regression analyses are presented in Table 2.

In Aragón (Figure 2), a similar pattern was observed. The first period, from 1991 to 2011, was dominated by courses focused on tools and initiation, while the second phase featured a more balanced offering. Between 2001 and 2011, there was a noticeable increase in courses related to technological tools, which coincided with two significant digital projects in the community: the Digital Blackboard Project and the Plan School 2.0 (Lerendegui, n.d). It's important to note that the increase in courses on tools and initiation in 2021 was due to the AEDUCAR training program, aimed at familiarizing educators with the educational platform of the Department of Education in the community. This platform allowed teachers to provide support to students by publishing assessments, notifications for students or their families, and accessing virtual teaching environments.

Figure 2

Evolution of the number of digital training courses offered to teachers in Aragon (1991-2021)

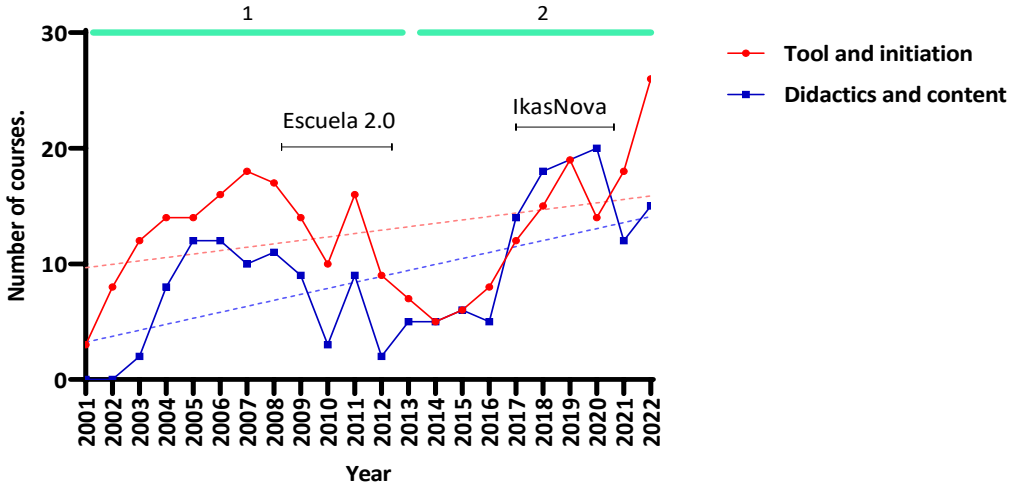


Note. The labels within the graph indicate educational digital projects conducted in these regions and their respective durations. The green lines marked as 1, 2, and 3 define the time periods. The parameters of the regression analyses are presented in Table 2.

In the Chartered Community of Navarre (Figure 3), a comparable division can be established. Until 2013, there were more introductory and tool-focused courses, which coincided with the end of the School 2.0 Plan. However, starting from 2013, there was a shift towards more courses focusing on didactic training and content, particularly in the year 2017, coinciding with the IkasNova Plan. In 2020, there was a temporary increase in introductory and tool-focused courses due to the COVID-19 pandemic. It is evident that courses on tools and initiation were more prevalent than those on didactics and content until 2013, when the Department aimed to shift the emphasis of digital training toward teaching and learning processes. Nevertheless, both categories continued to have similar values, and technology-oriented courses remained consistently present, experiencing a resurgence starting from 2020.

Figure 3

Evolution of the number of digital training courses offered to teachers in Navarre (2001-2022)



Note. The labels within the graph indicate educational digital projects conducted in these regions and their respective durations. The green lines marked as 1, 2, and 3 define the time periods. The parameters of the regression analyses are presented in Table 2. In Navarre, in the year 2020, a didactic and content-based course was offered 136 times and has been excluded from the sample for subsequent statistical analysis.

Table 2

Outcomes of simple regression analyses and the comparison of slopes

	Andalusia		**Aragon**		**Navarre**	
	T/I	**D/C**	**T/I**	**D/C**	**T/I**	**D/C**
F	0,531	11,39	3,166	27,13	2,836	9,957
p	0,474	0,003	0,086	<0,0001	0,108	0,005
R^2	0,025	0,352	0,098	0,483	0,124	0,344
Elevations Intercepts	F = 4.825, p = 0.034		F = 34.59, p = 0.0001		F = 7.497, p = 0.009	

Source: Own elaboration

In summary, the territories represented above all show a common trend. Courses related to technological knowledge (T/I) maintain consistently high values, as indicated by the Elevation Intersections values (Table 2) (Andalusia: F = 4.825, p = 0.034, Aragon: F = 34.59, p = 0.0001, and Navarre: F = 7.497, p = 0.009). However, there is a more pronounced increase in courses related to teaching and content (D/C) over time (Andalusia: R2 = 0.3517, p = 0.003, Aragon: R2 = 0.483, p < 0.0001, and Navarre: R2 = 0.344, p = 0.005), and this increase has been more marked for some regions, with D/C courses in Andalusia balancing with I/T, and ever surpassing them, as in Navarre (Table 2).

Similarly, although no quantitative data is provided, similar patterns are observed in other autonomous communities. For instance, digital training programs in the Canary Islands, such as Project Ábaco in 1984-1987, Project Medusa in 2001-2011, or Project ucticee in 2016-2020 (Gobierno de Canarias, 2023), have also evolved from more instrumental topics (Introduction/tools) towards themes related to didactic and content domains (Table 3).

Table 3

Digital Skills Training Courses Available to Educators in the Canary Islands. The numbers in the boxes represent the quantity of courses offered during the specified timeframe, accompanied by illustrative examples, as outlined in the Gobierno de Canarias (2023)

	Tool/Initiation	**Didactics/Content**
***Abaco 85 Project* (1984 – 1987)**		
Medusa Project (2001 – 2011)	32 -Getting started with OpenOffice. -Virtual classroom platforms (Moodle). -Introduction to computers and the Internet.	27 -Integration of ICT into various subjects in the curriculum
Ucticee Project (2016 – 2020)	17 -Educational Use of Digital Tablets. -Blog as an Educational Resource	56 -Adaptive technology to improve the educational experiences of students requiring specialized support. -Computational thinking and robotics. -3D design, augmented and virtual reality. -Flipped and collaborative learning.

Note. The numbers in the boxes represent the quantity of courses offered during the specified timeframe, accompanied by illustrative examples, as outlined in the Gobierno de Canarias (2023).

This course division aligns with the strategy adopted by other regions, such as the Educantabria Plan (Gobierno de Cantabria, n.d.), which envisioned three training pathways: "Basic/Initiation," designed to introduce ICT skills for technical proficiency and their application in the teaching/learning process. "Intermediate/Deepening," where activities requiring prior knowledge are developed to explore the content of previously conducted activities in greater depth. "Advanced/Innovation," featuring more challenging actions focused on designing curriculum materials and experimenting with them in the classroom.

4. Discussion

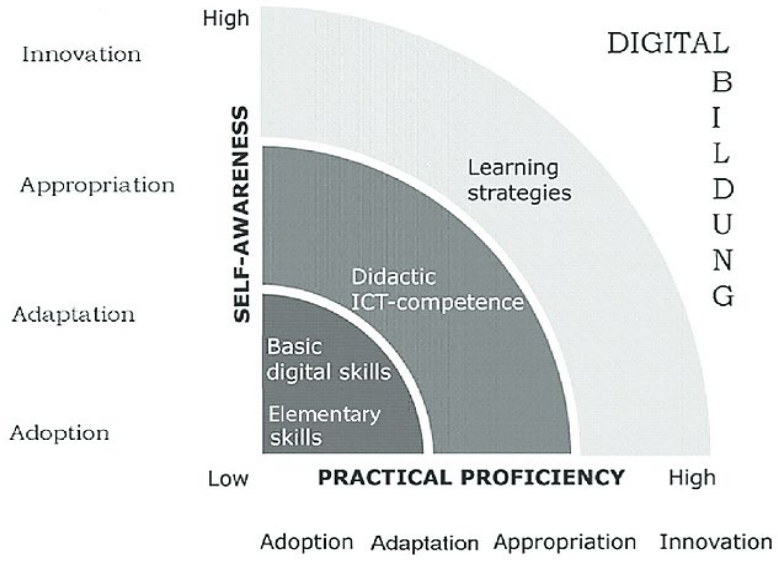
The analysis of the examined teacher digital competence training plans reveals some common features. Firstly, they all begin by introducing tools and their basic user-level applications. For example, teaching staff are taught how to handle spreadsheets or word processors, how to search for information online, and how to create materials in different formats. This can be observed in the data provided by the Department of Education of Aragon, which offered courses such as "Introduction to Computing", "Introduction to Word Processing", or "Introduction to PC Communications and Local Networks". This initial stage aligns with the perspective of Cabero-Almenara (2014) and the findings of studies conducted in Spain by Ballesteros et al. (2010), in the United States by Wachira & Keengwe (2011), in Turkey by Goktas et al. (2008), and in Mexico by Valerio & Paredes (2008). All of these studies show that the focus of teacher training has been primarily on acquiring instrumental skills.

However, as time progresses, the content of these training programs evolves to include a more instructional approach. This instructional approach involves both technology and content, such as computational thinking and educational robotics. It also involves using educational technology to explore new teaching strategies, such as gamification and technology-supported collaborative learning: ‟Introduction to Arduino”, “Innovation through the Creation of Digital Materials for Project-Based Learning”, “Introduction to Python”, “Cooperative Learning with ICT”.

Up until around the year 2012, there was a predominant emphasis on courses related to introducing ICT and gaining knowledge of these tools. It's important to note that courses focused on tool knowledge have always been relevant due to the constant evolution of technology in the market. Subsequently, there has been a gradual increase in courses with a more didactic and content-oriented focus, sometimes even surpassing the prominence of instrumental courses. Wherever it happened, it did it as a consequence of regional plans or projects that, in contrast to earlier plans, purely focused on material infrastructures and connectivity (Plan Escuela 2.0 at the regional level, And@red in Andalusia), emphasized the need to direct teacher training towards topics related to teaching and content to enhance the teaching and learning processes (as in the Ikasnova Plan in Navarre en 2017 (Gobierno de Navarra, 2023).

This approach makes sense, as outlined in the EduCantabria Plan (Gobierno de Cantabria, n.d.). It is necessary to provide teachers with an initial introduction to ICT to help them overcome psychological barriers and insecurities related to these tools. Moreover, according to the Digital Competence (or Digital Bildung) model by Krumsvic (2007), didactic use of technology cannot occur without possessing basic technical skills with the tools. This becomes easier over time with the development of more intuitive tools (Figure 4).

Figure 4
Teacher´s Digital Competence Model proposed by Krumsvik in 2007



According to this model, teachers need to undergo four stages of training to consistently improve their digital competence. Starting from the bottom-left corner and moving upwards: basic digital skills, followed by a stage of didactic competence with digital tools, then the development of learning strategies, and finally, digital construction or development. Developing these phases alongside teaching activities is a significantly important element for integrating ICT in the classroom. This is because improving digital competency levels will encourage the development of innovative methodologies and result in an enhancement of teaching and learning processes (Krumsvik, 2011). An example of this can be found in the study conducted by Fuentes et al. (2019), where they highlight that the lack of digital competence among Spanish teachers had a negative impact on the development, management, and problem-solving involved in the design of materials enriched with technology.

Following the TPACK model developed by Mishra and Koehler (2006), initial courses would primarily focus on Technological Knowledge (TK). As courses progress, they would explore the intersections between the different aspects of the model, including Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and the integration of all these aspects known as Technological Pedagogical Content Knowledge (TPACK). However, based on the results of this study, it is unclear to what extent the educational offerings emphasized Technological Knowledge (TK) as opposed to achieving integration across these dimensions. In simpler terms, it's uncertain how effectively technology was used to enhance teaching specific content (TCK), implement pedagogical strategies or methods (TPK), or instruct on content through an appropriate approach (TPACK).

At first glance, this educational strategy might seem satisfactory. In the context of ICT integration in Europe, Spain has stood out as a country that has invested significantly in training teachers for digital competency (European Commission, 2013; TALIS, 2009), and Spanish teachers are known to have a positive perception of their digital competence (European Commission, 2019). However, this positive perception sharply contrasts with

the situation experienced during the COVID-19 epidemic. The pandemic led to the suspension of in-person academic activities and exposed significant gaps in access and use of technology, both among teachers and students (Cabero & Valencia, 2020). Many teachers, even during the period of school closures and subsequent partial lockdowns in the following academic year (2020-2021), limited themselves to, at best, transferring their traditional classroom materials and routines to the virtual environment.

This happened despite the availability of training opportunities during the pandemic years and the preceding ones, which included a substantial number of courses related to the educational use of technology. For example, in Andalusia between 2016 and 2022, a total of 3659 activities were offered, covering various topics such as radio and podcasts, digital resource banks for different subjects, robotics and computational thinking, gamified teaching, augmented reality, flipped classroom, and project-based learning (PBL). Similarly, in Navarre, data from the Center for Teacher Support and Innovation Projects showed that the number of courses in didactics and content offered during the pandemic years (2020-2022) exceeded those with a focus on instrumental skills (Figure 3).

Considering that, according to the findings of this study, teachers have access to an ever-increasing supply of training courses centred on pedagogy and didactics, it is crucial to understand why teachers are not reaching a sufficient level of digital competence to meet pedagogical demands. Specially, considering that possessing this skill constitutes an important element for improving both current and future teaching and learning processes of students. According to the results of Backfisch et al. (2021), teacher digital competence is a key element that enables the satisfactory integration of technology into teaching, since it influences the actual use of technology in the classroom, among other reasons due to the degree of utility perceived by the teacher. Not having this competence or only reaching basic levels prevents, on one hand, providing many learning opportunities for students (Sailer et al., 2021), and on the other hand, generating usage gaps between territories where it is being achieved (González-Pérez et al., 2022). All this, considering that teachers show positive attitudes, motivation, and confidence in using these tools, as indicated by Diep et al. (2017) and González (2017). In addition to the above, and extrapolating this issue to another dimension, we agree with Palacios et al. (2023) and also with Rodríguez-Carracedo and De-la-Barrera-Minervini (2014) that being immersed in a digital society and making simple use of technology does not guarantee a good level of competence development in this area, therefore increasing the possibility of a person not being fully integrated into the society where they live.

Furthermore, it is possible that a "backfire" effect occurred, with teachers feeling overwhelmed by technology or other mandatory training, which may have prevented them from delving deeper into the technological realm. For instance, in Navarre, during the 2022-2023 academic year with full in-person instruction, the administration offered a higher number of didactic-focused digital training activities, but the participation and certification percentages markedly decreased compared to the previous year (Table 4).

Table 4
Digital Teacher Training held in the Autonomous Community of Navarre

T	Academic year.	Courses completed	Σ Registrations	Σ No admissions	Σ admissions	Σ resign	Σ participants	Σ Certificates	Average % of certificates	Time (h)
D/C	20-21	52	1866	240	1626	83	1543	1339	87%	735
T/I		39	1475	62	1413	56	1362	1051	77%	399
D/C	21-22	48	1823	188	1635	86	1551	1307	84%	643
T/I		19	702	22	680	25	655	576	88%	199
D/C	22-23	66	2655	550	2105	134	1972	1037	53%	834
T/I		10	403	20	383	19	364	270	74%	84

Source: Own elaboration

It is worth noting that, even though there is a gradual shift observed in courses for introducing tools and technology, the Autonomous Communities or the State have continued to offer them to introduce new platforms like EDUCA in Navarra or AEDUCAR in Aragón, as well as new electronic devices like digital whiteboards or Chromebooks. Therefore, these courses will always be a part of teacher training programs in digital matters. There is no debate about the fact that teachers need to update their technological knowledge to stay current with new, more efficient tools that have greater potential and are adapted to the latest technological and security standards.

However, the ongoing integration of tools into the education market should not overshadow their educational and pedagogical value. Otherwise, if the focus remains solely on replacing tools without going beyond that, it will not go beyond the Substitution or Augmentation phase (Puentedura, 2013), where it only improves some tasks functionally but does not truly redefine processes or bring about transformative changes.

5. Conclusion

The training programs offered by government bodies in the field of digital skills have historically focused heavily on introductory technology courses and familiarizing individuals with various tools available at the time. This trend was observed across all the communities studied, particularly in the initial stage until 2013-2015. However, starting from these years, and in contrast to the existing literature, these courses have gradually given way to new training initiatives with more educational and substantive themes. In light of this evolution, it can be asserted that the nature of educational training related to digital skills in Spain has followed the directionality outlined by theoretical models of technology integration, and that all the regions considered have followed a consistent path, despite individual differences in regions making a special point aligned to regional policies. These models encompass addressing not only technological knowledge but also pedagogical and content knowledge, as proposed in the TPACK model. Additionally, they involve shifting from simply acquiring basic digital skills to the development of learning and innovation strategies, as exemplified by the Digital Bildung model. The ultimate goal is not merely to introduce these digital tools, but rather to empower educators to enhance their digital competence. This, in turn, equips them with a broader

array of resources, both inside and outside the classroom, to improve teaching and learning processes. Finally, we consider it necessary to open new lines of research that analyze in detail the content addressed in these training programs, the methodology used, the results obtained by the teaching staff, and specially whether this determines the degree of ICT integration among regions, among other reasons to address this limitation present in the study.

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