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Instructional Confidence and Technology Attitudes in a Centralized Education System: Evidence from Türkiye

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Abstract
Educational Technology Integration has been shaped by the beliefs of teachers; however, the majority of evidence connecting self-efficacy in teaching with technology attitudes is based on data collected from western, high-autonomy systems. In order to investigate whether the widely documented positive relationship exists within an examination-driven and centralized educational system, this study examined the relationship between technology attitudes and general teaching self-efficacy in Turkey. Using a cross-sectional survey design, a total of 386 urban public school teachers in Balıkesir Province were recruited through convenience sampling. Correlation analyses utilizing Pearson correlation coefficients and t-test statistics were performed to analyze the data. The results revealed a very small and statistically non-significant relationship between general teaching self-efficacy and technology attitudes ($r = .06$, $p = .231$, $r^2 = .004$), and no statistically significant gender differences were found in either construct. The findings indicate that general instructional confidence and technology-related dispositions may function somewhat separately in highly structured educational environments, rather than suggesting that this weak association can be attributed solely to the structural aspects of a centralized system. Additionally, limited variability in both constructs — due to ceiling effects — and the conceptual difference between efficacy in general domains and attitudes toward specific domains likely contributed to the weak association.

Keywords: Teacher attitudes toward technology, teaching self-efficacy, centralized education system, technology integration

Merkezi Bir Eğitim Sisteminde Öğretimsel Güven ve Teknoloji Tutumları: Türkiye Örneği

Öz
Eğitim teknolojilerinin sınıf ortamına entegrasyonu, büyük ölçüde öğretmenlerin bireysel inanç ve tutumları tarafından biçimlenmektedir. Ne var ki öğretme öz-yeterliliği ile teknoloji tutumları arasındaki ilişkiyi ele alan çalışmaların büyük çoğunluğu, özerklik düzeyi yüksek Batılı eğitim sistemlerinden elde edilen verilerle sınırlı kalmaktadır. Bu çalışma, söz konusu ilişkinin merkezi ve sınav odaklı bir eğitim sisteminde de geçerlilik taşıyıp taşımadığını Türkiye örneği üzerinden incelemeyi amaçlamaktadır. Kesitsel tarama modeliyle tasarlanan araştırmada, Balıkesir İli'ndeki devlet okullarında görev yapan 386 öğretmenden uygun örnekleme yöntemiyle veri toplanmıştır. Veriler, Pearson korelasyon katsayısı ve bağımsız gruplar t-testi aracılığıyla analiz edilmiştir. Araştırma bulguları, genel öğretme öz-yeterliliği ile teknoloji tutumları arasında istatistiksel açıdan anlamlı olmayan, oldukça düşük düzeyli bir ilişki olduğunu ortaya koymaktadır ($r = .06$, $p = .231$, $r^2 = .004$). Bunun yanı sıra her iki değişken bakımından da cinsiyete göre anlamlı bir farklılık gözlemlenmemiştir. Bu bulgular, yüksek düzeyde yapılandırılmış eğitim ortamlarında genel öğretim öz-güveni ile teknolojiye yönelik tutumların birbirinden görece bağımsız örüntüler sergileyebildiğine işaret etmektedir. Öte yandan gözlemlenen zayıf ilişkinin yalnızca merkeziyetçi sistem yapısına bağlanması doğru olmayacaktır; tavan etkisinin yol açtığı sınırlı varyans ile genel öz-yeterlilik algısı ve alana özgü tutumlar arasındaki kavramsal ayrımın da bu sonuca katkıda bulunduğu düşünülmektedir.

Anahtar Kelimeler: Öğretmenlerin teknolojiye yönelik tutumları, öğretme öz-yeterliliği, merkeziyetçi eğitim sistemi, teknoloji entegrasyonu

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Introduction

The integration of educational technology seeks to achieve genuine pedagogical transformation, which requires both technological competence and strong pedagogical confidence (Ertmer et al., 2012; OECD, 2019). For more than two decades, research has shifted from viewing teachers as passive recipients of top-down technological mandates to understanding integration as a complex, interactive process shaped by individual beliefs and institutional contexts (Ertmer & Ottenbreit-Leftwich, 2010; Sang et al., 2010).

In a large number of studies, teachers' beliefs—especially their self-efficacy for using technology and their general views on technology—have often determined the extent to which they will actually utilize technology in their classrooms (Kaplan & Çetin, 2025). At one time, most of the problems related to the adoption of new technologies by educators could be traced back to various types of technological or physical barriers. However, today there is an increasingly greater emphasis being placed upon the role that psychological elements, i.e. educator's resistance to change and/or lack of vision relative to effective teaching methods, play in inhibiting the utilization of technology in educational settings (Tondeur et al., 2017; Voogt et al., 2013).

Background and Theoretical Framework

The Turkish Educational Context

The curriculum content, the pace at which it is taught and the instructional material for all students are decided by national government agencies. This means that teachers generally teach from an agreed upon curriculum with little or no opportunity to adjust their teaching methods in response to student learning needs (Turkish Ministry of National Education [MoNE], 2024). The use of standardized national assessments as part of the assessment process in Turkey, creates pressure on teachers to ensure they cover what is required and that students perform well on these assessments. Therefore, under current conditions, there will be greater likelihood that technology will be used as a tool to deliver the day-to-day teaching/learning environment rather than creating new and innovative approaches to teaching/learning (MoNE, 2024).

Although there has been growth in access to digital resources since the inception of FATİH, this does not mean that classrooms across Turkey are adopting digital resources uniformly. In many regions across Turkey, urban centers were able to adopt digital resources sooner than rural and eastern regions. Many students and educators in rural and eastern areas continue to experience difficulties with internet connectivity, technical support and access to devices. Similarly, many of the same gaps exist among teachers who engage with the EBA portal as do among students. These gaps have been shown to be primarily attributed to technical constraints and inadequate professional development for teachers (Pamuk et al., 2013; Tezci, 2011). Additionally, cultural aspects related to the central authority of decision making may also affect how reforms are implemented locally (Hofstede, 2011).

Theoretical Framework and Literature Review

Rather than repeating the broader rationale, the discussion below narrows the argument to one specific question: whether the expected link between efficacy and technology attitudes remains stable when instruction is shaped by centralized curricular and accountability conditions.

Teacher Attitudes and Self-Efficacy: Conceptual Foundations

Teacher attitudes toward technology are commonly described as consisting of affective, cognitive, and behavioral components, rather than as a simple positive or negative position (Ajzen, 2005). In practice, these attitudes tend to occupy an intermediate role. They shape how conditions such as institutional support, expectations, and access to resources are reflected in teachers' everyday use of technology in the classroom. In line with this view, major frameworks such as the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology treat attitudes (and closely related acceptance beliefs) as key pathways connecting antecedent factors to use behavior (Davis, 1989; Venkatesh et al., 2003). Positive attitudes predict greater adoption and more sophisticated integration, while negative attitudes create barriers even when resources exist (Ertmer, 2005). Teaching self-efficacy—teachers' beliefs in their capabilities to accomplish specific teaching tasks (Bandura, 1997)—shapes goal-setting, effort investment, persistence, and openness to change (Tschannen-Moran & Hoy, 2001). Turkish teachers generally hold positive attitudes toward the use of technology in education and relatively high

levels of teaching self-efficacy, as indicated by studies using the Attitude Scale Toward Technology Use in Education (Öztürk, 2006) and the Teacher Self-Efficacy Perception Scale – Short Form (Aydın & Semerci, 2017 ; Karaoğlu, 2019; Küçük & Çelik, 2021 ; Yünkül & Güneş, 2022).

Western theories and studies often show that having confidence in oneself is linked to having a positive attitude towards technology (Albion, 1999; Wang et al., 2004). According to self-efficacy theory, confidence can apply to different areas, so teachers who are confident in their abilities should also feel confident when trying new teaching methods, like using technology (Bandura, 1997). Prior international research generally suggests that technology-related efficacy beliefs, technology attitudes, and intended ICT integration tend to be positively associated. However, these relationships have usually been examined with technology-specific constructs, such as computer self-efficacy or ICT-related confidence, rather than with domain-general teaching self-efficacy (Hermans et al., 2008; Sang et al., 2010; Wang et al., 2004). For that reason, stronger findings from prior literature are not treated here as directly comparable benchmarks. Instead, the present study asks whether a broader sense of instructional confidence is associated with technology attitudes in a centralized educational context.

Institutional context may also shape how efficacy beliefs relate to technology-oriented dispositions. In more centralized systems, teachers may feel instructionally competent while still perceiving limited room to experiment with new tools or methods. In such environments, curriculum pacing, externally defined assessment priorities, and uneven infrastructure can all weaken the extent to which broad teaching confidence translates into favorable orientations toward technology use (Ertmer, 2005; Tondeur et al., 2017; Teo, 2011; Akbaş & Yünkül, 2024). This possibility is especially relevant where instructional routines are closely tied to centrally regulated expectations.

In this study, the observed weak relationship between general teaching self-efficacy and technology attitudes is described as a form of limited empirical alignment. This phrasing is used purely operationally to indicate that the two constructs showed only a negligible association in the present sample. It does not imply a historical breakdown of any previously established relationship.

Rationale for Domain-General Self-Efficacy

This study employs domain-general teaching self-efficacy for three theoretically motivated reasons. First, self-efficacy theory posits hierarchical organization wherein domain-general confidence serves as a foundation for domain-specific efficacies, making it a conceptually appropriate starting point for examining technology-related orientations. Second, technology-specific self-efficacy scales may conflate genuine instructional beliefs with prior exposure to digital tools; in contexts where infrastructure is uneven, lower scores may reflect limited access rather than limited capability. Domain-general efficacy is less susceptible to this confound. Third, using a domain-general measure allows the findings to speak to a broader theoretical question: whether instructional confidence as such — independent of technology familiarity — is associated with technology attitudes under centralized conditions. General teaching self-efficacy was therefore selected as the focal predictor, as it captures broad instructional confidence without being confounded by variation in technology access or prior technology training.

This makes domain-general self-efficacy especially useful in the present study, as it allows the analysis to focus on teachers' broader instructional confidence without collapsing that construct into immediate access conditions or technology-specific familiarity.

Research Gap

For this reason, attention to general teaching self-efficacy allows a different perspective on teachers' professional confidence. Whether this broader sense of efficacy is reflected in attitudes toward educational technology within centralized systems is not yet well understood. The Turkish education system, where curriculum implementation and assessment practices are centrally defined, offers a context in which this issue can be examined. Looking at belief–practice relationships in this setting makes it possible to consider how structural conditions shape the ways in which teachers' beliefs are, or are not, reflected in their orientations toward technology.

This study had two aims: first, to examine the relationship between Turkish teachers' technology attitudes and general teaching self-efficacy in a centralized educational system; and second, to examine whether these constructs differed by gender. In light of prior research, the expected relationship between technology attitudes and domain-general teaching self-efficacy was treated as an empirical question rather

than as a fixed expectation, while the gender comparison was approached as exploratory given the inconsistency of prior findings. More specifically, the study addressed the following questions:

RQ1. What is the relationship between Turkish teachers' technology attitudes and general teaching self-efficacy?

RQ2. Do technology attitudes and teaching self-efficacy differ by gender?

Method

This study used a cross-sectional, correlational design to examine how Turkish teachers' attitudes toward educational technology relate to their teaching self-efficacy (Creswell & Creswell, 2018). We chose a correlational approach because the goal was to describe associations between naturally occurring psychological constructs rather than to test the effects of an intervention. This is particularly appropriate for school settings, where experimentally manipulating teachers' attitudes or efficacy beliefs is neither practical nor ethical in most cases (Field, 2018).

Participants

Teachers who completed a survey for this research (n = 386) are all employed by urban public school systems serving students in the Altıeylül and Karesi districts of Balıkesir, which is in northwest Turkey. Convenience sampling was used to recruit these participants. A convenience sampling design can be useful when evaluating relationships among variables in a single sample, however, such designs cannot reasonably allow researchers to make statistical generalizations about similar samples.

All participants met one eligibility requirement – that they use educational technology as part of their instructional activities on an occasional basis or more frequently. The self-reported measure used to determine how often each participant uses educational technologies in their classrooms did not involve verification via other means (e.g., usage reports).

Prior to responding to items in the surveys, all eligible participants signed informed consent documents. For descriptive purposes only, age data were collected from participants.

Table 1. *Participant Demographic Characteristics (N = 386)*

Characteristic	Category	n	%
Gender	Female	294	76.2
	Male	92	23.8
Age	20–30 years	30	7.8
	30–40 years	175	45.3
	40+ years	181	46.9
Teaching Experience	1–10 years	72	18.7
	10–20 years	221	57.3
	20+ years	93	24.1
Educational Level	Primary	146	37.8
	Middle School	154	39.9
	Secondary	86	22.3

Instruments

The data collection tool was a survey based on an established format and structure. The design of the survey was based on ajzen's (2005) attitude model and Tschannen-Moran & hoy's (2001) teaching self-efficacy model. The tool had two types of questions. Multiple choice was for collecting demographic and category type data. Likert scale type questions were for collecting data on teachers' technology attitudes and their level of confidence as a teacher using educational technology.

Educational technology attitudes among teachers were assessed by means of an established survey tool with 39 items rated using a five point Likert continuum (strongly disagree to strongly agree). The same dimensions that comprised this scale were derived from the results of the initial development research conducted by Öztürk (2006) through application of factor analysis procedures:

1. Impact of Technology on Teaching Processes (16 items; α = .86): beliefs about technology's role in instruction and student learning
2. Self-Development in Technology Use (14 items; α = .94): motivation to learn and apply new technologies professionally

3. Technology Use and Classroom Management (9 items; α = .93): concerns about technology's effects on classroom control and workload

The scale includes 24 negative items (e.g., "If it were not mandatory, I would not use any tools in my lessons") and 15 positive items (e.g., "Using tools increases students' interest in the lesson"). Following Öztürk's (2006) scoring procedure, negative items were reverse-coded (6 - raw score) prior to analysis such that higher scores consistently indicate more positive attitudes toward technology integration. The original study reported Cronbach's α = .88 for the full scale; the present sample yielded α = .81.

General teaching self-efficacy was measured using the Teacher Self-Efficacy Perception Scale – Short Form (Karaoğlu, 2019). The scale includes 12 items rated on a 9-point Likert scale (1 = Not at all, 9 = Very much) and comprises three dimensions: Student Engagement (4 items, α = .81), Instructional Strategies (4 items, α = .80), and Classroom Management (4 items, α = .79). Sample items include "How much can you motivate students to participate?", "How much can you implement effective strategies?", and "How much can you manage classroom discipline?" Higher scores indicate stronger self-efficacy. Although the instrument does not assess technology-specific efficacy, it captures teachers' generalized instructional confidence, allowing the study to examine whether broad professional beliefs are associated with technology-related orientations.

Table 2. *Instrument Characteristics and Reliability Coefficients*

Instrument	Dimension	Items	Scale	Sample Item	α	Source
Attitudes (Öztürk, 2006)	Teaching Impact	16	1-5	Technology in teaching processes	.86	Öztürk, 2006
	Self-Development	14	1-5	Self-development with tech	.94	
	Classroom Management	9	1-5	Tech for classroom control	.93	
	Total	39	1-5	-	.81	
Self-Efficacy (Karaoğlu)	Engagement	4	1-9	Motivate participation	.81	Karaoğlu, 2019
	Strategies	4	1-9	Effective strategies	.80	
	Management	4	1-9	Discipline management	.79	
	Total	12	1-9	-	.90	

Note. α = Cronbach's alpha. Negative attitude items (n = 24) reverse-coded per Öztürk (2006); higher scores indicate more positive attitudes. All scales demonstrated acceptable-to-excellent reliability (α ≥ .79).

Both instruments had previously been validated in Turkish samples, including evidence from factor-analytic studies (Öztürk, 2006; Karaoğlu, 2019). Because the present study was designed primarily to examine associations between constructs rather than to re-establish the measurement structure of the scales, psychometric evaluation focused on internal consistency within the current sample. Reliability estimates were acceptable to high across all subscales (α = .79–.94). Future research using broader and more diverse samples may usefully revisit the factor structure through confirmatory analyses.

Data Collection

Data collection occurred during the 2023–2024 academic year. Teachers were recruited via convenience sampling from public schools in Balıkesir's Altıeylül and Karesi districts, yielding 386 complete responses. Surveys were administered in paper (n = 214, 55.4%) and online formats (n = 172, 44.6%); completion took 15–20 minutes.

Independent-samples t-tests indicated no statistically significant mode differences for either technology attitudes, t(384) = 0.34, p = .731, d = 0.04, or teaching self-efficacy, t(384) = 0.52, p = .604, d = 0.05. Because the observed effect sizes were negligible, paper and online responses were treated as analytically comparable.

Data Analysis

Prior to examining the results of the major analyses, a priori power calculations were completed utilizing G*Power 3.1.9.7 (Faul et al., 2009) to assess whether there was sufficient sample size based upon previous research. A medium-sized effect (r = .30) was used in the priori calculation of adequate sample size at a moderate level of alpha = .05 and power = .8. In order to detect a medium-sized effect (r = .30) as identified above, a total sample size of 84 was necessary. Since the current sample consists of n = 386, the study has virtually unlimited power to detect effects of r = .30 or greater. However, power is much reduced (approximately .24) when assessing the relationship found (r = .06). Detecting a relationship of this magnitude with 80 percent power will necessitate approximately n = 2175.

In addition, it should be noted that the priori calculated sample sizes reflect a desire to compare gender differences. Therefore, if one wished to use an effect size of d = 0.20, then approximately n = 620 would need to be included in each group so as to have 80 percent power. These factors have been taken into account when interpreting the findings in terms of their magnitude in addition to determining statistical significance (Lakens, 2013).

All of the data were analyzed using SPSS version 28.00. All 386 participants provided complete responses on all items of both the attitudes toward technology use scale and self-efficacy scale. Assessment of normality was completed through the use of Kolmogorov-Smirnov tests (all p's > .05) and examination of distributions (e.g., skewness/kurtosis < |2|; Kline, 2016). Ceiling effects were observed in all three subscales of self-efficacy, however, given the large number of participants (n = 386) and the robustness provided by the Central Limit Theorem (Norman, 2010), it was deemed appropriate to utilize parametric statistics. Nonparametric alternative measures were also used in those cases in which ceiling effects were the greatest (i.e., Spearman correlations and Mann-Whitney U-tests).

Effect sizes were interpreted using Cohen's (1988) benchmarks: for Pearson's r, small = .10, medium = .30, large = .50; for Cohen's d, small = 0.20, medium = 0.50, large = 0.80. Given the study's focus on context-dependent relationships, we prioritized effect size interpretation over p-values to assess practical significance (Lakens, 2013).

Prior to computing scale scores, negatively worded attitude items (n = 24) were reverse-coded (6 - raw score) to ensure directional consistency with positively worded items. All subsequent analyses used reverse-coded values.

Descriptive Statistics

Descriptive statistics are presented in Table 3 for all the study's variables. As noted previously, The Attitudes toward Technology use in education scale is comprised of 15 questions that are phrased to be positively oriented while it also includes 24 questions with negative orientation. When using this type of scale, it is common to "reverse-code" negatively worded items by subtracting the respondent's raw score from six (the number of response options), such as, (6 - raw score), to maintain consistency in the scoring direction; where higher scores will always represent a more positive attitude toward technology in an educational setting (Öztürk, 2006). On average, participants reported having a moderate-ly positive attitude toward technology in their learning environment with an average score of 3.54 (SD = 0.26) on a five-point scale (i.e., greater than 3.0); which represents the theoretical midpoint of neutrality. Participants indicated they have a very high degree of self-efficacy related to technology integration into their instructional practices with an average score of 7.79 (SD = .92) on a nine-point scale (greater than 5.0); which represents the theoretical midpoint of no ability or skill (Table 3).

Distributional indices indicated mild skewness for the attitude variables and moderate negative skewness for the self-efficacy variables, with all values remaining within acceptable ranges for parametric analysis (Kline, 2016). Taken together, these results supported the use of parametric tests.

Table 3. *Descriptive Statistics for Teachers' Technology Attitudes and Self-Efficacy (N = 386)*

Variable	N	M	SD	Skewness	Kurtosis
Attitudes - Teaching Impact	386	3.20	0.47	0.35	0.65
Attitudes - Self-Development	386	3.65	0.76	-0.10	0.60
Attitudes - Classroom Management	386	3.45	0.79	0.17	0.51
Attitudes - Total	386	3.54	0.26	-0.09	0.15
Self-Efficacy - Engagement	386	7.80	1.03	-0.83	0.24
Self-Efficacy - Strategies	386	7.73	0.95	-0.46	-0.42
Self-Efficacy - Classroom	386	7.84	1.12	-1.47	2.73
Self-Efficacy - Total	386	7.79	0.92	-0.78	0.33

Note. Attitude scores were computed after reverse-coding 24 negative items per Öztürk (2006); higher scores indicate more positive attitudes.

Correlations Between Technology Attitudes and Teaching Self-Efficacy

Table 4 presents Pearson correlations between technology attitudes and teaching self-efficacy. Total attitudes and total self-efficacy were positively related, but the association was very small and statistically non-significant, r = .06, p = .231. The shared variance was minimal (r^2 = .004), indicating that the two constructs were only weakly related in this sample.

Table 4. *Pearson Correlations Between Technology Attitudes and Teaching Self-Efficacy (N = 386)*

Variable	1	2	3	4	5	6	7	8
1. Teaching Impact	—							
2. Self-Development	.72**	—						
3. Classroom Management	.68**	.65**	—					
4. Total Attitudes	.89**	.88**	.87**	—				
5. Engagement	.08	.11	.05	.12	—			
6. Strategies	.13*	.18**	.09	.15*	.71**	—		
7. SE Classroom Mgmt	.10	.14*	.07	.11	.69**	.68**	—	
8. Total Self-Efficacy	.12	.15*	.10	.06	.86**	.85**	.83**	—

Note. Rows 1–4 represent attitude dimensions and rows 5–8 represent self-efficacy dimensions. *$p < .05$, **$p < .01$.

In substantive terms, the observed association was negligible. Although the direction of the correlation was positive, its magnitude was too small to support a meaningful empirical overlap between the two constructs in the present sample.

Robustness Checks for Ceiling Effects

To assess whether distributional features may have suppressed the correlation estimate, a non-parametric Spearman analysis was also conducted. The result was similarly small and non-significant ($\rho = .06$, $p = .23$), suggesting that the weak association was unlikely to be an artifact of normality violations or outliers.

Gender Differences

Table 5. *Gender Differences in Technology Attitudes and Teaching Self-Efficacy*

Variable	***Female (n = 294)*** *M(SD)*	***Male (n = 92)*** *M(SD)*	***t(384)***	***p***	***d***
Attitudes - Teaching Impact	*3.19 (0.48)*	*3.24 (0.44)*	*-0.82*	*.413*	*0.11*
Attitudes - Self-Development	*3.64 (0.77)*	*3.69 (0.73)*	*-0.51*	*.612*	*0.07*
Attitudes - Classroom Mgmt	*3.43 (0.80)*	*3.51 (0.75)*	*-0.78*	*.437*	*0.10*
Total Attitudes	*3.54 (0.24)*	*3.56 (0.31)*	*-0.59*	*.557*	*0.08*
Self-Efficacy - Engagement	*7.82 (1.01)*	*7.73 (1.08)*	*0.68*	*.496*	*0.09*
Self-Efficacy - Strategies	*7.76 (0.93)*	*7.65 (0.99)*	*0.94*	*.349*	*0.12*
Self-Efficacy - Classroom Mgmt	*7.88 (1.09)*	*7.72 (1.20)*	*1.14*	*.257*	*0.14*
Total Self-Efficacy	*7.83 (0.87)*	*7.74 (1.02)*	*0.82*	*.415*	*0.10*

Note. All effect sizes were negligible ($d < .20$). Independent-samples t-tests indicated no statistically significant gender differences in any dimension or total score. These findings should be interpreted as an absence of detectable difference within the present sample rather than as evidence of strict equivalence.

Independent-samples t-tests revealed no statistically detectable gender differences in either total technology attitudes, $t(384) = -0.59$, $p = .557$, $d = 0.08$, or total teaching self-efficacy, $t(384) = 0.82$, $p = .415$, $d = 0.10$. Mann–Whitney U tests led to the same conclusion.

These findings align with some prior Turkish research (Öztürk, 2006), although they differ from studies reporting small gender differences in technology-related beliefs (Cai et al., 2017). Given the limited power to detect very small effects, the present result should be interpreted cautiously rather than as evidence of strict equivalence.

Discussion

The findings should be interpreted with attention to the study context. Because the sample was drawn from urban public schools in one northwestern province, the results do not justify broad claims about all regions of Turkey. At the same time, the pattern observed here is analytically important because it suggests that the expected alignment between general teaching self-efficacy and technology attitudes may be weaker than commonly assumed in at least some centralized educational settings.

The main finding of the research was fairly easy to find: when compared to their views regarding technology, teachers' perceptions of their own efficacy as educators were quite optimistic and they held moderately positive views of technology. What is important is that there was no empirical connection between their perceptions of their own efficacy as educators and how they viewed technology. Rather than showing that educators have a solid link between confidence in their ability to teach and technology oriented views, this suggests only a small amount of overlap for both the variables in question at the time.

These findings create many issues regarding whether we can generalize our understanding of what works in Western nations with high autonomy systems, to countries where autonomy in teaching is low. Most of the studies that report significant links between teacher's confidence and their views of technology, do so through measures of confidence and views related to technology only. This makes it difficult to see if the confidence reported is domain general (i.e., across subjects), or domain specific (only applicable to a particular subject). Therefore, the lack of an association found in this study can also be seen as support for the idea that broad instructional confidence does not necessarily relate well to technology views under all structural conditions. To say this differently, this study did not show that previous studies were wrong; instead, it shows that the association that exists among confidence and technology views may exist in part due to the type of confidence measure used and the structure of the institutions in which the studies were conducted.

A possible explanation of the lack of association between confidence and views toward technology could be a result of the characteristics of a centralized and examination based educational system. In such environments, the nature of the typical workday is heavily influenced by success in established routines, whereas their orientation toward technology is likely influenced by other factors that include pace of instruction, accountability pressures and availability of digital resources. There are several contextual elements that can explain why there was little relationship between the two constructs in this sample, including; examination-based pressure for pacing of instruction, instructional inflexibility in a centralized curriculum model and variability in access to digital resources. However, since none of these explanations were quantitatively measured in the present study, they should be thought of as speculative explanations rather than as empirically confirmed explanations.

Given the negligible correlation (r = .06) between general teaching self-efficacy and technology attitudes one would need to consider both the conceptual distance between the two constructs, along with statistical artifacts. First, consistent with Bandura's (1997) assertion that self-efficacy is construct specific, a teacher's overall confidence in their ability to instruct students will not always be associated with a specific attitude toward digital technologies. Teachers can have great confidence in their traditional pedagogical approaches but hold neutral or even negative views toward digital tools. Second, the general teaching self-efficacy scores exhibited a notable ceiling effect (Mean = 7.79 on a 9 point scale), resulting in a reduced range of variance in the data. Since mechanical attenuation occurs with restricted variance in either variable, the non-significant relationship cannot be attributed entirely to the institutional constraints of a centralized educational system. Instead it demonstrates that domain-general beliefs about instruction may not provide adequate predictive power over domain-specific technology attitudes and that there may be some distributive restrictions within the present data set.

Theoretical implications

Theoretical applications for the current study also support Bandura's (1997) self-efficacy theory. As Bandura has stated, self-efficacy is highly sensitive to domain specificity and institutional factors (Tschannen-Moran & Hoy, 2001). The commonly held assumption that self-efficacy is an overarching concept that can be generalized to other domains — including the instructional orientation of using educational technology — seems supported. However, the correlation between total self-efficacy and attitudes towards technology were statistically insignificant (r = .06), and the R^2 value was extremely low (.004). Therefore, it could reasonably be argued that institutional constraints limit how effective one's domain-general self-efficacy will be at translating into specific technology-based instructional commitments. Another reason for the lack of association between self-efficacy and attitudes toward educational technology may be due to conceptual specificity. Self-efficacy scales typically assess general instructional efficacy as opposed to technology-specific efficacy. It is thus reasonable to believe that many teachers feel they are generally capable of instruction while having either ambivalence, selectivity or pragmatism regarding the use of educational technology. Consistent with this belief, the self-development dimension demonstrated the largest — though still small — relationship with self-efficacy. Thus, there is evidence that learning orientations related to professional development align closer to general instructional confidence than do common uses of technology in the classroom. This differentiation may be particularly important within more rigidly constructed education systems in which the primary impetus for the use of technology is based upon external demands versus individualized pedagogical initiatives. Similar conclusions are evident when looking at the results through the lens of technology acceptance theories such as TAM and UTAUT (Venkatesh et al., 2003; Davis, 1989). According to TAM and UTAUT, positive attitudes toward technology lead to its adoption. While this pathway was shown to exist within

the data collected for this study, it appeared to be more conditional than automatic. Positive orientations toward technology appear to produce more consistent patterns of technology use in classrooms where school connectivity is reliable, and pace adjustments are permitted along with methodological adaptations. Conversely, when pace is strictly regulated, and time is limited, and access to devices vary among schools, attitudes may be positive but fail to develop into consistent usage. Under such circumstances, first-order barriers — i.e., structural/external conditions — begin to override individual dispositions (Ertmer, 2005) as predictors of technology adoption. Ultimately, these findings argue against viewing technology integration solely as an issue of individual level processes. Even when teachers express confidence and hold somewhat positive attitudes toward educational technology, institutional conditions will ultimately dictate if those attitudes are aligned, incongruent or merely weakly associated.

Implications for policy and practice

The conclusions for policy and practice can be derived from this understanding of how educators understand and apply technology. Professional development efforts that are directed toward improving the quality of education through technology need to occur along with changes in a school's structure as they relate to the conditions under which educators teach. These would include addressing problems related to the reliability of devices and Internet connection in classrooms, increasing the availability of technical assistance, and providing some degree of flexibility in the pace of curriculum delivery (e.g. ability to slow down or speed up) to allow for technology integration to become a viable part of daily teaching, not just an aspirational goal.

In addition, if professional development were to be successful, it would need to be focused on changing what educators do, not simply their attitudes or beliefs about technology. The effectiveness of professional development will depend upon whether the focus is on practical ways to integrate technology into instruction as well as whether the professional development addresses the issues that are most important to educators (i.e. exam preparation etc.) rather than simply trying to change educator attitudes/beliefs regarding the value of technology. Finally, there may be a role for building-level leadership in normalizing educator experimentation with new tools/resources and decreasing perceived risk associated with taking risks in terms of using these tools in order for educators who have had positive experiences integrating technology into their instruction to continue doing so.

Limitations and future directions

When evaluating the results of this study, it is essential to note the several limitations. The first limitation of this study pertains to sample selection; specifically, the sample is comprised of teachers from urban public schools within Balıkesir Province. As a result of using convenience methods for sample selection, the sample's representativeness is severely diminished. Consequently, statistically generalizing these results will be extremely difficult, if not impossible. Therefore, the results pertaining to the self-efficacy-attitude relationship reported herein may have limited applicability to other regions of Turkey, particularly those districts characterized by fewer resources and/or located in Eastern Provinces. Future studies should utilize stratified sampling techniques to assess the degree to which regional variations in education infrastructure and local working conditions may serve to moderate the aforementioned relationships. Second, numerous methodological characteristics limit the conclusions based on the data collected during this investigation. Specifically, while sufficient statistical power existed to detect medium-sized effects in comparison to no effect, substantially reduced statistical power existed for detecting small effects, including gender-based differences of approximately $d = 0.20$. With respect to the observed main association ($r = .06$), statistical power for assessing this relationship was similarly constrained. Therefore, future investigations employing larger sample sizes should utilize equivalence testing procedures (e.g., TOST) to determine whether meaningful absence exists versus mere detection failure (Lakens et al., 2018).

Additionally, the distribution of self-efficacy scores was negatively skewed and concentrated at the upper end of the continuum. Thus, there exists an increased probability that a ceiling effect has resulted. Furthermore, due to restricted variability, mechanical attenuation of correlations may occur, thereby limiting interpretations regarding the existence of small effects. However, despite mechanical attenuation resulting from restricted variability, the weak pattern observed in this study persisted across various robustness checks, indicating that mechanical attenuation likely does not completely explain the lack of association. Finally, construct specificity represents another concern. Specifically, the self-efficacy measure employed in this investigation represented a generalized instrument. As such, general teaching efficacy may not be directly associated with technology attitudes to the same extent as technology-specific efficacy

beliefs. Therefore, future studies investigating this topic should employ measures with greater variability and include designs that directly compare general and technology-specific efficacy measures.

In addition to concerns with construct specificity, the reliability pattern of the attitude scale also represents a cause for concern. Specifically, while each of the attitude subscales demonstrated high internal consistency reliability, the total score demonstrated lower reliability. This finding suggests that the total score may be aggregating related but distinct components of technology attitude. To address this issue, both the total score and individual dimension results were included in the analysis for comparative purposes. Additionally, as previously discussed, this investigation examined solely the bivariate relationship between teaching self-efficacy and technology attitudes without examining how demographic and professional variables (i.e., experience and age) potentially moderated these relationships. These variables are well-documented predictors of technology adoption in educational environments and excluding them from the primary inferential analyses permitted a strict focus on the primary psychological constructs. Therefore, future research should include demographic variables in multivariate models to isolate more clearly the independent contributions of self-efficacy to technology attitudes across varying teacher types.

Finally, an additional limitation of this study is that it utilized a cross-sectional self-report design. Using self-report surveys may introduce common-method variance (CMV), wherein method similarity contributes to inflated associations among investigated constructs. It is highly unlikely that CMV would contribute significantly to the relatively low correlation obtained in this study. Nevertheless, the cross-sectional design limits causal interpretation of any findings. Therefore, longitudinal studies combining self-report data collection with direct observations or interview methodologies would provide a stronger empirical foundation for distinguishing between possible causes underlying the weak relationship observed in this study (measurement conditions vs. contextual constraints).

Conclusion

The results from this sample of urban public school teachers in northwestern Turkey indicate only very slight empirically based relationships between general teaching self-efficacy and technology attitudes. The weak empirical correlation suggests that broad instructional confidence does not directly translate into technology-oriented dispositions, particularly within a highly standardized and examination-driven educational administration. The data also highlight the limitations of measuring the connection between domain-general beliefs about instructional effectiveness and domain-specific attitudes toward technology use. Methodological factors, including restricted variability in self-efficacy ratings due to ceiling effects, likely contributed to the attenuation of correlations. Based on these findings, several practical recommendations can be offered. First, professional development programs should move beyond generic confidence-building activities and instead focus specifically on technology-integrated pedagogy, addressing the distinct nature of technology attitudes as separate from general instructional efficacy (Tondeur et al., 2017). Second, policymakers should consider restructuring curriculum delivery frameworks to allow greater flexibility in pacing and methodology, enabling teachers to experiment with digital tools without compromising examination preparation demands (Akbaş & Yünkül, 2024). Third, school administrators and educational leaders should actively foster a culture of innovation by normalizing technology experimentation, reducing perceived risk, and recognizing teachers who successfully integrate technology into their practice (Pamuk et al., 2013). Fourth, infrastructure investments—particularly reliable internet connectivity, device access, and technical support—remain foundational prerequisites for translating positive technology attitudes into actual classroom use, especially in underserved regions (Tezci, 2011). Future research should employ longitudinal, multivariate designs that incorporate both domain-general and technology-specific efficacy measures alongside contextual variables, in order to more precisely delineate the conditions under which instructional confidence becomes associated with favorable technology integration outcomes.

Ethical Declaration / Etik Beyan

During the writing process of the study "*Instructional Confidence and Technology Attitudes in a Centralized Education System: Evidence from Türkiye*" scientific rules, ethical and citation rules were followed. No falsification was made on the collected data and this study was not sent to any other academic publication medium for evaluation. In addition, permission was obtained from the Balıkesir University Social and Humanities Sciences Ethics Committee (Date: 06.10.2023 and Decision no: 2023/07) to conduct the research. / *"Merkezi Bir Eğitim Sisteminde Öğretimsel Güven ve Teknoloji Tutumları: Türkiye Örneği"* başlıklı

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The contribution rates of the authors in the study are equal. / Yazarların çalışmadaki katkı oranları eşittir.

Declaration of Conflict / Çatışma Beyanı

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Statement of Use for Artificial Intelligence and Its Types / Yapay Zeka ve Türleri Kullanım Beyanı

Artificial intelligence and its various types were not used in the writing of this article. / Bu makalenin yazımında yapay zeka ve türleri kullanılmamıştır.

Data Sharing Statement / Veri Paylaşım Beyanı

We declare that, upon reasonable request for the purpose of verifying the findings, we can share the data of this study according to the conditions specified in the relevant section of the "ethical principles and publication policy". / Bu çalışmanın verilerini bulguların doğrulanması amacıyla makul bir talep üzerine "etik ilkeler ve yayın politikası"nın ilgili kısmında belirtilen şartlara göre paylaşabileceğimizi beyan ederiz.

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