



Challenges in achieving educational inclusion and development in the digital era: analysis of emotions, barriers and perceived needs

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Abstract

Society is currently immersed in a highly digitalised panorama due to Information and Communication Technologies (ICT). The educational process is also in a period of constant technological change and renewal. The transformation of education and methodologies can bring positive benefits for students, but also inequalities. This study aims to analyse the perceptions of families of pupils aged 3–18 on how the use of technology influences their children’s education in terms of emotions, barriers and needs. It is also intended to study whether the perceived barriers are determined by the underlying needs of the households and/or the emotions they experience from the use of technological resources. Finally, the consequences of perceived barriers on needs are studied. For this purpose, 720 parents completed an online questionnaire. The application of the Structural Equation Model reveals that negative emotions have a positive and significant effect on perceived barriers. On the other hand, a positive and significant effect of perceived barriers on expressed needs is found. The results of the research show the inequalities that ICT generate in the school environment, which are determined by the characteristics of the pupils’ family context. Knowing about the situations and perceptions of families is a first step towards carrying out actions to break down barriers and meet needs, the ultimate goal of inclusive education.

Keywords Inclusion · Development · ICTs · Digital divide · Families

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1 Introduction

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) sets among the seventeen Sustainable Development Goals (SDGs) of its 2030 Agenda the need to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (SDG 4) as a cornerstone for reducing social inequalities (UNESCO, 2017). Achieving a school that is based on the right to education for all is the ultimate goal of inclusive education, which understands student diversity as a pedagogical value because it reflects the heterogeneity that exists equally outside the school context (Baranauskienė & Saveikienė, 2018).

For a long time, the approach to educational inclusion has been linked only to the integration of learners with special educational needs. This idea and terminology has gradually given way to broader perspectives in which inclusion refers to the attention and application of means to favour the educational development of all students, regardless of their particular characteristics or conditions (Echeita Sarrionandía & Ainscow, 2011; Haug, 2017; Messiou, 2017; Nilholm & Göransson, 2017). Inclusion involves breaking down barriers and addressing needs in order to benefit the educational development of all learners (Arnaiz Sánchez et al., 2019; Bailey & Baker, 2020), so it is necessary to recognise inclusive education as the constant search for the precise ways and resources to respond in the best possible way to the diversity of needs in the classroom, so that while living and coexisting with differences, we also take advantage of them (Echeita Sarrionandía & Ainscow, 2011).

For a few years now, the digital era we live in has meant that Information and Communication Technologies (hereinafter, ICTs) have been an indispensable part of our daily lives. So much so that the use made of technologies directly influences people’s living conditions, since they are expanding on multiple levels and dimensions that make the network an essential social good (Schlomann et al., 2020; Singh, 2017). Among them is the educational context, to which technological resources can provide multiple possibilities and benefits to favour the teaching-learning process of students, fostering inclusive contexts and facilitating respect for diversity (Fernández-Batanero & Colmenero-Ruiz, 2016; Susinos-Rada et al., 2019). However, in the same way, the implementation of ICT as teaching resources means that new barriers and needs may arise that may hinder the educational development of students who suffer from them and, therefore, their inclusion (Álvarez-Herrero & Fernández-Herrero, 2020; Beaunoyer et al., 2020; Rahiem, 2020; Lloyd, 2020; Talebian et al., 2014).

In this way, the present study is proposed, understanding inclusive education as that which favours the educational development of all students and considering the problems derived from the barriers and needs that ICT cause in part of the pupils. The aim of this study is to find out and analyse how the families of Aragonese pupils aged 3–18 years conceive the use of ICT in the school context in terms of barriers and needs, incorporating the emotional component due to its capacity to influence our perceptions.

2 Theoretical framework

2.1 Building quality education for and by all learners

Talking about diversity and needs in the educational context means, on many occasions, looking at those students who require curricular support due to the fact that they have a disability or disorder that affects their teaching-learning process (Qvortrup & Qvortrup, 2017). However, differences and inequalities in education can be determined by factors external to the student, such as those caused by the circumstances or particularities of their immediate environment: economic, cultural or social factors, access possibilities or lack of resources, among others (Beaunoyer et al., 2020; Lloyd, 2020; Rahiem, 2020).

Through its practices, education can contribute to social change, favouring the inclusion of all people by addressing their diversity (Baranauskienė & Saveikienė, 2018). This task lies primarily and directly in the role and function of teachers, which are key elements in facilitating student inclusion (Avramidis et al., 2019; Lacruz-Pérez et al., 2021; Pit-ten Cate et al., 2018; Round et al., 2016). The teacher's attitude and training become decisive and closely related factors in the way teachers approach the educational task. Thus, teachers who have a positive attitude towards diversity in the classroom will also show greater willingness to train themselves and acquire the necessary knowledge and skills that enables them to implement inclusive strategies and resources to enhance the development of all their students. On the other hand, teachers who approach diversity and inclusion with a negative attitude and with little to no training will become a barrier to providing quality education for all (Avramidis et al., 2019; Corrina Goddard, 2018; Hernández et al., 2016; Lacruz-Pérez et al., 2021; Saloviita, 2019).

This way, an education that does not respond to the principle of inclusion has no place in the favour of achieving an education by and for all students. Therefore, those involved in the proper functioning of education systems must favour the attention to diversity of the students in order to achieve optimal educational development.

2.2 Technological barriers across the classroom: from the school context to the family context

Currently, ICT is one of the most effective pedagogical tools for supporting inclusion and favouring the educational development of students. Technological resources can play a very important role in the attention to diversity, bringing benefits to the teaching-learning process of all students (Fernández-Batanero & Colmenero-Ruiz, 2016). These tools offer great opportunities to foster more inclusive educational contexts and facilitate respect for diversity by allowing students to access information regardless of their own characteristics and conditions (Susinos-Rada et al., 2019). However, it is not enough to merely use them, but it is necessary for educational centres to carry out actions that allow for them to be used effectively in order to take advantage of the benefits they provide (Caena & Redecker, 2019; Kerstin et al., 2017). With the necessary training, skills and knowledge, teachers can apply technologies in the classroom

to develop new learning, adapt educational resources to the needs of each student and build a more accessible education (Bartolomé et al., 2018; Pandolfini, 2016).

However, we cannot ignore the barriers that the transforming effect of ICT can create in the educational process if their use is not appropriate for the optimum development of academic activity. Many authors have pointed out some of the disadvantages that technological tools can have when applied in education. Among them stands out the possibility of accessing spaces on the Internet that are not of an educational nature, such as online games or social networks, which leads to distraction and loss of concentration in the classroom (Álvarez-Herrero & Fernández-Herrero, 2020). Being able to navigate through so many and varied sites can lead to finding unreliable information because it is erroneous. This may cause confusion and hinder learning and cause the opposite effect: misinformation (Talebian et al., 2014). The way of accessing learning content and communicating with teachers and classmates is also conditioned by ICT, as it leads to a lack of manipulation on the part of students, as well as more distant relationships as the need for face-to-face contact to communicate with teachers or other students is lost (Álvarez-Herrero & Fernández-Herrero, 2020). Some authors (Cobos et al., 2019; Talebian et al., 2014) also point out as a negative aspect the time invested in technology, referring to the time needed to learn to use it and the time it takes away from other activities inside and outside the classroom, which ends up being time wasted because it is not profitable (Cobos et al., 2019; Özdemir, 2017). Similarly, factors or components of a more personal nature come into play, such as the emotional changes that students may experience when using ICT, particularly the appearance of anxiety or stress (Álvarez-Herrero & Fernández-Herrero, 2020), and the economic limitations or access to technology that each student's family context may present and that, therefore, prevent them from accessing certain resources or carrying out different school tasks (Talebian et al., 2014).

In addition to these barriers, which could be classified as those that directly affect the development of classes and student performances, Rahiem (2020) establishes a categorisation of possible obstacles that he calls technological barriers. In this case, the classification includes elements that could affect the educational process within schools, but also outside schools, i.e., in the educational and family context of students. The main dimensions identified by Rahiem (2020) are problems with the devices, internet connection, costs and skills. As shown in Fig. 1, these dimensions are divided into a total of ten further sub-dimensions:

ICTs are an indispensable dynamizing element as they are present in multiple levels and dimensions of daily life, including education (Schlomann et al., 2020; Singh, 2017). Thus, lacking access to technological resources due to barriers such as those mentioned by Rahiem (2020) means that part of the population is digitally excluded, leading to the so-called “digital divide”.

2.3 The digital divide: a stumbling block on the road to educational inclusion

ICTs have had and continue to have an undeniable impact on our society, which has considerably increased its dependence on technological resources (Vartanova & Gladkova, 2019). Without forgetting the innumerable advantages that technology offers us, it is not possible to ignore the inequalities that this growing use causes in

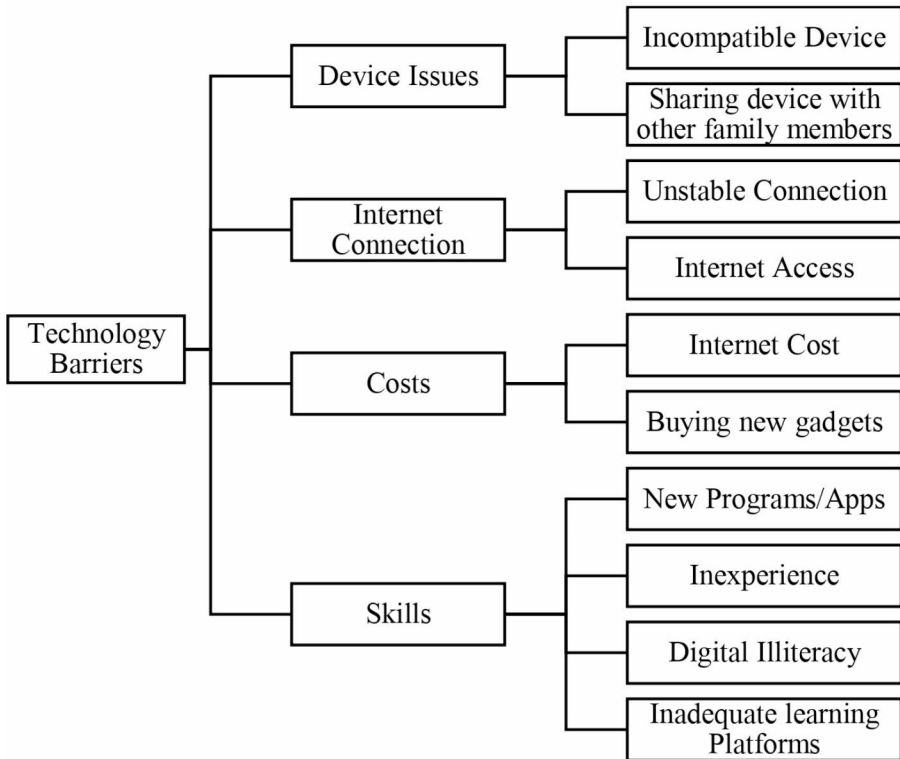


Fig. 1 Technological barriers in education (Rahiem, 2020)

the knowledge society, thus hindering the inclusion of a large part of the population in multiple everyday contexts. Today, there are still many sectors of society that, for various reasons, do not have access to ICTs and are excluded from the benefits that these tools bring. Thus the term “digital divide” arises, understood as the distance that exists between people or social groups who have access to technology and those who do not (Aydin, 2021; Choudrie et al., 2018; Evans et al., 2015; Jamil, 2021; Liu et al., 2022; Macedo, 2017; Ragnedda, 2019; Shakina et al., 2021; Wallcook et al., 2019; Warf, 2019). However, as stated by numerous authors (Aydin, 2021; Choudrie et al., 2020; Jamil, 2021), the digital divide, whose origin is determined by multiple and diverse causes, is nothing more than the prolongation of other pre-existing social divides such as economic factors, education, geographic location or gender, among others.

Until a few years ago, ICTs could be considered as support tools to favour learning at specific moments. Over time, their transformation, growth and expansion in all areas of society –including education– has led them to become basic and fundamentally necessary resources for educational training (Farro Lamas et al., 2020). Thus, with the implementation and use of ICT tools in the classroom as a mean of invigorating the teaching-learning processes, having access to technology is essential in order to achieve educational success (Moore et al., 2018). However, this fact means that the

digital divide existing in society is directly reflected in the reality of the classroom, since those students who do not have access to the ICT tools and resources required by their educational centre will find themselves at a disadvantage and an unequal access to learning (Cheshmehzangi et al., 2022; Moore et al., 2018; Weiss, 2020).

Since the term “digital divide” came into use in the early 1990s, the concept has evolved and adapted to new perspectives (Dijk, 2020; Larraz Rada, 2021; Scherder et al., 2017). This progression has shed light by incorporating more concrete details to determine the causes and consequences of differences in terms of interaction with ICT. In addition to considering access possibilities, interest has focused on studying skills and the type of use made of the technology. Thus, different authors (Dijk, 2020; Larraz Rada, 2021; Scherder et al., 2017; Surian & Sciandra, 2019) support the distinction between three levels of digital divide:

The first level, infrastructure-oriented, refers to the possibilities of access to technological devices and the Internet. Thus, this categorisation distinguishes between people who have material access to technology –computers, mobile phones, tablets, internet connection, etc.– and those who do not.

The second level, focused on uptake, focuses on the skills and competences to be able to make use of such tools. In this case, the difference is made between those who have a sufficient level of digital literacy to make use of ICTs and those who do not.

The third level, focused on the use of resources, refers to the way ICT resources are used, namely how to make critical use of them in the knowledge society and how to take advantage of them. This last level separates, on the one hand, those people who are simply consumers of technology from those who obtain effective results from such consumption.

This classification can also be structured into two closely related categories, with the first level corresponding to the more traditional digital divide and the next two to the so-called cognitive divide (Larraz Rada, 2021). Figure 2 illustrates this relationship between levels and types of divide:

In view of the above, and understanding inclusive education as education that not only caters for students with special educational needs due to disabilities, disorders or other pathologies, but also aims to favour the entire student body in the educational process (Haug, 2017; Messiou, 2017; Nilholm & Göransson, 2017), the digital divide becomes an obstacle to achieving educational inclusion while generating multiple needs in terms of technology (Ballesta Pagán et al., 2018; Surian & Sciandra, 2019).

2.4 The digital divide: a stumbling block on the road to educational inclusion

Considering the above, it has become clear how the use and implementation of technologies in the classroom is generating a profound gap in the educational sphere (Ibujés Villacís & Franco Crespo, 2019), producing barriers that, on many occasions, fall directly on a specific part of the student body. Proof of this is the recent evidence of inequalities and technological access needs that were unleashed during the period of time in which the COVID-19 pandemic forced the educational process to be redesigned so that it could be followed online from the students’ homes, highlighting the technological needs present in many family contexts (Abuhammad 2020; Beaunoyer et al., 2020; Doyumğaç et al., 2021; Gan & Sun, 2022; Rahiem, 2020).

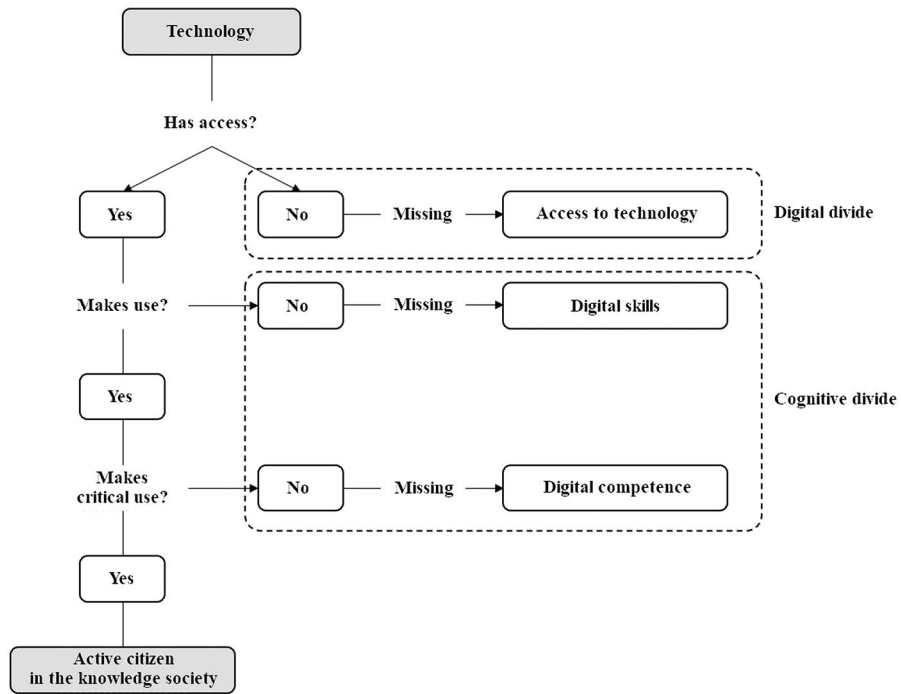


Fig. 2 Relationship between the digital divide and the cognitive divide (Larraz Rada, 2021) (own translation)

Such needs –which have not only existed during the pandemic, but are persistent– may be determined by very diverse causes that arise from the situation or conditions that characterise the students’ family context. However, despite the multiple possibilities as to the origin of these needs, all of them entail the difficulty of access to ICT-mediated learning and thus generate situations of educational inequality.

The economic factor is highly determinant, as it is necessary to have access to technological devices as well as internet connection. Families with lower incomes will find it more difficult to afford the amount and functionality of equipment, while students with higher incomes will not face such obstacles and will have easier access to learning (Beaunoyer et al., 2020; Lloyd, 2020; Rahiem, 2020).

On the other hand, also closely related to the digital divide, there is the problem derived from the lack of information and training on ICTs that some families may have about devices, resources, risks, operation, etc. This fact makes it difficult for them to properly accompany their children in the tasks and activities they must carry out using these tools (Beaunoyer et al., 2020; Lloyd, 2020; Rahiem, 2020).

These ICT needs are therefore a burden on the educational development of students, which will mean that those students whose families have several needs will suffer a certain degree of exclusion because they cannot access learning in the same way as the rest of their peers.

2.5 Objective of the study

Considering the influence of ICT in the educational context and the need for its appropriate implementation to favour the educational process of pupils, as well as the repercussion of factors such as emotional responses, barriers and needs perceived from the context of the students' families, this research aims to analyse some of the perceptions that families have about the use of technology as a teaching resource.

Thus, the aim of this study is to examine the negative emotions experienced by the families of pupils aged 3–18 when using technological tools as resources in their children's teaching-learning process. In addition, we analyse the barriers that families perceive in relation to the use of ICT in the educational environment and whether these are determined by the negative emotions mentioned. Finally, we study the consequences that the perception of barriers has on the existence of the families' needs to be able to cope with the use of ICT and to accompany their children in their educational process mediated by these tools. In addition, different control variables will be taken into account in order to analyse whether the socio-demographic characteristics of the families determine certain results or others. Figure 3 shows the model of relationships tested in the study.

3 Methodology

3.1 Participants

The sample of the present study is made up of the families of pupils aged 3 to 18 years old in the Autonomous Community of Aragon. In order to invite families to participate in the research, contact was firstly made with the Parents' Associations of the different schools in the region and, secondly, with the schools themselves so that they could disseminate the information among the families of their pupils. The objective of the study, as well as the possibility of participating on a voluntary basis

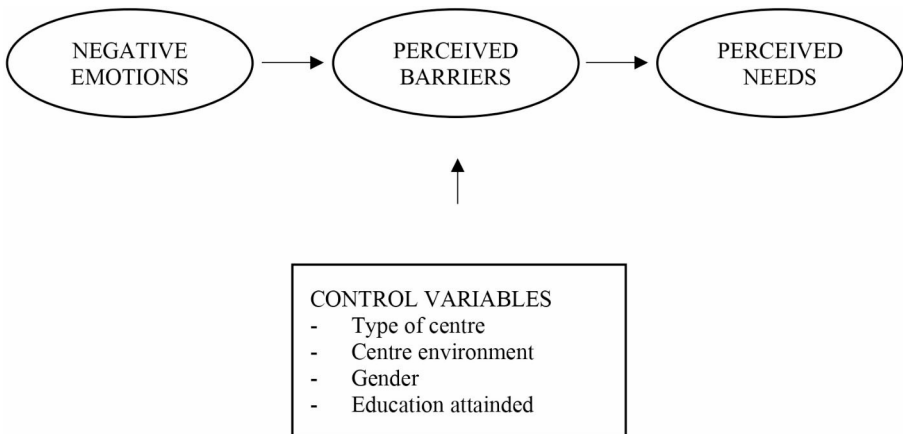


Fig. 3 Study approach

and the confidentiality of the information provided, was communicated via e-mail. In the same message, they were provided with a web link through which they could access the questionnaire to be filled in if they decided to participate, which had been designed and elaborated using Qualtrics software.

After taking into account the questionnaires that would be valid for the research, the number of participants was 720. Table 1. shows the socio-demographic variables of the respondents. Of the total sample, 79.7% were female and the remaining 20.3% were male. The age of the participants ranged from 18 to 62 years old ($M=45.88$; $SD=5.53$), with the largest age range being those born in the 1970s, currently aged 43–52 years (65.28%). As for the province in which the surveyed families reside, most of them are located in the province of Zaragoza (77.4%), followed by Huesca (16.8%) and Teruel (5.8%). This geographical distribution of the sample corresponds to the proportion of population density in the three provinces that make up the Autonomous Community of Aragon, with Zaragoza being the most populated and Teruel having the smallest number of inhabitants. Half of the parents who participated in the research have a university education (50.1%), followed by those with Vocational Training (26.9%) and, to a lesser extent, Primary/Secondary Education (11.6%) and Baccalaureate (11.3%). Most children of the participants study in public educational centres (89.6%), while the remaining percentage study in private-subsidised centres (10.4%). Finally, regarding the students' school environment, most of the

Table 1 Socio-demographic characteristics of the sample (N=720)

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

families indicated that it is located in a municipality with more than 10,000 inhabitants (61.3%), with the rest of the participants distributed between municipalities with 2,000–10,000 inhabitants (27.9%) and those with less than 2,000 inhabitants (10.7%).

3.2 Definition of variables

Through an exhaustive review of the available literature on the variables under study, we proceeded to define each of the latent constructs whose relationships would subsequently be analysed: negative emotions, barriers and perceived needs. These variables will be analysed from a perceptual perspective, i.e., they will be expressions conveyed from a totally subjective approach by each participant in the study.

An expert who has focused his efforts on the study of emotional education since the 1990s, Bisquerra (2016) defines emotions as reactions of the organism to certain stimuli that produce personal experiences that are perceived immaterially. The author points out that all emotions are good and necessary, but some are categorised as positive and others as negative, which depends on the effect they have on people's well-being. By this, he means that even though they are all good, some make us feel good (positive) and others make us feel bad (negative). Negative emotions are experienced in the face of events perceived as threats, losses, blockages or difficulties. Bisquerra (2016) groups fear, anger, sadness, disgust and anxiety into this category of negative emotions.

Educational barriers are understood as those factors that hinder the educational process for students, limiting their access and learning opportunities. Specifically, the barriers perceived as a consequence of the use of ICT in the classroom are defined as difficulties in integrating these tools into the teaching-learning process (Caena & Redecker, 2019).

The last of the constructs refers to the educational needs presented by families and whose origin lies in the use of technological tools as didactic resources. These needs are usually determined by the barriers faced by families depending on the lack of training and resources in the students' families, often as a result of the digital divide (Lloyd, 2020). Generally, these needs are determined by the economic factor and the lack of information and training on the use and management of ICT (Beunoyer et al., 2020; Lloyd, 2020; Rahiem, 2020).

3.3 Instrument

The instrument used for data collection was designed ad hoc on the basis of the literature consulted on the subject of the study. From this exhaustive review, the three dimensions to be studied were formed. As mentioned above, these dimensions are theoretically grounded to be defined from different studies and research. Specifically, emotions are based on the definitions of Bisquerra (2016), educational barriers from studies by Caena and Redecker (2019) and educational needs from the work of Beunoyer et al. (2020), Lloyd (2020) and Rahiem (2020).

Firstly, the dimension of emotions was designed. As mentioned above, the author taken as a reference due to his extensive experience in the study of emotions was Bis-

querra (2016). Specifically, Bisquerra's way of organising emotions, what the author calls the "Structure of the universe of emotions", was used as a guide. Within this structure, a distinction is made between negative emotions and positive emotions. The former were used to design the instrument for this research.

In the case of the barriers dimension, different research studies were used as a model for the development of the items. In particular, some of the subscales from the empirical studies of Kilinc et al. (2018) and Prasojo et al. (2019) were adapted. In the first case, the reliability of the questionnaire showed a Cronbach's α coefficient of 0.89 (Tarman et al., 2019), while in the second it was 0.86 (Prasojo et al., 2019). In addition, both studies applied expert judgement to ensure the construct and content validity of the indicators. The adaptations of these instruments were made with the target audience in mind. While these previous research studies had been conducted with teachers, the present study has as its sample the students' families. Therefore, it was necessary to modify the items in order to take into account the personal position of the participants. For this purpose, different theoretical research on the subject of the study focused on families has been used as support (Álvarez-Herrero y Fernández-Herrero, 2020; Cobos et al., 2019; Özdemir, 2017; Talebian et al., 2014).

Finally, the items that make up the needs dimension of the questionnaire were modelled on some of the subscales of the quantitative studies by Chin et al. (2022) and Prasojo et al. (2019). The reliability of the first questionnaire resulted in a Cronbach's α coefficient of 0.98 (Chin et al., 2022) and the reliability of the second was 0.86. Again, adaptations had to be made, taking into account that the present research takes families as participants. The instruments taken as models were intended for teachers. In order to make the adaptations, different theoretical studies (Abuhammad 2020; Beaunoyer et al., 2020; Doyumğaç et al., 2021; Gan & Sun, 2022; Lloyd, 2020; Rahiem, 2020) were used, which made it possible to adjust the final items.

After the development of the first version of the instrument, it was subjected to expert judgement in order to determine the adequacy, fit and wording of the dimensions and items to the research objective. Ten professional judges from academic universities from different disciplines, such as education, inclusive education, use of ICT in the educational context, research methods in education and behavioural sciences, participated. The instrument was also provided to ten parents of students aged 3–18 years old in the Autonomous Community of Aragon so that they could give their opinion on the wording and intelligibility of the instrument. In this way, the aim was to check whether the vocabulary and indications given in the instrument were easy for families to understand. For this phase, families from different economic, educational and socio-cultural backgrounds were purposively selected.

Based on this review and considering the contributions made by professionals and families, the instrument was remodelled to obtain its final version. In its final version, the instrument consisted of two distinct parts: a first part corresponded to the collection of information related to socio-demographic characteristics of the participants and, in a second part, indicators were included that defined the latent constructs to be analysed in relation to the use of ICT as an educational resource: negative emotions (5 items), perceived barriers to their use (7 items) and the needs of families to cope with such use (5 items). The items were measured on a Likert-type rating scale with eleven response possibilities for the degree of agreement from 0 to 10. This figure

was taken as a reference as it is similar to the rating scheme used by teachers in the Spanish education system. In total, this second part consisted of 17 items.

3.4 Data analysis

In order to test the relationships between the variables set out in the objectives, the methodology adopted in this study took the form of Structural Equation Modelling with Latent Variables (SEM-LV). This methodological strategy makes it possible to jointly analyse the direct, indirect and total effects of all the variables that make up the hypothesised model. The proposed models were estimated with MPLUS version 7.4 (Muthén & Muthén, 1998–2007) using the robust maximum likelihood procedure.

Initially, the measurement model of the latent constructs, also called “confirmatory factor analysis”, was proposed, which reflects the relationships established between the latent variables (constructs or factors) and the observed indicators (or observed variables). This way, the factor loadings and the coefficients of explained variance of each of the constructs of the study were assessed: the AVE coefficient of Fornell and Larcker (1981) and the omega coefficient (CRC) of McDonald (1985). The minimum recommended values are 0.50 and 0.70 for the AVE and CRC, respectively.

Secondly, the structural model was tested, which allows estimating the relationship between the latent variables of the study. Therefore, it is expected that the negative emotions expressed by the family in relation to the use of technology in the teaching-learning process of their children will have a significant influence on the barriers that the participants perceive in relation to the use of technology. Finally, it is also expected that the needs expressed by the families are explained by the perceived barriers.

4 Results

Table 2 shows the median scores and standard deviations for each of the indicators of negative emotions, barriers and perceived needs linked to the participating families' perceptions of the use of ICT as an educational tool.

In terms of negative emotions towards ICT in the teaching-learning process, the overall average of the indicators in this dimension is less than 5 ($M=4.03$). Considering this data, it can be seen that negative emotions do not stand out excessively in the families' view of the use of technology at educational centres. However, it should be noted that the indicator that received the highest score, and therefore constitutes the most common negative emotion among families, is fear, being the only one that exceeded 5 points on average ($M=5.31$; $SD=2.81$). On the other hand, the negative emotion with the lowest score was disgust ($M=2.73$; $SD=2.76$). As for the standard deviation obtained, this is high in all the indicators of the dimension, highlighting the negative emotions of anger ($SD=3.00$) and anxiety ($SD=3.01$), which shows the variety of opinions among respondents.

Continuing with the barriers that the family members surveyed perceived with respect to the use of technological tools in education, the overall median of the indicators that the sample was asked about is slightly higher than the intermediate

Table 2 Descriptive statistics for negative emotions, barriers and perceived needs

	M	DT
Negative emotions (NGEM)		
NGEM1. Fear	5,31	2,81
NGEM2. Anger	4,20	3,00
NGEM3. Sadness	3,84	2,97
NGEM4. Disgust	2,73	2,76
NGEM5. Anxiety	4,06	3,01
Perceived Barriers (BAR)		
BAR1. Access to non-educational spaces (games, social networks, etc.)	5,52	3,16
BAR2. Time spent	6,02	2,57
BAR3. Exposure to multiple and varied information	5,70	3,10
BAR4. Changes in the way of communicating with teachers and peers	5,44	3,00
BAR5. Transformation of the learning process	5,21	2,87
BAR6. Modification in the access to learning content	5,04	2,92
BAR7. Changes in emotional state	5,88	2,68
Perceived needs (NEE)		
NEE1. Material and financial resources to access technology	4,89	3,32
NEE2. Information about the ICT resources that our children have to use	5,60	2,94
NEE3. Support from the educational centre to learn how to use ICTs	5,70	3,06
NEE4. Information on the risks of the Internet (cyberbullying, addiction...)	6,40	3,06
NEE5. Training resources for managing our children's use of ICTs	6,18	2,99
Scale of 0–10		

value offered, i.e., slightly higher than 5 ($M=5.54$). The time spent using technology resources in education is the indicator reported as the greatest barrier ($M=6.02$; $SD=2.57$), followed by the emotional changes experienced as a result of their use ($M=5.88$; $SD=2.68$). At the other extreme, the least pronounced barrier was the changes that ICT brings or offers in access to learning content ($M=5.04$; $SD=2.92$), followed by the transformations to which the teaching-learning process is subjected ($M=5.21$; $SD=2.87$). All median scores are between 5.04 and 6.02 points, so the range in which they fall is very small. However, as in the case of negative emotions, a great diversity of perceptions is observed as the scores corresponding to the standard deviation are considerably high, with those referring to the possibility of accessing non-educational spaces such as games or social networks ($SD=3.16$) and the multiple and varied information to which students are exposed ($SD=3.10$) standing out.

Regarding the needs that families have in order to be able to make use of ICT and accompany their children in the academic tasks that involve the presence of these tools, the indicators evaluated obtained a total score of 5.75. The indicator with the highest score, so that it represents the most prominent need among families, is the one referring to the demand for information about the risks and dangers of the Internet, such as cyberbullying or the development of addictions ($M=6.40$; $SD=3.06$). This item is followed by the need for training to enable families to manage ICT properly with their children ($M=6.18$; $SD=2.99$). On the other hand, the need for material and financial resources is the indicator with the lowest average score ($M=4.89$), but at the same time, it is this same indicator which has the highest standard deviation

(SD=3.32), which shows the disparity in families' ability to meet the cost of having technological tools at home.

In order to study the degree of adequacy of the dimensional structures of the constructs whose relationships are to be analysed in this study, the measurement model was operationalised and estimated. After data analysis, the statistics and goodness-of-fit indices of the model did not allow this measurement model to be rejected (χ^2 [116]=600.078; RMSEA=0.076; CFI=0.91; SRMR=0.05) (Hu & Bentler, 1999). Table 3 shows the standardised estimates of the factor loadings and the percentages of variance explained (R²). The estimates of these parameters have shown the existence of reliability and convergent validity.

After testing the measurement model, the structural model was estimated with three latent variables and control variables were included (Table 4). In this case (Model 2), the reasonable fit is supported by the goodness-of-fit statistics (χ^2 [215]=825.646; RMSEA=0.06; CFI=0.91; SRMR=0.06). Since the overall structural model was not rejected, we proceeded to the analysis of the particular significance of the standardised estimates of the structural parameters involved in the relationships proposed in the model. Thus, a positive and significant effect of negative emotions on perceived barriers was observed ("NGEM" → "BAR" = 0.42; $p < 0.00$; R²=0.21). To some extent, these results would support the fact that feeling negative emotions towards the role of technology in educational processes leads to the perception of

Table 3 Measurement model: negative emotions, barriers, and perceived needs

	NGEM	BAR	NEE R ²	
NGEM1	0,66			0,44
NGEM2	0,84			0,71
NGEM3	0,89			0,79
NGEM4	0,79			0,62
NGEM5	0,83			0,69
BAR1		0,57		0,32
BAR2		0,61		0,37
BAR3		0,72		0,52
BAR4		0,84		0,71
BAR5		0,90		0,81
BAR6		0,88		0,74
BAR7		0,63		0,40
NEE1			0,65	0,42
NEE2			0,79	0,62
NEE3			0,83	0,69
NEE4			0,81	0,66
NEE5			0,87	0,76
NGEM	1,00			
BAR	0,42	1,00		
NEE	0,34	0,30	1,00	
α	0,90	0,90		0,89
CRC	0,80	0,74		0,79
AVE	0,65	0,55		0,63

χ^2 [116]=600.078 RMSEA=0.076 CFI=0.91 SRMR=0.05

Table 4 Results of the structural models

	<i>Model_1</i>			<i>Model_2</i>		
	<i>NGEM</i>	<i>BAR</i>	<i>NEE</i>	<i>NGEM</i>	<i>BAR</i>	<i>NEE</i>
<i>DIRECT EFFECTS</i>						
Type of centre						
<i>Private-Subsidised</i>	0,02	0,10*	-0,02	0,02	0,09*	-0,02
Centre environment						
<i>2.000–10.000 inhabitants</i>	-0,04	0,01	0,01	-0,04	0,02	0,01
<i>More than 10,000 inhabitants</i>	0,02	-0,10*	0,01	-0,02	-0,06	0,02
Gender						
<i>Male</i>				-0,03	-0,13**	0,08*
Studies						
<i>Baccalaureate</i>				0,08*	-0,05	-0,07*
<i>Vocational Education</i>				0,11*	0,01	-0,08
<i>University</i>				0,09	-0,14*	-0,18**
NGEM					0,42***	
BAR						0,31***
R²	0,01	0,19	0,09	0,02	0,21	0,11
Goodness of fit:	χ^2 [159]=719,373 RMSEA=0,07 CFI=0,91 SRMR=0,06			χ^2 [215]=825,646 RMSEA=0,06 CFI=0,91 SRMR=0,06		

more barriers to ICT-enhanced learning. On the other hand, the direct effect of the barriers perceived by families regarding the use of ICT in the educational environment on the needs expressed is also positive and significant (“BAR” → “NEE” = 0.31; $p < 0.00$; $R^2 = 0.11$). This result suggests that the greater the barriers perceived in relation to ICT in education, the greater the need for families to make use of them.

Finally, it is worth noting the results of the analysis of the control variables introduced in the model, also shown in Table 4. In relation to the type of school attended by the children of these families, differences were found in relation to perceived barriers, with those who take their children to private-subsidised schools reporting more barriers than those who attend a public school (0.09; $p = 0.05$). Likewise, differences were found by gender, with men finding fewer barriers to the use of ICT as a tool in their children’s teaching-learning process than women (-0.13; $p = 0.05$). Similarly, taking gender into account, men reported a lower perception of needs linked to the use of technology in the teaching-learning process than women (0.08; $p = 0.05$). With regard to the highest level of studies attained, those who have studied up to Baccalaureate or Vocational Training experience more negative emotions in relation to ICT than those who have studied up to Primary or Secondary Education (Baccalaureate: 0.08; $p = 0.05$) (Vocational Training; 0.11; $p = 0.05$). Continuing with the control variable of studies attained, people with university studies perceive fewer barriers than those with Primary or Secondary Education (-0.14; $p = 0.05$). Lastly, with regard to perceived needs, family members who have indicated that their highest level of education attained was Post-Secondary Education or University found a greater number of needs in relation to ICT use than those who selected Primary or Secondary Education (Post-Secondary Education: -0.07; $p = 0.05$) (University: -0.18; $p = 0.05$).

5 Discussion

Through the analysis carried out using the corresponding statistical techniques, an in-depth description has been made of the barriers and needs perceived by the pupils' families in relation to the use of ICT as an educational resource, as well as the intensity with which they experience different emotions as a result of the presence of technology in their children's educational process, which according to authors such as Bisquerra (2016) are negative in nature as they destabilise people's well-being. Thus, considering the previous review of the literature related to the subject under study and the subsequent data analysis carried out, the close relationship between the variables studied has become evident.

Looking at the findings of the study in a general way, it can be seen that there is a wide variety of perceptions about the implementation and use of ICT in the classroom, as many differences were found between the answers that parents gave when participating in the research. Such a contrast could be determined by the inequalities faced by today's society in terms of the possibility of access to technological resources, a fact that is materialised in the so-called digital divide (Aydin, 2021; Choudrie et al., 2018; Evans et al., 2015; Jamil, 2021; Liu et al., 2022; Macedo, 2017; Ragnedda, 2019; Shakina et al., 2021; Wallcook et al., 2019, Warf, 2019). This idea would support the results of different research studies (Beaunoyer et al., 2020; Lloyd, 2020; Rahiem, 2020), which state that those families that have the resources, both material and educational, to access and make use of ICTs will perceive these resources in a more positive way than those that encounter a greater number of obstacles to accessing such tools.

The results obtained from the descriptive statistics with respect to the negative emotions—fear, anger, sadness, disgust and anxiety—allow us to show that this block of emotions does not occupy a predominant place in the opinions of the families surveyed regarding the use of technological resources as educational media. However, it should be noted that the most common emotion is fear and that the greatest diversity of opinions is found in the responses regarding the intensity with which fathers and mothers feel anger and/or anxiety, so these emotions could be the ones that arouse most controversy. Bisquerra (2016) refers to the experience of negative emotions in the face of a succession of events that we can evaluate as threats or difficulties. Specifically, he establishes a close relationship between the three negative emotions that stand out in the results of this study: fear, anger and anxiety. The expert points out that anxiety depends on fear and stems from it, while the experience of fear can lead to feelings of anger. However, he stresses the importance of knowing the difference between fear and anxiety, because although there is a close relationship between the two emotions, fear is the response to a real and imminent danger, while anxiety is a kind of fear that is imaginary and comes from our thoughts. Thus, the results could lead to the interpretation that the fear experienced by families towards the use of ICT in education is a consequence of perceiving ICT as a threat to their children's well-being, while anxiety and anger—emotions experienced with different intensity among participants—arise from parents' interpretation and management of fear.

Continuing with the analysis of the perceptions expressed by pupils' families regarding the use of technology at educational centres, and as indicated by various

authors (Álvarez-Herrero & Fernández-Herrero, 2020; Cobos et al., 2019; Özdemir, 2017; Talebian et al., 2014), the transformative effect of ICT leads to the appearance and presence of barriers that hinder the optimal development of the educational process for students. Considering the descriptive statistics obtained in the analysis of this variable under study, the majority of families indicate that ICT are a barrier to their children's education, mainly due to the time invested in their use. It is also interesting to note that this opinion is the most generalised, i.e. the most common among the families surveyed and the one that would give rise to the least disparity of opinions. Talebian et al. (2014) refer to the different learning rhythms in order to master the use of technological resources, since the duration of this process will vary depending on the subject and this may consequently lead to a reduction in the time invested in educational tasks. Along the same lines, Cobos et al. (2019) allude to the waste of time as a problem because it subtracts time that could be spent on other activities inside and outside the classroom, which, according to Özdemir (2017), is time lost because it is not profitable.

Returning to the concept of emotion, the families consider that the emotional changes whose origin lies in the use and management of ICT are a significant barrier to be taken into account in the teaching-learning process of the students. Similarly, this opinion is fairly widespread among the people who took part in the study, with few differences between the perceptions expressed. Álvarez-Herrero and Fernández-Herrero (2020) point to the appearance of anxiety and stress as substantial changes in terms of emotional state as a consequence of exposure or overexposure to technology. In this sense, authors such as Martínez et al. (2022) or Priyadarshini & Pattnaik (2021) speak of the term “technostress”, understood as the stress produced by the use of ICT in situations in which technology is predominantly present due to its high demand. This type of stress is becoming an increasingly common problem due to the expansion that technology has experienced over the last few decades in all areas of life and that negatively affects the academic performance of students who suffer from it. On the other hand, with regard to anxiety, Henderson and Corry (2019) state that anxiety can be increased by the increase of technological integration in the classroom. Likewise, studies such as those by Hsieh et al. (2020) and Matos et al. (2016) link technological anxiety with the development of a dependence on digital and technological media that can sometimes lead to addiction.

On the other hand, families have pointed out as minor barriers the changes that ICT have brought about in education, specifically those referring to the transformation of the learning process and the modification of access to content. This fact could be understood in such a way that families perceive the transformations that technology has brought to the educational process as advances in terms of the learning model and accessibility to the resources that enable it. Thus, such results would support the idea of other authors (Bartolomé et al., 2018; Caena & Redecker, 2019; Fernández-Batanero & Colmenero-Ruiz, 2016; Kerstin et al., 2017; Pandolfini, 2016; Susinos-Rada et al., 2019), who allude, from the perspective of education for all learners, to the multiple benefits that ICT can bring to learning contexts if their potential is harnessed.

Additionally, in terms of the needs expressed by the parents who participated in the research, we find similar findings to those of the authors Beaunoyer et al. (2020),

Lloyd (2020) and Rahiem (2020), who state that the lack of information and training on ICT is a problem for students' families. The indicators with the highest scores are those that refer to the scarce information and training resources to which they have access in order to correctly manage their children's use of technology. In relation to this, these same authors emphasise how this makes it very difficult for parents to accompany their children's learning process. This need is also structured by the digital divide, specifically if we pay attention to the distinction made by authors such as Dijk (2020), Larraz Rada (2021), Scherder et al. (2017) and Surian and Sciandra (2019), it would be classified in the second level of the divide, which refers to uptake, understood as the skills and competences to be able to make correct use of ICT.

Continuing with the needs, we find that the one with the lowest average score is the need for material and economic resources to access technology. However, it is difficult to affirm from these results that this is a need that is not very widespread among the families surveyed, given that the values obtained in terms of standard deviation show the great variety of opinions and ideas. In this way, the differences and inequalities between family nucleus become evident, and we can thus mention the first level of the digital divide that refers to infrastructure, i.e., access to technological devices and the Internet (Dijk, 2020; Larraz Rada, 2021; Scherder et al., 2017; Surian & Sciandra, 2019). Referring again to the research by Beaunoyer et al. (2020), Lloyd (2020) and Rahiem (2020), in terms of technological needs, the authors agree on the great impact that the economic factor can have to the point of being decisive, since families with lower incomes will find it more difficult and, therefore, will have more needs than those with a higher economic level.

After testing the measurement and mediation models, the results allow us to draw a number of conclusions from the literature available so far. The existence of a positive and significant effect of negative emotions on the barriers perceived by families has been revealed. Thus, it can be affirmed that experiencing or feeling negative emotions such as fear, anger, sadness, disgust or anxiety leads to the perception of more barriers with regard to the use of technological resources as dynamic elements of the educational process. Likewise, a direct, positive and significant effect has been found of the perception of barriers on the needs that the students' families have to cope with the use of ICT in the educational context. This finding allows us to affirm that the greater the technological barriers perceived by parents, the greater their needs will be.

6 Conclusions

As the main conclusion and reflection of this research, it should be noted that it is essential to understand inclusive education as that which aims to promote the educational development of all students (Echeita Sarrionandía & Ainscow, 2011; Haug, 2017; Messiou, 2017; Nilholm & Göransson, 2017). The findings obtained in this study show that ICT generate inequalities in the school environment determined by the characteristics of the students' family context. Such differences, echoed by multiple authors (Álvarez-Herrero & Fernández-Herrero, 2020; Beaunoyer et al., 2020; Lloyd, 2020; Rahiem, 2020; Talebian et al., 2014), are an impediment to the goal of moving towards inclusive, equitable and quality education promoted by UNESCO

through the 2030 Agenda. Knowing and understanding the situations and perceptions of students' families is essential to carry out actions to break down barriers and address needs, the ultimate goal of inclusive education (Arnaiz Sánchez et al., 2019; Bailey & Baker, 2020).

It should be noted that the research has a series of limitations. The geographical focus is very specific, which limits the generalization of the results. It offers a vision of very specific localities in which each participant is inevitably influenced by her individual life history. However, the personal social context of the research subjects could not be exhaustively considered an influential result. On the other hand, the absence of specific research on family perceptions in relation to the use of ICT makes it difficult to compare our results with similar research in other contexts.

For future research, it would be advisable to adapt the data collection instrument according to the evolution of the literature and the context in which it is intended to be applied. Likewise, it would be necessary to subject it again to expert judgment and to operationalization and estimation techniques of the measurement model to support its validity. Expanding the social context of application would be pleasantly enriching and would allow us to complement the results of this study, for which it is essential to consider the limitations.

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Data Availability All data generated or analysed during this study are included in this published article.

Declarations

Conflict of interest This article has no financial or non-financial interests.

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