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Post-Digital Power Lines of Influence: A Diachronic Cartography of Knowledge which Shapes Teachers' Practice

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A persistent dichotomy exists between policy and peer networks in shaping digital pedagogical innovation. This study explores how in-service teachers describe the forms of knowledge that shape their practice at two distinct points in the digital transformation of education, immediately before the COVID-19 pandemic (2019) and after the AI turn (2025). We compared two independent cohorts of Spanish-speaking teachers who answered an open-ended questionnaire. Nine influence categories were coded and reconciled through peer-debriefing. Frequencies were normalised and plotted on a formality–proximity matrix. Personal and proximal experiences remained the largest single source of influence (~32% in both waves). References to named academics and research literature were less frequent in 2025, while mentions of ministry-backed programmes, competence frameworks and (AI-focused) institutional/structured PD were relatively more prominent. These descriptive patterns suggest possible changes in the configuration of professional influences, but should not be interpreted as evidence of historical change between the two cohorts. The formality–proximity mapping provides a heuristic tool for examining whose knowledge counts in post-digital teacher development.

Keywords: teacher professional learning, digital pedagogical innovation, platformisation of education, AI in teacher development, teacher agency

Introduction

Digital technology has migrated from a peripheral curiosity to a policy imperative in schooling. COVID-19 accelerated long-standing digitisation, turning classrooms into hybrid or fully online spaces and casting "innovation" as the official cure for learning loss (Leech et al., 2022). Yet popular narratives continue to portray such innovation as organic and teacher-led, masking the dense network of actors—public agencies, EdTech firms, multilateral organisations, social-media influencers and academic "gurus"—that compete to define what counts as good knowledge for teaching with technology.

Critical scholarship, however, warns that a renewed re-institutionalisation may be under way. Competency frameworks, mandatory professional-development (PD) schemes and platformised solutions standardise what teachers may do and how success is measured (Birch et al., 2025; Williamson, 2025). Few empirical studies have traced who influences teachers' knowledge and thinking; what configurations of influence emerge; or whose voices fade and rise in the process. Most evidence remains anecdotal or confined to single-site cases.

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This article forms part of a larger, multi-year project that interrogates these knowledge dynamics in teacher professional learning. Here we focus on two datasets collected in different stages: The first was in 2019, immediately before the pandemic—a period of growing but largely discretionary use of digital technology. The second was 2025, after a phase of stabilisation marked by pervasive talk of artificial intelligence (AI) in education and the rollout of new, often compulsory, PD frameworks. Drawing on teachers' self-reported influences across these two datasets, we asked: Which people, resources, experiences and training opportunities do practising teachers cite as shaping their digital-pedagogical initiatives; and what patterns of influence and pedagogical authority emerge from these accounts?

To explore these questions, we analysed open-ended questionnaires collected from in-service Spanish Speaking teachers in Spain and several Latin-American countries. The data were analysed through mixed coding and a cartographic approach. In doing so, the study offers a critical approach for exploring how professional authority is understood in post-digital schooling and offers a basis for reflecting on PD policies that protect teacher agency while scrutinising external agendas.

Whose knowledge counts -framing innovation

Contemporary schooling unfolds in what has been called the post-digital condition: a landscape where the digital is inseparable from the social, the material and the political (Fawns, 2022; Gourlay, 2023; Jandrić et al., 2022). When technology is understood as a sociomaterial entanglement, every decision about a platform, curriculum or assessment rubric simultaneously advances a pedagogical stance, an infrastructure choice and a policy intervention (Castañeda et al., 2023; Castañeda & Williamson, 2021). Such hybridity legitimises our decision to map an entire ecosystem of influence rather than isolate discrete variables, because the forces that shape teachers' decisions—formal or informal, proximate or distal—are always already intertwined (Jandrić et al., 2022).

Aubrey-Smith (2021) shows that teachers' use of digital technologies cannot be explained by access or skills alone. Instead, she identifies four key influences: prior learning and teaching experiences, pedagogical beliefs, institutional conditions, and professional networks. Her relational model reinforces our view of innovation as a situated process shaped by both individual trajectories and systemic forces.

Within this entanglement, teacher learning is conceived as a relational achievement. Agency, far from being a purely individual trait, is enacted across professional-learning ecosystems that merge people, artefacts and institutions (Biesta et al., 2015; Prestridge, 2019; Tondeur et al., 2018). Teachers curate their own Personal Learning Environments selecting which voices to amplify and which to mute as they navigate human–computer–human interaction spaces where formal courses, non-formal webinars and informal tinkering intersect (Castañeda, 2021; Castañeda & Adell, 2013; Dabbagh & Castañeda, 2020; Morrison & Hughes, 2024; Prestridge et al., 2024). This perspective helps to explain why, in our data, personal and close experiences emerge as a frequently

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cited source of inspiration across the two datasets, highlighting their potential relevance to how teachers experience and enact agency amid external pressures.

Yet calls for "innovation" rarely disclose who benefits when a new tool or framework is adopted. Political-economy studies show how professional-development platforms convert teacher activity into data and rent (Birch et al., 2025; Verger et al., 2017; Williamson, 2025). Such scholarship provides a critical lens for reading the rise of institution-led programmes and branded micro-credentials that dominate our 2025 wave. The shift we observe—from individually named academic "gurus" to corporate pathways certified by ministries—signals a re-institutionalisation of influence rather than a neutral evolution: platform governance and policy mandates converge to decide what counts as competent practice.

Diffusion-of-innovation research further illuminates these dynamics (Greenhalgh et al., 2004). Communities of practice and networked learning spaces—Twitter/X threads, Telegram groups—once acted as low-threshold hubs where teachers experimented with new pedagogies (Coppe, 2024; Spiteri & Chang Rundgren, 2020; Starkey & Yates, 2022). However, algorithmic timelines may favour institutional accounts and sponsored content, while monetisation pushes may encourage individual influencers to migrate or commercialise their advice**.** The patterns across our two datasets are consistent with this possibility**:** in 2019 respondents cite names of notable education scholars; in 2025 they point to ministry-endorsed platforms offering stackable badges.

Artificial intelligence crystallises these tensions. Its appearance in the 2025 responses is not merely a function of technical maturity; AI became a narrative anchor in global EdTech discourse. Reviews of AI-based teacher PD and large regional trials show public–private alliances reorganising professional learning around predictive dashboards and adaptive content (Coppe, 2024; Dogan et al., 2025). These developments illustrate the platform power described earlier and re-ignite the question of agency: when training is algorithmically "personalised", do teachers gain freedom or does the system narrow their horizon of possible practices? (Munro, 2018; Player-Koro et al., 2018).

Reading these patterns requires attention to the porous boundaries between formal, non-formal and informal learning. Non-formal spaces—short webinars, online challenges—function less as mid-points and more as bridges that allow ideas to travel back and forth (Prestridge et al., 2024). Formal competence models, nowadays more and more adopted by governments all over the world (Arstorp et al., 2024), are frequently re-appropriated in informal lesson-planning exchanges.

A multi-wave design lets us trace such movements without following identical individuals (Prestridge et al., 2024). The different waves, combined with qualitative coding, allow us to explore patterns of influence and possible knowledge relations. In this study, the mapping serves as a researcher-generated heuristic to provide a descriptive snapshot of each dataset and visually synthesise patterns and relationships (Parmentier-Cajaiba & Cajaiba-Santana, 2020). The prominence of situated knowledge across both datasets is discussed separately as a descriptive finding.

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Taken together, these strands depict teacher learning as post-digital, agentic yet relational, platform-governed, networked, AI-inflected, boundary-crossing and situated. This composite lens underpins our coding schema and research questions. Through a critical cartography of knowledge, the study moves beyond a focus on tool adoption to examine the deeper issue of whose knowledge counts when defining pedagogical innovation in post-digital education—an inquiry that may have relevance beyond the Spanish-speaking context examined here.

Method

This study adopts a qualitative-interpretative approach (Corbin & Strauss, 2015) aimed at exploring the ecosystem of influences that shapes teachers' pedagogical decisions regarding the integration of DT (Digital Technology) in the classroom. The research comes from a broader project on innovative teaching practices in Spain and focuses on the factors that teachers identify as influential.

A multi-wave design was applied using data from 2019 and 2025 to explore potential differences in the sources of influence perceived by active teachers. Although the study is not longitudinal because the individuals are not the same in both years, the two waves allow us to examine influences and patterns of continuity and difference.

The approach seeks to move beyond linear cause-effect models to focus on the situated construction of pedagogical knowledge, particularly in post-digital contexts (Jandrić et al., 2022) where technological, social, and institutional factors are closely intertwined.

Participants and context

The study involved a total of 154 in-service teachers, who participated anonymously and voluntarily through an online questionnaire. The sample was distributed across two waves: 109 participants in 2019 and 45 in 2025.

While most participants were based in Spain, the study also included teachers from several Latin American countries, including Argentina, Colombia, Ecuador, and Brazil. The 2019 sample consisted of 109 teachers from various Spanish-speaking countries, with the majority based in Spain (58%), followed by Argentina (18.5%), Colombia, Brazil, and other Latin American countries.

The highest proportion of participants worked in higher education (48.1%) and secondary education (41.7%), with representation also from primary (30.6%), vocational training (24.1%), and early childhood education (12%). Smaller proportions taught in adult education or specialized areas. The distribution by educational level reveals a strong representation from higher education and secondary education, followed by primary, vocational training, and early childhood.

Regarding teaching experience, the 2019 sample was predominantly composed of teachers with extensive professional trajectories. The largest group had 11–20 years of experience (39.3%), followed by those with more than 20 years (31.8%). A further 15.9% reported having between 6 and 10 years of experience, while 13.1% had 1 to 5

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years. This distribution suggests a teaching population with substantial experience, offering valuable insights into long-term professional development and exposure to technological change.

2025 sample

In 2025, the sample comprised 45 teachers, mainly from Spain, with additional responses from Argentina, Colombia, and mentions of professional mobility to Germany.

The largest share of participants worked in primary education (37.3%), followed by higher education (23.7%), secondary (16.9%), and early childhood (13.6%).

The 2025 cohort was composed largely of experienced educators: 41.3% had more than 20 years of teaching experience, and only 10.9% had less than one year, indicating a predominance of established professionals.

In terms of age, the most represented group was 50–60 years (41.3%), followed by 20–30 years (26.1%) and 40–50 years (21.7%). The gender balance was 54.3% women and 45.7% men.

This distribution highlights a heterogeneous and experienced teacher population, whose insights contribute valuable depth to the qualitative analysis of professional influences within the 2025 dataset.

The 2025 cohort is smaller (n = 45) due to post-pandemic recruitment constraints and survey fatigue. Although both waves comprise mostly experienced educators working across comparable sectors, no formal equivalence tests were run; hence cross-wave contrasts should be read as indicative rather than conclusive.

Data collection

The main data collection instrument was a self-administered online questionnaire, specifically designed for this research. The 2019 questionnaire was updated in 2025, while retaining the same core focus and key open-ended question examined. The revisions primarily involved updating terminology, clarifying some items, and adding a small number of variables related to the broader research project. The questionnaire combined closed-ended questions (Likert scales, multiple choice) with open-ended questions that invited teachers to express their ideas freely.

The survey focused on a key open-ended question:
"Which people, resources, experiences or training have influenced your way of teaching innovations?"

This question invited teachers to describe freely any sources of influence, such as individuals, personal experiences, professional development, digital content, or academic and institutional references.

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Both questionnaires were validated by a panel of 6 experts in Educational Technology. Two main validation criteria were applied:

- Relevance: to assess whether the item contributes to the study's goals.
- Clarity: to assess whether the item is understandable and well-formulated.

Experts rated items using a 5-point Likert scale and provided qualitative feedback, which was used to adjust wording, reformat demographic questions, and eliminate non-essential sections. Notably, a fourth section about the future of AI was removed due to its lack of alignment with the study's objectives. The instrument was also approved by the Ethics Committee of the University of Murcia (2025).

Data Analysis Procedure

The open-ended responses were analyzed using qualitative content analysis, following a deductive categorical approach with room for inductive adjustments (Saldaña, 2009).

An initial classification system was developed based on prior literature and a preliminary review of 2019 responses. This system was revised and refined during the analysis of the 2025 data**.**

Nine main categories of influence were established:

- Websites – references to specific or general web pages consulted for inspiration, ideas, or resources.
- Unspecified – responses that did not clearly name or describe any concrete influence.
- Self-identified motivation– personal drive, curiosity, passion, or reflective identity as a teacher.
- Specific individuals – colleagues, mentors, or educators personally known or publicly followed.
- Institutional entities– schools, ministries, educational platforms, or organizational frameworks.
- Professional training – participation in formal or informal learning experiences (courses, seminars, webinars, etc.).
- Academic material – books, scientific articles, official reports, or academic texts used as references.
- Personal or close experiences – direct life events or relationships that have shaped one's pedagogical perspective.
- Generic social media platforms – inspiration or exposure via platforms such as Instagram, TikTok, Twitter (X), etc., without naming specific accounts or individuals.

Each response was coded individually and assigned to one or more categories as appropriate. Multiple coding was applied when teachers mentioned diverse types of influence in the same response (e.g., a training course and an Instagram account). The

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analysis was conducted using Microsoft Excel, through a matrix that included category, literal comments, and analytical notes. This structure allowed for systematic analysis of the two datasets, supporting the exploration of patterns and persistent themes.

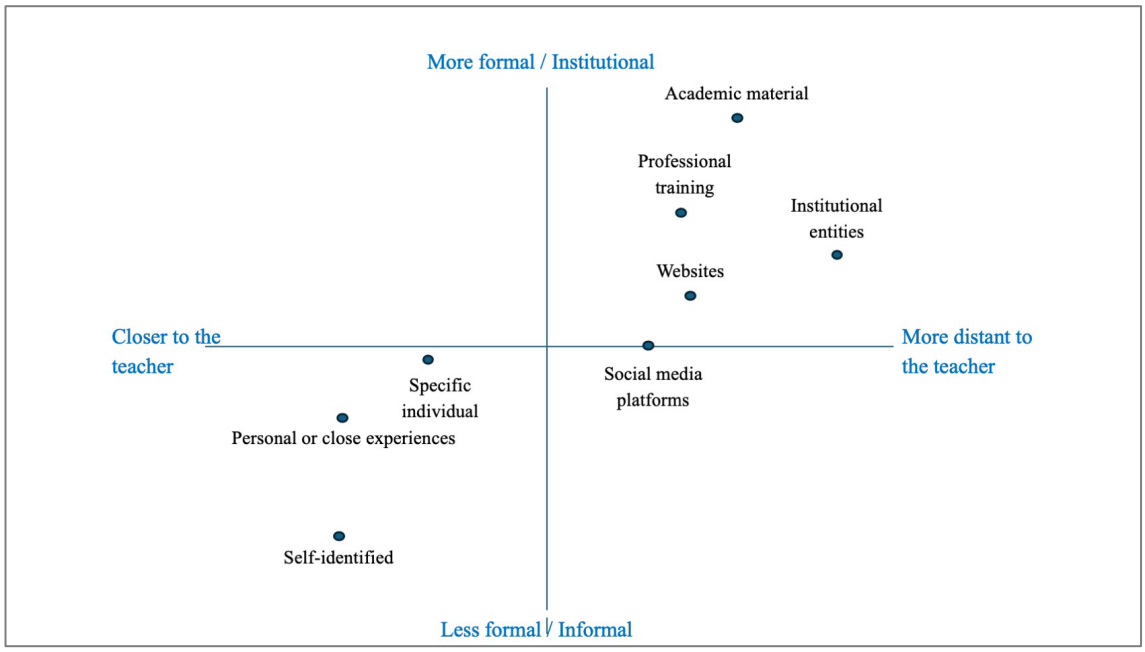
All open-ended answers were first coded by the lead author. A peer-debriefing approach ensured coding consistency. The second author independently reviewed a stratified 15 % of responses, and any discrepancies were resolved through discussion until consensus was achieved. No statistical agreement coefficient was computed, consistent with the interpretative focus of this study.

To complement the categorical analysis of influences, a graphical representation was developed in the form of a Cartesian chart. Rather than representing an empirical measurement, this visual framework provides a conceptual representation of the nine identified categories of influence according to two interpretative criteria:

(1)Degree of formality: ranging from informal/unstructured influences (e.g., self-motivation or unregulated social media content) to more institutionalized or academic forms (e.g., formal training, academic materials).
(2)Degree of proximity to the teacher: from highly personal or intimate sources (e.g., close colleagues, personal experiences) to distant or generic ones (e.g., websites, public discourse, open networks).

Figure 1

Conceptual map of teacher influences by formality and proximity.



The placement of each category on the graph is based on its inherent nature. This visual device (see Figure 1) serves to synthesize the relational logic behind teachers'

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professional influences and provides a conceptual framework for reading the patterns identified in the two datasets.

The Cartesian chart described above serves as a visual and conceptual framework for interpreting teacher influences, rather than as an analytical tool for comparing frequencies across time periods. By placing the eight categories along axes of formality and proximity, the model allows for a nuanced understanding of how structured and emergent sources of influence can be conceptually situated in relation to one another. Given the low frequency of the "Unspecified" category (3 mentions in 2019, 1 in 2025) and its very nature—used when respondents named no concrete influence—it was omitted from the Cartesian chart as it added no analytic value.

This visualization offers a meaningful way to conceptually differentiate between institutionalized knowledge and everyday practices, while recognizing the complexity between them. It aligns with recent perspectives that advocate for maintaining boundaries between formal, non-formal, and informal learning, while also building bridges through significant professional practices. As Prestridge et al. (2024, p. 1803), "It is not effective to consider an engulfment approach where formal learning absorbs informal learning". Instead, they propose non-formal learning as a bridging space, where diverse influences converge through passionate engagement and digital collaboration.

To keep the conceptual analysis transparent, we translated the nine coded categories into two Cartesian charts (2019 / 2025). The findings are visualized using a formality–proximity matrix that combines a conceptual positioning of the eight identified categories of influence with a descriptive representation of their relative frequency (as we previously mentioned, the "Unspecified" code was excluded). Each category was represented as a bubble and placement was considered based on a Cartesian chart introduced earlier in the methodology: each bubble represents one category of influence, positioned conceptually according to its level of formality (y axis) and its proximity to the teacher (x axis). Bubble size is proportional to the normalized frequency with which that category was mentioned in the open responses, providing a descriptive indication of the prominence of each category within each dataset and colour labelling of the categories**.**

Data collection and dissemination strategy

The 2019 data collection was shared on Twitter (X) and e-mail. The 2025 data collection campaign included the creation of a public profile on Instagram. The campaign attracted more than 9,000 views across posts and Reels. In addition, the questionnaire was shared on TikTok, Twitter (X), Telegram, other Instagram accounts and WhatsApp, with tailored messages appropriate to each platform.

Findings

The findings are organized in three parts: (1) an overview of the frequencies for each category in the two datasets, (2) an interpretative analysis of each category supported by representative excerpts from teacher narratives, and (3) a visual representation using a

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Cartesian chart that integrates both the conceptual location and the relative prevalence of each influence type.

General distribution of influences

Table 1 presents the overall distribution of teacher-reported influences across the two datasets: 2019 (n = 621 coded influences) and 2025 (n = 62 coded influences). The classification was based on the nine categories described before.

Table 1. Frequency of mentions.

Type	2019 (n)	2019 %	2025 (n)	2025 %
Personal or close experiences	197	31.7	19	30.6
Specific individuals	102	16.4	3	4.8
Academic material	101	16.3	7	11.3
Professional training	57	9.2	11	17.7
Institutional entities	54	8.7	9	14.5
Self-identified	53	8.5	4	6.5
Generic social media	34	5.5	2	3.2
Websites	20	3.2	6	9.7
Unspecified	3	0.5	1	1.6

Table 1 lists raw counts alongside percentages for orientation only; no statistical tests were conducted because the 2025 corpus (62 coded units) is markedly smaller. Personal or close experiences account for 197 of 621 codes (31.7 %) in 2019 and 19 of 62 codes (30.6 %) in 2025. Mentions of academic material represent 101 (16.3 %) of the 2019 codes and 7 (11.3 %), while references to institution-led PD and competence frameworks represent 111 (17.9 %) of the 2019 codes and 20 (32.2 %). These descriptive differences should be viewed as exploratory and suggestive rather than conclusive.

The most frequently cited category in both years was "experiences or close people", highlighting the enduring relevance of everyday, situated knowledge in the responses**.** Differences can be observed in the distribution of other categories across the two datasets. Because the 2025 sample comprises only 62 coded references, proportional interpretations should be read with caution.

In 2019, most influence types include "specific individuals" (16.4%) and "academic material" (16.3%), followed by training courses (9.2%) and institutions (8.7%). In the 2025 data, although smaller in volume, courses (17.7%), institutions (14.5%), and webpages (9.7%) are among the more frequently represented categories. These descriptive differences point to areas of interest for further exploration, rather than demonstrating a shift towards more structured and externally mediated influences.

Less frequently mentioned sources in both datasets include social media platforms, self-referenced influences, and cases in which no identifiable influence was given. These

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categories, while marginal in frequency, offer valuable insight into how teachers perceive their agency, exposure to networks, or difficulty in articulating external sources of inspiration.

Table 1 also presents the percentage distribution of each category across the two datasets. This descriptive overview draws attention to differences in teachers' reported sources of influence and provides a basis for exploring how these patterns may relate to broader educational and technological contexts, including post-pandemic digitization and new professional development models.

Interpretative analysis by influence type

Teacher quotes are identified by a numerical code indicating their anonymised response ID and the year of participation (e.g., Teacher #12, 2025). The influence categories are discussed in descending order of their frequency in the 2019 cohort providing a starting point for the analysis. Inside each category's subsection, we then considered the 2025 data alongside the 2019 responses to explore similarities, differences, and points of interest without duplicating the entire list twice**.** This single-pass structure keeps the narrative compact—each category appears only once—and allows separate presentation of each category as well as exploration across each category for the two datasets. The Unspecified code (4 of 683 mentions) is omitted.

Personal or close experiences

In both data sets, 2019 and 2025, the most frequently cited source of influence was personal experience and interactions with close individuals, particularly students, colleagues, and immediate school environments.

In 2019, many teachers referred to daily classroom realities and the desire to improve or respond to specific problems. For instance, teachers highlighted their own students or children as key motivators— "*my students and children*"—or emphasized collaborative school cultures: *"The need to know what's happening in the classroom next door. What projects we are working on in our school."* (Teacher #52, 2019).

The 2025 responses show a similar pattern, yet with more references to personal trajectories, such as studying or working abroad, participating in local innovation networks, or drawing from past learning experiences. Examples include: *"Working in Germany as an early childhood educator"* (Teacher #21, 2025) or *"My own experience as a student in electronics, decades ago."* (Teacher #27, 2025). These accounts illustrate the role of biographical experience and professional situatedness in teachers' accounts of innovation.

Notably, both sets of responses include self-reflexive statements, where teachers identify themselves as the main driver of change: *"Personal motivation,"* (Teacher #52, 2019) or *"It was something that had been on our minds for years, and we finally launched it in an organized and thoughtful way."* (Teacher #32, 2019**).** This perspective points to forms of internal agency and critical reflection within teachers' accounts of pedagogical innovation.

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Specific individuals

A recurring influence mentioned by teachers in both 2019 and 2025 was individual educators or professionals who served as personal or intellectual references. These were often cited by name and associated with specific pedagogical approaches, online visibility, or leadership roles in educational innovation.

In 2019, teachers referred to well-known figures in the Spanish-speaking educational technology community, such as *"Linda Castañeda," "Jordi Adell,"* or *"Miguel Ángel Azorín"*. These names appeared as models of practice and sources of professional inspiration, often tied to broader communities or training networks.

In the 2025 data, references to specific individuals were less frequent (3 mentions compared with 102 in 2019). Some participants still referred to individuals whose ideas were encountered through online talks or interviews (César Poyatos is a content creator and academic scholar in Madrid), such as the *#CharlasEducativas* series:

"I get interesting ideas from listening to other teachers like César Poyatos on #CharlasEducativas." *(Teacher #25, 2025).*

This difference points to a possible area for further exploration concerning how individual educators are encountered and described as sources of influence. The 2025 responses also include references to collective spaces (networks, platforms) rather than only singular figures. At the same time, the presence of identifiable names in both datasets points to the continued relevance of relational authority and embodied pedagogical knowledge in teachers' accounts of professional learning.

Academic Material

A smaller group of teachers in both data sets cited books, articles, or theoretical frameworks as sources of influence in their pedagogical innovations with digital technologies.

In 2019, participants referred to specific authors and publications—often linked to well-established educational theories. For example, one teacher wrote: *"Readings by Ramón Flecha"* (Teacher #71, 2019), while another mentioned *"Perkins, The Intelligent Classroom (1994)"* (Teacher #18, 2019). These references show a deliberate connection to theoretical perspectives and research-based knowledge, suggesting an integration of formal knowledge for scholarly discourse into classroom decision-making.

Although less frequent in 2025, there were still mentions of educational texts that framed the teachers' approaches. These included titles such as *"La educación en la era de la inteligencia artificial" by Rosa María Martín* and *"Escuelas emocionalmente competentes" by Laia Mestres* (Teacher #11, 2025). In some cases, the influence came from academic journals or university-level research, as seen in: *"Articles in the Revista Iberoamericana de Educación"* (Teacher #7, 2025).

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Additionally, a small but noteworthy number of 2025 responses include explicit references to artificial intelligence (AI). Teachers mentioned sources such as *"UNESCO's report on AI and education"* (Teacher #32, 2025), *"articles on the potential of AI in learning"*(Teacher #45, 2025) or postgraduate programs on AI with a humanistic approach. These mentions point to an emerging area of pedagogical interest around AI, encompassing both practical and theoretical considerations.

This type of influence reflects a more formal and structured engagement with knowledge production, in contrast to the informal and peer-based learning described in other categories.

Professional training

A substantial number of participants in both 2019 and 2025 identified professional development courses as key influences in their innovation with digital technologies. These courses, whether institutional, self-directed, or part of broader training programs, were described as starting points for the adoption of active methodologies and the integration of digital tools in everyday teaching.

In 2019, many teachers explicitly referenced official training programs offered by educational institutions or regional governments. Examples include: *"Innovation in Mathematics course (JCCM)"* (Teacher #22, 2019), *"Service-learning training"* (Teacher #16, 2019), and *"INTEF virtual courses"* (Teacher #81, 2019).

In 2025, the references to courses remained consistent in function, but revealed a wider range of providers and platforms. Participants mentioned regional training centers and private initiatives, such as *"CEFIRE", "SomDocents"* and *"Fundació Vincles"* (Teacher #33, 2025), or more general digital competency programs: *"Curso de formación de competencia digital"* (Teacher #19, 2025). This range of references points to a diverse learning ecosystem involving both public and private actors in teacher development.

While some responses suggest a passive reception of training content, others highlight how these courses catalysed more active reflection and experimentation. For example, teachers mentioned that training helped them better understand student engagement, redefine assessment methods, or discover new tools for inclusive teaching.

Institutional entities

Teachers referenced institutions and organized projects as influential in shaping their pedagogical innovations. These included government agencies, non-profit organizations, European programs, and public educational initiatives. While less frequently cited than personal experience or training, these institutional references indicate that external frameworks and policies can serve as scaffolds for experimentation at the classroom level.

In 2019, several teachers mentioned participation in structured programs or institutional projects. Examples include: *"Plan Ceibal"* (Teacher #61, 2019), a national digital

Meliá-Meseguer, Sara; Castañeda, Linda; Prestridge, Sarah (2026). Post-Digital Power Lines of Influence: A Diachronic Cartography of Who Shapes Teachers' Practice. *Technology, Knowledge and Learning*. https://doi.org/10.1007/s10758-026-10058-9

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inclusion initiative in Uruguay, or *"Proyecto CHARLIE, funded by the European Union"* (Teacher #88, 2019). These initiatives often offered ready-made resources, training materials, and validation, making them accessible platforms for teachers seeking to innovate with technology.

In 2025, the presence of institutional references remains modest but significant. Some participants referred to the UNESCO report on AI and education (Teacher #25, 2025) or to public institutions offering certification in digital competence (Teacher #4, 2025). While these influences are more macro in scale, the responses illustrate how transnational discourses and guidelines (e.g., around AI integration or digital ethics) can enter teachers' awareness and professional language, including through indirect forms of influence..

Generic social media

In both, teachers cited generic social media platforms—especially Twitter (now X), YouTube, Instagram and Telegram—as sources of pedagogical inspiration and digital learning.

In 2019, participants referred to the use of social media as a space for exploration, sharing, and professional connection. For instance, one teacher mentioned: *"OAOA Mathematics Telegram group"* (Teacher #52, 2019), while others described YouTube and mostly Twitter as a resource for discovering educational projects and sharing.

In the 2025 data, references to social media included specific communities or formats. For example, one participant wrote: *"I get ideas from listening to #CharlasEducativas and following teachers on Twitter"* (Teacher #25, 2025). Also, Instagram is more mentioned than in 2019.

Websites

A small number of participants across both datasets identified specific websites as sources of influence for their pedagogical innovation. This category captures a range of online resources—blogs, educational portals, and content-sharing platforms—that teachers consult independently and on demand to explore ideas, access materials, or solve specific problems.

In 2019, mentions of webpages were often general or referred to platforms encountered during training or through peer recommendations. For example, some participants cited sites that provided resources for project-based learning or examples of digital tools in action. However, these references were brief and less elaborated, with webpages appearing mainly as supporting resources within teachers' accounts of pedagogical innovation.

In the 2025 data, references to webpages included more specific examples and personal account. One participant mentioned: *"Blogs like "Sabers en acció" (knowledges in action) have helped me reflect on certain practices"* (Teacher #11, 2025). Others

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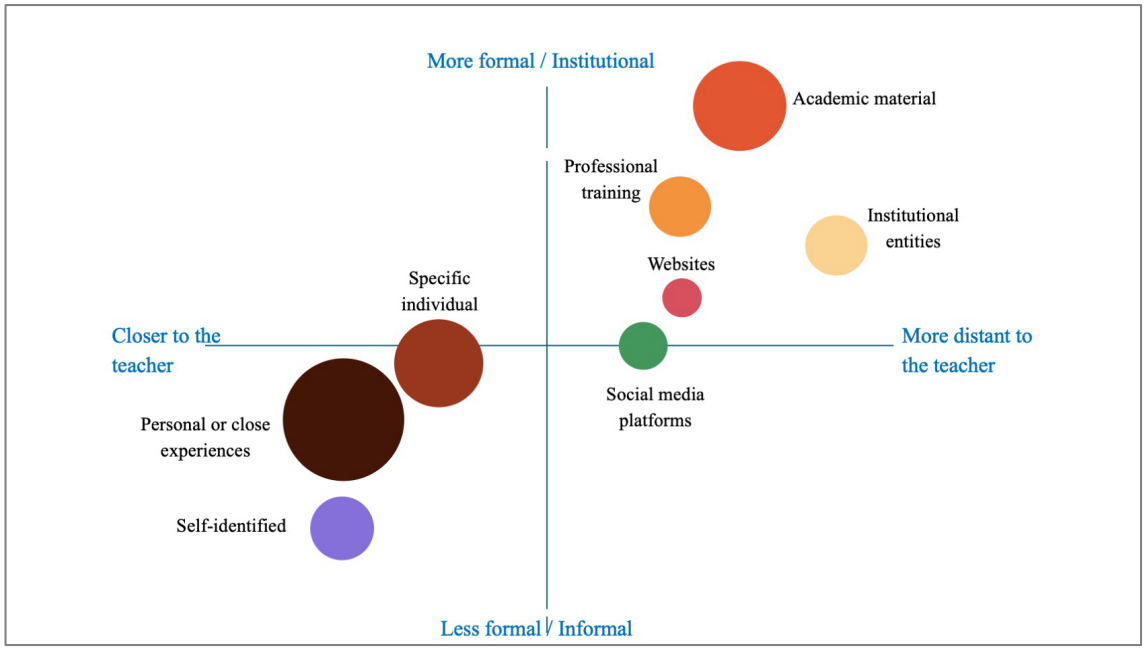
described how they regularly consulted educational portals or digital repositories to complement their lesson planning.

Graphical analysis of knowledge Influences

As explained in the methodology, bubbles were mapped onto the Cartesian chart for each data set (2019/2025) to visually represent the eight categories of influence, with the categories' size of bubble corresponding to the frequency of mentions. The categories were positioned according to their degree of formality and proximity to the teacher.

Figure 2. 2019 Cartesian chart: Conceptual positioning of influence of categories and descriptive frequency.



This visualization in Figure 2 highlights the most frequently cited sources of knowledge inspiration but also illustrates their conceptual position within the broader professional learning ecosystem. The most prominent categories—personal or close experiences, named individuals, and academic materials—are situated in areas that blend experiential proximity with professional reflection. This positioning invites consideration of how specific individuals may connect informal and formal influences, linking personal experiences with broader professional frameworks.

The 2025 Cartesian chart (Figure 3) visualizes the eight influence categories.

Figure 3. 2025 Cartesian chart: Conceptual positioning of influence of categories and descriptive frequency.

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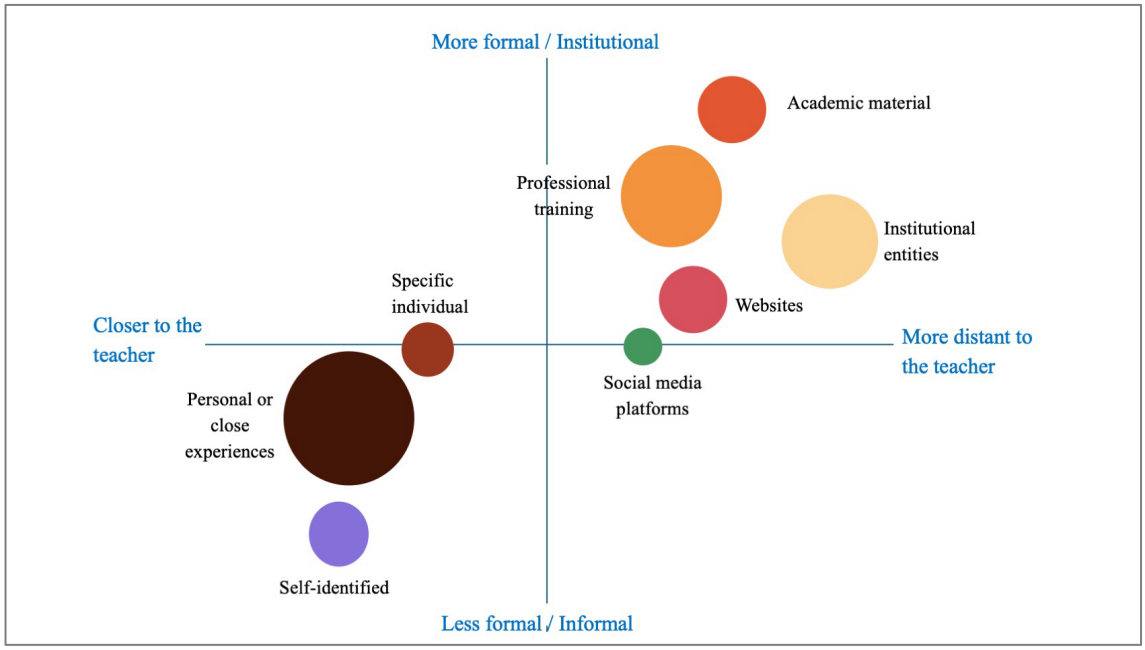

The 2025 proximity-formality mapping in Figure 3 offers a way of considering the distribution of influence categories in relation to formality and proximity. While "personal or close experiences" remain the most frequently cited category, the descriptive frequencies show fewer mentions in the 2025 dataset than in 2019. In contrast, institutional categories such as "academic material", "professional training", and "institutional entities" are represented among the more frequently cited categories in the 2025 data, occupying the upper-right quadrant of the chart. Notably, categories such as "specific individuals", "social media", and "self-identified" appear marginal in both size and position. Taken together, these patterns raise questions about how different forms of knowledge may influence and relate to one another within teachers' professional learning ecosystems, including the possible role of informal and intermediary spaces in connecting more personal and formal sources of influence.

Rather than indicating a definitive shift in the structure of teacher influence, the 2025 mapping provides an exploratory basis for considering the relationship between formal, informal, and intermediary sources. It also invites further examination of how institutional and professional-development structures coexist with, and potentially interact with, more situated and informal forms of learning.

Discussion

The data presented in this study reflect both continuities and shifts in the ecosystems that influence teachers' pedagogical innovation in the post-digital era. Personal experiences and close relationships—whether with students, colleagues, or school contexts— remain the most frequently cited source of influence across both waves (roughly one-third of all references), reinforcing the idea that teacher agency is enacted through relational and situated processes (Biesta et al., 2015; Prestridge, 2019). These findings align with perspectives that emphasise the importance of Personal Learning Environments (Castañeda & Adell, 2013; Dabbagh & Castañeda, 2020) and hybrid

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learning pathways (Munro, 2018), where formal, non-formal, and informal modes of learning intertwine (Castañeda, 2021).

At the same time, the lower frequency of academic references and named researchers in the 2025 data, alongside the presence of formal programmes and competence frameworks led by public institutions or external entities, raises questions about how different forms of professional influence are positioned and made visible. This can be read alongside critiques in the political economy of EdTech (Birch et al., 2025; Williamson, 2025), which draw attention to the role of institutional actors—ministries, platforms, and credentialing schemes—in shaping what is recognised as legitimate professional knowledge. Rather than establishing a re-institutionalisation of influence, these patterns point to an area for further investigation concerning how institutional structures, platforms, and professional networks interact in teachers' learning ecosystems**.**

Our Cartesian charts provide conceptual representation of the relationships between the categories of knowledge that influence teachers that were identified in the data. While in 2019 many participants referred to specific academic figures as sources of inspiration, these references are nearly absent in 2025. Instead, teachers refer to certified platforms and structured training routes, often embedded in official or commercial agendas. These descriptive patterns invite consideration of how different forms of professional knowledge and influence circulate within contemporary teacher networks**.** This can be considered in relation to research on networked learning and informal communities of practice in algorithmically mediated spaces (Coppe, 2024; Spiteri & Chang Rundgren, 2020). The role of platform logic in shaping visibility therefore offers a relevant question for further research, particularly regarding institutional accounts, sponsorship, and content curation mechanisms.

Mentions of artificial intelligence in 2025 illustrate the rapid uptake of a new agenda-setting force. Rather than arising organically from peer discourse, AI appears primarily through institutional channels: UNESCO reports, official training sessions, and certified courses. These references suggest that AI is not just a new tool, but a discursive anchor in policy and EdTech narratives—consistent with studies that describe how public–private alliances reconfigure teacher learning around emergent technologies (Dogan et al., 2025; Munro, 2018; Player-Koro et al., 2018).

The spatial representation of the responses on our Cartesian charts (Figures 2 and 3) shows a persistent teacher preference for proximal and informal sources, despite the growing presence of formalised and centralised offers. This tension illustrates the hybridity of post-digital professional learning ecosystems (Jandrić et al., 2022; Prestridge, 2019) in which teachers operate in overlapping spaces where individual agency coexists with platform governance and policy mandates. Maintaining that agency will require recognising, rather than subsuming, informal practices and boundary spaces that sustain innovation from below.

The contrast between the two datasets also raises a question about the role of non-formal spaces as potential bridges between informal experiences and more formal forms of professional development. The absence of a clearly identifiable non-formal bridge in

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the 2025 responses may therefore be understood as an exploratory point of interest rather than evidence of a narrowing of hybrid pathways.

Limitations and future research

This study presents certain limitations that should be considered when interpreting the findings. First, both data collection waves relied on self-selected participants, primarily recruited through social media channels. This approach limits the representativeness of the sample and may privilege voices already inclined toward digital engagement.

Second, the 2025 dataset (n = 45; 62 coded units) is considerably smaller than the 2019 wave (n = 109; 621 coded units); therefore, comparisons across waves should be regarded as conceptual and descriptive rather than inferential.

Third, only approximately 15 % of the responses underwent peer debriefing, and no statistical index of intercoder reliability was calculated. This constrains the strength of claims regarding the rigor of the coding process.

Despite these limitations, this exploratory research offers meaningful contributions to the field. The enduring relevance of teachers' personal and close experiences emerges as a foundational context for digital innovation. This continues to raise critical questions about how such experiences can be situated within the more formal, policy-defined boundaries of teacher learning and practice—boundaries long critiqued as misaligned with everyday educational realities (Cuban, 1986). Further research is needed to explore the mechanisms that enable recursive professional praxis and bridge this persistent gap between policy and practice.

Notably, the findings suggest a decline in the use of social media as a space for professional learning, pointing to a need for deeper inquiry into how teachers assess credibility in an era of disinformation. The formality–proximity grid introduced in this study serves as a heuristic device to visualise the ecology of professional influences. Future research could build on this by triangulating data with complementary methods such as classroom observation, social network analysis, or investigations into how teachers validate knowledge and expertise in increasingly platformised environments.

Finally, critical discourse analysis may offer valuable insight into how institutional narratives around digital innovation shape pedagogical practices. The references to AI in the 2025 responses also represent a potential avenue for further investigation, particularly regarding its role in teachers' professional judgement and learning.

Conclusions

This study set out to trace how teachers themselves narrate the sources that shape their digital-pedagogical practice, and to explore the patterns of influence that emerge from these accounts. Rather than measuring tool adoption or compliance with innovation policies, we focused on teachers' own attributions: who or what do they say drives their pedagogical choices in digital contexts. By examining two sets of open-ended responses

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collected in 2019 and 2025, we aimed to map not only frequencies but also the different forms of influence that appear within teachers' professional learning ecosystems.

The findings show that personal experience and close interactions with students, colleagues and local school contexts remain the single most cited source of influence, accounting for about one-third of responses in both datasets. This consistency highlights the relational and situated nature of teachers' accounts of pedagogical innovation, in which practice-based experiences coexist with other forms of professional influence.

Around this stable core, however, the two datasets present differences in the types of influences that teachers report. Mentions of academic figures and research literature have dropped sharply, while references to official programmes and externally mandated frameworks are more visible in the 2025 dataset. Rather than treating these differences as evidence of a re-institutionalisation of professional development, they raise questions about how institutional actors, professional programmes, platforms, and other sources of knowledge become visible within teachers' accounts of 'innovation'. The growing presence of private actors and commercial platforms further complicates this landscape, offering new opportunities but also raising questions about equity, autonomy, and the homogenisation of pedagogical models.

Notably, artificial intelligence emerges in 2025 as a newly visible agenda setter. From UNESCO reports to micro-credentials in AI for teachers, the rapid appearance of this theme reveals how quickly global discourses can redirect local professional narratives. At the same time, the disappearance of individual pedagogical "gurus" hints at a broader shift from personal authority to collective, curated or algorithmic forms of influence—though this transformation warrants deeper investigation.

The Cartesian visualisation—mapping influences by their degree of formality and proximity— provides a conceptual lens through which these different forms of influence can be considered. While teachers continue to value informal, proximal learning, formal and distal structures are gaining ground. Rather than presenting this as evidence of a definitive transformation, the mapping offers a way of thinking about how different sources of knowledge may influence by coexisting, intersecting, or becoming more or less visible within professional learning ecosystems. Supporting teacher agency in this context will require policies that recognise the value of informal spaces and find ways to link, rather than absorb, them into institutional frameworks. In this sense, the mapping strategy does more than visualise frequency data: it renders visible the power dynamics that shape what influences teachers, how, and through whom. By translating raw mentions into a spatial-temporal cartography, the study offers a critical lens to read both emergent silences and dominant narratives—an approach that aligns with the need to interrogate not only what changes in teacher learning, but who benefits from those changes.

Ultimately, the critical value of this study lies not only in the absolute frequencies it reports, but in the power dynamics it helps surface. By transforming raw mentions into a visual Cartesian chart, we have made visible the silences, emergences and displacements that would remain hidden in conventional reporting. While the design has limitations—non-panel cohorts, self-selection, potential recall bias, and a single coder—

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the approach is replicable and adaptable to other linguistic and educational contexts. Future research can build on this mapping to examine how teacher voice, professional autonomy and the meanings of "innovation" are negotiated amid increasingly platformised and policy-driven learning ecologies.

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