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Information and Communication Technologies Serving Educational Transformation: Emotions, Benefits and Efficacy of ICT

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Education systems must be constantly renewing to offer quality education that is in-keeping with 21st-century society's demands. In recent times, information and communication technologies (ITC) have gained strength and become revitalising elements at all social levels. In the education domain, the application of technological resources can make a valuable contribution to promote overall student development and to favour the teaching-learning process. Bearing in mind this reality, this article aims to analyse the perceptions of the relatives of students aged 3-18 years of the impact that technology has on their children's education in terms of emotions, benefits and efficiency. It also aims to examine if the emotional factor is a conditioning factor for how the benefits and efficacy obtained from using ICT in classrooms are perceived. Likewise, the underlying relation between the variables referring to ICT benefits and efficacy is studied. For this purpose, a survey was devised, which 720 mothers and fathers completed. To this end, descriptive statistics (means and standard deviations) and the Structural Equation Model (SEM) were applied. The application of SEM revealed that positive emotions had a positive significant effect on perceived benefits. Another positive significant effect was found for positive emotions and benefits on perceived efficacy. Although there is a significant diversity of perceptions, families identify the greatest benefit of ICT in education as its remarkable capacity to motivate students in their educational processes and to develop digital competence. Regarding the efficacy of these tools, participants have highlighted how ICT can facilitate access to online materials for all students. From the study results, we can conclude that relatives recognise that technological tools confer their children's educational process benefits and efficacy.

Keywords: educational transformation, emotions, benefits, efficacy, relatives, ICT

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INTRODUCTION

Review of literature

Constant social transformations and progress mean that education systems must be updated to offer students an education that falls in line with existing requirements and demands that go beyond classrooms. In the late 1990s, UNESCO's World Education Report (1998) predicted the transformative impact of information and communication technologies (ICT) on teaching methods, educational processes, and access to information. Nowadays the UNESCO points out the high capacity of digital innovation to complement, enrich and transform education, and to extend access to educational opportunities, and their potential to favour Sustainable Development Goal (SDG4) being met: ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Digital technologies, thus, constitute a social-type need to ensure education as a basic human right (UNESCO, 2022).

ICT have transformed many aspects of education for being extremely efficient tools that can provide a wide range of benefits for students, teachers and the T-L process (Das, 2019). Given their numerous qualities, these resources are capable of improving the quality of teaching by offering new tools and learning opportunities that favour overall student development (Henderson, 2020). Of their characteristics, the following stand out: interactivity, the capacity to personalize teaching based on aspects like learning paces, weak points, strong points and each student's needs, accessibility for all students, especially those with special needs; variety in educational resources and materials (Fansury et al, 2020).

The benefits and efficacy of ICT are closely related, as proper ICT use maximizes these tools' advantages, adding value to teaching and enhancing learning efficiency (Caena & Redecker, 2019; Henderson, 2020). According to Van Braak et al. (2004), the use of these tools can be divided into two levels. The first level refers to teachers' generally inefficient use of technological resources because they employ them merely as a support to carry out their professional work and they do utilize the benefits that ICT offer. The second level covers the use that completely employing these tools involves by efficiently applying them so that their numerous benefits can be exploited in teachers' day-to-day work. According to these authors, reaching the second level is the only way to efficiently use technology to enjoy the benefits it offers us.

On the efficacy of ICT in education, it is worth making a comparison to the model that Bandura presents (1995), who talks about the term "self-efficacy". This author defines self-efficacy as someone's personal perception of their own capacities to face a given situation. In line with it, Christophersen et al. (2016) transfers this terminology to the education field by indicating that teachers' self-efficacy refers to their vision of their own capacity to provide good teaching in classrooms. Thus, by bearing all this in mind, teachers' adequate use of ICT tools in their daily work will confer them more self-efficacy and will, therefore, allow them to offer students more efficient education because teachers will put the benefits of ICT to good use (Das, 2019; Henderson, 2020).

ICT offers diverse benefits to education. Today, digital skills are essential for meaningful engagement in various aspects of daily life (Hafifah, 2020; Henderson, 2020). To this end, one of the most outstanding benefits is the possibility of students acquiring the digital competence, and education centres must carry out these practices so that this competence can be developed (Hafifah, 2020; Jackman et al., 2021; Rodrigues et al., 2021). Chan et al. (2017, p. 2) define this competence as "the capacity of understanding and using information in multiples formats by stressing critical thinking more than ICT competences".

Continuing with the benefits that ICT provide, and given the wide range of resources, and the use of technological devices and methodologies that support their practices with them, students feel more motivated with and committed to their education, which culminates in their performance and results improving (Asiah & Anwar, 2019; Fansury et al., 2020; Gjelaj et al., 2020; Henderson, 2020; Krishan & Al-rsa'i, 2023). Furthermore, the possibility of students accessing resources, learning at their own pace, having collaboration tools to work with other students or receiving immediate feedback all offer students the chance to be active agents who show more autonomy and self-responsibility in their learning (Henderson, 2020). It is also worth stressing the capacity of technology for facilitating the relation between students' relatives and schools (Llevot Calvet et al., 2019; Macia Bordalba & Garreta Bochaca, 2019; Moreno-González et al., 2023), which favours their optimum educational and personal development (Reinke et al., 2019).

Despite the numerous benefits that ICT offers in the educational field, its integration also entails significant challenges, especially related to the digital divide. This divide refers to inequalities in access to and effective use of technology among students and communities, particularly affecting those with fewer socioeconomic resources or those living in rural areas (Rofiah et al., 2022; Selwyn, 2021). Although ICT democratises access to knowledge, it can also increase inequalities if there is a lack of adequate infrastructure, teacher training, or access to stable devices and connectivity. Moreover, the effective use of ICT requires digital competencies from both students and teachers, which can hinder its implementation in contexts where training resources are limited (Antonietti et al., 2022). Consequently, digital inclusion is a critical aspect in ensuring that the use of ICT contributes to equity and an improvement in educational quality for all students.

Finally, it is worth pointing out how ICT provide teachers with the means to adapt to their students' needs, which facilitates and favours learning. By bearing in mind each student's level of knowledge, pace and learning style, teachers can offer a more individualized learning experience. Likewise, technological tools allow much more specific needs to be covered. For example, some students require specific adaptations to access learning because they have some kind of disability or disorder (Henderson, 2020).

Study objectives

By taking into account the valuable contribution that ICT make in the education field, this study aims to examine relatives' views about such technology being incorporated as

a didactic tool. The overall objective consists in analysing the positive emotions that the relatives of students aged 3-18 years feel as a result of using ICT in the education field and if ICT have an effect on the perception of the benefits and efficacy of their use. Another aim is to examine which benefits relatives think that ICT have for their children's education and if this idea influences how they perceive the efficacy of this technology in the education context. Finally, different control variables are considered to determine if the socio-demographic characteristics of the surveyed relatives are conclusive for obtaining the same perceptions or different ones.

METHOD

Participants

The sample of this study comprised 720 relatives of students aged 3-18 years from the Spanish Autonomous Community (SAC) of Aragón. Table 1 reflects the socio-demographic variables of the surveyed relatives, of whom 79.7% were women and 20.3% men. Their ages ranged from 18 to 62 years (M = 45.88; SD = 5.53). The participation of those mothers and fathers born in the 1970s stood out with 65.28%; that is, those aged 43-52 years. Regarding the province where the participants currently live, most indicated the Zaragoza province (77.4%), followed by the Huesca (16.8%) and Teruel (5.8%) provinces. This geographic distribution is similar to the population density of the three provinces of Aragón, where that of Zaragoza is more populated and that of Teruel has the fewest inhabitants. Half the surveyed relatives had University studies (50.1%), followed by those who had completed Vocational Training (26.9%), while a lower percentage had finished Primary/Secondary Education (11.6%) and Higher Secondary Education (11.3%). Most of the children of the surveyed relatives attend public education centres (89.6%). The remaining percentage goes to private/ state-assisted education centres (10.4%). Finally, most relatives indicated living in a town with more than 10,000 inhabitants (61.3%). The remaining participants mentioned living in towns with between 2,000 and 10,000 inhabitants (27.9%), and towns with fewer than 2,000 inhabitants (10.7%).

Table 1
The sample's socio-demographic characteristics (N=720)

Variables	N	% of the sample
Gender		
Female	574	79,7
Male	146	20,3
Age (M=45.88; SD=5.53)		
Between 18-32 years old	7	0,97
Between 33-42 years old	169	23,47
Between 43-52 years old	470	65,28
Between 53-62 years old	74	10,28
Province		
Huesca	121	16,8
Zaragoza	557	77,4
Teruel	42	5,8
Highest level of education attained		
Primary/Secondary	84	11,6
Baccalaureate	81	11,3
Vocational training	194	26,9
University	361	50,1
Type of school your children attend		
Private-Subsidised	75	10,4
Public	645	89,6
Children's school environment		
Municipality with less than 2,000 inhabitants	78	10,7
Municipality between 2,000 - 10,000 inhabitants	201	27,9
Municipality with more than 10,000 inhabitants	441	61,3
Total	720	100

Definition of the variables

After reviewing the theoretical literature on the study objective, each key variable – positive emotions, benefits, and efficacy– was defined. The relationships among these constructs were analysed from a subjective, perception-based perspective, incorporating the participants' prior expressions.

As a benchmark of the emotional education field, Bisquerra (2016) understands and defines the emotion concept as the way in which an organism is manifested when faced with certain stimuli. This author distinguishes between "positive" and "negative" emotions, but emphasizes that this terminology must not lead to the mistake of thinking that certain emotions are bad because all emotions are necessary in human beings. "Positive" or "negative" concepts refer to how each emotion alters or interferes with our well-being. Following Bisquerra's (2016) definition, positive emotions are those that make us feel good and arise when events align with personal goals. In the positive

emotions' series, the author includes joy (enthusiasm, satisfaction), devotion (interest, trust) and happiness (calm, security).

The second studied variable responds to the "benefits" term, which refers more specifically to the benefits that technological tools offer education so that it is enriched. The benefits of ITC in education refer to the advantages and improvements that these tools and technological resources can provide the T-L process with (Boruah, 2022; Erni, 2019).

Finally, the "efficacy" variable is defined in the close relation to ICT efficacy. Educational efficacy generally refers to the ability of an educational system or practice to achieve positive outcomes in student learning and development (Kyriakides et al., 2018). In the present research work, the term efficacy refers to such capacity mediated by technological resources.

Instrument

The instrument chosen for this study was a survey. It was designed ad hoc after thoroughly performing a review of the available literature linked with the research theme. In order to determine the suitability, fit and writing of the dimensions and items making up the first version of the survey, it was checked by a panel of experts. At this stage, 10 academic experts in fields such as inclusive education, ICT in classrooms, educational research methods, and behavioral sciences participated. The survey was also tested with 10 parents of students aged 3–18 from SAC Aragón to ensure the clarity of its vocabulary and instructions. In this evaluation phase of the instrument, relatives from different economic, educational and socio-cultural levels participated, and were intentionally selected to obtain such diversity.

Having finished all the reviews and checks, the contributions made by professionals and relatives were considered to redesign the survey. To obtain a definitive version of the instrument, it was arranged in two parts. The first part corresponded to the request for data related to participants' socio-demographic characteristics. The second part included the indicators by means of which the latent constructs to be analysed and linked with using technology in the education domain were defined: positive emotions (3 items): the benefits of such use for the T-L process (7 items); perceived efficacy of the educational practice mediated by ICT (25 items). In turn, the last construct was arranged in five subdimensions: structuring the physico-material space in classrooms (5 items); the academic structure of activities and tasks (6 items); the social structuring of the classroom or interpersonal relationships (5 items); classroom organization and control structures (5 items); participants' cognitive structures (4 items). This second part was made up of 35 items in all. Using the Spanish education system's rating scheme, items were scored on an 11-point Likert scale, ranging from 0 to 10.

Data Analysis

In a first stage, descriptive statistics were analysed of the positive emotions that the relatives of the students from Aragón experienced as a result of using ICT as an educational resource in classrooms, and also of the barriers that they believe these tools

pose for their children's T-L process, and the needs they pointed out as relatives when tackling their use.

To analyze the data in this study, we used Structural Equation Modeling (SEM) with latent variables. This approach allowed us to incorporate initial data and evaluate their suitability. SEM also enables researchers to adjust or refine the model as needed (Bollen, 1989). We used robust statistical techniques and goodness-of-fit indices to handle data that were not normally distributed. Model estimation was performed using MPLUS software (version 7.4; Muthén & Muthén, 1998-2007) with a robust maximum likelihood method. This method applies Satorra and Bentler's (1994) corrections to both goodness-of-fit measures and the standard errors of the estimated parameters.

First of all, the models to measure theoretical constructs were tested. For this purpose, a confirmatory factor analysis that included three dimensions was carried out. The identification of the underlying structures in perceived efficacy was considered, which required specifying the latent dimensions. These dimensions constitute sets of variables that cannot be directly measured, and they were deduced when the observed indicators were taken into account.

Next the factor scores were estimated for the perceived efficacy of ICT as a means to favour the educational process. Then five first-order latent variables were obtained and corresponded to the general structures that included the educational practices performed by means of ICT: structuring the physico-material space in classrooms; the academic structure of activities and tasks; the social structuring of the classroom or interpersonal relationships; classroom organization and control structures; participants' cognitive structures.

The resulting correlations between the latent dimension that corresponded to perceived efficacy were considerably high. Hence it was deemed appropriate to estimate a second-order model (Bagozzi, 2010), which included a higher order dimensional structure called "ICT efficacy".

In all cases, the factor loadings of each item on its corresponding dimension were evaluated, with a minimum value of 0.50 set to ensure that each indicator made a significant contribution to its latent variable (Hair et al., 2010). Additionally, the average variance extracted (AVE) coefficients and composite reliability (omega or CRC) were calculated for each dimension. The AVE coefficient, with a minimum value of 0.50, ensures that the variance captured by the factors exceeds the variance due to error (Fornell & Larcker, 1981), indicating adequate convergent validity. Similarly, the omega coefficient, with a threshold of 0.70, guarantees the internal consistency of the dimensions (McDonald, 1985). Finally, to assess discriminant validity, the square roots of the AVE values were compared with the correlations between constructs, following the Fornell-Larcker criterion (1981). This confirmed that each construct shared more variance with its indicators than with other constructs in the model. These procedures have strengthened the validity of the measurements and enhanced transparency in the application of SEM.

After examining this set of modelling, a structural model with latent variables was checked by considering that the consistency of the described measurement models was evaluated, along with the significance of all the structural parameters involved in them. It was proposed that the relation among the variables had to respond to these conditions: firstly, the positive emotions that relatives feel about ICT have a direct effect on these tools' perceived efficacy; secondly, positive emotions also have a direct effect on the fact that benefits are perceived when applying technology to education. In turn, this perception of benefits has an effect on perceived efficacy. Finally, an indirect effect exists between positive emotions and perceived efficacy through benefits, which act as a mediator variable.

If, in the end, positive emotions did not have a significant influence when the mediator variable (benefits) was present, it would be established that the effects of these positive emotions would be "completely" mediated by the mediator variable. Furthermore, if the positive emotions variable significantly influenced efficacy even when the mediator variable was present, it would be determined that the effects of this perceived efficacy would be "partially" mediated (Baron & Kenny, 1986). In the set of such relations of effects, the following control variables were contemplated: type and setting of their children's education centre, gender, and the surveyed relatives' highest achieved level of education.

Although SEM is a valid tool for analysing complex relationships between latent variables, it also presents certain limitations that should be considered. One of the main limitations concerns bias due to imprecise model specification. Additionally, SEM is sometimes susceptible to issues of overfitting, especially when the model is overly complex in relation to the sample size. Another relevant aspect relates to certain subjective decisions made when defining latent structures, which can introduce biases in the modelling of relationships. Although robust methods and appropriate fit indices have been applied in this research, it is advisable to keep these limitations in mind to interpret the results in a balanced manner.

FINDINGS

Table 2 includes the mean scores and standard deviations corresponding to the indicators of the positive emotions and the perceived benefits of ICT according to how the surveyed relatives perceived the role that ICT play in the education domain. In this way, the aim is to address the research question regarding the extent to which parents experience joy, attachment, and happiness as a result of the use of ICT in education. Furthermore, it seeks to explore the research question concerning the perceived benefits derived from this use.

For the positive emotions that using technology in classrooms arouse in relatives, the total mean score of the three indicators was 5.17. This score comes very close to the intermediate value of the employed scale (0-10) and, thus, evidences that positive emotions are not that usual in the way relatives perceive ICT use. The mean scores obtained for the three emotions that the survey asked the participants about were similar. These three emotions were joy (M = 5.39), devotion (M = 5.03) and happiness (M = 5.09). These results reveal that none came over as being more habitual for

relatives when they thought about ICT use in their children's educational process. Nonetheless, the standard deviation of these three indicators was quite high, which implies a high diversity of perceptions of the feelings aroused about ICT (joy: SD = 2.42) (devotion: SD = 2.51) (happiness: SD = 2.42).

When continuing to examine the benefits that relatives perceived of educational practice mediated by ICT, and from all the indicators making up the dimension, a mean score of 6.85 was observed. The benefit that relatives most acknowledged and that, therefore, obtained the highest mean was possibilities of students' improving their digital competence (M = 8.19; SD = 1.72). This indicator was followed by the motivational capacity of ICT in education with the second highest mean score because ICT increased students' interest in learning (M = 7.16; SD = 2.21). These two indicators had the lowest standard deviations insofar as ICT use improved the digital competence while also acting as a motivational element, and was a widespread and generalised perception for the participating relatives. The other indicators obtained similar means. It is worth mentioning that the item with a lower score referred to the possibility of increasing relatives' participation (M = 6.15; SD = 2.33), which did not seem to be perceived as a main benefit offered by technological tools in the school environment.

Table 2
Descriptive statistics of the positive emotions and perceived benefits of ICT

	M	SD
Positive Emotions (EMO)		
EMO1. Joy	5,39	2,42
EMO2. Attachment	5,03	2,51
EMO3. Happiness	5,09	2,42
Perceived Benefits of ICT (BEN)		
BEN1. Increases my children's interest in learning	7,16	2,21
BEN2. Provides higher-quality education for my children	6,33	2,43
BEN3. Facilitates my children's learning	6,83	2,33
BEN4. Improves my children's digital competence	8,19	1,72
BEN5. Develops my children's autonomy	6,95	2,30
BEN6. Instills a sense of self-responsibility for learning in my children	6,36	2,45
BEN7. Increases family involvement	6,15	2,33

Scale of 0-10

Table 3 shows the descriptive statistics corresponding to efficacy that, according to the participating relatives, ICT have to support and drive students' educational development. Thus, the objective is to address the research question regarding the extent to which families consider ICT to enhance the effectiveness of the teaching-learning process. This table reveals that all the indicators of the five blocks making up this dimension obtained scores over 6 on a scale from 0 and 10 points, with a mean of 6.66 points. In the first block, related to the efficacy of ICT for structuring the physico-material space inside classrooms, the mean score was 6.98. The items that refer to how efficient technological resources are for accessing materials available online are stressed (M = 7.65; SD = 1.98) and for learning (M = 7.13; SD = 2.26). The first of the two obtained the lowest standard deviation.

In second place came the block about ICT being efficient for carrying out the academic structure of activities and tasks obtained a mean score of 6.83. In this section, the indicators with higher means were those that enhance the efficacy of ICT for performing different activities and using various didactic resources (M = 7.33; SD = 2.02), this with the second lowest standard deviation, for constantly following up students' achievements (M = 7.17; SD = 2.20) and for increasing student motivation for the T-L process (M = 7.00; SD = 2.33). The mean for social structuring in classrooms or of interpersonal relationships was 6.19 points, and the five indicators making up this block obtained relatively similar scores. Although none of the items obtained a more outstanding mean than the others, the highest score was for that which influenced ICT efficacy on promoting interactions among students (M = 6.42; SD = 2.53). Nonetheless, and despite them being similar and complementary to the above-mentioned indicator, the lowest mean score for this block and the complete dimension was for the item referring to how efficient ICT are for students to develop the social competence, which also obtained the highest standard deviation and, therefore, relatives' perceptions were more widely dispersed (M = 5.84; SD = 2.61). When analysing the fourth block (organisation and control structures in classrooms), similar scores were also found for the indicators comprising it, with a total mean of 6.57 points. The items with higher means were those expressing ICT's efficacy for the possibility of organising class times and activities (M = 6.82; SD = 2.31) and for creating ordered learning environments (M = 6.76; SD = 2.15). Finally in the last block (participants' cognitive structures of the T-L process), the mean score was 6.70. Once more, all the indicators presented very paired means, with the highest mean being that which added value to ICT efficacy that allows students to always be the main figures in their own learning (M = 6.-81; SD = 2.20).

Table 3
Descriptive statistics of the perceived ICT efficacy

	M	SD
Physical and Material Classroom Space Structuring (EFP)		
EFP1. Organizing students to work individually	6,72	2,07
EFP2. Organizing students to work collaboratively	6,69	2,15
EFP3. Including all students in the class dynamics	6,73	2,24
EFP4. Facilitating access to online materials for all students	7,65	1,98
EFP5. Allowing access to learning for all students	7,13	2,26
Academic Structure of Activities and Tasks (EFA)		
EFA1. Adjusting tasks according to individual needs	6,62	2,31
EFA2. Monitoring students' achievements progressively	7,17	2,20
EFA3. Motivating students	7,00	2,33
EFA4. Guiding students	6,65	2,35
EFA5. Varying activities and teaching resources	7,33	2,02
EFA6. Reducing learning difficulties	6,23	2,38
Social Classroom Structure or Interpersonal Relationships (EFS)		
EFS1. Providing spaces where students can speak and be heard	6,31	2,56
EFS2. Promoting interaction among students	6,42	2,53
EFS3. Fostering group cohesion	6,11	2,59
EFS4. Developing students' social competence	5,84	2,61
EFS5. Stimulating a positive classroom climate	6,26	2,54
Classroom Organization and Control Structures (EFO)		
EFO1. Creating organized learning environments	6,76	2,15
EFO2. Establishing rules or routines	6,69	2,31
EFO3. Facilitating the teacher's resolution of crisis periods	6,34	2,48
EFO4. Improving students' sustained attention	6,25	2,50
EFO5. Organizing the class and activity schedule	6,82	2,31
Cognitive Structures of Participants (EFC)		
EFC1. Managing their own learning	6,75	2,19
EFC2. Being the protagonist of their own learning	6,81	2,20
EFC3. Acquiring problem-solving strategies	6,50	2,30
EFC4. Developing a positive attitude towards learning	6,75	2,31

Scale of 0-10

In order to analyse the suitability of the described measurement structures, the measurement model was implemented and estimated. After analysing the data, the model's statistics and goodness-of-fit indices did not provide evidence for this measurement model to be rejected ($\chi 2$ [552] = 1661.81; RMSEA = 0.05; CFI = 0.93 SRM = 0.04) (Hu & Bentler, 1999). Table 4 shows the standardised estimations of the factor loadings and the percentages of explained variance (R2) corresponding to the positive emotions and perceived benefits variables. The estimations of these parameters evidenced the existence of reliability and convergent validity.

Table 4
Measurement model of emotions and perceived benefits

	EMO	BEN	R^2
EMO1	0,84		0,71
EMO2	0,77		0,59
EMO3	0,89		0,79
BEN1		0,84	0,71
BEN2		0,90	0,81
BEN3		0,93	0,86
BEN4		0,61	0,37
BEN5		0,85	0,72
BEN6		0,85	0,72
BEN7		0,65	0,42
EMO	*1,00*		
BEN	*0,80*	*1,00*	
α	0,87	0,93	
CRC	0,83	0,80	
AVE	0,70	0,66	

χ^2 [552]=1661,81 RMSEA=0,05 CFI=0,93 SRM=0,04

For the "perceived efficacy" variable in the first-order model, the five first-order latent subdimensions were tested (see Table 5): "EFE" (structuring of the physico-material space in the classroom); "EFA" (academic structuring of activities and tasks; "EFS" (social structuring of the classroom or interpersonal relationships); "EFO" (organisation and control structures in the classroom); "EFC" (participants' cognitive structures). Both the statistics and goodness-of-fit indices of the first-order confirmary factor analysis model presented a reasonal fit (χ2 [539] = 1615.36; RMSEA = 0.05; CFI = 0.93; SRMR = 0.04). When checking the estimations of the parameters in Table 5, there was evidence that reliability and convergent validity existed. All the factor loadings were significant, the coefficients of explained variance exceeded 0.41, and the coefficients of the reliability of the latent variables exceeded the minimum cut-off points with a minimum AVE value of 0.57 and a minimum CRC value of 0.75.

Bearing in mind that the correlations among these subdimensions were considerably high and significant (from 0.64 to 0.94), the existence of a higher-order construct was tested by estimating a second-order factor analysis model made up of the five first-order subdimensions and the single second-order one. The model's goodness-of-fit statistics indicated a reasonable fit (χ2 [552] = 1661.81; RMSEA = 0.05; CFI = 0.93; SRMR = 0.04). Factor loadings were similar to those of the estimated first-order model. Regarding the reliability of the latent variables, the estimations of factor loadings were significant (between 0.63 and 0.94) in this second-order model, whereas both AVE and CRC exceeded the minimum cut-off values, with a minimum AVE value of 0.57 and a minimum CRC value of 0.75.

Table 5
Measurement model of technology's perceived efficacy

	First-order factor model						*Second-order factor model*						
	EFP	EFA	EFS	EFO	EFC	R^2	EFP	EFA	EFS	EFO	EFC	*Efficacy*	R^2
EFP1	0,75					0,56	0,76						0,58
EFP2	0,80					0,64	0,80						0,64
EFP3	0,81					0,66	0,81						0,66
EFP4	0,64					0,41	0,63						0,40
EFP5	0,77					0,59	0,77						0,59
EFA1		0,83				0,69		0,83					0,69
EFA2		0,85				0,72		0,85					0,72
EFA3		0,89				0,79		0,89					0,79
EFA4		0,91				0,88		0,91					0,88
EFA5		0,80				0,64		0,80					0,64
EFA6		0,81				0,66		0,81					0,66
EFS1			0,84			0,71			0,84				0,71
EFS2			0,93			0,86			0,93				0,86
EFS3			0,94			0,88			0,94				0,88
EFS4			0,89			0,79			0,89				0,79
EFS5			0,91			0,88			0,91				0,88
EFO1				0,89		0,79				0,89			0,79
EFO2				0,90		0,81				0,90			0,81
EFO3				0,79		0,62				0,79			0,62
EFO4				0,85		0,72				0,85			0,72
EFO5				0,82		0,67				0,82			0,67
EFC1					0,89	0,79					0,89		0,79
EFC2					0,90	0,81					0,90		0,81
EFC3					0,90	0,81					0,90		0,81
EFC4					0,91	0,88					0,91		0,88
	EFP	EFA	EFS	EFO	EFC								
EFP	*1,00*											0,87	0,76
EFA	*0,82*	*1,00*										0,91	0,83
EFS	*0,77*	*0,80*	*1,00*									0,88	0,77
EFO	*0,83*	*0,87*	*0,87*	*1,00*								0,97	0,94
EFC	*0,77*	*0,85*	*0,81*	*0,91*	*1,00*							0,93	0,86
α	0,87	0,94	0,96	0,93	0,94								
CRC	0,75	0,84	0,90	0,85	0,90		0,75	0,84	0,90	0,85	0,90	0,91	
AVE	0,57	0,73	0,82	0,72	0,82		0,57	0,73	0,82	0,72	0,82	0,83	
Goodness of fit:	χ^2 [539]=1615,36 RMSEA=0,05 CFI=0,93 SRMR=0,04						χ^2 [552]=1661,81 RMSEA=0,05 CFI=0,93 SRMR=0,04						

The findings presented below correspond to the objective of analysing the relationships between the different variables examined. As Table 6 reveals, the proposed effects on the theoretical structural model were analysed with the three latent variables in the study (positive emotions, efficacy and benefits) and the control variables (students' education type and setting, gender and the highest achieved level of education) were included. The goodness-of-fit statistics of the final model (Model 3, which included all the variables) were sufficiently reasonable to consider that the model had been fitted (mediation model: $\chi 2$ [776] = 2133.24; RMSEA = 0.05; CFI = 0.92; SRMR = 0.04).

A positive significant effect of the emotions that ICT use in the classroom aroused in relatives regarding their benefits ("EMO" → "BEN" = 0.13, $p < 0.001$) was acknowledged, and in such a way that the more intense the positive emotions perceived of ICT use in classrooms, the more the benefits perceived of them. Likewise, a positive

and statistically significant effect was found for the two positive emotions and perceived benefits variables for ICT use in educational practice on the perceived efficacy variable of ICT use ("EMO" → "EF" = 0,37, p < 0,001) ("BEN" → "EF" = 0.76, p < 0.001). These data would support the notion that the more intense the positive emotions felt about using ICT as educational resources, and the more the acknowledged benefits perceived of such use, the more efficient these technological tools will be perceived to support the T-L process.

In turn, the data reflected an indirect positive and significant effect of positive emotions on perceived efficacy through benefits (0.28, p < 0.-001). This process can be explained as the effect of positive emotions on perceived efficacy increasing if this variable (positive emotions) led to a greater perception of benefits. As a result of introducing the mediator variable (benefits) into the model, the direct effect of positive emotions on perceived efficacy was lesser than the total effect. Therefore, this model is a partial mediation model.

Table 6
Results of the structural models

	Model_1			*Model_2*			*Model_3*		
	EMO	*BEN*	*EFF*	*EMO*	*BEN*	*EFF*	*EMO*	*BEN*	*EFF*
DIRECT EFFECTS									
Type of centre									
Private-Subsidised	0,01	-0,01	-0,07*	0,01	-0,01	-0,07*	0,01	-0,01	-0,07*
Centre environment									
2.000-10.000 inhabitants	0,03	0,02	-0,05	0,03	0,03	-0,06	0,03	0,03	-0,06
More than 10,000 inhabitants	-0,02	0,03	-0,16**	-0,01	0,02	-0,13*	-0,01	0,03	-0,13*
Gender									
Male				0,02	-0,01	-0,04	0,02	-0,01	-0,04
Studies									
Baccalaureate				0,04	0,01	-0,02	0,04	0,01	-0,02
Vocational Education				0,06	0,05	-0,08	0,06	0,05	-0,08
University				-0,05	0,09*	-0,17**	-0,06	0,09*	-0,17**
EMO								0,13***	0,37***
BEN									0,76***
INDIRECTS EFFECTS									
EMO									0,28***
R^2	0,02	0,65	0,17	0,016	0,65	0,019	0,016	0,65	0,19
Goodness of fit:	χ^2 [648]=1852,46 RMSEA=0,05 CFI=0,93 SRMR=0,04			χ^2 [776]=1708,3 RMSEA=0,05 CFI=0,92 SRMR=0,04			χ^2 [776]=2133,24 RMSEA=0,05 CFI=0,92 SRMR=0,04		

The control variables were taken into account, and they also appear in Table 6: the type and setting of sons and daughters' education centre, gender and the highest achieved level of education. Differences were found in perceived efficacy for educational practice mediated by ICT, which were determined by education centre type, in such a way that the relatives whose children went to private/state-assisted centres less perceived the efficacy of technologies in the school domain than those whose children attended public centres (-0.07; p =0.05). In relation to the perceived efficacy of these tools, differences appeared according to the education centre's setting. The following

results were obtained: those living in towns with more than 10,000 inhabitants indicated less perceived efficacy than those living in towns with fewer than 2,000 inhabitants (-0.13; p = 0.05). The differences linked with perceived benefits and efficacy were observed while checking participants' highest achieved levels of education. The participants with university studies believed that using ICT in education provided more benefits than those who had completed Primary or Secondary Education (0.09; p =0.05). The former indicated more perceived efficacy of using technological resources during the T-L process than the latter (-0.17; p = 0.05). Finally, it is worth stressing that no significant differences were obtained for gender.

DISCUSSION AND CONCLUSIONS

Through statistical analyses, the benefits and efficacy of ICT in the T-L process were described in detail from the perspective of students' relatives. The intensity with which they experienced certain emotions as a result of digital tools being present in classrooms was also well-described which, according to Bisquerra (2016), can be called "positive" due to the feeling of well-being that they cause in those who feel them. The literature review and data analysis revealed a close relationship among the studied variables.

Generally speaking, the study findings evidenced a high diversity for relatives' perceptions of how many benefits could result from ICT use in education and how efficient they would be. Responses from relatives varied significantly, influenced by inequalities in access to technological resources, known as the digital divide (Aydin, 2021; Jamil, 2021; Liu et al., 2022; Macedo, 2017; Ragnedda, 2019; Shakina et al., 2021; Wallcook et al., 2019, Warf, 2019). This diversity in perceptions aligns with research (Beaunoyer et al., 2020; Rahiem, 2020), which shows that relatives with access to ICT tend to have more positive views than those without the necessary resources or training.

The results obtained with the descriptive statistics about positive emotions conclude that joy, devotion and happiness are not the emotions that relatives felt very intensely for ICT use in the education context. Nonetheless, and only slightly, the commonest emotion was joy and the main differences in perceptions appeared for devotion. Bisquerra (2016) defines this group of emotions as those experienced with events or situations that provoke a feeling of survival or making progress towards well-being. This author stresses that both survival and progress towards well-being have a personal dimension, but also a social dimension. In this sense, Bisquerra (2016) indicates that not only are positive emotions experienced with the events that one lives, but also with that which provides loved ones with benefits. Therefore, relatives did not experience high levels of joy, devotion, or happiness regarding ICT use in classrooms, possibly because they did not view technology as essential for educational progress.

Continuing with our analysis of perceptions of using technology in education centres in terms of benefits, relatives acknowledged the greatest benefit of using ICT in classrooms as the possibility of students acquiring, developing and improving their digital competence. This competence has become fundamental in today's context, in which technology is omnipresent in society's day-to-day life (Hafifah, 2020; Henderson, 2020). Therefore, providing students with technological skills and

knowledge will allow them to participate fully in the digital society in both their present and their personal/occupational future by, thus, enabling them to improve their quality of life (Hafifa, 2020; Jackman et al., 2021; Rodrigues et al., 2021). According to different authors (Hafifah 2020, Henderson, 2020), integrating digital tools into the T-L process is extremely beneficial for students to develop their digital competence, which supports the idea indicated by the surveyed relatives.

Relatives saw ICT as a tool that increases student motivation to learn and engage with class content. So, the results of this study confirm what other authors have previously indicated (Asiah & Anwar, 2019; Fansury et al., 2020; Gjelaj et al., 2020; Henderson, 2020; Krishan & Al-rsa'i, 2023), whose works have reported that ICT are quite capable of motivating students in their educational process.

It is worth highlighting that, despite the high diversity of the perceptions in general, the results obtained with these two indicators (developing the digital competence and student motivation to learn) evidenced that these perceptions are very common to relatives because participants gave a similar score to these benefits. Therefore, it could be concluded that, apart from being the most outlined benefits by the surveyed relatives, they were also the benefits perceived in a more generalised manner by the relatives who accompany students' educational process on a daily basis.

Conversely, relatives pointed out that ICT are not very beneficial for increasing students' participation in their school life or their relation with education professionals. Although certain authors (Llevot Calvet et al., 2019; Macia Bordalba & Garreta Bochaca, 2019; Moreno-González et al., 2023) insist on how and how much digital tools might provide benefits to favour the link between students' relatives and education centres, the present research results reveal that the surveyed relatives did not perceive these resources to confer such a relation either quality or improvements. So once again, it is worth stressing the problems that stem from lack of information about and training in ICT, and also from lack of access to technological resources: the digital divide. It is essential to understand that, in order to make the best use of the benefits that technology provides, it must be properly used (Montenegro Rueda & Fernández Cerero, 2019). In line with this, Beaunoyer et al. (2020) and Rahiem (2020) indicated in their studies that those relatives in a situation of technological vulnerability will encounter difficulties in accompanying their children's learning process. So, it is possible to conclude that, to make the most of the benefits that ICT can provide the family-school relationship with, access to resources and training for all students' relatives should be favoured.

On the perceived efficacy of ICT by the surveyed relatives, they very positively valued and stressed the capacity of technology to facilitate all students gaining access to the didactic materials hosted on online platforms. In line with the indications of Henderson (2020), the fact that students can access online resources themselves also generates a feeling of autonomy and self-responsibility from being offered the opportunity to be active agents and being the leading figures of their own learning, which is favoured. Along these lines, the study of Henderson (2020) highlights the numerous opportunities that ICT offer teachers and students with specific needs so they can access resources

and materials via different tools and platforms without this undermining their educational process.

Relatives indicated how efficient the use of technology in classrooms can be to vary activities and didactic resources. Several authors (Fansury et al., 2020; Henderson, 2020) point out that having such diverse activities and resources in terms of formats and contents considerably enriches students' T-L process. According to their research works, digital tools offer the possibility of exceptionally captivating students' interest compared to more conventional didactic methods by avoiding monotony and providing a more dynamic approach by employing different innovative materials.

Once more, it is important to stress that, although different perceptions generally exist, the results of these two indicators (facilitating students' access to online materials and varying activities and didactic resources) reveal that these perceptions are generally shared by relatives. This was because participants gave a similar value to ICT efficacy in relation to these items. Kyriakides et al. (2018) indicate that efficacy in educational terms must be understood as the capacity to obtain positive desired results for students' learning and development. Thus, it is possible to conclude that in a very generalised way, relatives perceive that digital tools positively drive such learning and development basically by these two aspects: easy access to materials and diversity of didactic resources.

Finally, it is necessary to point out that the results obtained after testing the measurement and mediation models provide the available literature to date with a series of relevant conclusions. The existence of a positive significant effect of positive emotions on the benefits that relatives perceive is revealed. Thus, it can be concluded that experiencing positive emotions like joy, devotion or happiness impacts the perception of more benefits for including ICT as drivers of the educational process. Furthermore, these two variables (positive emotions and perceived benefits) have a positive and significant effect on the perceived efficacy of using technology. This finding allows us to conclude that, the more the positive emotions experienced and the more benefits perceived by relatives about ICT use, the more efficient they will consider these tools are to contribute to their children's learning.

In addition to the numerous perceived benefits of using ICTs in the educational context that have been highlighted in this research, it is also worth considering certain limitations and challenges that accompany their implementation. In this sense, the digital divide remains a significant barrier that prevents equitable access to technological resources. This fact can limit learning and development opportunities for many students. This situation becomes more visible in contexts with little technological infrastructure, more limited resources and less training in digital skills for family members and teachers. The lack of devices and stable connectivity also poses some obstacles for families, who perceive technology as something positive but report difficulties in accessing it or do not have the necessary training to support their children in the use of these resources (Garlinska et al., 2023). That is, although ICTs offer the potential to enrich learning, their effectiveness often depends on the conditions of access and support in the family and school context. To reduce these inequalities, it

would be necessary to implement policies that improve the availability of technological infrastructure in all educational contexts and that offer training to both teachers and family members.

To improve access to ICTs in more disadvantaged contexts (such as rural contexts), a specific recommendation could be to launch government programmes or public-private partnerships that fund and deploy basic technological infrastructures, such as high-speed internet access and shared devices in remote communities. These initiatives could include the establishment of community spaces with access to ICTs that support not only students, but also their families and the educational community at large. Furthermore, to enhance teacher training in the use of ICT tools, continuing education programmes could be created that focus on practical skills and are tailored to each teacher's level of technological experience. This training could include teaching strategies with specific digital tools, aimed at meeting the learning needs of students with different levels of access to technology. Another recommendation would be to integrate these training programmes into a collaborative framework in which teachers can share experiences and effective practices, especially those working in contexts with limited resources.

Given that positive emotions among families, such as joy and dedication, are linked to more favourable perceptions of the benefits and effectiveness of ICT, educational institutions could promote awareness and training programmes for families. These initiatives should focus on demonstrating how technology contributes to students' learning and development and, in many cases, can help reduce emotional and perceptual barriers. Furthermore, the fact that digital competence is one of the benefits most valued by families reinforces the importance of ensuring that all students have access to quality devices and connectivity, thereby reducing the digital divide. This can be achieved through policies aimed at technological equity in schools, in collaboration with families. Lastly, since effective use of ICT in the classroom encourages students' autonomy and responsibility in their learning process, teachers should receive training to implement student-centred pedagogical strategies and to utilise digital tools that foster self-directed learning and motivation.

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