The moderating role of school facilitating conditions and attitudes towards ICT on teachers' ICT use and emphasis on developing students' digital skills

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ABSTRACT

Although information and communication technology (ICT) has impacted many areas of society, its use in school contexts is still limited. In this study, we focused on teachers' attitudes towards ICT and the school facilitating conditions and examined their relationships to the teachers' emphasis on developing students' digital information and communication skills (TEDDICS) and ICT use. Furthermore, we tested whether school facilitating conditions moderated the relationships of attitudes and ICT use with TEDDICS. Overall, 552 teachers in primary and secondary education participated in our survey, and we analysed the resultant data via structural equation modelling. The results showed that positive attitudes towards ICT and ICT use were positively related. In addition, school facilitating conditions had a significant effect on both ICT use and TEDDICS. Notably, an interaction effect between school facilitating conditions and attitudes towards ICT existed—that is, better school facilitating conditions increased the effects of attitudes on ICT use and TEDDICS. These results show the importance of school facilitating conditions in teachers' practices. A lack of school facilitating conditions may result in less ICT use in teaching, even for teachers who have positive attitudes towards ICT. Hence, promoting facilitating conditions along with positive attitudes in ICT use can be a viable strategy for implementing digitalisation in schools.

1. Introduction

Information and communication technologies (ICTs) have transformed the way people act and interact (Lacasa, 2021). ICTs offer almost instant access to any information and the ability to create and modify content and share it. Moreover, these resources allow real-time communication with virtually anyone, regardless of time and place. This implementation of ICT, which has been progressively introduced into society over the last 30 years, has been further accentuated since the COVID-19 pandemic. Thus, this change in our society has led to the need to promote learning beyond the mere acquisition of information. Nowadays, it is necessary to promote competency-based learning that is focused on fostering students' ability to transform information into meaningful knowledge for them (Scheurs & Dumbraveanu, 2014). Thus, it is important to promote teaching practices that are student centred instead of the common content-centred practices (Tondeur, Pareja Roblin, et al., 2017). This implies that the use of ICT in the classroom should aim to develop skills that can be applied strategically in different contexts and promote specific attitudes.

To achieve these results, the processes that are activated must be oriented towards the search for, interpretation, organisation and analysis of information. To this end, it is necessary to design activities using ICT that are characterised as open-ended and require problem-solving skills, rather than just memorising information. Moreover, these activities should promote dialogue between students with the objective of integrating different points of view and creating shared knowledge. Furthermore, assessment should not only be directed at the product but also the process of the activity, contributing to the learner's awareness of practices that favour learning (Black & Wiliam, 2009). These facets make it paramount for researchers to consider how teachers use ICT to carry out their teaching practices in schools.

Therefore, it is not surprising that researchers have sought to identify how the technology can be included in schools. Some studies have analysed the practices of teachers with ICT training to identify the

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learning possibilities using digital technologies (Hadjithoma & Karagiorgi, 2009; Harris, 2022; Wikan & Molster, 2011). Other studies have used larger and more varied samples of teachers to identify which practices teachers consider the most beneficial or, in other words, they have analysed teachers' more explicit conceptions of ICT use (Jääskelä et al., 2017; Nikolopoulou & Gialamas, 2016).

Both types of studies present results of great interest. However, they are not focused on identifying what practices are being carried out in classrooms with a generalized sample of teachers. The first type of studies use samples of teachers, who are highly trained in ICT use, which leads to results that show more frequent and complex ICT use than would be expected with a generalized sample of teachers. On the other hand, the second type of studies are focus on identifying the most explicit conceptions about ICT use, which tend to be more favourable and constructive than the uses carried out in real contexts (Arancibia et al., 2020; De Aldama & Pozo, 2016; Du Plessis, 2016; Kaymakamoglu, 2018).

In this sense, we can highlight other studies that are less frequent and that are focused on the study of teaching practices using ICT with large and varied samples of teachers (Biagi & Loi, 2013; Cabellos et al., 2023; OECD, 2015; Pozo, Pérez Echeverría, Cabellos, & Sánchez, 2021). These studies use questionnaires that analyse the frequency of different school practices in using ICT.

Thus, from our perspective, this approach focuses on the frequency of activity using ICT favours representative results when analysing what practices are carried out with ICT in schools. This can be justified since identifying the frequency of these ICT uses allows access to a broad and diverse teacher sample and additionally minimises the biases offered by studies that analyse teachers' beliefs towards school practices they consider most beneficial to ICT use.

However, focusing on ICT use as a research variable does not consider more intrinsic aspects of teaching practices that can explain the instructional intentions behind these practices. In this regard, Siddiq et al. (2016) validated the teachers' emphasis on developing students' digital information and communication skills (TEDDICS) construct. TEDDICS is a novel construct that combines ICT use, teaching practices, curricular demands and beliefs about which ICT skills are important. Rather than looking at the frequency of ICT use, TEDDICS provides detailed information on the synergy between curricular demands and teachers' beliefs about the importance of digital skills, further linking them to the development of the competence of students in this area (Fraillon et al., 2013).

Therefore, although both ICT use and TEDDICS present similarities in terms of themes/areas covered, there are also important differences between them when it comes to predicting teaching practices using these resources in the classroom. However, TEDDICS is still a little-studied construct, so it is essential to identify how it is affected by variables that have traditionally been considered to influence practices in teaching with ICT. To do so, we compared how these variables were related to both ICT use and TEDDICS.

The scientific literature points to numerous variables that condition the practices that teachers carry out with ICT, such as teaching beliefs, competencies in ICT use and the previous use of digital resources. However, in this study, we focused on only two of the variables that have traditionally been related to ICT use (Williams et al., 2015): teachers' attitudes towards ICT and school facilitating conditions. The literature has not only identified that school facilitating conditions affect ICT use but also has an impact on ICT attitudes (Ngai et al., 2007; Teo, 2009). This knowledge implies that the effect of teachers' attitudes towards ICT in ICT use may be modulated by the school facilitating conditions. Therefore, in this study, we also investigated whether the expected impact of school facilitating conditions on ICT attitudes may somehow affect ICT use or, in other words, whether these variables interact in their effect on ICT use.

In the present study, we analysed the extent to which teachers' attitudes towards ICT use and their perceptions of the school facilitating conditions are related to their use of ICT for teaching and TEDDICS. Specifically, we examined (a) the direct effects of attitudes and school facilitating conditions on both ICT use and TEDDICS and (b) the respective interaction effects of attitudes and school facilitating conditions. This would allow us to provide information about the associations among these constructs and generate new knowledge about whether school facilitating conditions moderate the attitudes–outcomes relations. The latter offers a largely untested and novel perspective on the field of technology acceptance and integration.

2. Theoretical background

2.1. ICT use in teaching practices

As we have already emphasised, ICT integration in school contexts is essential in today's society. However, the practices carried out with ICT in school contexts have not always resulted in positive effects on learning. Some international reports, such as the Programme for International Student Assessment (PISA; Biagi & Loi, 2013; OECD, 2015), have identified that ICT use in school contexts leads to negative results, which would imply that teaching practices reproductive and content-centred are those that continue to predominate in schools, as pointed out in 2008 by the TALIS report (OECD, 2009). This contrasts with studies including samples of teachers who are better trained in ICT use and show positive effects (Chauhan, 2017; Comi et al., 2017; Xie et al., 2018). From our perspective, this discrepancy in results depends very much on the type of teaching and learning practices that are carried out with ICT in the classroom. In this sense, due to the multidimensional nature of ICT use in the classroom (Donnelly et al., 2011), it is important to consider the diverse possible uses of ICT in school contexts.

The scientific literature indicates that ICTs are generally used to search for, analyse or present information, which can be textual, multimodal or video (OECD, 2019; Suárez-Rodríguez et al., 2018; Yunus & Suliman, 2014). Chen and Bryer (2012) also highlighted that social media use at school can promote collaboration and dialogue. Finally, other works point out the possibilities of ICT in evaluating and providing students with feedback on their tasks (e.g., Atmojo & Nugroho, 2020).

Therefore, one possible classification of the diverse types of teaching practices that include the use of ICT is (1) searching for, analysing and presenting information; (2) collaboration and dialogue; and (3) assessment and feedback.

2.2. Teachers' emphasis on developing students' digital information and communication skills (TEDDICS)

As we have noted, TEDDICS is a construct that combines both ICT use and more general aspects of teaching practices, curriculum demands and beliefs about which ICT skills are most needed (Siddiq et al., 2016). This variable presents detailed information about the value placed on teaching practices in the classroom. Similar to the ICT use variable, TEDDICS also has a multidimensional nature. In this sense, Siddiq et al. (2016) differentiated three different factors: (1) accessing digital information, (2) evaluating digital information and (3) sharing and communicating digital information. Although these three factors are conceptually distinct, all of them identify the teachers' emphasis on teaching practices using ICT (the general construct). Moreover, it is important to note that these factors are not completely independent but are related to each other. For example, in an activity related to the evaluation of information, prior search and access to different information is necessary. Therefore, these factors cannot be understood in isolation.

2.3. Factors related to the integration of ICT in educational contexts

Numerous studies have referred to various models that attempt to explain the variables that predict ICT use. In this regard, two of the most

frequently mentioned in the literature are the technology acceptance model (TAM) proposed by Davis (1989) and the more current unified theory of acceptance and use of technology (UTAUT) model proposed by Venkatesh et al. (2003).

TAM points to two constructs: perceived usefulness (which is defined as the degree to which a person considers that using a technology may enhance their job performance) and perceived ease of use (which is the degree to which a person believes that using a technology might be free from effort). In this model, both constructs are considered to affect attitudes towards ICT use, and these attitudes are positively related to behavioural intention towards ICT use, which justifies the interest in identifying the effect of the attitudes on teaching practices using ICT and TEDDICS.

However, other factors that may influence ICT use have been identified, which has led to the proposal of a more integrative model, the UTAUT. This model includes as main factors performance expectancy, effort expectancy, social influence and facilitating conditions that may affect the behavioural intention to use ICT. Thus, we observe that the effect of school facilitating conditions is also supported by the literature, which justifies the interest in analysing how school facilitating conditions affect ICT use, especially TEDDICS.

Ertmer (1999) has also shown the effect that attitudes and school facilitating conditions can have on ICT use. However, rather than considering these as variables that explain usage, this author theorises these aspects as barriers that may hinder ICT use. Ertmer referred to first-order and second-order barriers. First-order barriers are those that are external to teachers and hinder ICT use. These barriers include a lack of equipment, time, support or adequate training in the use of ICT—making it difficult to integrate ICT into teaching practices. In this sense, despite the efforts made by a school administration to reduce a lack of ICT resources (Ertmer et al., 2015), there may still be perceived problems related to a lack of support, rigidity of school schedules and lack of teacher support in the integration of ICT in the classroom (Nikolopoulou et al., 2016; Vrasidas, 2015). In contrast, second-order barriers would be those intrinsic to the teacher, for example, the attitudes and beliefs of teachers towards teaching and learning processes that hinder teaching practices using ICT. Therefore, there is general agreement that both attitudes towards ICT and school facilitating conditions are constructs that are essential when analysing teaching practices that use digital resources (Tondeur, van Braak, et al., 2017; Wilson, 2021).

2.3.1. Relationship between attitudes towards ICT and ICT use in teaching practices

An attitude can be defined as an element that guides behaviour, integrity and consistency in an individual's feelings, thoughts and behaviours towards an object (Tavşancil, 2005). Therefore, it is not surprising that attitudes towards ICT play a relevant role in ICT use. Numerous studies have identified how these attitudes positively affect the intention to use ICT (Davis, 1985; Kreijns et al., 2013; Teeroovengadum et al., 2017). Likewise, Teo (2011) found that positive attitudes towards ICT were associated with its integration into teaching. Finally, some authors identified that attitudes towards ICT affect the frequency and type of the use of ICT (Kerckaert et al., 2015; e.g., Tezci, 2009). However, it is not known how these attitudes may affect TEDDICS, which was one of the purposes of this study.

2.3.2. Relationship between the school facilitating conditions and ICT use in teaching practices

School facilitating conditions can be defined as the extent to which teachers believe that organisational and technical infrastructure exists to support ICT use at school (Chang, 2012). In other words, these facilitating conditions for ICT use include those factors and resources that support teachers' ICT use, such as technical and pedagogical support from their colleagues and schools as well as the impact of school leadership (Chiu & Wang, 2008; Lai et al., 2012).

Numerous studies have focused on how these school facilitating conditions affect the intention to use ICT (Buraimoh et al., 2023; Teo, 2010, 2011). For example, Groves and Zemel (2000) found that support was a relevant factor for teachers when incorporating ICT in their teaching. Likewise, other studies, such as Gil-Flores et al. (2017), identified more frequent use of these resources when these conditions were present. There are also studies, such as that of Daughtery and Funke (1998), which identified the barriers that teachers encountered when incorporating ICT into their teaching. In their study, the teachers referred to barriers related to the lack of school facilitating conditions. Equivalent results can be seen in García-Martínez and Silva-Payró (2022), who identified how a lack of access to resources, software or poor connectivity hindered the adoption and integration of ICT in teaching. However, again, whether these results can be extrapolated to TEDDICS has not been studied, which is another purpose of this paper.

2.3.3. Relations between attitudes towards ICT use and school facilitating conditions

As noted above, the scientific literature has also identified that school facilitating conditions affect attitudes (Ngai et al., 2007; Teo, 2009). For example, a study by Kumi et al. (2012) found that institutional support, such as training and technological resources, was associated with more positive attitudes towards ICT use. As we also anticipated, this fact could lead to school facilitating conditions affecting the relationship between attitudes towards ICT and both ICT use and TEDDIC. However, the scientific literature has not considered this possible interaction effect, which is an essential aspect of this paper.

3. The present study

As we have seen throughout the theoretical background, both attitudes and school facilitating conditions are variables that affect the use of ICT and probably TEDDICS. Likewise, it has also been observed that these school facilitating conditions also affect attitudes towards ICT. However, as we have pointed out, until now, it has not been considered whether the effect of teachers' attitudes in ICT use or TEDDICS, a novel variable almost studied, may be modulated by the school facilitating conditions. From our position, this effect is feasible given that all these variables seem to be closely related.

In the present study, to address this lack, we examined the relations between the teachers' attitudes towards ICT, school facilitating conditions, ICT use for teaching and TEDDICS. Given that the extant body of research has established the multidimensionality of TEDDICS and ICT use (Siddiq et al., 2016), we have reported the relationships for several dimensions of these constructs. Specifically, we considered the following three TEDDICS dimensions: (1) accessing digital information, (2) evaluating digital information and (3) sharing and communicating digital information. Furthermore, we considered the following three ICT use dimensions: (1) skills, (2) collaboration and (3) assessment and feedback in student activities. Utilising structural equation modelling (SEM; Schreiber et al., 2006), we then estimated the direct effects of attitudes and school facilitating conditions on both ICT use and TEDDICS. Extending these models with interaction effects, we further tested whether school facilitating conditions moderated the attitude–outcome relationships. To this end, we addressed the following research questions (RQs) in this study.

RQ1. (a) To what extent are teachers' perceptions of school facilitating conditions and attitudes towards ICT related to their ICT use? (b) To what extent do school facilitating conditions moderate the relation between attitudes towards ICT and ICT use?

RQ2. (a) To what extent are teachers' perceptions of school facilitating conditions and attitudes towards ICT related to TEDDICS? (b) To what extent do school facilitating conditions moderate the relation between attitudes towards ICT and TEDDICS?

4. Methods

4.1. Context and sample

This study was conducted within a collaborative project between a research institution and a medium-sized municipality in Norway. The teachers in our sample worked in 24 schools in this municipality. The schools varied in the number of students and their respective socio-economic backgrounds. Of these 24 schools, 16 were primary schools (Grades 1–7), and eight were lower secondary schools (Grades 8–10). The research project followed the municipality's enrolment of one-to-one technological devices, meaning all teachers and students in the municipality were equipped with individual tablets or laptops. The present survey was conducted in 2017 at the beginning of the project. All teachers (N = 730) across the 24 schools received an e-mail invitation with a link to the online survey. The participation in the survey was voluntary and anonymous, and the project was approved by the Norwegian Centre for Research Data. Notably, given the constraints within the collaboration with the schools, teachers could not be sampled randomly. Overall, 717 teachers answered the survey. A total of 165 responses were not used in the analysis due to missing information for the main variables (ICT use, TEDDICS, school facilitating conditions and teachers' attitudes towards ICT). The final sample included 552 cases. A summary of the professional and personal characteristics of these teachers can be found in Table 1.

4.2. Measures

The questionnaire included 36 items, which were all measured with 4-point Likert scales (0–3), although they used different labels. Eleven items were included to measure ICT Use (0 = "never", 1 = "in some lessons", 2 = "in most lessons" and 3 = "in every or almost every lesson"). In addition, ICT use included three different subdimensions: (1) assessment and feedback, (2) collaboration and (3) skills. TEDDICS consisted of 14 items (0 = "no emphasis", 1 = "little emphasis", 2 = "some emphasis" and 3 = "strong emphasis") and consisted of three subdimensions: (1) accessing, (2) evaluating and (3) sharing and communicating. In addition, this questionnaire included five items to measure school facilitating conditions and eight items to measure

teachers' positive attitudes towards ICT (0 = variables were measured through the degree of agreement "strongly disagree", "disagree", 1 = "agree" and 3 = "strongly agree"). Table A1 in the Appendix includes the items for each scale and subscale.

4.3. Data analysis

For the data pre-processing, we calculated the descriptive statistics, characteristics of the distributions and reliabilities for each scale. To identify the reliability of the scales with only one factor, the omega total for polychoric variables was used. However, the reliability of the assessment and feedback in the ICT use scale could only be identified using Cronbach's alpha. It is important to note that omega is considered a better estimator than Cronbach's alpha (Revelle & Zinbarg, 2009). Alpha requires unidimensionality, tau-equivalence and normality, and, in this case, we could not guarantee the tau-equivalence and normality of the scales. To calculate the reliabilities of the full scales of ICT use and TEDDICS, an adaptation of omega that takes into account the presence of more than one factor (hierarchical omega) was used.

Confirmatory factor analyses (CFAs; Schreiber et al., 2006) were conducted to test the internal structure of each scale while taking into account all their corresponding items. The estimator used was maximum likelihood with robust standard errors (MLR), as although we used a relatively small sample size and the items were ordinal, they were roughly normal (Brown, 2015; Kline, 2016; Robitzsch, 2020). Given the relatively small sample size and numerous items, we also performed parcelling (Devlieger & Rosseel, 2017; Hau & Marsh, 2004) in all the scales except TEDDICS–accessing to reduce the complexity of the models. Parcelling is a strategy used to group items according to possible residual covariances and/or factor loadings. In particular, we followed Little et al.'s (2013) suggestions and constructed summary item bundles into a "super-item" by averaging item response scores as a function of the factor loadings of each item. This approach involves selecting the items with the highest and lowest loadings on each factor and averaging them to create a new variable representing the mean responses to those items. This procedure was repeated to construct parcels containing two to three items depending on the number of items within the factor. By employing this process, the model parameters are reduced, the relationship between the structural parameters is preserved and arbitrary residual item-to-item covariances are avoided. This approach also helps improve the model fit and convergence (Little et al., 2013; Matsunaga, 2008). The parcelled items can be seen in Table A2 in the Appendix. CFA was again performed with these parcelled items.

Once the structure of the variables involved in our study had been established, we determined the analyses that would be appropriate for RQ1 and RQ2. To identify how school facilitating conditions and attitudes affect both ICT use and TEDDICS and whether school facilitating conditions modulate the effect of attitudes on both ICT use and TEDDICS, SEM was conducted (Schreiber et al., 2006) while maintaining the item parcelling previously described. Two of the models (see Fig. 1) identified the effect of school facilitating conditions and attitudes on ICT use (Model 1) and on TEDDICS (Model 3). The other two models included the effect of school facilitating conditions, attitudes and the interaction of school facilitating conditions and attitudes on ICT use (Model 2) and TEDDICS (Model 4).

Because the teachers participated in this study on a completely voluntary basis, some did not complete the questionnaire, but we were unable to obtain the missing information. In particular, 6.7% of the submitted questionnaires were identified as having missing data. For the treatment of partially incomplete data, we used the full information maximum likelihood (FIML) method (Collins et al., 2001). This procedure takes into account all available information when estimating the parameters, which also includes data from those teachers who had missing values in their answers (Enders, 2022).

To control for differences between schools, we included the effect of the specific school, which considers the nesting of teachers in schools

Table 1
Professional and personal characteristics of teachers.

Variable	Category	Type of variable	
		Categorical	Continuous
		Frequency	*M* (*SD*)
Gender	Men	121 (21.9%)	
	Women	431 (78.1%)	
Age [a]			45.5 years (11.1)
Teaching experience [a]			14.9 years (10.2)
Educational level [a]	Primary Education (Grades 1–7)	272 (49.3%)	
	Secondary education (Grades 8–10)	112 (29.5%)	
Area [b]	Norwegian	133 (36.1%)	
	Foreign language	38 (10.3%)	
	Mathematics	78 (21.2%)	
	Science	22 (6.0%)	
	Social science	19 (5.2%)	
	Art, music and craft	23 (6.3%)	
	Others	55 (14.9%)	

[a] The variables age, teaching experience and educational level were calculated with 380 cases (172 missing values)..

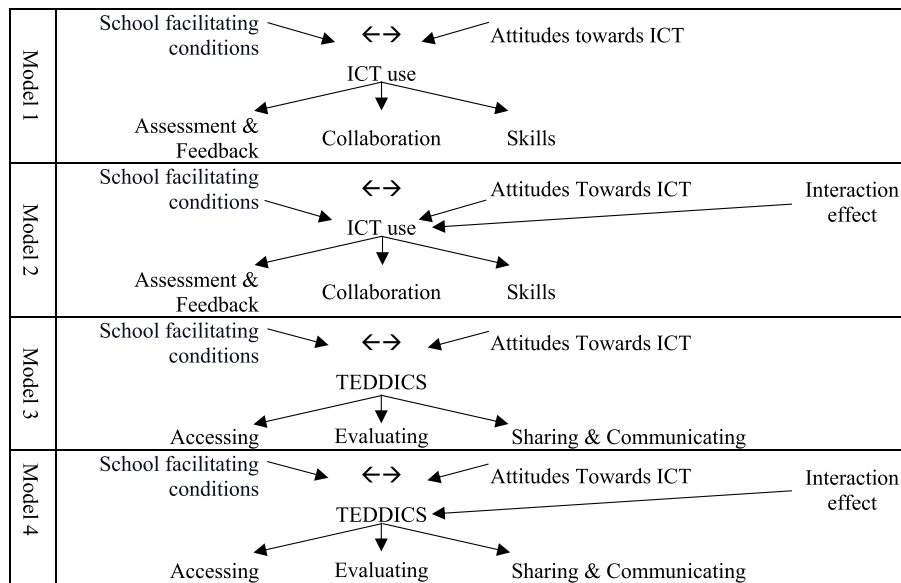[b] The variable area had 368 cases (184 missing values)..

Fig. 1. Hypothesized structural equation models.

within the analysis. We used two robust absolute fit indexes (root mean square error of approximation [RMSEA] and standardized root mean square residual [SRMR]), the robust comparative fit index (CFI) and robust Tucker–Lewis index (TLI). We used SPSS 26 for the descriptive analyses and outlier detection and RStudio version 4.1.1 to calculate the reliabilities, CFA and SEM. The R packages used were lavaan (Rosseel, 2012), semTools (Jorgensen et al., 2018), psych (Revelle & Revelle, 2015) and semPlot (Epskamp, 2017).

4.4. Data pre-processing

4.4.1. Outlier detection

To identify outliers, standardized values were calculated for the items representing attitudes, school facilitating conditions, ICT use, and TEDDICS. We performed an outlier scan using the SPSS option "Identify outliers", in which data points are considered outliers if their anomaly index is greater than 2 (IBM, 2017). Due to the instability of the analysis and following the recommendations of IBM (2023), different checks were carried out by randomly sorting the cases. In some checks no outliers were identified but in others one or two slightly extreme data appeared, but never with anomaly indices higher than 2.3. Because these outliers were always reflected in the item an of the ICT use variable, we checked the standardized values. We observed that the maximum standard deviation was $Z = 3.14$. Since the deviation was not very pronounced and we could not identify any substantial reason for these responses, we kept them in the data set.

4.4.2. Descriptive statistics, reliability coefficients, and measurement models

We calculated the descriptive statistics, characteristics of the distributions and reliabilities for each scale (Table 2). Reliabilities obtained by calculating the omega statistic were above 0.7 and therefore acceptable for all scales, except for ICT-use–assessment-and-feedback, which had only two items. The reliability of this dimension, calculated using Cronbach's alpha, obtained a value above 0.6.

Likewise, we first used CFA without parcelling to validate the factors in each scale. As planned, the school facilitating conditions and attitudes towards ICT scales responded well to a single-dimension solution.

The ICT use scale was composed of three factors: (1) assessment and feedback, (2) collaboration and (3) skills. The TEDDICS scale was also composed of three factors: (1) accessing information, (2) evaluating knowledge and (3) sharing and communicating. The item factor

Table 2
Reliabilities for the different scales.

Variables	Items	M (SD)	Range	Reliability
School facilitating conditions	5	**1.55 (.44)**	.88–3.00	Omega (total): .75
Attitudes Towards ICT	8	**2.07 (.37)**	.17–3.00	Omega (total): .91
ICT Use				
Assessment & Feedback	2	1.02 (.65)	.00–3.00	Alpha: .64
Collaboration	4	.92 (.63)	.00–3.00	Omega (total): .80
Skills	5	1.29 (.51)	.00–3.00	Omega (total): .80
ICT Use TOTAL	11	**1.11 (.51)**	**.00–3.00**	**Omega (hierarch.): .80**
TEDDICS				
Accessing	3	1.62 (.79)	.00–3.00	Omega (total): .87
Evaluating	4	1.63 (.79)	.00–3.00	Omega (total): .96
Sharing & Communicating	5	1.54 (.73)	.00–2.86	Omega (total): .85
TEDDICS TOTAL	12	**1.58 (.71)**	**.00–2.93**	**Omega (hierarch.): .87**

loadings and goodness of fit of each scale are shown in Table 3.

Although the CFA in general showed high item factor loadings on the appropriate constructs, the goodness of fit obtained was sometimes limited to a degree (Table 3). Therefore, a parcelling strategy was followed (the parcelled items can be seen in Table A2 in the Appendix). The CFA was then performed again with these parcelled items (Table 4), showing a substantial improvement in the goodness of fit of the models and the item factor loadings.

Likewise, bivariate correlations (Taylor, 1990) showed that ICT use and TEDDICS were quite correlated (with coefficient values between 0.53 and 0.82, as can be seen in Table 5). This may bias the structural parameters (i.e., path coefficients) in subsequent models. Therefore, we examined the multicollinearity of the data. The resulting variance inflation factors (VIF) for each of the ICT use and TEDDICS subscales resulted in values between 1.80 and 4.02, indicating that multicollinearity did not severely bias the structural parameters (criterion: VIF <5; Thompson et al., 2017).

We also identified whether the different scales correlated with each other (Taylor, 1990). We observed a low correlation between attitudes

Table 3
Item factor loadings and the goodness of fit of the CFA for each scale before parcelling.

Variables	Items	Std. All	Goodness of Fit
School facilitating conditions	Item a	.359	Robust CFI: .946
	Item b	.578	Robust TLI: .893
	Item c	.581	Robust RMSEA: .074
	Item d	.592	SRMR: .036
	Item e	.407	
Attitudes Towards ICT	Item a	.476	Robust CFI: .943
	Item b	.545	Robust TLI: .920
	Item c	.598	Robust RMSEA: .074
	Item d	.507	SRMR: .039
	Item e	.682	
	Item f	.662	
	Item g	.624	
	Item h	.680	
ICT Use–Assessment & Feedback	Item a	.601	Robust CFI: 939
	Item b	.812	Robust TLI: .918
ICT Use–Collaboration	Item c	.845	Robust RMSEA: .079
	Item d	.674	SRMR: .044
	Item e	.781	
	Item f	.579	
ICT Use–Skills	Item g	.365	
	Item h	.569	
	Item i	.669	
	Item j	.663	
	Item k	.737	
TEDDICS–Accessing	Item a	.780	Robust CFI: .920
	Item b	.808	Robust TLI: .901
	Item c	.795	Robust RMSEA: .104
TEDDICS–Evaluating	Item d	.851	SRMR: .052
	Item e	.917	
	Item f	.905	
	Item g	.747	
TEDDICS–Sharing & Communicating	Item h	.730	
	Item i	.802	
	Item j	.720	
	Item k	.701	
	Item l	.734	
	Item m	.719	
	Item n	.693	

Table 4
Item factor loadings, correlations between factors and the goodness of fit of the CFA for each of the scales after parcelling.

Variable	Item parcelling	Std. All	Goodness of Fit
School facilitating conditions	Item 1	.503	Robust CFI: 1
	Item 2	.570	Robust TLI: 1
	Item 3	.642	Robust RMSEA: .000
			SRMR: .000
Attitudes Towards ICT	Item 1	.704	Robust CFI: 1
	Item 2	.786	Robust TLI: 1
	Item 3	.732	Robust RMSEA: .000
			SRMR: .000
ICT Use–Assessment & Feedback	Item 1	.607	Robust CFI: .964
	Item 2	.803	Robust TLI: .940
ICT Use–Collaboration	Item 1	.899	Robust RMSEA: .084
	Item 2	.792	SRMR: .038
	Item 3	.573	
ICT Use–Skills	Item 1	.589	
	Item 2	.884	
	Item 3	.554	
TEDDICS–Accessing	Item 1	.766	Robust CFI: .969
	Item 2	.812	Robust TLI: .951
	Item 3	.795	Robust RMSEA: .099
TEDDICS–Evaluating	Item 1	.944	SRMR: .035
	Item 2	.832	
	Item 3	.882	
TEDDICS–Sharing & Communicating	Item 1	.753	
	Item 2	.780	
	Item 3	.909	

Note: All std. All values and correlations among factors were significant, p < .001.

also observed that school facilitating conditions and attitudes towards ICT were significantly positively correlated.

The second proposed mode was similar to the previous one but sought to identify whether there was an interaction effect of school facilitating conditions and attitudes on ICT; it explained 20.6% of the variance in ICT use. That is, this model explained 2.5 points more than the prior model. Furthermore, this model showed good fit indices (CFI = 0.984, TLI = 0.981, RMSEA = 0.023 and SRMR = 0.045). Again, the partitioned items presented factor loadings above 0.5, as expected. In this model (see Fig. 3), it was also observed that teachers' positive attitudes towards ICT use and especially school facilitating conditions significantly affected ICT use in the classroom (Table 7). Likewise, the correlation between school facilitating conditions and attitudes towards ICT was again significant. In addition, a significant interaction effect was found between facilitating conditions and attitudes on ICT use. When there are many school facilitating conditions for ICT use, the slope relating attitudes to it was positively significant. However, when these school supports are low, we find that attitudes cease to affect ICT use (see Fig. 4 and Table A3 in the Appendix).

5.2. Attitudes towards ICT and school facilitating conditions as predictors of TEDDICS (RQ2)

The model that identified the effect of school facilitating conditions and teachers' attitudes towards ICT without including the interaction effect explained 13.5% of the variance of TEDDICS. However, the overall goodness of fit of the model was somewhat poor (CFI = 0.941, TLI = 0.927, RMSEA = 0.074 and SRMR = 0.058). This model had factor loadings above 0.75 for all items plotted. Therefore, they seemed to predict the latent variables of this model very well. In terms of the relationships obtained (see Fig. 5), school facilitating conditions had a significant positive effect on TEDDICS. However, teachers' attitudes towards ICT did not predict this emphasis on carrying out practices with digital resources (Table 8). There was a correlation between attitudes towards ICT and school facilitating conditions, as we had seen

towards ICT and school facilitating conditions (≤0.35). Both variables were also correlated with ICT use and TEDDICS (≤0.35) except in the case of attitudes towards ICT and TEDDICS–evaluating and TEDDICS–sharing and communicating, whose correlations were not significant. In contrast, ICT use and TEDDICS showed moderate correlations (>0.36 to < 0.67), except for the correlation between ICT-use–skills and TEDDICS–evaluating (≤0.35).

5. Results

5.1. Attitudes towards ICT and school facilitating conditions as predictors of ICT use (RQ1)

The model that identified the effect of school facilitating conditions and teachers' attitudes towards ICT without including the interaction effect explained a total of 18.1% of the variance of ICT use. However, this model obtained a slightly poor goodness of fit (CFI = 0.947, TLI = 0.932, RMSEA = 0.056 and SRMR = 0.053). The RMSEA, SRMR and even CFI values could be considered acceptable, but the TLI value indicates a slightly weak fit. This model had factor loadings above 0.5 for all the parcelled items. Therefore, the items adequately predicted the latent variables. Furthermore, it was identified (see Fig. 2) that both school facilitating conditions and teachers' attitudes towards ICT use had a significant positive effect on the implementation of practices using ICT (Table 6). In other words, schools that provide facilitating conditions for ICT use and have positive attitudes towards ICT are associated with higher ICT use in the classroom. In addition, school facilitating conditions was the variable that had the largest effect on ICT use. It was

Table 5
Correlations between factors.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Attitudes towards ICT	1	.14**	.25**	.15**	.18**	.28**	.10*	.15**	.07	.09
2. School facilitating conditions		1	.27**	.23**	.25**	.22**	.28**	.25**	.22**	.29**
3. ICT Use			1	.78**	.92**	.89**	.57**	.53**	.45**	.57**
4. ICT Use – Assessment & Feedback				1	.68**	.53**	.56**	.53**	.47**	.54**
5. ICT Use – Collaboration					1	.67**	.55**	.51**	.42**	.57**
6. ICT Use – Skills						1	.41**	.39**	.33**	.40**
7. TEDDICS							1	.92**	.91**	.96**
8. TEDDICS – Accessing								1	.82**	.82**
9. TEDDICS – Evaluating									1	.78**
10. TEDDICS – Sharing & Communicating										1

* ≤0.05, ** ≤0.01, *** ≤0.001.

Fig. 2. Model explaining ICT use by attitudes towards ICT and school facilitating conditions.

Fig. 3. Model explaining ICT use by attitudes towards ICT, school facilitating conditions, and their interaction.

Table 6
Regression coefficients of the Model explaining ICT use by attitudes towards ICT and school facilitating conditions.

	Estimate	z-value	P (>|z|)	Std. All
ICT Use ~				
Attitudes towards ICT	.171	2.915	.004	.166
School facilitating conditions	.370	3.974	.000	.355
School facilitating conditions ~				
Attitudes towards ICT	.026	2.118	.034	.229

Table 7
Regression coefficients of the Model explaining ICT use by attitudes towards ICT, school facilitating conditions, and their interaction.

	Estimate	z-value	P (>|z|)	Std. All
ICT Use ~				
Attitudes towards ICT	.179	3.131	.002	.159
School facilitating conditions	.393	3.251	.001	.350
Interaction	.203	2.387	.017	.181
School facilitating conditions ~				
Attitudes towards ICT	.228	2.683	.007	.228

Fig. 4. Interaction effect on ICT use.

previously in the models that included ICT use.

The second proposed model that in addition to the effect of attitudes and school facilitating conditions analysed the interaction of these variables in TEDDICS explained 14.4% of the variance. Therefore, this showed an improvement of 0.9 points over the previous model. Furthermore, this model showed considerably better goodness of fit than the previous model (CFI = 0.969, TLI = 0.964, RMSEA = 0.038, SRMR = 0.046) and again had factor loadings above 0.75. In this model (see Fig. 6 and Table 9), it was also observed that the school facilitating conditions positively affected TEDDICS in a significant way. In addition, a positive correlation was observed between attitudes towards ICT and school facilitating conditions as noted above. However, as we saw in the previous model, there was no direct relationship between attitudes towards ICT and TEDDICS, but in this case, we did observe a slight, almost significant (p = .05) interaction effect between school facilitating conditions and attitudes towards ICT that affected TEDDICS. Therefore, we calculated the slopes that identified how the school facilitating conditions interacted with the relationship between attitudes and TEDDICS

and found interesting results. This analysis showed that when the school facilitating conditions were high, teachers' attitudes did promote a greater emphasis on activities carried out with ICT. However, when these supports were not high, this effect disappeared, which would
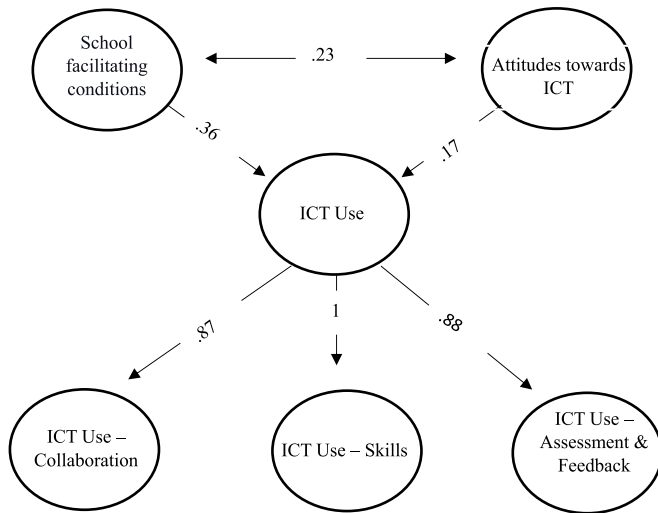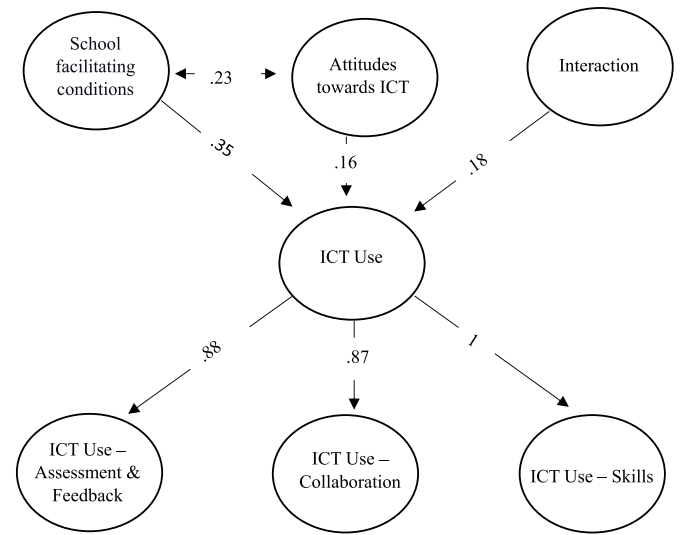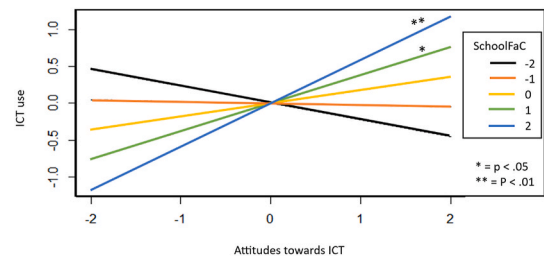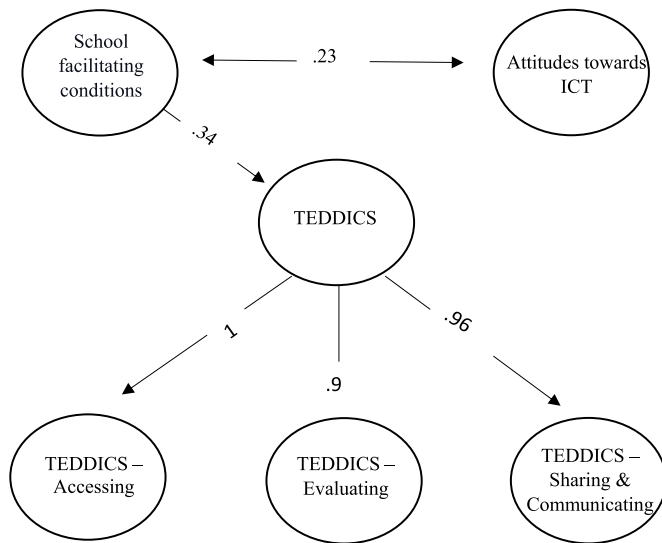
Fig. 5. Model explaining TEDDICS by attitudes towards ICT and school facilitating conditions.

Table 8
Regression coefficients of the model explaining TEDDICS by attitudes towards ICT and school facilitating conditions.

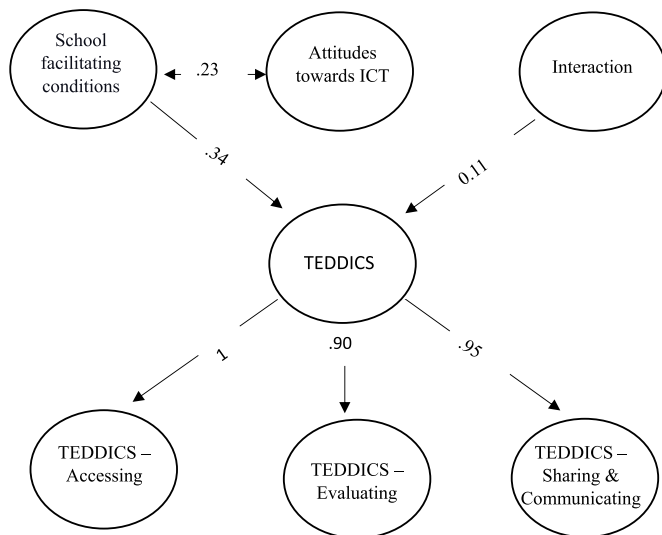|	Estimate	z-value	P (>|z|)	Std. All
TEDDICS ~				
Attitudes towards ICT	.167	1.480	.139	.082
School facilitating conditions	.691	6.493	.001	.339
School facilitating conditions ~				
Attitudes towards ICT	.026	2.124	.034	.228

Fig. 6. Model explaining TEDDICS by attitudes towards ICT, school facilitating conditions, and their interaction.

explain why the proposed model did not identify the relationship between attitudes and TEDDICS (see Fig. 7 and Table A4 in the Appendix).

6. Discussion

The present study was aimed at investigating attitudes towards ICT and school facilitating conditions as predictors of ICT use (Research Question 1) and attitudes towards ICT and school facilitating conditions

Table 9
Regression coefficients of the Model explaining TEDDICS by attitudes towards ICT, school facilitating conditions, and their interaction.

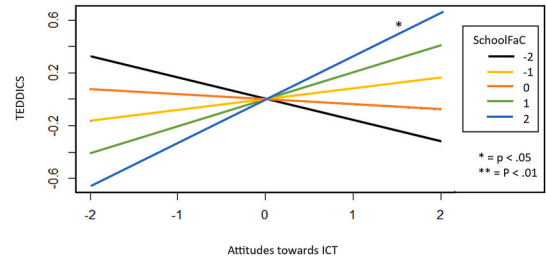|	Estimate	z-value	P (>|z|)	Std. All
TEDDICS ~				
Attitudes towards ICT	.083	1.498	.0.134	0.077
School facilitating conditions	.364	3.655	.001	.337
Interaction	.122	1.99	.052	.113
School facilitating conditions ~				
Attitudes towards ICT	.228	2.616	.009	.228

Fig. 7. Interaction effect on TEDDICS

as predictors of TEDDICS (Research Question 2). To answer these questions, we performed descriptive analyses of each construct (attitudes towards ICT, school facilitating conditions, ICT use and TEDDICS) and identified their factorial structure to assure the quality of the measurement instrument. Second, SEM analysis was carried out to specifically answer the two questions posed.

6.1. Descriptive levels of ICT use and TEDDICS

We observed that the teachers' ICT use was quite low. Therefore, despite the possibilities of these resources, the teachers still reported being somewhat reluctant to incorporate them into the classroom. In particular, when analysing ICT use, we found that teachers reported carrying out more activities related to the development of skills with their pupils than assessment activities, with collaborative activities being the least common. These results are supported by a large body of scientific literature. In particular, some papers have identified that ICTs are mainly used to promote skills, such as searching for information or learning information through watching videos (OECD, 2019; Suárez-Rodríguez et al., 2018; Yunus & Suliman, 2014), the reading of information in multimodal texts (Mailizar & Fan, 2020; Suárez-Rodríguez et al., 2018) or the production of answers (Kauffman & Young, 2015). However, these activities, in general, are rather oriented towards content-centred practices, as pointed out by some authors (see Cabellos et al., 2023; OECD, 2009). This could also justify how the frequencies of use obtained were not particularly high because an important part of the activities proposed in our questionnaire would not fit under these content-centred conceptions but rather focused on student-centred practices.

Similar results were also identified in the activities aimed at evaluation. Some studies have also pointed out that teachers frequently use ICT to assess their students (Cabellos et al., 2023). However, this evaluation is usually summative and aimed at identifying the content learned instead of promoting a formative evaluation related to student-centred conceptions. Therefore, in future work, we propose to take into account this distinction between activities that are more summative or content-centred and those that are more formative and student-centred. Finally, the lower frequency of activities oriented towards cooperation has also been noted by authors, including Cabellos et al. (2023), who again point out the need to promote more student-centred activities that favour the integration of different points of view for which it is important to develop social and cooperative skills.

Similar results were observed when analysing the teachers' emphasis on carrying out certain activities. Again, lower scores were observed for teachers' emphasis on carrying out sharing and communicating activities when compared with activities aimed at promoting information accessing skills and oriented towards the evaluation of learning with ICT. Therefore, again, there is a tendency to prioritise the acquisition of content and, in this case, evaluation rather than carrying out collaboration activities. However, it should be noted that although they are not directly comparable variables, the mean score on TEDDICS was higher than the teachers' mean score on ICT use. TEDDICS differs from ICT use because it allows us to obtain information not only about teaching practices but also about more explicit teachers' beliefs about the type of learning that should be prioritised at school. This could justify how the TEDDICS variable evidences practice more frequent and diverse than ICT use and that are generally related to more constructive learning theories than those that are manifested in practices (Arancibia et al., 2020; De Aldama & Pozo, 2016; Du Plessis, 2016; Kaymakamoglu, 2018).

6.2. Attitudes towards ICT and school facilitating conditions as predictors of ICT use (RQ1)

To answer RQ1 (identifying the effect of attitudes towards ICT and school facilitating conditions as predictors of ICT use), we conducted two SEM analyses. The first model included the effect of attitudes towards ICT and school facilitating conditions in ICT use. This model identified a significant effect of both variables on ICT use, explaining 18.1% of the variance.

In particular, this tends to be related to first-order and second-order barriers (Ertmer, 1999), as noted in the theoretical background section. First-order barriers were related to the lack of school facilitating conditions. Therefore, these results suggest that these facilitating conditions still have an essential effect on the use of ICT, as pointed out by several authors (Nikolopoulou & Gialamas, 2016; Vrasidas, 2015; Williams et al., 2015). In contrast, second-order barriers were those related to attitudes and beliefs towards ICT use and that, in the same way as first-order barriers, influenced the practices carried out by teachers. In this study, we identified teachers' attitudes towards ICT as having a direct and positive effect on their use, which has also been confirmed by several previous studies (Davis, 1985; Kreijns et al., 2013; Teeroovengadum et al., 2017).

In addition, we identified a slight correlation between the variables school facilitating conditions and attitudes towards ICT, which has also been supported by several authors (e.g., Kumi et al., 2012; Ngai et al., 2007; Teo, 2009). However, it should be noted that our model presented a slightly poor fit, which led us to question the possibility of improving it by incorporating the moderating effect of school facilitating conditions in the relationship between attitudes towards ICT and ICT use. This second model presented better goodness of fit with an increase of 2.5 points in the explained variance of ICT use. In addition, the effect of school facilitating conditions and attitudes towards ICT on ICT use was identified, which confirmed the model stability. However, the most remarkable result was the identification of a significant interaction effect between school facilitating conditions and attitudes. Thanks to this result, we have provided additional support that school facilitating conditions affect not only ICT use but also promote a stronger relationship between attitudes towards ICT and ICT use, which is a novel finding that has not been identified to date.

6.3. Attitudes towards ICT and school facilitating conditions as predictors of TEDDICS (RQ2)

To answer RQ2 (identifying the effect of attitudes towards ICT and school facilitating conditions as predictors of TEDDICS), we conducted two SEM analyses. The first model included the effect of attitudes towards ICT and school facilitating conditions in the TEDDICS, which

explained 13.5% of the variance. This model identified that school facilitating conditions were related to attitudes towards ICT. In addition, school facilitating conditions significantly affected TEDDICS. Therefore, the importance of school facilitating conditions in showing a greater emphasis on carrying out various teaching practices with ICT can be shown.

However, attitudes towards ICT did not affect TEDDICS. We believe that the lack of a relationship between attitudes towards ICT and the emphasis placed on the activities is because TEDDICS is a variable that integrates aspects that go beyond ICT use, such as teachers' beliefs about teaching and learning (Siddiq et al., 2016) and which could not be justified by attitudes towards digital resources.

In the first model of ICT use, we identified slightly poor goodness of fit (see the results section). Thus, we incorporated the interaction effect between school facilitating conditions and attitudes towards ICT. The aim was to identify whether the lack of effect between attitudes and ICT use was due to school facilitating conditions mediation.

The second model showed an increase in goodness of fit and explained 0.9 points more of the variance of ICT use. This model identified the effect of school facilitating conditions on TEDDICS but found no relationship between attitudes and this variable. However, it should be noted that a slightly significant interaction effect was found between school facilitating conditions and attitudes towards ICT, which indicated that although the relationship between attitudes towards ICT and TEDDICS was small, it could exist in cases where school facilitating conditions were high. This confirms the effect of school facilitating conditions not only on ICT use but also on more general aspects of teaching practices (e.g., teaching beliefs) that would be included in TEDDICS.

7. Limitations and future Research Directions

Our study has several limitations: First, our data were cross-sectional and do not allow for causal inferences or the mapping of development over time. Therefore, we recommend using longitudinal analyses to determine whether the progressive incorporation of facilitating conditions in schools may favour a stronger relation between attitudes, ICT use, and TEDDICS.

Second, our data were obtained from a sample with some missing responses. These missing cases could have biased the relations, for instance, the regression on the interaction term. Thus, we believe it would be advisable to replicate these analyses with other samples to assess the extent to which this effect may or may not occur.

Third, the TEDDICS variable requires further study beyond attitudes and school facilitating conditions. TEDDICS is a novel variable that has not been extensively explored but allows us to gain a more holistic view of the relationships established between practices, teaching beliefs, etc. Therefore, we propose that future studies examine the impact of other variables, such as teaching beliefs, on teaching and learning processes, teaching experience frequency of ICT use, etc., which are known to affect the use of ICT.

Fourth, attitudes could have been studied by distinguishing positive and negative attitudes towards ICT (Semerci & Aydin, 2018), and school facilitating conditions could also have been analysed more specifically. We suspect that school leadership may be another, supportive facilitating condition. As Strudler and Hearrington (2008) pointed out, we believe that promoting educational agents who work to support teachers in the use of ICTs can facilitate the consolidation of the bases that favour varied and student-centred uses by teachers, which has an essential impact when it comes to meeting the competence demands of today's society. Factors such as school leadership (Håkansson, 2019; Ottestad, 2013) or institutional policy (Mercader & Gairín, 2020; Nikolopoulou & Gialamas, 2016) may affect attitudes, ICT uses, and TEDDICS differently. For this reason, we propose that future work take into account these variable specifications.

8. Conclusions

In this study, we observed that both in the case of ICT use and TEDDICS, the models with the best fit and which best explained the variance of these two variables were those that included the effect of the interaction between the school facilitating conditions and attitudes towards ICT. This SEM analysis was carried out since it was observed that facilitating conditions were related to attitudes, which had already been described by some authors (Ngai et al., 2007; Teo, 2009). As evidenced in the results of this study, in both cases, it has been shown that not only are school facilitating conditions relate to attitudes towards ICT, ICT use, and the emphasis placed on practices with these resources but also promote a higher impact of the attitudes on ICT use and TEDDICS. We found that when there was not much support from the educational institution in ICT use, having positive attitudes towards ICT did not affect whether ICT was used more or whether the emphasis was increased when it came to valuing these activities in teaching. However, when school support was high, attitudes had a significant effect on ICT use and TEDDICS.

From our perspective, teachers' attitudes towards ICT are not fixed but depend on the school facilitating conditions context. Therefore, a similarity can be observed with research on teachers' beliefs towards learning and teaching that identifies that these beliefs are organised and activated depending on contextual demands (Bautista et al., 2010; Ertmer et al., 2015; López-Íñiguez et al., 2014; Tondeur, van Braak, et al., 2017). Therefore, despite the existence of positive attitudes towards ICT, these may be hidden due to contexts that do not favour their use. This highlights the importance of studying the degree of support offered by schools to teachers when using ICT.

Researchers should take more account of ICT-related conditions in schools to examine the connection between ICT-related attitudes and teaching. Thus, we believe that existing models describing the relation between attitudes and practices should include school context, not only as an explanatory variable but also as a compensatory variable that may or may not determine the connection between these two constructs.

Likewise, it is necessary to promote better conditions for school facilitation. Commonly, programs that promote the incorporation of ICT in schools focus on improving teaching practices (Khan, 2014) or promoting more positive attitudes towards ICT use (Hismanoglu, 2012). However, our study showed that, without optimal school conditions, the incorporation of ICT in classrooms can be undermined – which partly contradicts the results of some studies that indicate that these aspects are already partially resolved (Ertmer et al., 2015).) or are not sufficient to explain the incorporation of these resources (Gil-Flores et al., 2017). Nevertheless, the results of our work suggest that further studies should be done in this direction.

Materials and/or code availability

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

Ethical approval and consent

We obtained the informed consent of all participants. The study was approved by the Faculty of Psychology at the Autonomous University of Madrid.

CRediT authorship contribution statement

Beatriz Cabellos: Conceptualization, Methodology, Software, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization. **Fazilat Siddiq:** Conceptualization, Methodology, Investigation, Data curation, Resources, Writing – review & editing. **Ronny Scherer:** Conceptualization, Methodology, Investigation, Data curation, Writing – review & editing, Visualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgements

Appendix 11

Table A1
Definitions and Items in Each Dimension

Variables		Items
School facilitating conditions		Item a: I work together with other teachers on improving the use of ICT in classroom teaching.
		Item b: There is sufficient time to prepare lessons that incorporate ICT.
		Item c: I observe how other teachers use ICT in teaching.
		Item d: There is a common set of expectations in the school about what students will learn about ICT,
		Item e:There is sufficient technical support to maintain ICT resources.
Attitudes Towards ICT		Item a: Enables students to access better sources of information.
		Item b: Helps students to consolidate and process information more effectively.
		Item c: Helps students learn to collaborate with other students.
		Item d: Enables students to communicate more effectively with others.
		Item e: Helps students develop greater interest in learning.
		Item f: Helps students work at a level appropriate to their learning needs.
		Item g: Helps students develop skills in planning and self-regulation of their work.
		Item h: Improves the academic performance of students.
ICT Use	Assessment & Feedback	Item a: Assessing student learning through tests.
		Item b: Providing feedback to students.
	Collaboration	Item c: Supporting collaboration among students.
		Item d: Mediating communication between students and experts or external mentors.

Table A1 (*continued*)

Variables		Items
TEDDICS	Skills	Item e: Enabling students to collaborate with other students (within or outside school).
		Item f: Collaborating with parents or guardians in supporting students' learning.
		Item g: Presenting information through direct class instruction
		Item h: Providing remedial or enrichment support to individual students or small groups of students.
		Item i: Enabling student-led whole-class discussions.
		Item j: Reinforcing learning of skills through repetition of examples.
		Item k: Supporting inquiry learning.
	Accessing	Item a: Accessing information efficiently.
		Item b: Exploring a range of digital resources when searching for information.
		Item c: Providing references for digital information sources.
	Evaluating	Item d: Evaluating the relevance of digital information.
		Item e: Evaluating the credibility of digital information.
		Item f: Validating the accuracy of digital information.
		Item g: Evaluating their approach to information searches.
	Sharing & Communicating	Item h: Displaying information for a given audience/purpose.
		Item i: Sharing digital information with others.
		Item j: Using computer software to construct digital work products (e.g. presentations, documents, images and diagrams)
		Item k: Providing digital feedback on the work of others (such as classmates).
		Item l: Understanding the consequences of making information publicly available online.
		Item m: Collaborating digitally with students in class or students in their own school.
		Item n: Communicating digitally to a specified audience for a specified purpose.

Table A2
Item Parcelling in Each Dimension

Variables		Item parcelling
School facilitating conditions		Item 1: a and c
		Item 2: b
		Item 3: d and e
Attitudes Towards ICT		Item 1: a, b and g
		Item 2: c, d and h
		Item 3: e and f
ICT Use	Assessment & Feedback	Item 1: a
		Item 2: b
	Collaboration	Item 1: c and d
		Item 2: e
		Item 3: f
	Skills	Item 1: g and j
		Item 2: h
		Item 3: i and k
TEDDICS	Accessing	Item 1: a
		Item 2: b
		Item 3: c
	Evaluating	Item 1: d
		Item 2: e and g
		Item 3: f
	Sharing & Communicating	Item 1: h and j
		Item 2: i, k and l
		Item 3: m and n

Table A3
Interaction Effect on ICT Use

School facilitating conditions	Est.	SE	Z	*p*-value
−2	−.228	.196	−1.164	.245
−1	−.025	.141	−0.175	.861
0	.179	.121	1.481	.139
1	.382	.149	2.559	.010
2	.586	.208	2.819	.005

Table A4
Interaction effect on TEDDICS

School facilitating conditions	Est.	SE	Z	*p*-value
−2	−.162	.163	−0.994	.320
−1	−.040	.121	−0.327	.744
0	.083	.100	0.831	.406
1	.205	.111	1.844	.065
2	.327	.148	2.208	.027

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