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AN EXTENDED TECHNOLOGY ACCEPTANCE MODEL OF TEACHERS' ICT ACCEPTANCE AND INTENTION TO USE IN NON-UNIVERSITY EDUCATION

Abstract. This study examines factors associated with information and communication technology (ICT) acceptance and intention to use in teaching among non-university teachers in the Autonomous Community of La Rioja, Spain. Drawing on an extended Technology Acceptance Model (TAM), a validated questionnaire was administered to 1,259 teachers from public and private-subsidized schools. Central motivational constructs (perceived usefulness, perceived ease of use, digital self-efficacy, and attitude toward ICT), contextual factors (institutional support, availability of resources, and subjective norm), and the outcome variable (intention to use ICT in teaching) were analysed using structural equation modelling and multigroup analysis. The results indicate that attitude toward ICT is the strongest predictor of intention to use, with perceived usefulness, perceived ease of use, and digital self-efficacy acting as key mediators. Digital self-efficacy shows a strong association with both perceived ease of use and perceived usefulness. Statistically significant differences emerged by age, qualification, teaching experience, and school characteristics: younger teachers and those with higher qualifications or less experience reported higher intention to use ICT, whereas more experienced teachers reported greater reliance on institutional and family support, and more favourable perceptions were observed in private-subsidized and urban schools. A complementary qualitative analysis reveals ambivalent perceptions of ICT in teaching: teachers recognize its pedagogical potential but also express concerns about student distraction, digital divides, screen overexposure, and insufficient training and resources. Overall, the findings highlight the need for comprehensive strategies that address individual factors, school-level conditions, and targeted professional development in order to support sustainable digital transformation in educational settings.

Keywords: Information and communication technologies (ICT); technology acceptance; intention to use; digital self-efficacy; attitude toward ICT; non-university teachers.

1. INTRODUCTION

Digital transformation is one of the most significant processes currently reshaping education systems worldwide. Driven by the rapid advancement of information and communication technologies (ICT) and the demand for more inclusive, equitable, and personalized learning environments, this transformation requires a profound rethinking of the

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pedagogical, organizational, and training foundations that underpin educational practice [1]. In this context, digitalization goes beyond the mere incorporation of devices in classrooms and calls for a comprehensive review of how teaching, learning, and school management are designed and supported [2].

From this perspective, educational technology should be understood not only as an additional tool, but as a didactic resource with substantial transformative potential. Its meaningful integration can enable the redesign of teaching–learning processes from an inclusion perspective, promote student-centered active methodologies, and foster key competences for navigating increasingly complex, uncertain, and rapidly changing societies [3]. However, realizing this potential depends critically on the conditions under which ICT are adopted and used in schools.

In this process, teachers emerge as strategic actors whose role is decisive for whether digital technologies become catalysts for pedagogical change or remain marginal add-ons [4]. Far from playing a passive role, teachers act as essential mediators between technological innovation and classroom practice, translating tools into concrete instructional strategies or, conversely, filtering or resisting their use [5]. Consequently, understanding teachers' dispositions toward ICT is central to any attempt to support sustainable digital transformation in educational centres.

Empirical research consistently shows that teachers' acceptance of technology remains a key bottleneck for consolidating digital transformation at the institutional level [6]. Even when digital competence is formally incorporated into curricula and policy frameworks, this does not in itself guarantee effective ICT integration in schools, especially when implementation may generate unintended adverse effects for students. Moreover, the introduction of new digital tools is often undertaken without prior analysis of teachers' attitudes, perceived self-efficacy, or the institutional and contextual factors that condition their pedagogical use and integration [2]. As highlighted in recent international monitoring reports on digital technology in education, understanding these determinants is fundamental for school leaders and policymakers when designing teacher professional development and ICT management strategies [7].

Against this background, there is a need to examine how these dynamics are reproduced in specific educational systems and to identify the personal, professional, and institutional variables that shape teachers' acceptance and intention to use ICT in teaching. In particular, it is important to analyse how central motivational constructs (such as perceived usefulness, perceived ease of use, digital self-efficacy, and attitudes toward ICT) interact with contextual conditions (such as institutional support, availability of resources, and subjective norms) in the context of school-level digital transformation.

Given these considerations, the aim of this study is to analyse the factors associated with ICT acceptance and intention to use ICT in teaching among non-university teachers in the Autonomous Community of La Rioja, Spain. More specifically, the study pursues the following objectives:

1. To determine the degree of ICT acceptance among non-university teachers from their own perceptions.
2. To identify the main motivational and contextual factors associated with teachers' attitudes toward ICT and their intention to use ICT in teaching and learning processes.
3. To examine significant differences in ICT acceptance and intention to use according to teachers' personal characteristics and school context.
4. To explore teachers' perceptions of the challenges and tensions associated with digital transformation in educational centres.

2. THE THEORETICAL BACKGROUNDS

2.1. Teacher Acceptance of ICT

Teacher acceptance of digital technologies has been identified as a key factor for achieving effective pedagogical integration of ICT in educational centres, particularly in digital transformation contexts [8]. This acceptance is closely linked to teachers' willingness to incorporate digital devices into their educational practice, influenced by cognitive, affective, and contextual factors [9].

Among the theoretical models most commonly used to explain technology adoption stands out the Technology Acceptance Model (TAM), proposed by Davis [10]. This model (Fig. 1) posits that perceived usefulness and perceived ease of use are two fundamental variables for explaining individuals' attitude toward technology use, which in turn predicts intention to use.

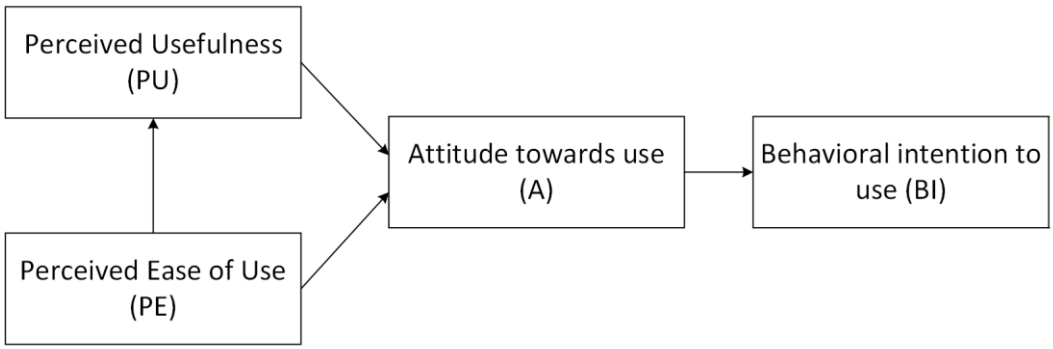

Figure 1. Technology Acceptance Model (TAM) [10]

The TAM has gained substantial relevance in the educational domain [11], particularly due to its applicability across diverse contexts and samples, its capacity to explain variance in teachers' intention to use technology, its flexibility to incorporate additional constructs and variables related to technology acceptance, as well as the simplicity of its specification within structural equation modelling frameworks [6].

In this context, the model has evolved through applied research [12], leading to more comprehensive models and frameworks that underscore the need to include additional variables associated with individual differences and external motivational factors regarding technology and its use—such as perceived self-efficacy, facilitating conditions, subjective norm, age, educational level, and gender, among others [13]. These external variables appear to relate significantly to the core factors of the TAM; however, their level of influence and conceptualization vary across studies [14].

2.2. Determinants of ICT Integration in Educational Centres

Reviews and extensions of the TAM have evidenced the need to incorporate additional explanatory factors to the original constructs – attitude toward use, perceived usefulness, and perceived ease of use – in order to more accurately understand both behavioural intention and actual technology use [15].

In the educational domain, teachers' intention to use has been consolidated as one of the most relevant predictors of actual technological behaviour in centres, particularly in digital transformation contexts [6]. From this perspective, the absence of a favourable disposition among teachers toward digital technology integration significantly limits the achievement of objectives associated with such transformation processes. Consequently, it is a priority to identify and analyse the factors that most significantly influence teachers' intention to use.

Attitude toward ICT has been consistently identified as a direct antecedent of teachers' future intention to incorporate digital technologies into their teaching practice [16]. This

construct is conceptualized as a rational evaluation of expected outcomes from a behaviour, insofar as it reflects the perceived consequences of its adoption [17]. In this sense, teachers are more likely to develop favourable attitudes toward ICT use when they perceive that these contribute significantly to improving teaching and learning processes (perceived usefulness) and when they consider that their use does not entail disproportionate effort or relevant operational difficulties (perceived ease of use). Analysing these perceptions therefore constitutes an essential starting point for understanding technology acceptance among teachers.

However, in educational contexts characterized by high organizational and pedagogical complexity, attitude toward ICT use cannot be explained exclusively by these variables. In this regard, authors such as Padilla-Carmona et al. [18] incorporate perceived self-efficacy as a central analytical construct, in line with Bandura's social cognitive theory [19]. Their results demonstrate a significant relationship between ICT use and teachers' perception of their own capabilities to organize and execute tasks linked to the employment of such technologies.

Likewise, contextual factors such as institutional support, resource availability, or subjective norm—conceptualized as the perceived social pressure a person feels to perform a certain behaviour—emerge as necessary components to more comprehensively explain teachers' technology acceptance [20]. These variables, along with certain individual sociodemographic characteristics, can modulate perceived usefulness, perceived ease of use, and self-efficacy, leading to differentiated technology acceptance profiles. Such profiles are particularly relevant for understanding the dynamics and scope of digital transformation processes in educational centres [21].

2.3. Challenges of Digital Transformation in Educational Centres

Although the specialized literature widely recognizes the potential of digital technologies to improve teaching and learning processes, their effective integration in educational centres continues to face significant challenges that must be analysed in light of the TAM and its extensions. These challenges act as conditioning factors for perceptions of usefulness and ease of use, as well as for teachers' attitude and intention to use – central elements of the model.

One of the most persistent challenges relates to resistance to change and deficiencies in teachers' digital competencies. Recent research demonstrates that personal factors such as gender, age, and teaching experience significantly influence digital competence levels and, consequently, ICT acceptance in educational settings [22]. This is compounded by the insufficiency of continuous training programs and digital pedagogical leadership, which negatively impacts the perception of technology usefulness. In this regard, various studies indicate that management teams often lack the necessary competence to foster an institutional culture oriented toward innovation and pedagogical ICT use [23]. This limitation reduces both teachers' professional development opportunities and organizational support, identified as a key antecedent of facilitating conditions in TAM extensions applied to educational contexts [15].

Another relevant challenge concerns the balanced management of technology use in educational processes. Empirical evidence suggests that excessive or inadequate use of digital devices can generate adverse effects on students' attention, motivation, and learning, potentially leading to negative evaluations of ICT usefulness [24]. Digital distractions, such as constant notifications and multitasking, disrupt deep cognitive processing and undermine the academic benefit perceptions that underpin the perceived usefulness construct in the TAM [25]. These situational factors not only affect students but also shape teachers' assessments of technologies' pedagogical efficacy in their professional practice.

From teachers' perspective, phenomena such as technostress – understood as the psychological stress derived from intensive technology use – emerge as additional barriers to technology acceptance. The literature indicates that technostress can reduce motivation and

willingness to integrate ICT into teaching, translating into lower perceptions of ease of use and usefulness, and ultimately a reduced intention to use [26].

In this context, teacher training emerges as a key structural factor for addressing digital transformation challenges. Recent research underscores that professional development programs should not be limited to technical training in digital tools but must incorporate a pedagogical approach that promotes meaningful, reflective, and contextualized ICT use. This type of training strengthens both perceived usefulness and perceived ease of use, thereby facilitating more effective and sustainable technology integration [27].

In summary, the challenges associated with digital transformation in educational centres can be interpreted as factors that influence TAM's core constructs and extensions either directly or indirectly. Analysing how these factors interact from a more interpretive approach to shape perceptions of usefulness, ease of use, attitude, and intention to use is essential for advancing the empirical understanding of technology integration in education. Based on this theoretical review and in coherence with the research objectives outlined, the methodological design adopted for the study is described in the following section.

3. RESEARCH METHODS

3.1. Design

This study adopts a quantitative approach and employs the survey technique as the primary instrument for data collection. Drawing on the TAM proposed by Davis [10] as the reference theoretical model, a specific research model has been designed (Fig. 2) that enables the systematic analysis of perceptions, attitudes, and factors influencing teachers' acceptance and use of ICT in educational contexts. The choice of this methodological approach is justified by its suitability for examining relationships among key factors and providing robust empirical evidence on a complex phenomenon situated within a specific context – the Autonomous Community of La Rioja, Spain.

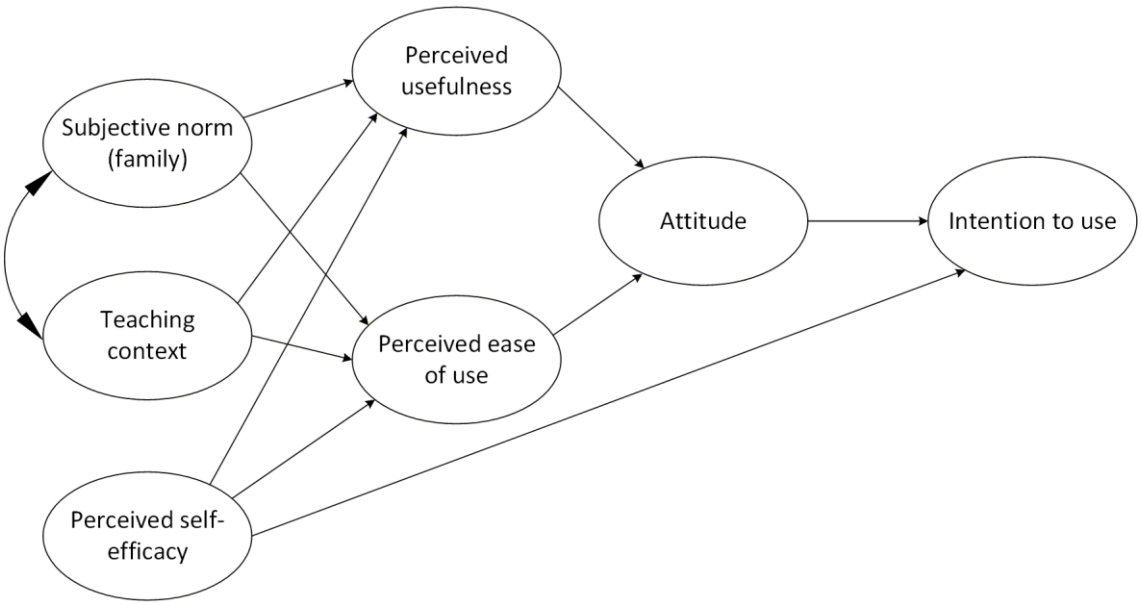

Figure 2. Research design adapted from the TAM model [10]

3.2. Population and Sample

The target population consisted of 5,843 teachers delivering regulated non-university education in public and private-subsidized centres in the Autonomous Community of La Rioja. The sample was selected through non-probabilistic voluntary participation sampling, using an online questionnaire as the data collection instrument. The final sample comprised 1,259 teachers, representing 21.5% of the total population. Participants taught across different educational stages (non-exclusive), distributed as follows: Early Childhood Education (21.2%), Primary Education (43.3%), Compulsory Secondary Education (32.6%), Upper Secondary Education (15%), and Vocational Training (15%).

Regarding sociodemographic characteristics, the majority of participants were female (66%), with a mean age of 44.1 years (range: 22–65 years). Teaching experience showed wide variability, from less than 10 years (34.8%) to more than 40 years (1.4%). Most teachers worked in public centres (59.6%) located in urban settings (81.1%). In terms of academic qualifications, 46.6% held a bachelor's degree or equivalent, 29.6% a diploma, and 19.1% a master's degree.

Overall, the sample exhibited sufficient diversity in terms of educational stage, professional experience, and sociodemographic profile, enabling reliable analysis of these variables' influence on ICT perception and use. Additionally, the sample size was adequate for structural equation modelling (SEM) analysis, ensuring high post-hoc statistical power (0.99, exceeding the recommended minimum of 0.80–0.90) and the detection of small effects ($d = 0.20$) at 95% confidence ($\alpha = 0.05$), even after finite population correction.

3.3. Measurement Instrument

3.3.1 Questionnaire Design

Drawing on reviews and extensions of the TAM proposed by Davis [10], a structured ad hoc questionnaire was designed, specifically adapted to the study's context and objectives. To ensure theoretical and content validity, the instrument underwent a review process by an expert panel from the Autonomous Regional Education Council, who evaluated its structure, dimensions, and items, and provided improvement suggestions prior to its definitive implementation in educational centres.

The final version of the instrument consisted of eight question blocks aimed at assessing the following dimensions (see Appendix for the complete questionnaire version):

1. Teachers' sociodemographic characteristics.
2. ICT perception, measured through perceived ease of use (three items) and perceived usefulness (four items).
3. Perceived self-efficacy in ICT use (three items).
4. Attitude toward ICT implementation in teaching practice (three items).
5. Intention to use ICT in the classroom (two items).
6. Institutional contextual factors, including resource availability in educational centres and perceived institutional support (four items).
7. Subjective norm, related to perceived family support toward ICT use (four items).
8. Open-ended question, intended to gather qualitative contributions and additional teacher opinions.

Fig. 3 illustrates the proposed research model underlying these dimensions.

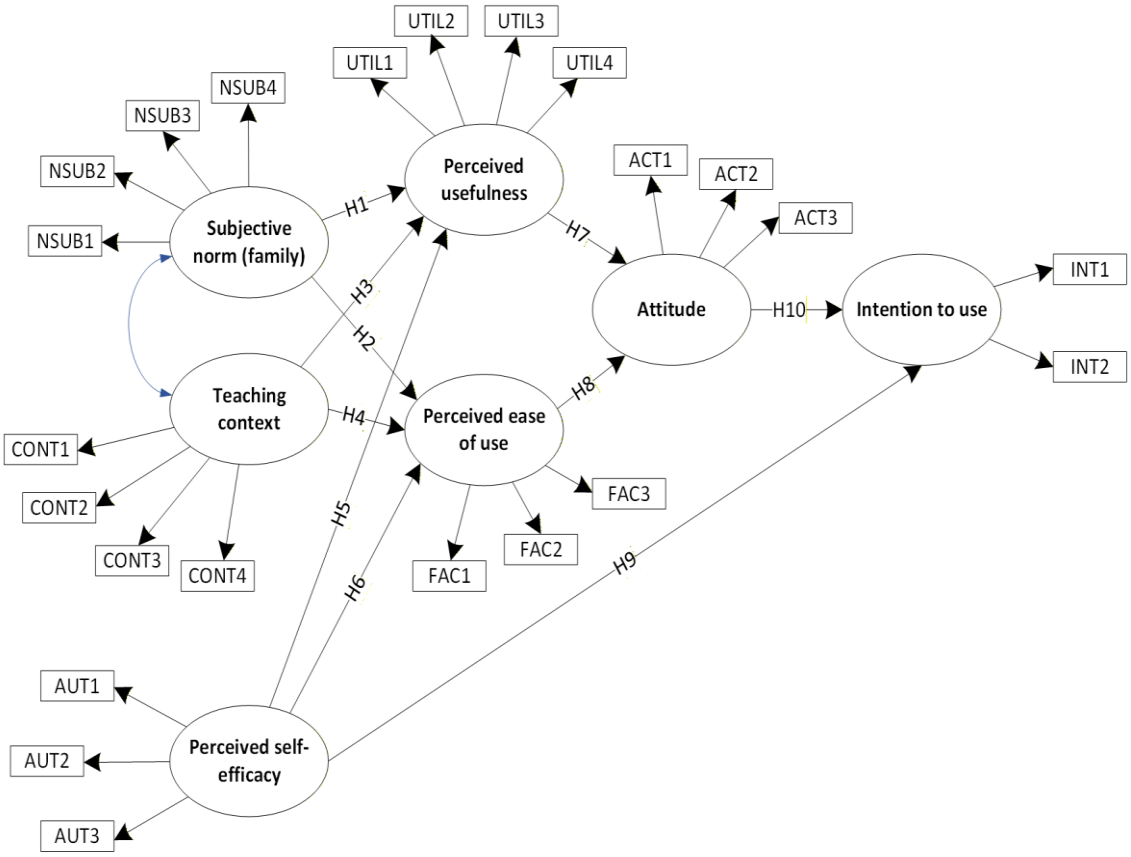

Figure 3. Proposed research model

3.3.2 Scale and Psychometric Validation

Questionnaire items were formulated using a 5-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree), allowing for graduated and systematic capture of teachers' perceptions across the analysed dimensions.

To ensure instrument validity, a confirmatory factor analysis was conducted, evaluating the adequacy of the proposed factorial structure and the internal consistency of items associated with each factor. Results showed factor loadings above 0.70 for 74% of items and values between 0.60 and 0.70 for the rest, with one single item slightly below (0.57), considered acceptable according to criteria established by Hair et al. [28]. Convergent validity was confirmed through average variance extracted (AVE), with values ranging from 0.57 to 0.71, exceeding the recommended threshold of 0.50 in all cases [28].

Regarding reliability, internal consistency was assessed using Cronbach's alpha coefficient and composite reliability, yielding values above 0.79 and 0.80, respectively, across all dimensions. These results indicate high internal coherence among items comprising each construct [28]. Finally, discriminant validity was examined using the HTMT (Heterotrait-Monotrait Ratio) criterion, with values below 0.90 across all dimensions, confirming that the assessed constructs are conceptually distinct and exhibit no significant overlaps [29].

These results support the validity and reliability of the instrument for evaluating teachers' acceptance and use of ICT in the Riojan educational context.

3.4. Procedure

The questionnaire was distributed through official digital platforms with institutional support from the Government of La Rioja, Spain. Participant anonymity and confidentiality were ensured through informed consent prior to questionnaire commencement. The study

received approval from the Research Ethics Committee of the University of La Rioja, in accordance with its Regulations (Resolution 978/2022) and the European Code of Conduct for Research Integrity, thereby guaranteeing compliance with ethical principles and prevailing research standards.

3.5. Data Analysis

Data analysis was conducted using R statistical software (version 4.4.1). Specifically, for confirmatory factor analysis and SEM, the psych and lavaan packages were employed.

First, the presence of outliers or spurious data was examined using Mahalanobis distance. Results yielded p-values above 0.001 ($p = 0.08–0.89$) across all scale factors, indicating no multivariate outliers in the sample. Subsequently, the SEM model was estimated using robust maximum likelihood (MLR) due to non-fulfilment of multivariate normality (verified via Mardia's test, $p < 0.05$). Additionally, model fit was evaluated using various indices, including RMSEA (Root Mean Square Error of Approximation), SRMR (Standardized Root Mean Squared Residual), CFI (Comparative Fit Index), TLI (Tucker-Lewis Index), and PNFI (Parsimony Normed Fit Index), ensuring empirical data supported the proposed theoretical structure [30].

To delve deeper into the impact of various teacher characteristics on ICT perception and use, a multigroup analysis was performed. Metric and scalar invariance was assessed across sociodemographic subgroups (gender, age, academic qualification, teaching experience, centre ownership, and educational stage) through multiple fit statistics [30]. While configural invariance was evaluated via global model fit for each subgroup (SRMR, RMSEA, CFI, χ^2/df), metric and scalar invariances were progressively tested by comparing nested models differing only in the added set of constraints. This comparison employed differences in fit statistics between models, using increments in CFI (ΔCFI), RMSEA (ΔRMSEA), and SRMR (ΔSRMR) as evaluation criteria: if differences between nested models exceed 0.01 for CFI, 0.015 for RMSEA, and 0.03 or 0.01 for SRMR (for metric and scalar invariance, respectively) in favour of the less restrictive model, the more constrained model is rejected.

Once measurement invariance was verified across all cases—ensuring constructs were equivalently interpreted in all subgroups—differences between teacher subgroups were evaluated, and effect sizes were calculated using Cohen's d to measure significant differences (small: $d = 0.20–0.30$; medium: $d = 0.50–0.80$; large: $d > 0.80$).

4. THE RESULTS AND DISCUSSION

4.1. Structural model results

The fitted structural model (Fig. 4) captures the relationships among motivational constructs, contextual factors, and intention to use ICT in teaching. The overall goodness-of-fit indices meet recommended thresholds for acceptable to very good fit [30] (see Table 1), indicating that the proposed extended TAM model is well supported by the data.

The model explains 76.7% of the variance in intention to use ICT ($R^2 = 0.767$), 75.5% in attitude toward ICT ($R^2 = 0.755$), 91.1% in perceived ease of use ($R^2 = 0.911$), and 64.4% in perceived usefulness ($R^2 = 0.644$), which can be considered substantial predictive power [28]. These values suggest that, within this context, the selected motivational and contextual variables capture most of the relevant variance in teachers' dispositions toward ICT integration in teaching.

Table 1

Model goodness-of-fit indices

	SRMR	RMSEA (90% CI)	CFI	TLI	PNFI	χ^2/df
Minimum acceptable fit	≤ 0.08	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.50	≤ 5
Very good fit	≤ 0.05	≤ 0.05	≥ 0.95	≥ 0.95	≥ 0.70	≤ 3
Obtained level	0.043	0.055 (0.052, 0.059)	0.95	0.95	0.80	4.09

Note: SRMR = Standardized Root Mean squared Residual. RMSEA = Root Mean Square Error of Approximation. CI = Confidence Interval. CFI = Comparative Fit Index. TLI = Tucker-Lewis Index. PNFI = Parsimony Normed Fit Index. df: degrees of freedom

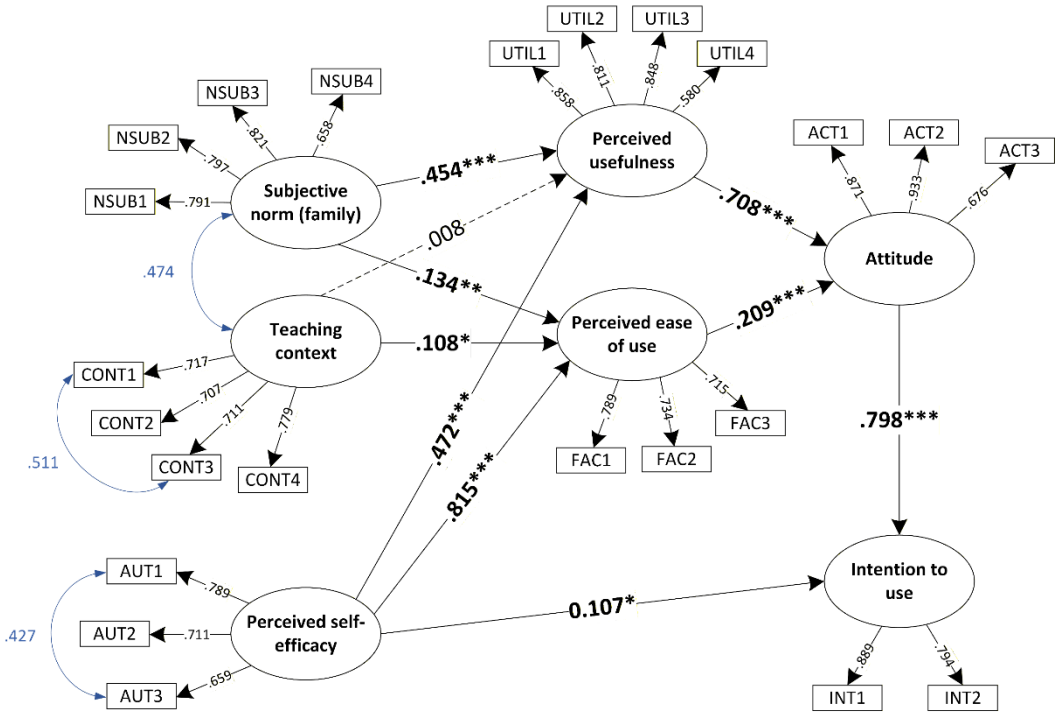

Figure 4. Fitted research model

Table 2 summarizes the standardized path coefficients. Nine out of ten hypothesized relationships are statistically significant. The strongest effect on intention to use ICT is exerted by teachers' attitude (H10, β = 0.856, p < .001), confirming attitude as the main proximal predictor of intention within the extended TAM framework. Perceived usefulness (H7, β = 0.638, p < .001) and perceived ease of use (H8, β = 0.211, p < .001) both contribute positively to attitude, with usefulness showing the larger effect, in line with previous TAM research that highlights the central role of perceived pedagogical benefit in shaping teacher attitudes [6], [9], [11], [20].

Digital perceived self-efficacy plays a pivotal role. It has strong positive effects on perceived ease of use (H6, β = 0.868, p < .001) and perceived usefulness (H5, β = 0.565, p < .001), and a smaller but significant direct path to intention (H9, β = 0.124, p < .05). This pattern indicates that teachers who feel more confident in their digital competences tend to see ICT as easier to use and more useful, and they also report higher intention to use ICT in teaching. In practical terms, this reinforces the idea that digital self-efficacy is a central lever for ICT integration: it shapes not only intention, but also how teachers construct their perceptions of usefulness and ease of use in the classroom.

Table 2

Standardized regression weights for the research model

	Path	Estimate	SE	CR	Hypothesis
H1	Subjective norm → Perceived usefulness	0,537	0,045	0,454	***
H2	Subjective norm → Perceived ease of use	0,141	0,041	0,134	**
H3	Teaching context → Perceived usefulness	0,008	0,043	0,008	ns
H4	Teaching context → Perceived ease of use	0,099	0,039	0,108	*
H5	Perceived self-efficacy → Perceived usefulness	0,565	0,050	0,472	***
H6	Perceived self-efficacy → Perceived ease of use	0,868	0,064	0,815	***
H7	Perceived usefulness → Attitude	0,638	0,035	0,708	***
H8	Perceived ease of use→ Attitude	0,211	0,043	0,209	***
H9	Perceived self-efficacy → Intention to use	0,124	0,061	0,107	*
H10	Attitude → Intention to use	0,856	0,061	0,798	***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$, ns = non-significant; SE = Standard Error. CR = Critical Ratio

Subjective norm and teaching context operate mainly as antecedents of perceived usefulness and ease of use, aligning with TAM extensions that incorporate facilitating conditions and social influence as key determinants of technological behaviour [12]. Subjective norm shows a strong effect on perceived usefulness (H1, $\beta = 0.537$, $p < .001$) and a smaller but significant effect on perceived ease of use (H2, $\beta = 0.141$, $p < .01$), suggesting that perceived support or pressure from families, colleagues, and the school community matters for how teachers evaluate ICT. Teaching context (resources, institutional support, leadership) significantly influences perceived ease of use (H4, $\beta = 0.099$, $p < .05$), but its path to perceived usefulness (H3, $\beta = 0.008$, ns) is not significant. This asymmetry is noteworthy: the school context appears to facilitate teachers' perceptions of ICT as manageable (for example, through technical support, stable platforms, and adequate resources), but does not necessarily change their judgement about whether technologies have pedagogical value. This implies that equipment and support policies are necessary conditions for smooth use, but not sufficient to convince teachers of the pedagogical relevance of ICT; for that, perceived usefulness and alignment with instructional goals remain crucial.

Taken together, these quantitative results confirm the basic TAM structure in non-university education and highlight three key points:

1. Attitude toward ICT is the strongest predictor of intention to use;
2. Digital perceived self-efficacy drives both perceived ease of use and perceived usefulness, and also has a smaller direct effect on intention;
3. Contextual factors act mainly as facilitators of ease of use, while perceived usefulness is more strongly anchored in teachers' own assessments.

4.2. Multigroup analysis and teacher profiles

Measurement invariance tests (configural, metric, and scalar) across sociodemographic and school-level subgroups met conventional criteria, which justifies comparing latent means and path estimates across groups. The multigroup analysis reveals several systematic, though mostly small to moderate, differences that delineate differentiated profiles of ICT acceptance.

– **Gender**: Male teachers report higher scores in digital perceived self-efficacy, perceived ease of use, teaching context, and subjective norm, with a moderate effect size for self-efficacy ($d = 0.509$) and small effects for the other constructs. This suggests that male teachers feel more digitally competent and perceive greater institutional support, which may translate into lower perceived barriers to ICT integration.

- **Age**: Younger teachers (under 35) obtain higher scores than older colleagues, especially those aged 50+, in perceived self-efficacy, perceived usefulness, perceived ease of use, and attitude (all with small effect sizes), while older teachers report higher subjective norm. This pattern points to a generational divide: younger teachers are more comfortable and positive about ICT, whereas more experienced teachers perceive stronger social expectations to use technology.
- **Academic qualification**: Teachers with a master's degree show higher self-efficacy, perceived ease of use, attitude, and intention to use than those with diplomas or bachelor's degrees, with a moderate effect in self-efficacy and small effects in other constructs. Advanced qualifications thus appear associated with greater digital capital and willingness to use ICT, which has clear implications for initial and continuing teacher education.
- **Teaching experience**: Less experienced teachers (under 10 years) score higher in self-efficacy, perceived usefulness, perceived ease of use, and attitude, especially when compared with teachers with 20+ years of experience; conversely, the most experienced group scores higher in teaching context, indicating a more positive assessment of institutional conditions. This suggests that seniority is linked to better perceptions of the institutional environment, but not necessarily to higher confidence or attitudes toward ICT, reinforcing the need for differentiated professional development strategies across career stages.
- **School ownership and location**: Teachers in private-subsidized schools report significantly higher scores than those in public schools across all constructs, with a large effect in teaching context ($d = 0.946$) and a near-moderate effect in perceived ease of use ($d = 0.476$). Teachers in urban schools also obtain higher scores than those in rural settings, particularly in teaching context, subjective norm, and perceived ease of use. These differences indicate structural inequalities in ICT resources, support, and digital climate between school types and territories, reflected in higher ease of use and, to some extent, greater intention to use in private-subsidized and urban contexts.
- **Educational stage**: Vocational training teachers show higher self-efficacy and intention to use ICT than early childhood/primary teachers, and a more favourable attitude than secondary teachers, whereas early childhood/primary teachers report slightly higher perceived usefulness than secondary teachers. These nuances suggest that the culture of ICT use varies across educational stages and should be taken into account when designing policies and training actions.

Overall, the multigroup analysis shows that ICT acceptance is not homogeneous: it is modulated by gender, age, qualifications, teaching experience, school type and location, and educational stage. From an ICT management perspective, these profiles indicate where to concentrate support and training efforts (for example, experienced teachers in public and rural schools) and where existing digital capital can be leveraged (for example, younger teachers with master's degrees in urban and private-subsidized schools).

4.3. Qualitative insights into ICT use in teaching

The qualitative analysis of 330 open-ended responses offers a complementary view of teachers' lived experiences with ICT in teaching. On the positive side, teachers widely acknowledge the potential of digital technologies to enrich teaching–learning processes, increase student motivation, and support attention to diversity, as well as their role in preparing students for an increasingly digitalized society. These perceptions are consistent with the relatively high levels of perceived usefulness observed in the quantitative model.

At the same time, this positive valuation coexists with strong concerns about unintended consequences of intensive technology use. Teachers frequently mention student distraction, reduced sustained attention, risks of losing traditional skills, and worries about students' mental health and screen overexposure. They also highlight structural barriers such as insufficient ICT resources, unstable institutional platforms, and limited technical support, which undermine the potential benefits suggested by high perceived usefulness and ease of use in some groups.

Many responses call for balanced and contextualized integration of ICT, respecting subject-specific requirements, educational stages, and students' maturity. Teachers tend to advocate for ICT as a complementary, rather than substitutive, tool to traditional methods, insisting on the need to align technology with clear pedagogical purposes and to avoid uncritical or excessive use. Teacher training and support for teachers, students, and families are repeatedly identified as key conditions for responsible, effective, and ethical ICT use, and respondents frequently call for coherent institutional and regional policies, as well as collective reflection on emerging technologies such as artificial intelligence in education.

These qualitative findings reinforce two central messages from the quantitative model:

1. a generally favourable attitude toward ICT and even a high intention to use do not, by themselves, guarantee transformative pedagogical integration;
2. ICT acceptance is an ambivalent phenomenon, in which expectations of innovation coexist with concerns about risks and unintended side-effects. For ICT in education policy, this implies that raising acceptance levels is necessary but not sufficient; technological integration must be accompanied by frameworks for responsible use, psychosocial support, and ongoing pedagogical reflection [25].

4.4. Synthesis

Taken together, the quantitative and qualitative findings show that ICT acceptance and use in teaching depend on a combination of individual, training-related, and institutional factors. At the individual level, digital perceived self-efficacy and perceived usefulness are central for building positive attitudes and intention to use ICT. At the institutional level, teaching context, resources, support, and school type and location shape how easy ICT appear to be and how supportive the environment is for their use. At the systemic level, differences across teacher profiles and school characteristics point to potential digital divides within the teaching workforce and across schools, which have direct implications for equity in access to enriched learning environments.

For school leaders and policymakers, these results suggest that supporting sustainable digital transformation requires differentiated, data-informed strategies: reinforcing digital competence and self-efficacy where they are weaker; improving ICT infrastructure and support; and designing professional development that connects teachers' perceived utility of ICT with concrete, context-sensitive pedagogical practices.

4. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

This study provides empirical evidence on the factors associated with non-university teachers' acceptance and intention to use digital technologies in the context of ongoing digital transformation in education. The results confirm that attitude toward ICT is the strongest proximal predictor of intention to use, with perceived usefulness, perceived ease of use, and – especially – digital self-efficacy playing key mediating roles.

These findings support the validity and applicability of the TAM in school settings, while highlighting the added value of incorporating personal and contextual variables to more fully understand teachers' ICT acceptance. The strong influence of digital self-efficacy indicates that

effective ICT integration depends not only on access to technological resources, but also on teachers' confidence in their ability to use technology in pedagogically meaningful ways. This has direct implications for teacher education policies, which should go beyond technical skills to explicitly strengthen beliefs of competence and control over ICT in classroom practice.

The results also show that a favourable attitude toward ICT does not automatically translate into transformative pedagogical integration. The ambivalent perceptions captured in the qualitative analysis reveal persistent tensions between the perceived educational potential of ICT and concerns about intensive use, including student distraction, screen overexposure, and the possible erosion of certain traditional skills. These tensions underline the need to approach educational digitalization from a critical and contextualized pedagogical perspective, avoiding purely instrumental or technocentric approaches that ignore risks and unintended consequences.

Contextual and institutional factors – such as organizational support, resource availability, and social influence – emerge as important elements in explaining differences in ICT acceptance across teacher groups and school contexts. Variations by age, teaching experience, educational stage, and school ownership point to differentiated acceptance profiles, suggesting that support and professional development strategies should be tailored to the specific characteristics and needs of each group. From an applied perspective, the findings stress the importance of moving toward more integrated and sustainable models of digital transformation that combine the development of teachers' digital competence, strengthened pedagogical leadership, and improved institutional conditions.

Overall, teachers' ICT acceptance should be understood as a systemic process closely linked to educational policies, school organizational culture, and the real conditions of teaching practice. Sustainable digital transformation will require coordinated actions at multiple levels: individual (self-efficacy and attitudes), school (resources, leadership, support), and system (policies and equity-oriented ICT strategies).

This study has several limitations that should be acknowledged. First, the data come from a single regional education system, which calls for caution when generalizing the findings to other contexts. Second, the reliance on self-report measures may introduce subjective biases and does not capture actual ICT use in classrooms. Future research could extend this work to other geographical settings, employ longitudinal designs to examine changes over time, and combine perceptual data with observational or log-based indicators of ICT use in teaching. It would also be valuable to evaluate the impact of specific digital competence development programmes on teachers' ICT acceptance and classroom practices, particularly in relation to the integration of emerging technologies such as artificial intelligence in education.

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РОЗШИРЕНА МОДЕЛЬ ПРИЙНЯТТЯ ТЕХНОЛОГІЙ ПЕДАГОГАМИ НЕУНІВЕРСИТЕТСЬКОЇ ОСВІТИ ТА ЇХНІХ НАМІРІВ ВИКОРИСТОВУВАТИ ІКТ

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Анотація. У цьому дослідженні розглядаються фактори, пов’язані з прийняттям інформаційно-комунікаційних технологій (ІКТ) та наміром їх використання у навчанні серед учителів позауніверситетських закладів освіти в Автономній спільноті Ла-Ріоха, Іспанія. На основі розширеної моделі прийняття технологій (TAM - Technology Acceptance Model) було проведено анкетування 1 259 вчителів державних та приватних шкіл, що отримують державну підтримку. Основні мотиваційні конструкти (сприйнята корисність, сприйнята простота використання, цифрова самоефективність та ставлення до ІКТ), контекстуальні фактори (інституційна підтримка, доступність ресурсів та суб’єктивна норма) та результативна змінна (намір використовувати ІКТ у навчанні) були проаналізовані за допомогою моделювання структурних рівнянь та багатогрупового аналізу. Результати показують, що ставлення до ІКТ є найсильнішим предиктором наміру використовувати їх,

причому сприйнята корисність, сприйнята простота використання та цифрова самоефективність виступають ключовими посередниками. Цифрова самоефективність демонструє сильний зв'язок як зі сприйнятою простотою використання, так і зі сприйнятою корисністю. Виявилися статистично значущі відмінності за віком, кваліфікацією, педагогічним стажем та характеристиками шкіл: молодші вчителі та ті, хто мав вищу кваліфікацію або менший стаж, виявляли більшу схильність до використання ІКТ, тоді як учителі з більшим стажем більше покладалися на підтримку з боку навчального закладу та сім'ї; водночас більш позитивне ставлення спостерігалось у приватних школах, що отримують державну підтримку, та в міських школах. Додатковий якісний аналіз виявляє амбівалентне сприйняття ІКТ у навчанні: учителі визнають їхній педагогічний потенціал, але також висловлюють занепокоєння щодо відволікання учнів, цифрового розриву, надмірного використання екранів та недостатньої підготовки й ресурсів. Загалом отримані результати підкреслюють необхідність комплексних стратегій, що враховують індивідуальні фактори, умови на рівні школи та цілеспрямований професійний розвиток, з метою підтримки сталого цифрового перетворення в освітніх закладах.

Ключові слова: інформаційно-комунікаційні технології (ІКТ); прийняття технологій; намір використовувати; цифрова самоефективність; ставлення до ІКТ; учителі поза університетами.

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