



Article

Teacher Motivation: Exploring the Integration of Technology and Didactics in the Narratives of Future Teachers

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Abstract: Different theories addressing the motivational process in educational practice highlight the importance of the teacher's perspective in the effective integration of technologies as pedagogical-didactic tools in the classroom. The current study consists of a manifest content analysis applying a non-experimental, cross-sectional, qualitative research design. A longitudinal study was conducted through semi-structured individual interviews over three academic years (2020–2023) with a sample of 36 teacher-training students, including undergraduate and postgraduate students from the Valencian Community. The results obtained reveal the participants' perceptions of the motivations for using technology in their self-learning process, highlighting the positive value they attribute to these tools as resources to motivate their future students. The narratives compiled highlight the relationship between the use of technology and improved academic performance in teacher training. Furthermore, they underline the need to incorporate educational models that not only foster digital skills but also provide solid pedagogical training in this area.

Keywords: motivation; perception; technology; teacher training; TPACK



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1. Introduction

There is currently widespread interest in society regarding citizen education. The new educational paradigm proposes that training should not be limited to the mere transmission of knowledge and information but should focus on the development of the capacity to generate new knowledge. Educational curricula therefore seek to place students at the centre of the teaching and learning process, granting less importance to the accumulation of theoretical knowledge and more to the development of skills and procedures that allow for the active construction of knowledge.

In this context, motivation becomes a key element that can facilitate significant changes in school learning. Although motivation is not a unitary construct and involves various components that defy definition (Núñez 2009), specialists in the field agree that it consists of a series of processes involved in the activation, direction and persistence of behaviour (Gómez-Fraguela et al. 2008; Losada-Sierra and Gómez 2022).

In the academic sphere, school motivation is defined as the set of beliefs students hold about their objectives and purposes to reveal why a goal is important for them by deducing an explanation as to why their conduct persists (Rosário et al. 2014). Students' attitudes, perceptions and expectations of themselves are important factors influencing their academic performance. These personal variables play a fundamental role in shaping the attitude they have towards their academic development. However, studies of motivation should consider not only personal and internal variables but also external influences of

the environment in which students develop and with which they interact (García and Doménech 1997). Therefore, a distinction needs to be drawn between intrinsic motivation and extrinsic motivation.

Intrinsic motivation refers to the drive to undertake an activity deriving from the inherent satisfaction associated with it, where the learner is not dependent on external reinforcement. Usán and Salavera (2018) identify three types of intrinsic motivation: experience-based motivation, where the student engages in an activity for enjoyment or to experience positive feelings deriving from the activity; knowledge-based motivation, relating to the desire to learn new concepts; and achievement-based motivation, characterised by the desire to excel or to achieve pre-determined personal goals.

Extrinsic motivation refers to behaviour oriented towards the achievement of external goals, such as obtaining good grades, rewards, positive feedback, approval from teachers or parents or the avoidance of negative evaluations. As in intrinsic motivation, three types may be distinguished: external extrinsic motivation, which focuses on obtaining a reward for performing a task; identified motivation, in which the individual perceives the activity as a personal choice that he/she considers beneficial for his/her personal development; and introjected motivation, where the individual performs the activity to avoid feelings of guilt or to increase his/her self-esteem in the performance of the task (Usán and Salavera 2018).

The affective component also plays a significant role in the educational process. This aspect is addressed through emotional intelligence (EI), which is defined as the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion in the self and others (Mayer et al. 2000).

In the educational context, the terms EI and motivation are often used interchangeably (Mengual-Andrés et al. 2020), on the basis that the student's state of mind forms part of his or her motivation to achieve a goal, in this case the execution of an activity. When students are able to understand their own moods, interact with their environment and appreciate their limitations, their anxiety levels and feelings of failure tend to be reduced and this acts as an intrinsic motivation for them (Soriano-Sánchez and Jiménez-Vázquez 2022).

Therefore, when designing didactic situations, teachers need to consider the students' self-concept (intrinsic motivation), learning goals (extrinsic motivation) and emotions with respect to what they will be taught and learn (a combination of intrinsic and extrinsic motivation). In this research, the didactic concept is understood as the branch of pedagogy that is responsible for searching for methods and techniques to improve teaching, defining the guidelines to ensure that knowledge reaches those educated in a more effective way. In other words, it serves teachers when selecting and developing content; it pursues the purpose of ordering and supporting both the teaching models and the learning plan. The teaching circumstance is called a teaching act for which certain elements are needed: the teacher (who teaches), the student (who learns) and the learning context. The interrelationship of these different aspects will determine school motivation and thus learning achievement.

1.1. Intrinsic–Extrinsic Motivation

Self-concept is based on the analysis, assessment and integration of information deriving from one's own experience and the perception of experience through interaction with others in the human environment. In the case of education, this environment consists of classmates, teachers and family (parents, grandparents, etc.). As García and Doménech (1997) point out, self-concept regulates behaviour through the process of self-awareness. In the educational context, a student's behaviour is largely determined by the self-concept he/she has at a given moment, e.g., during an oral presentation or a written exam. This behaviour is therefore influenced by previous self-assessments of their abilities and will affect their motivation towards a designed activity as well as the results they will obtain during its execution. Various studies have established a link between higher student

motivation and higher academic performance (Zimmerman 2008; Navas and Sampascual 2008; Salavera and Usán 2018).

The goals pursued by students influence the achievement of learning objectives and determine different ways of approaching academic tasks (García and Doménech 1997). It is also possible to distinguish different types of “goals”: those oriented towards resolution of the task through learning (Ames 1992; Vallerand 2015), characterised by the student being motivated by the desire to know and curiosity; and those aimed at the mechanical resolution of the activity with the objective of obtaining good grades and rewards in the form of positive evaluation by teachers or parents, among others (Ames 1992).

Other authors suggest that the student’s perception of his or her own ability drives task performance and thus motivation. When they perceive themselves as being capable of undertaking a task, the distinction between the type of goal (learning or reward) tends to blur, and the motivation to carry out the assigned tasks is reinforced (Nichols and Miller 1994).

Furthermore, the COVID-19 context has been a powerful motivator for online learning. This situation generated an adaptation of the dynamics of traditional classes to digital ones, as well as the simplification of teaching materials, exams, tasks and activities. Additionally, positive effects on learning were presented when students were encouraged to work autonomously and collaboratively, with virtual tutoring, which improved the monitoring of learning. It also worked to establish pedagogical dialogues with concrete instructions and develop flexible, contextualised and updated study programs. All of this helped students have a good perception of technologies and online learning (Gómez-Trigueros 2023).

Together with these theories, McClelland’s (1987) theory of social motivations stands out, who considers that motivation is made up of groups of expectations or associations that are formed and grow around affective experiences. This theory is located within human motivations and specifically in the field of social motivations. This theory focuses on the study of three relevant social motivations, the motivation for success or the inner need that determines the behavior of an individual to influence another human being or a group of them, this is manifested through actions that imply an effect on the others as prestige and recognition. The second social motivation is affiliation, a form of social behavior that responds to the impulse that is satisfied through the creation and enjoyment of emotional ties with other people (family or friends).

The third social motivation according to this theory is achievement motivation, as the need expressed by human beings to act in search of realistic goals that satisfy them, which is why they carry out activities in terms of quality and excellence. Continuously working towards these goals leads you to set new goals and options that allow you to climb different positions day by day within your social context.

The great contribution of McClelland and his theory is that it constitutes a definition and a methodology to measure intrinsic and extrinsic motivation from a qualitative and quantitatively. Within the same current of MacClelland’s approach, there is Atkinson’s model (Atkinson 1964). This theory has been very useful in qualitative and quantitative research, since it has allowed us to evaluate and predict the behaviors that can affect the execution and performance of people in a certain activity.

1.2. Technology and Motivation in Instruction

The pervasion of Information and Communication Technology (ICT) in society has resulted in an environment profoundly influenced by connection and access to information through different technologies and the internet. These innovative resources have led to a digital transformation in all facets of life which in turn has brought about a significant social transformation (Ríos 2021). In this new socio-economic landscape, it is essential to prepare citizens in the competent use of technology in order to keep up with constant technological changes (Felszeghy et al. 2019; Gómez-Trigueros 2023).

Society is immersed in a digital world in which electronic devices have become both commonplace and necessary as tools to enable greater citizen participation in social issues affecting the entire population. In the case of students, ICT is a tool that can be used to improve their learning by providing access to the wealth of up-to-date content hosted on the internet. This promotes learning by improving problem-solving skills, stimulating group work and peer relations and reinforcing self-esteem and autonomous learning, among other advantages (Huertas and Pantoja 2016). In addition to its importance for learning, ICT has also been found to have a positive impact on student motivation (Cheng et al. 2018), with a significantly positive relationship between ICT use and a positive willingness to perform tasks (Gutiérrez et al. 2022; Zuo et al. 2022).

This motivational aspect of ICT is manifested in the development of various educational programmes and policies that promote digital skills training for students at all levels of education (Organización de las Naciones Unidas 2015). Furthermore, both international (Organization for Economic Cooperation and Development (OECD) 2019; European Digital Media Observatory 2021) and national (Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado 2021) institutions argue that innovations in and the inclusion of ICT in the classroom contribute towards greater employment opportunities for citizens (Micheal and Marjadi 2018).

The integration of technological resources in daily teaching work has therefore become a social demand, a right for students and an obligation on the part of educational authorities (Huertas and Pantoja 2016). Digital transformation involves incorporating digital technology in all aspects of the learning process.

This fundamental change in the functioning of education and its evolution is marked by a transformation of teaching and learning methodologies, characterised by a shift from traditional transmissive, teacher-centred learning to more active and participatory learning where the student is the central focus of the educational process (Amaya-Conforme and Yáñez-Rodríguez 2021). Some of the effects of these changes on educational communities include the introduction of new technologies, social networks, big data and the Internet of Things (IoT). This has an impact on the teaching–learning nexus in both face-to-face and distance-learning environments, alongside raising new challenges (Ghavifekr and Wong 2022).

In this context, it has been observed that motivation is optimised when students are involved in a variety of innovative experiences that are attractive to them and allow them to assume an active role. This is where these different technologies emerge as innovative didactic resources that foster participatory educational processes by actively involving students (Oherrou et al. 2019). These technologies also facilitate the design of didactic proposals that enhance curiosity and interest through the use of problem situations, a way of motivating learning and contributing to intrinsic motivation (Gómez-Trigueros and Yáñez de Aldecoa 2021).

As mentioned earlier, learning in today's educational world requires more innovative educational processes. In this sense, the use of technology provides an ideal set of tools to achieve educational goals (Soriano-Sánchez and Jiménez-Vázquez 2022). Their appropriate integration in the teaching–learning process can help to promote autonomy and collaboration between students (Hinojo et al. 2020), especially in e-learning environments that apply new technologies to the educational environment. In addition, the use of these technologies creates more proactive environments with a change of roles in the educational process, encouraging students to develop their own learning while teachers guide these processes. Technology is therefore seen as a driver of active and innovative methodologies (Amaya-Conforme and Yáñez-Rodríguez 2021) that stimulate enquiry, improve knowledge acquisition and retention and consequently motivate students to learn and teachers to teach (See et al. 2022).

Although there are different studies on motivation and the use of technologies in the classroom, there is no literature or in-depth research that analyzes how the motivation of future teachers in the use of technologies occurs. Nor what motivates the student, a teacher

in training, to use technologies in their self-education. In this work we want to respond, in the context of the Valencian Community (Spain), to what moves future teachers to include technologies in their own learning and, also, in their use in their future teaching work.

1.3. Technology and Motivation in Learning

The proposals for the technological training of teachers are varied and they have evolved over time. Initially, research focused on the manipulative dimension of software and hardware, as seen in studies in the latter part of the 20th century (Kaminskienė et al. 2022). However, over time, the importance of more in-depth training was gradually recognised, including didactic–technological aspects and the correct integration of digital resources in the educational process (Gómez-Trigueros 2023; Sommerhoff et al. 2023).

In the 1980s, Shulman (1986) introduced the concept of the Knowledge Base of Teaching (KBT), which highlighted the importance of combining knowledge of a discipline with pedagogical preparation. However, the irruption of ICT in society raised the need to integrate technological resources as a further component of teacher training.

In response to this new need, Mishra and Koehler (2006) developed the Technological Pedagogical Content Knowledge Framework (TPACK), which seeks to act as a guide for the proper integration of technology in education. This approach recognises the intersection of three domains of knowledge: technology (TK), pedagogy (PK) and content (CK), and it focuses on how the connections between them enhance teaching and learning with technology. These three knowledge domains give rise to the concept of technological pedagogical knowledge (TPK), which explores the relationship between technology and pedagogical practices; pedagogical content knowledge (PCK), relating to pedagogical practices and learning goals; and technological content knowledge, relating to digital resources and learning goals (TCK). Without a proper understanding of technology and its links to the educational process, it is difficult to develop positive motivations and the appropriate use of technological tools in the classroom.

The evolution of these models reflects the importance of comprehensive training to prepare teachers not only in the technical use of tools but also their contextualised pedagogical application in the content they teach (Schmidt et al. 2009; Gómez-Trigueros and Yáñez de Aldecoa 2021).

This study focuses on the motivations of teacher-training students regarding the use of technology both for their own training and for their future work as teachers. It aims to obtain an understanding of how students use digital resources for their training; what level of appropriation they have of these technologies in their preparation as teachers; and what pedagogical, didactic and motivational value they attribute to technology as a means of improving learning in their future educational work.

To carry out this analysis, responses were collected from 36 students through semi-structured interviews conducted over three academic years (2020–2021, 2021–2022 and 2022–2023). The questions were adapted to the specific research objectives based on an instrument designed for the project (I+D+i GV/2021/077). The results obtained provide a detailed insight into future teachers' views and perceptions of technology as a motivational resource for self-learning. They also provide information on how positively they rate technology as a motivational factor in the classroom and a means of improving their performance as future teachers.

These results have allowed us to formulate proposals for changes in the methodologies certain subjects in light of the importance of technology as a key tool in 21st century education.

2. Materials and Methods

The method consisted of a manifest content analysis via a non-experimental *ex post facto* research design applying a qualitative cross-sectional methodology. The data collection was carried out between September 2020 and December 2023. No specific instructions were given in relation to the responses, thus allowing for the greatest possible freedom

in the discussion by the participants. An inductive methodology was used based on the emergent nature of the qualitative data obtained, and constant comparison was carried out to identify similarities and differences in the content analysed (McCaig and Dahlberg 2010).

2.1. Participants

The participants consisted of 36 teacher-training students from the University of Alicante, Spain. A total of 20 were enrolled in the Bachelor's Degree in Primary Education Teaching and 16 in the Master's Degree in Secondary Education Teaching. The gender distribution consisted of 20 females and 16 males, with a mean age of 23.3 years (standard deviation = 2.9; age range 20–30 years).

Non-probability convenience sampling was carried out to select the participants based on the researchers' accessibility to the sample and their suitability with regard to the research objectives. The selection was based on a single criterion: having completed and passed the teaching practice modules included in the respective curricula. This circumstance was considered fundamental to the soundness and influence of their representations in practical classroom contexts (Strauss and Corbin 1990).

2.2. Instrument

The tool used to collect the data was a semi-structured interview. This technique was used to obtain personalised information on the motivation, perceptions and representations of the participants with regard to technology, both for their self-training and their future teaching work.

The focus questions were grouped into four dimensions: the concept of technology and its use for students' self-training (questions 1–3); the motivational potential of technology in education (questions 4–9); and the relationship between technology and gender equality (questions 10 and 11) (see Table 1).

Table 1. Interview focus questions.

Dimension-Variable	Focus Questions
Q1. Concept and motivation of the application of technology for self-training of future teachers	c1. What do you understand by technology? Could you propose a brief definition?
	c2. Do you think technology enhances your own learning and training? If so, please indicate why.
	c3. What motivates or drives you to use technology regularly in your preparation as a teacher?
Q2. Concept and motivation for the application of technology in education	c4. Why do you think teachers use technology in the classroom? For what purposes would you use technology in the classroom?
	c5. Do you consider that technologies favour the development of thinking skills in students? If so, which ones? For what reason?
	c6. Do you think that today's society is very mindful of the fact that teachers use technology to teach? Why?
	c7. What do you understand by motivation? Could you propose a brief definition from the point of view of motivation in education?
	c8. Do you see technology as a tool to motivate students in the classroom? If so, give at least one example.
	c9. Do you think that the inclusion of technology in the classroom poses a problem for learning? If so, please explain why.
Q3. Concept and motivation of technology for gender equality opportunities	c10. Do you think that technology facilitates the teacher's task of engaging in more egalitarian, gender-balanced teaching? If so, state at least two reasons why.
	c11. Do you think that the use of technology reduces the gender gap? Why?

2.3. Reliability and Validity

The research instrument was validated using the Delphi method (Landeta 2006). Four experts in didactics and digital environments for education rated the questionnaire on a 5-point scale. They assessed the relevance, appropriateness, internal consistency and importance of the questions asked, as well as providing a general evaluation of the construct on a scale of 1 to 10 points. Two rounds were conducted to achieve consensus of the experts with statistically reliable results. When applying this method, two groups were formed: a coordinating group composed of the researchers responsible for the design of the instrument and, secondly, the group of experts (Table 2).

Table 2. Professional characteristics of the group of experts.

Professional Category	Area of Knowledge	Teaching Experience (Years)
Senior Lecturer	General Didactics	13
Senior Lecturer	Didactics and School Organisation	12
Tenured Full-Time Lecturer (PhD)	Educational Research and Innovation	12
Tenured Full-Time Lecturer (PhD)	General Didactics	10

The procedure for the general evaluation of the construct was carried out in several stages. Firstly, the group of experts was formed, who were informed of the research objectives during a brief virtual meeting. They were given a deadline for submission of their evaluations and the draft questions were emailed to them. Secondly, each expert submitted their evaluations in relation to the following blocks: (a) relevance and appropriateness of the questions (the question reflects the meaning, which explains its measurement); (b) internal coherence (the question shows a logical relationship, which explains its measurement); (c) importance (the question is relevant, which explains its measurement) of the questions with respect to the objectives of the study. Thirdly, using the experts' data, the mean and standard deviation of the general and specific results for each question were calculated. Finally, Cronbach's alpha coefficient was calculated to determine the reliability of the instrument.

The results of the evaluation of the blocks were positive, with each block scoring an average of more than 4. The general evaluation of the construct was also considered positive, with a mean of over 7.5. In addition, a general optimal value was found for the reliability of the scale, as well as for each scale item, with values ranging from $\alpha = 0.659$ to $\alpha = 0.889$ (Table 3).

Table 3. Descriptive statistics and reliability per item.

Question	Relevance/Appropriateness		Internal Coherence		Importance	
	M	α	M	α	M	α
c1	4.86	0.889	4.77	0.963	4.90	0.893
c2	4.45	0.833	4.38	0.810	4.41	0.812
c3	4.70	0.872	4.64	0.797	4.73	0.727
c4	4.61	0.760	4.70	0.806	4.60	0.723
c5	4.82	0.881	4.80	0.814	4.79	0.735
c6	4.56	0.716	4.51	0.712	4.50	0.698
c7	4.93	0.869	4.90	0.811	4.86	0.856
c8	4.90	0.862	4.86	0.852	4.88	0.845
c9	4.32	0.691	4.48	0.659	4.30	0.716
c10	4.48	0.712	4.32	0.726	4.31	0.718
c11	4.53	0.723	4.33	0.703	4.42	0.729

2.4. Procedure and Data Analysis

Data from the individual interviews were collected at different times throughout the academic years during which the study was carried out, with the aim of obtaining

different perspectives of the phenomenon under study. After collecting and transcribing all the interviews, the constant comparison technique was used to identify similarities and differences, interpret the information and generate and define the analysis categories until reaching saturation (Miles et al. 2014).

The interviews followed a semi-structured design with a total of eleven main questions, allowing for delimitation of the information expected to be obtained. The participants were called for the interviews during their face-to-face tutorials, taking advantage of different contexts: (a) for postgraduate students, the tutorials for the preparation of their Master's Degree Final Project (TFM); (b) for undergraduate students, the tutorials for the preparation of their Bachelor's Degree Final Project (TFG) and their teaching practice reports. They were provided with information on the location, date and time of the interview and were allowed to choose according to their preferences. Before starting, they were informed of the conditions of the interview, the objectives of the research and its expected duration (30 min). The confidentiality and anonymity of the data gathered were duly guaranteed. Finally, the research team organised the notes taken during the interviews, transcribing them faithfully as they were uttered without any textual or discursive corrections.

The Atlas.ti (v. 23) software was used for coding of the information and each analysis variable in the different phases of the analysis. The resulting categories coincided with the results in the extensive literature existing on the perception of technology for motivation in education (Soriano-Sánchez and Jiménez-Vázquez 2022). These categories were integrated around three central dimension analysis variables: concept and applications of technology for self-training of future teachers; concept of motivation and application of technology in teaching-learning; and technology and gender equality/opportunities (Table 4).

Table 4. Dimensions and their relationship with types of motivation with ICT.

Dimension Analysis Variables	Type of Motivation	Subcategories Indices	Codes Atlas.ti
Q1. Concept and motivation of the application of technology for the self-training of future teachers	Intrinsic	Achieving curricular objectives	Q1-1
		Interest–curiosity	Q1-2
		Improving grades	Q1-3
	Extrinsic	Family/teacher rewards–scholarships–payment of tuition fees	Q1-4
		Classroom climate–competitiveness	Q1-5
		Equal opportunities–socialisation	Q1-6
Q2. Concept and motivation of the application of technology in teaching	Intrinsic	Achieving teaching objectives	Q2-1
		Improving the quality of teaching	Q2-2
		Applying innovative learning methodologies	Q2-3
		Increasing student participation	Q2-4
		Motivating students	Q2-5
	Extrinsic	Following trends	Q2-6
		Recognition of the educational community	Q2-7
		Positive feedback from students/parents	Q2-8
		Improving equal opportunities–socialisation	Q2-9
Q3. Concept and motivation of technology for gender equality opportunities	Intrinsic	Improving educational use of ICT	Q3-1
		Empowerment in the use of ICT	Q3-2
	Extrinsic	Relevant social issue	Q3-3
		Enabling and enhancing gender inclusion in the use of ICT	Q3-4

The methodology for the presentation of the results involved counting the keywords and the frequency of the most recurrent thematic responses. The percentages of concomitant textual fragments were also recorded. For the identification of each textual response in the presentation of the results, the units were coded using the following alphanumeric code: S [student_(student number)]-T [degree_(D=Degree; M=Master)]-V [subcategory-variable or indicator code_(letter and number)]. This approach allowed for systematic organisation and classification of the responses and facilitated the subsequent interpretation and analysis of the results.

3. Results

This section presents an analysis of the information provided by the 36 teacher-training students who participated in the study. The results are grouped into the three dimension variables of the analyses and include the resulting indicators (Table 5).

Table 5. Frequency and presence of subcategory variables or indicators by dimension variable analysed.

Dimension Variable	Total <i>f</i> per Variable	Total %	Codes Atlas.ti	<i>f</i> per Indicator	Relative %
Q1	46	39.6%	Q1-1	6	13%
			Q1-2	3	6.5%
			Q1-3	16	38%
			Q1-4	13	28.2%
			Q1-5	6	13%
			Q1-6	2	4.3%
Q2	52	44.8%	Q2-1	3	5.7%
			Q2-2	8	15.3%
			Q2-3	5	9.6%
			Q2-4	9	17.3%
			Q2-5	13	25%
			Q2-6	2	3.8%
			Q2-7	1	1.9%
			Q2-8	3	5.7%
			Q2-9	8	15.3%
Q3	18	15.6%	Q3-1	4	22.2%
			Q3-2	4	22.2%
			Q3-3	2	11.1%
			Q3-4	8	44.4%

f = frequency
Total textual frequencies: *n* = 116

The results provide a detailed insight into how the students (future teachers) perceive motivation with technology in different aspects of their training and future work in the classroom. Dimension Q2, which focuses on how motivation with technology is developed in teaching, seems to be discussed the most by the participants, closely followed by dimension Q1, which focuses on the application of motivation with technology for self-training. Dimension Q3, relating to the collaboration of motivation with technology in gender equality opportunities, has a lower presence in the responses. Broadly speaking, it can be seen that the largest number of references revolve around the category variable relating to Q2: *how motivation with technology is developed in teaching* (N = 52; 44.8%). Similarly, it is noteworthy that indicator Q1-3: *improving grades* (*f* = 16; 38%) together with indicator Q1-4: *family/teacher rewards–scholarships–payment of tuition fees* (N = 13; 28.2%) of the category variable Q1: *how motivation with technology is applied for the self-training of future teachers* is the one that appears the most in the participants' responses (N = 46; 39.6%). On the opposite side is category variable Q3: *how motivation with technology contributes to gender equality opportunities* (N = 18; 15.6%). In this case, the distribution by information units is uneven, with higher representativeness of indicator Q3-4: *enabling and improving gender*

inclusion in ICT use (N = 8; 44.4%) and very limited presence of indicator Q3-3: *relevant social issue* (N = 2; 11.1%).

In order to evaluate how these responses refer to aspects of motivation and its relationship with technology, it is necessary to carry out an analysis of the responses by the participants to identify the ideas in which the references found are embedded (Pinto and Molina 2015). The narratives collected in the study for each dimension variable are shown below.

3.1. Dimension Variable: Concept and Motivation of the Application of Technology for Self-Training of Future Teachers

In this dimension, motivation processes with technologies in the self-training of future teachers are mostly associated with seeking better grades, which is identified as an intrinsic motivation ($f = 16$; 38%). Next, seeking rewards from parents and teachers emerges as a significant extrinsic motivation ($f = 13$; 28.2%). In contrast, the use of ICT resources is barely associated with future teachers' interest or curiosity ($f = 3$; 6.5%) as an intrinsic motivation.

These responses suggest that the motivation to use technology is strongly linked to obtaining improved grades and external rewards rather than intrinsic interest or curiosity to learn. This indicates a perception of technology as a means to obtain positive academic results rather than a tool to explore and deepen knowledge.

In the narratives collected, the focus is on the motivation to use technology to achieve more positive results in assignments and assessments. The importance of curiosity and interest in exploring more complex information or broadening knowledge seems to be less relevant according to the responses.

I usually use technology to produce higher quality work [...]. That time I spend searching on the internet or using software is to improve my final paper and to make sure I get a very good grade $S_{(5)}-T_{(G)}-V_{(Q1-3)}$.

I often use software to help me organise references or to check for spelling mistakes. This helps me to get better grades in my work $S_{(21)}-T_{(M)}-V_{(Q1-3)}$.

Whenever I've used digital resources such as design programmes for the cover page or searched the internet for similar materials to those I'm working on, I've received good grades for the tasks assigned. I like my teachers to have a good impression of me $S_{(2)}-T_{(G)}-V_{(Q1-4)}$.

I'm looking to get good grades. I need to learn, but above all I need to get good grades so that [my parents] can continue to help me with my studies $S_{(9)}-T_{(G)}-C_{(Q1-4)}$.

The work atmosphere and competitiveness of the class group itself is mentioned as a motivating element in the use of technological resources. In some cases, these narratives appear to be linked to the achievement of the curricular objectives of the subjects being studied:

[I'm motivated to use technology] because my classmates use it regularly and looking for information in the library seems a bit old-fashioned. I don't want to be the only one who doesn't search the internet and use technology to do the tasks $S_{(11)}-T_{(G)}-V_{(Q1-5)}$.

Most [of the class] use the internet and ICT to do their work because it's quicker to search the Web than to wade through lots of books. Also, hardly anyone [in class] goes to the library to look for anything $S_{(22)}-T_{(M)}-V_{(Q1-5)}$.

These narratives reveal that the work climate and competitiveness in the class group are motivating elements for the use of technological resources. In some cases, the narratives are linked to the achievement of the curricular objectives of the subjects being studied. Specific examples of these narratives are presented below.

In addition, there is little mention of extrinsic motivation relating to improving opportunities and socialisation in the use of technology for academic self-training. The narratives

for this indicator are more focused on the teaching task and less on self-training. This is evidenced by the difference in frequency and percentage of representation of the indicators Q1-6 ($f = 2$; 4.3%) and Q2-9 ($f = 8$; 15.3%).

3.2. Dimension Variable: Concept and Motivation of the Application of Technology for Education

This dimension variable, which has the highest total frequency ($f = 52$; 44.8%), examines the motivation of future teachers in the application of technology for teaching. The narratives associated with this dimension variable have an impact on future teachers' approach to technology in order to promote greater participation by their future students in class, as they are aware that ICT captures students' attention and encourages student participation:

One of the main reasons [I would include ICT in the classroom] is student motivation. [Students] are obsessed with it and it's a way of bringing us closer to their world and offering them knowledge $S_{(16)}-T_{(G)}-V_{(Q2-4)}$.

I believe that most teachers use technology with a clear interest in firstly motivating students, encouraging them and attracting their attention so that they are attentive and participate in class. Secondly, because the use of ICT improves students' skills and thus improves their learning $S_{(30)}-T_{(M)}-V_{(Q2-5)}$.

Because it's a dynamic way of attracting students' attention, getting them involved and interested in learning. It also makes it possible to propose more innovative and attractive teaching designs for secondary school classes $S_{(28)}-T_{(M)}-V_{(Q2-4)}$.

I believe that teachers can motivate students by making them see that learning a subject is connected to their daily lives, and in this sense technology can offer us many tools. It's also a way of making the learning process more fun for younger pupils $S_{(18)}-T_{(G)}-V_{(Q2-4)}$.

It is also included as an intrinsic motivation for future teachers to improve the quality of education. The narratives reveal a proactive perception of technology as a classroom resource (Q2-2) ($f = 8$; 15.3%):

[I will use technology in my future classes] because it facilitates explanation of the content and helps to develop other skills of the students. It also allows me to use other innovative learning methodologies that improve the quality of teaching $S_{(14)}-T_{(G)}-V_{(Q2-2)}$.

[Technology] makes it possible to show the content in a clearer manner, providing visual examples and adding tools that make learning easier for students, as well as making the classroom more dynamic $S_{(33)}-T_{(M)}-V_{(Q2-2)}$.

In terms of extrinsic motivation, one indicator that stands out relates to the functionality of technology in the classroom to improve equality of opportunities and the socialisation of students (Q2-9) ($f = 8$; 15.3%):

Technology tends to grant freedom to those who use it to express themselves, to inform themselves, to raise awareness and to learn. Therefore, it can be useful for individual development, as an empowering element which can expand your vision [...] and achieve more egalitarian education $S_{(7)}-T_{(G)}-V_{(Q2-9)}$.

I believe that technologies improve equal opportunities because they democratise society, since practically everyone has access to the internet and to knowledge, which is a good way to reduce the differences between men and women and also between people with different purchasing power $S_{(26)}-T_{(M)}-V_{(Q2-9)}$.

In the educational context, ICT facilitates socialisation between students because it allows face-to-face and virtual group work and because many students feel more capable of participating in class with presentations using technology $S_{(34)}-T_{(M)}-V_{(Q2-9)}$.

In contrast, little or no importance is attributed to the use of ICT as an adaptation to current trends (Q2-6) ($f = 2$; 3.8%) or as a search for recognition by the educational community (Q2-7) ($f = 1$; 1.9%).

3.3. Dimension Variable: Concept and Motivation of Technology for Gender Equality Opportunities

Another important aspect analysed is the motivation of technology as a tool and resource to achieve equal opportunities in education. Future teachers positively relate the use of ICT in the classroom with the possibility of improving gender inclusion and reducing the existing digital divide. This is an extrinsic motivation that grants inclusion of technology in the classroom the added value of minimising gender differences. In this sense, the narratives linked to the indicator Q3-4 ($f = 8$; 44.4%) emphasise the strengths of technology as a teaching resource for equality:

Technology tends to grant freedom to those who use it to express themselves, to inform themselves, to raise awareness and to learn. Therefore, its use can be useful for individual development, as an empowering element that can expand your vision, break down gender roles and achieve more equal education $S_{(15)}-T_{(G)}-V_{(Q3-4)}$.

Education and technology in the educational context both seek to reduce inequality. Technology reduces possible gender gaps in students' education, as well as enriching their thinking from an egalitarian perspective $S_{(24)}-T_{(M)}-V_{(Q3-4)}$.

I think so, because [...] practically everyone has access to the internet and to knowledge, which is a good way to reduce the differences between men and women and promote gender equality $S_{(8)}-T_{(G)}-V_{(Q3-4)}$.

In terms of intrinsic motivation, teacher-training students relate the use of ICT in the e-learning process to the empowerment of society (Q3-2; $f = 4$; 22.2%) and to narratives relating to improving self-training in digital teaching skills (Q3-1; $f = 4$; 22.2%):

Education and technology in the educational context both seek to reduce socio-economic inequality. In this sense, technology empowers society and enriches students' thinking from an egalitarian perspective $S_{(3)}-T_{(G)}-V_{(Q3-2)}$.

[I plan on using technology in class] as a tool that allows me to improve my digital skills as a teacher and develop my teaching proposals with greater skill $S_{(25)}-T_{(M)}-V_{(Q3-1)}$.

In contrast, little importance is attributed to the use of technology in relation to the hyper-connected context of the 21st century (Q3-3; $f = 2$; 11.1%) and the search for recognition by the educational community (Q2-7; $f = 1$; 1.9%). These extrinsic motivations seem to have less weight in future teachers' justification for implementing technology in their professional activity.

4. Discussion

Motivation emerges as a key predictor of academic success, exerting a significant impact on students' behaviour and learning. Various theoretical approaches such as goal theory, the attributional theory of achievement motivation, the expectancy/value model and self-determination theory, among others, have been developed to analyse the various factors driving the learning process (Valenzuela et al. 2015).

In the field of teacher training, it is essential to consider the importance of different types of motivation, such as intrinsic and extrinsic motivation, which play a fundamental role in the achievement of educational goals. Despite numerous studies of what is taught in faculties of education and how, with a focus on pedagogy and subject content knowledge according to Shulman's Knowledge Base Model (Shulman 1986), it is essential to highlight the growing relevance of technology as a third essential pillar in teacher training.

In the 21st century, technology has assumed a significant role as another key source of knowledge of essential importance in the training of future teachers. This evolution has led to the development of the Technological Pedagogical Content Knowledge Model (TPACK) by [Mishra and Koehler \(2006\)](#), which recognises the inter-section of three essential domains: technology, pedagogy and subject content knowledge. Furthermore, it stresses the need to review research into teacher motivation, especially with regard to the use of ICT for teaching.

The convergence of motivation and technology in teacher training highlights the importance of understanding how these digital tools can not only influence the teaching–learning process, but also the intrinsic and extrinsic motivation of teacher-training students themselves. This integrative approach is a key way to prepare future teachers for the educational context of the 21st century.

This study seeks to unravel the nuances of intrinsic and extrinsic motivation that drive future teachers to integrate technology in the educational environment. Three key dimensions may be distinguished: motivation for teacher self-training; application of technology in teaching; and the contribution to gender equality and equal opportunities in the classroom.

In the area of self-training, the results reveal that teacher-training students perceive technology as an extremely useful tool. In terms of intrinsic motivation, the study confirms that the quest for better grades in tests and assignments is the main motivation behind the use of technology for self-training. Surprisingly, interest in learning, curiosity and the achievement of curricular goals was found to occupy a secondary position, contradicting previous research ([Reyes and Rodríguez 2022](#); [Del-Valle-Díaz et al. 2023](#)) suggesting that these factors have an important influence on interest in educational technologies. These findings could shed light on the reasons behind the difficulties various institutions face when training teachers in the field of digital skills, as future professionals do not consider these skills to be essential for their jobs.

Understanding the intrinsic motivations of future teachers provides valuable insights that can guide training and professional development efforts. Furthermore, this holistic analysis highlights the need to consider not only technical skills but also personal incentives that influence the integration of technology in teacher self-training, thereby contributing to ensure more effective preparation of tomorrow’s educators in today’s educational landscape.

The current study delves into the intrinsic and extrinsic motivations leading teachers to incorporate technology in their training. The connection between academic performance and scholarship opportunities stands out, suggesting that passing subjects is a significant extrinsic motivation. This relationship is linked to the specific requirements to obtain scholarships in Spain, where students are required to pass at least 90% of the credits for which they were enrolled in the previous year ([Boletín Oficial del Estado 2023](#)). This perspective reveals an interesting nuance: education is perceived not only as a learning process, but also as a strategy to achieve specific goals such as scholarships. Future teachers may see the use of technology as a tool to ensure the academic performance necessary to access benefits such as scholarships and financial support. This approach highlights how students can internalise certain behaviours to reduce risks and ensure academic success, using ICT as a tool to achieve specific goals. This conclusion is consistent with the findings of other research ([Mosquera et al. 2023](#); [Soto-Varela et al. 2023](#)).

The current study also highlights the influence of the work climate and the use of ICT as an extrinsic motivation of future teachers. The results support the idea that greater use of technological resources by some students in a classroom encourages the adoption of these technologies by the rest of the students in the same classroom. This phenomenon illustrates the importance of learning by imitation or social learning in the educational context ([Tituaña 2022](#)).

The relationship between the use of technology by some students and its adoption by others reflects how interactions in the educational environment can generate positive per-

ceptions towards the added value of technology in teacher training (Baş and Baştuğ 2021). Also noteworthy is the connection between this phenomenon and emotional intelligence, suggesting that social interactions influence the perception and acceptance of technology as a tool for self-training.

External regulation, where behaviour is a consequence of seeking to obtain a desired result, is manifested in this context through peer recognition and inclusion in the class-group. This type of regulation can have a significant impact on the adoption of technology in teacher training, as it reinforces the positive perception and social acceptance of these tools (Serafini and Cuenya 2020). These findings highlight the importance of considering social and emotional dynamics in the implementation of technology in teacher training. Furthermore, they underline the relevance of strategies that promote positive experiences and role models for the use of technology within the educational environment.

The study reveals that the main intrinsic motivation among future teachers for the integration of technology in their teaching practice was to involve students in the learning process. The results highlight the direct connection between the perception of technology as a tool to actively engage students in their learning and the intrinsic motivation of teacher-training students. In addition, the extrinsic motivation of fostering students' attention and participation was also relevant in the predisposition of future teachers towards the incorporation of technology in their classrooms. This is in line with previous research suggesting that technology-mediated teaching and learning can improve student attention and encourage participation in educational activities (Copriady 2014; Lawrence and Tar 2018).

The association between the use of technology and improvements in the quality of teaching is another aspect highlighted in our study. This reflects the widespread perception that the integration of technology in teaching can facilitate the creation of more effective and diversified activities, thus improving teachers' performance. It highlights the notion that technology-mediated learning, when it is both active and interactive, contributes to the development of a consistent understanding of the subject content from a skills perspective (Gökçearsan et al. 2022).

The implementation of technology-enhanced learning environments is also associated with a student-centred approach, where learners are actively involved in the construction of their knowledge. This paradigm shift places the teacher as a guide or facilitator of the educational process, supporting the idea that technology can empower students and promote autonomous learning (Wu et al. 2022).

These results underline the importance of considering intrinsic and extrinsic motivation when integrating technology in teaching practice. The positive perception of technology as a tool for engaging students and improving the quality of teaching can be a significant driver for its adoption in the classroom.

The current study also highlights future teachers' positive perception of the possibilities of technology to improve equal opportunities and socialisation of students as a significant extrinsic motivation. This perspective may have been influenced by the actions and policies implemented by educational bodies and institutions in Spain, especially during the COVID-19 pandemic. The health crisis highlighted deficiencies in digital skills in the educational environment, leading to investments and efforts to achieve the digitalisation of different educational levels, as well as teacher training in the use of these technologies (Vásquez et al. 2023).

Other extrinsic motivations, although less prominent, include the positive evaluation of family members and the students themselves. Adaptation to current trends in the media relating to the use of ICT tools in education is also mentioned. It is important to understand teachers' perceptions regarding the potential of ICT for learning and teaching, as they can influence the acceptance or rejection of their use in education (Baş and Baştuğ 2021).

In relation to motivation for the use of technology focused on achieving gender equality and equal opportunities for students, the study reveals that this dimension has a

relatively lower presence in both the intrinsic and extrinsic motivation of teacher-training students compared to the other dimensions analysed.

In terms of intrinsic motivation, it is noteworthy that future teachers seek to implement technology with the aim of improving their didactic use and empowering themselves for the application of ICT in their educational work. Both indicators are related to the improvement of the participants' digital teaching skills.

In terms of extrinsic motivation, the findings show that the use of technology is seen as facilitating and enhancing gender inclusion. Also considered, although to a lesser extent, is the idea that the implementation of technology can contribute to the achievement of equal opportunities in educational processes. These perceptions are in line with previous research highlighting the opportunities offered by technology to reduce the gender digital divide and democratise society, reducing differences between students (Gómez-Trigueros and Yáñez de Aldecoa 2021) and fostering egalitarian thinking (Pérez et al. 2021).

This study highlights that teacher training generates a positive motivation towards the use of technology as a key tool for self-training and future teaching work in the classroom. In the case of their training, this positive predisposition is characterised by the pursuit of personal achievements focused on achieving better grades or passing courses. These results differ from those of other studies (Reyes and Rodríguez 2022; Del-Valle-Díaz et al. 2023) and suggest that it is training excellence and digital literacy that motivates future teachers to use ICT in their university studies. With regard to the use of ICT as a teaching tool, teacher-training students attribute high pedagogical–educational value to it, considering it to be capable of capturing students' attention and enhancing student involvement and learning.

These results confirm the importance of continuing with the efforts to coherently develop digital teaching skills in syllabuses and training curricula in order to train future teachers in the correct incorporation of technology beyond the traditional use of digital resources (preparation of documents and presentations, basic searches on the internet without critically examining the sources, use of social media for the basic purpose of communication with the class group, etc.) or simple searches for student motivation. As previous studies (Karsenti and Lira-Gonzales 2011; Pinto and Plaza 2021) have shown, current training contexts do not allow for the genuine integration of ICT in the classroom, and teachers' digital competence levels are low. In this sense, e-learning models such as TPACK can help to compensate these shortcomings in the use and development of technology in the approaches adopted by teacher-training students, providing them with the manipulative, didactic–pedagogical and subject content skills that allow them to advance with the correct incorporation of digital tools in the classrooms of the 21st century.

With regard to the limitations of this study, it should be noted that the results were based on responses provided by students from a single university and are limited to the Spanish context, so they cannot be generalised to other countries.

In relation to future research, we propose the in-depth study of the relationship between the motivation of future teachers and technology from a quantitative and participatory perspective, including academic performance based on a specific technological intervention. It would also be interesting to explore other variables that may influence the type of motivation for the use of technology in their future teaching tasks, such as the gender of the sample, the quality of the content or the methodology used.

Comparative studies could also be carried out to analyse differences in student motivation between online and traditional learning environments.

5. Conclusions

The aim of this study was to explore the views and perceptions of teacher-training students regarding technology as a resource for self-learning and to improve their work as future teachers. The participants' narratives regarding their intrinsic and extrinsic motivations for technology use provide a clear picture of the importance that future teachers grant to ICT as a resource for teaching and learning, both for themselves and their future students.

The main intrinsic motivations for its use in their training are geared towards achieving better academic results, with interest or curiosity about accessing more information on the internet assuming a secondary role. Extrinsic motivations include passing the different subjects in order to continue their studies, completing their degree and the greater or lesser use of digital resources and the internet in the classroom environment.

In the case of ICT as a teaching tool, it is considered to play a key role to improve educational processes. This is one of the intrinsic motivations for its implementation in the classroom, together with the stimulation of student motivation and attention. The students also attribute technology with the potential to democratise education and reduce inequalities. It is seen as having the capacity to diminish gender differences and reduce the latent gender digital divide in the educational context. This is another extrinsic motivation driving future teachers to perceive the use of ICT in teaching positively.

To sum up, this study highlights the importance of understanding the intrinsic and extrinsic motivations that influence the use of technology in teacher education, along with the need to promote a more holistic approach to digital skills development.

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