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Saudi EFL Teachers' Self-efficacy in Technology-assisted Language Learning (TALL)

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ABSTRACT

This study employs an explanatory, convergent parallel, mixed methods design to investigate the perceived self-efficacy of 145 Saudi teachers of English as a foreign language (EFL) when engaging in technology-assisted language learning (TALL). These teachers were evaluated on their technological knowledge on four subdimensions, on their pedagogical technology skills on five subcategories, and on five subdimensions related to their self-perceived ability to integrate TALL into English-language classrooms. The triangulated data were recursively collected in three consecutive phases. Self-efficacy was assessed using data obtained from a 48-item TALL survey and from classroom observations and interviews. Participants completed questionnaires on their self-perceived technological self-efficacy, 13 of whom were observed while teaching and subsequently participated in one-on-one interviews. The data were analyzed using the descriptive statistics of means and standard deviations and inferential statistics through one-way repeated-measures analysis of variances (RM ANOVA), along with some statistical tests and Stepwise regression. The data from the observed lessons were subjected to scrupulous and meticulous analysis, and the data from the interviews were recorded, transcribed, coded, and categorized. The findings culled from the survey, lesson observations, and interviews all revealed that Saudi EFL teachers have low self-efficacy in terms of language-learning technological knowledge, language-learning pedagogical technology skills, and ability to effectively integrate technology into EFL instruction. The implications emerging from this study center on the need to develop EFL teachers' self-efficacy with technology to ensure that language-related digital tools in EFL instruction are used in the most effective pedagogical manner and to their full potential.

Key words: Perceived Self-efficacy, Technology-assisted Language Learning, Perceived Technological Knowledge Pedagogical Technology Skills, Technological Pedagogical Knowledge and Skills, Perceived Technology Integration

INTRODUCTION

In teaching English as a foreign language (EFL), teachers' technological self-efficacy (TSE) is an essential factor and a valuable attribute that shapes EFL teachers' technological knowledge (TK), skills, and ability to incorporate digital tools into EFL instruction. Researchers believe there is a strong relationship between high self-perceived instructional TSE and the use of high-quality technology; these pedagogical characteristics magnify the impact of technological pedagogical practice effectiveness in EFL teaching (Hansen et al., 2009; Kavanoz et al., 2015; Liu & Kleinsasser, 2015; Rigi, 2015; Lailiyah & Cahyono, 2017).

The TSE of EFL teachers dictates whether technology-assisted language learning (TALL) tools are integral to EFL classrooms. Those with high self-efficacy are more likely to engage with TALL applications. Indeed, EFL teachers' beliefs concerning their capabilities impact technology-based pedagogical decisions and influence teachers' overall effectiveness. Further, self-efficacy, in part, determines the teacher confidence and competence needed in the implementation of learning experiences that successfully integrate technology into EFL classrooms. Teachers engage in tasks that they feel competent to perform and avoid those they do not (Choi & Lee, 2017). Teachers with a strong sense of self-efficacy are usually more receptive to implementing innovative teaching practices.

Under general self-efficacy lies a unique construct: TSE that relates specifically to language teachers. This encompasses three subsets in language teachers' perceptions: those regarding their TK, their pedagogical knowledge of and skills in technology, and their abilities to incorporate digital language tools. These are critical to create language-learning environments with enhanced technology. Although previous studies have generally addressed EFL teachers' TSE, the inclusion of their perceived technology self-efficacy within these key constructs adds a new dimension.

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Teachers' perceived technology efficacy is multifaceted. Therefore, this area requires investigation going beyond general self-efficacy to focus on these three related key areas. This will enable specialists to acquire a more accurate understanding of EFL teachers' beliefs in their capabilities to use TALL applications. This inquiry also allows researchers to clarify how teachers adopt technology and illuminates the link between teachers' technological knowledge and their actual practices within the EFL context.

This study aims to address knowledge gaps in EFL teachers' perceived technological self-efficacy. This involves determining EFL teachers' self-efficacy in how they perceive their TK, pedagogical technology skills (PTS), and integration of technology. The study highlights the importance of developing EFL teachers' self-efficacy regarding technology and of cultivating EFL teachers' abilities to keep learning.

LITERATURE REVIEW

This section discusses the study's three theoretical perspectives and presents a literature review of perceived technological knowledge (PTK), technological pedagogical knowledge (TPK) and skills, and perceived abilities to incorporate technology.

Theoretical Framework

The underlying conceptual framework combines TSE, TPK, and technological pedagogical content knowledge (TPACK). These theoretical frameworks were used to explore the self-efficacy of Saudi EFL teachers regarding TALL.

TSE was derived from general self-efficacy; namely, the belief in one's ability to engage in actions that will result in desired outcomes (Bandura, 1986, 1997). McDonald and Siegall (1992) explain TSE as teachers' perceived ability to use technological tools to increase learning. In this study, TSE refers to how EFL teachers perceived specific areas of TK.

The TPK framework is "an understanding of how teaching and learning changes when particular technologies are used, which includes knowing the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies" (Koehler & Mishra, 2008, p. 16). PTS is derived from a broader construct of TPK and defined as EFL teachers' perceived self-efficacy in terms of their PTS, with reference to particular language-learning PTS.

The TPACK framework relates to how teachers perceive their abilities to integrate technology into EFL instruction. TPACK describes the multifaceted forms of knowledge that teachers need to integrate technology into their teaching (Mishra & Koehler, 2006). In this study, perceived technological integration (PTI) into EFL instruction is defined as EFL teachers' perceived ability to integrate technology effectively into EFL instruction and to encompass several dimensions within the TPACK framework. Technology is only effective when its attributes and affordances align with associated theories of learning and teaching practices (Bostancıoğlu & Handley, 2018).

Perceived Technological Knowledge

Several studies have investigated PTK among EFL teachers. Koçolu (2009) examined the development of TPACK among EFL teachers and found development of it in their abilities to use its different functions. Tseng (2014) assessed TK among EFL teachers and found that students perceived that teachers had inadequate TK. Also, Alqurashi and Samarin (2015) concluded self-perceived technological knowledge of Saudi EFL teachers was lower than their knowledge regarding pedagogy and content.

Liu and Kleinsasser (2015) investigated EFL teachers' self-perceived development regarding computer-assisted language learning (CALL) after completing a year-long course. These teachers reported increases in self-efficacy regarding computers and greater TPACK. Hsu (2017) reported similar results, finding EFL teachers possessed technology-integrated knowledge but lacked understanding in perceived usefulness, continuous usage, and knowledge of technology. Bingimlas (2018) examined Saudi teachers' knowledge of technology related to the three essential components of TPACK: technology, content, and pedagogy, and found that their knowledge of technological and pedagogical content was poor. Bingimlas attributed this to insufficient technology training and resistance to modifying traditional teaching approaches.

Technological Pedagogical Knowledge and Skills

TPK is a major, distinct component of teacher knowledge in modern language pedagogy. It refers to the relationship between technology and pedagogy including planning and implementing technology-enhanced lessons and selecting, managing, and evaluating TALL. Kassem (2018) emphasized that the effective use of language-learning technology requires compatibility with the principles of language learning and sound pedagogy; Fullan and Quinn (2015) noted "pedagogy is the driver, technology is the accelerator" (p. 82).

Few studies have investigated TK and its effects on language learning pedagogy. Kurt et al. (2013) examined the development of TPK in pre-service Turkish EFL teachers after a 12-week TPACK program and found a significant increase in their TPACK scores. Comparably, Mahdum (2015) examined how in-service Indonesian EFL teachers developed and applied TPACK throughout their EFL teaching found their TK to be sufficient. Ersanli (2016) explored the effectiveness of a five-week training on TPACK among pre-service English language teachers and found a significant improvement in their scores.

Perceived Technological Integration

The integration of technology plays a crucial role in language learning and teaching; it is a significant element of

TALL. Köse (2016) highlighted the need to examine perceptions of language teachers' self-efficacy regarding technology integration in language teaching and identifying factors that can affect the use of technology in instruction. Studies have addressed the integration of technology in teaching and learning a second language (L2) and EFL. Hashmi (2016) contended that CALL has been integrated into Saudi EFL classrooms to improve English language proficiency, but that teachers still use technology infrequently and at low levels. Sulaimani et al. (2017) asserted that technology integration in Saudi EFL classrooms remains unknown and teachers' use of TALL remains ineffective. However, Saqlain et al. (2013) scrutinized English language teachers' readiness to integrate technology into Saudi EFL English classrooms and found teachers were willing to use technology, but noted the scarcity of technology and training to support engagement and learning.

Alresheed et al. (2015) found barriers to incorporating CALL in Saudi EFL classrooms including negative attitudes among Saudi EFL teachers and lack of support from the Ministry of Education and school administrations. Hakim (2015) found that Saudi EFL teachers reported that the lack technical skills and training opportunities prevented them from incorporating CALL into their classes. However, Alghamdi (2017) reported that teachers were able to implement many forms of technology in Saudi English classrooms and were, typically, willing and ready to integrate technology into EFL classrooms.

Collectively, these findings stress the importance of the key dimensions of TALL, specifically TK, PTS, and the ability to incorporate varied technological applications into EFL classrooms. Several conclusions can be drawn: First, insufficient data exist regarding EFL teachers' self-efficacy regarding TALL. Second, studies have only measured the overall technical knowledge of EFL teachers or assessed the development of such knowledge. Studies have been limited to EFL teachers' general perceptions of integrating technology in EFL classrooms and have overlooked teachers' self-judgments of their technological knowledge, PTSs, and ability to integrate TALL into their English-language teaching. These studies have failed to go beyond documenting self-reported feelings, general technological skills, general self-perceptions toward TALL, attitudes toward technology-based instruction, technology use in language-learning classes, generic technology knowledge, technical competence, and self-perceptions of the development of their TALL knowledge and competencies. The current study will attempt to address these gaps.

OVERVIEW OF THE STUDY

EFL teachers need sufficient TK and PTS and the ability to incorporate technological applications into their classrooms. These interconnected dimensions are key to enhancing their teaching and creating and implementing meaningful techno-pedagogical teaching materials and activities in EFL classroom settings.

This study examines the self-efficacy of Saudi EFL teachers with regard to TALL. The study measures how Saudi EFL teachers perceive their TK (four related sub-dimensions), their PTSs (five related subcategories), and their perceived ability to integrate TALL (five sub-dimensions). This paper serves as a stepping-stone for future research on self-perceived efficacy in TALL, particularly with reference to the TK base, skills, and abilities; and the subcategories within each. Six research questions are posed:

1. How do Saudi EFL teachers perceive their self-efficacy in related language-learning TK?
2. How do Saudi EFL teachers perceive their self-efficacy in related language-learning PTS?
3. How do Saudi EFL teachers perceive their self-efficacy to effectively integrate technology into EFL instruction?
4. Within the three dimensions of TK, PTS, and integration of TALL into EFL classrooms, in which subcategory or subcategories do teachers show high self-efficacy?
5. To what extent can various technological language-related learning practices be observed in Saudi English classrooms?
6. What are the Saudi EFL teachers' self-perceptions regarding their technological knowledge, pedagogical technology skills, and ability to integrate technology into EFL instruction?

METHODOLOGY

Participants

A convenience sample of 145 Saudi English teachers (87 males, 58 females) who taught EFL at the primary, intermediate, and high school levels in Saudi government public schools was selected. All were native Arabic speakers, 23-43 years old. All had 3-8 or more years of teaching experience. Of the participants, 56.5% had been using TALL applications for over five years; 31% had been using them for under five years and 12.5% used them for over two years. 125 (86.2%) had bachelor's degrees and 20 (13.7%) had master's degrees. Inclusion criteria were a keen interest in using TALL applications in English classrooms and 2+ years of experience using these applications for instructional purposes. Teachers needed to have completed at least one course related to the use of technology in EFL classrooms (see Appendix A).

Procedures

For data collection, the researcher sent prospective participants a letter describing the study, a copy of the survey, an four-digit identification (ID) code to track those who returned the surveys, survey instructions, and a return envelope. The participants completed their self-administered surveys at their preferred location and time. After two weeks, a reminder email was sent to non-responders. A final reminder with a copy of the survey was sent to those who had not responded two weeks later. Of the 165 EFL instructors originally approached, 145 (88%) returned complete questionnaires. The researcher was available to the participants to answer any questions.

Among respondents, 13 Saudi EFL teachers were randomly selected for observation and to complete post-observation

interviews. Observations of non-participants and structured observations were also undertaken. The researcher visited the classrooms, sat through 50-minute classes, and observed and recorded 44 prepared indicators across three predetermined dimensions of the use of TALL in EFL classrooms. Teachers were informed only about the general purpose of the research to avoid data contamination. Most lessons were in English classrooms, with a few in learning-resource rooms, and then one-on-one, semi-structured interviews were conducted.

Design Overview

This study used a convergent parallel, mixed-methods design incorporating both quantitative and qualitative methods. Data were analyzed independently in three phases and brought together to identify convergences and divergences.

The study first incorporated standard survey methodologies to record self-perceived efficacy of TALL. The survey addressed TK, PTSs, and technological integration of TALL in EFL classrooms. The researcher developed the survey after extensive review of the related literature. Descriptive and inferential statistical analyses were conducted. The researcher created a structured non-participant classroom observation form to gain more detailed and actionable knowledge of EFL teachers regarding TALL. Descriptive analysis and summary statistics were used to analyze closed-ended observational data. Semi-structured post-observation interviews with 13 participants were then used to triangulate the conclusions drawn from the observational data and the survey data. The interview data were transcribed, coded, and evaluated for emergent themes.

The use of multiple instruments and data sources provided complementary measures to determine the perceived efficacy of teachers with respect to TALL and to mitigate the limitations of any single instrument. This further corroborated the findings.

Development of Instruments

This study collected data using different instruments (as described below) to examine the perceived self-efficacy of Saudi EFL teachers regarding TALL.

Constructing EFL Self-efficacy in the TALL Survey

Participants' responses to a cross-sectional survey on their self-efficacy with regard to TALL were measured on a 4-point Likert scale ranging from 1 (*strongly agree*) to 4 (*strongly disagree*), with reference to TK, PTSs, and technological integration of TALL in EFL classrooms. The survey contained four sections and 48 statements:

Section 1. Background Information: survey participant demographics included seven questions on gender, age, years of teaching EFL, and self-assessment of the use of technological tools in general and of related instructional language-learning technologies.

Section 2. PTK: 19 statements in four areas elicited responses about participants' self-efficacy in related language-learning TK. Statements gauged their self-perceived abilities regarding general language-learning TK, conceptual technological knowledge (CTK), TPK, and updating their own TK.

Section 3. Perceived PTS (PPTS): 17 statements about Saudi EFL teachers' self-efficacy regarding language-learning PTS measured five language-learning PTS related to pedagogical technology, including planning, selecting, implementing, managing, and evaluating TALL instruction.

Section 4. PTI in EFL Instruction: 12 statements in four sections that measured how Saudi EFL teachers perceived their abilities to integrate technology effectively into EFL instruction. PTI includes the general ability to integrate technologies effectively into EFL instruction, the ability to integrate different forms of TALL, the awareness of factors that affect technology integration, and its integration into each EFL instructional stage.

Validity and Reliability of the Survey

Several measures were used to ensure the validity and reliability of EFL self-efficacy in the TALL survey. Three English/TALL experts examined the validity, accounting for clarity, comprehensiveness, length, breadth of coverage, and appropriateness. Further validation was sought by piloting the survey with five Saudi EFL teachers. Interviews were conducted with instructors after they completed the survey. After field-testing the instrument, its reliability was assessed using Cronbach's alpha, which demonstrated acceptable levels of internal reliability for each subscale (α =.78 for the PTK.,77 for the PPTS, and.76 for the PTI). The overall coefficient was α =.83; the constructs had good reliability.

Observation Form

A structured non-participant classroom observation form was developed to identify the Saudi EFL teachers' abilities to use digital and technological tools. The form allowed for open observation notes and scores on the 44 predetermined classroom indicators in language-learning TK, language-learning PTS, and technological integration of TALL in EFL classrooms. The observations focused on capturing key features of instructional practices of Saudi EFL teachers in their technological language-related learning tools (including 16 dimensions of classroom practice), their PTS in using such tools (16 indicators), and their abilities to integrate these into their English lessons (12 indicators). The observation form is descriptive/objective; it does not require inferences or judgments. Ratings were based on the extent to which technological language-related learning practices could be observed. The ratings were made on a four-point scale where 4 = Very Evident, 3 = Evident, 2 = Somewhat Evident, and 1 = Not Evident. The cumulative observation scores can range from 0 to 176; lower scores indicate low levels of self-efficacy in terms of language-related TK, PTSs, and abilities to integrate, and higher scores indicate higher efficacy.

Validating the Observation Form

Face and content validity were established after three EFL experts reviewed whether the forms measured the efficacy of digital and technological tool use in English classrooms, including the dimensions of TK, PTS, and self-efficacy regarding technological integration into EFL instruction. The experts also provided suggestions.

Interviews

To gain insight into participants' self-perceptions regarding their TK, PTS, and technological integration into EFL instruction, 13 Saudi EFL teachers were interviewed after completing the questionnaires and after classroom observations. The semi-structured, in-depth interviews were conducted at their places of employment. Each interview lasted approximately 45 minutes; the interview period spanned three weeks. The interviews were transcribed, and participants were asked to ensure that their views were accurately conveyed.

The interviews included 17 open-ended questions that explored the self-efficacy of the three major dimensions: PTK (six questions), PPTS (five questions), and PTI into EFL instruction (six questions) focusing on certain aspects in the three categories (see Appendix xx). Occasionally, participants' comments led to follow-up questions. To reduce interviewer bias and limit interview technique variation, one researcher conducted all interviews. Participants were contacted when necessary to clarify their responses.

Validating and Refining Interview Questions

The interview questions were reviewed by experts for culturally appropriate language, accurate wording, relevance, and to ensure alignment with research questions and whether the questions encouraged an inquiry-based conversation.

Pilot interviews were conducted with two Saudi EFL teachers. The pilot study tested the appropriateness of the interview questions and yielded some suggestions on the validity of the research and helped refine the interview questions to ensure the quality of the results.

Procedure for Analyzing Interviews

Interview analysis began with audio file transcription. After validation, the transcripts were imported into NVivo 8 and coded. A thematic framework analysis involved several phases. Themes were identified through a systematic, objective process and formed through open coding; sub-themes were connected to the main themes by axial coding. The coding and the construction of the themes and sub-themes were done by the first author and two other researchers. They then discussed their results to improve trustworthiness, credibility, and validity of the findings.

RESULTS

Three sections delineate the study's results. The first presents what the data reveal about the participants' self-efficacy pertaining to these three interconnected dimensions. The second reviews the observed lessons, and the final section reports the interview results.

Questionnaire Results

Data analysis procedures

The survey data for all 48 Likert scale items (1 = *strongly agree* to 4 = *strongly disagree*) were analyzed using SPSS version 25 for Windows (IBM Corp., Armonk, NY). Descriptive statistics (means and standard deviations) summarized the survey responses. The survey items included three subscales of EFL self-efficacy in the TALL survey: PTK, PPTS, and PTI into EFL instruction. Cronbach's alpha was used to determine each subscale's internal reliability. The scores of the associated items were averaged to form a composite score for each self-efficacy subscale. Descriptive statistics were used to calculate the composite scores for each subscale. The theoretical ranges of the scores (subscales and overall) were from 1 to 4, with lower scores indicating higher self-efficacy. One-way repeated-measures analyses of variance (RM ANOVAs) were conducted to determine whether statistically significant differences existed in the subscale scores within each EFL self-efficacy dimension, including PTI, PPTS, and PTI, and the overall PTI, PPTS, and PTI scores. The data's normality was examined using the Shapiro-Wilk W test statistic. Normality was attained if $W \geq .90$. If data were not normally distributed, the Friedman test was performed to validate the results of the RM ANOVA. According to the Shapiro–Wilk W test statistics, the PTI-CPT was the only variable that was not normally distributed ($W = .85$). The sphericity assumption of the RM ANOVA was checked using Mauchly's test of sphericity. When the sphericity assumption was violated, the Greenhouse-Geisser adjustment was employed. Post hoc pairwise comparisons using the Sidak method were conducted if the RM ANOVA's within-subjects main effect was significant. Stepwise regression was performed to determine the subset of subscales PPTS and PTI that best predicted the overall PTI score. A p-value less than.05 indicated significance.

Tests of the Research Questions

Question 1 examined Saudi EFL teachers' PTK. The composite score ranged from 1 to 4, with higher scores indicating higher perceived self-efficacy (see Table 1). The mean score for each PTK subcategory was computed to examine teachers' perceived self-efficacy with respect to TALL. Teachers had low self-efficacy regarding their general language-learning technological knowledge (GRTK) ($M = 1.72$, $SD = 0.42$), their CTK ($M = 1.88$, $SD = 0.49$), their TPK ($M = 1.85$, $SD = 0.46$), and updating their own technological knowledge (UOTK) ($M = 1.86$, $SD = 0.52$). The teachers felt more knowledgeable about CTK ($M = 1.88$) and less about GRTK ($M = 1.72$). The standard deviations show moderate data distribution.

Question 2 examined how Saudi EFL teachers perceived their self-efficacy with respect to PPTS. Higher composite scores indicated higher perceived self-efficacy

(see Table 2). Teachers had low self-efficacy regarding planning (PLLIT) (M = 1.99, SD = 0.62), selecting (SLLIT) (M = 1.81, SD = 0.62), and implementing and delivering language-learning instructional technology (IDLLIT) (M = 1.99, SD = 0.47), L2 technology-related classroom management (L2TRCM) (M = 1.86, SD = 0.44), and evaluating language-learning instructional technology (ELLIT) (M = 2.02, SD = 0.59). Teachers were most able to perform tasks involving ELLIT (M = 2.02) and least able to accomplish tasks involving SLLIT (M = 1.81). The data were moderately distributed.

Question 3 examined how Saudi EFL teachers perceive their PTI. Higher composite scores indicated higher perceived self-efficacy (see Table 3). Teachers had low self-efficacy regarding their abilities to integrate technologies into EFL instruction (GA) (M = 2.09, SD = 1.84), to connect EFL pedagogy with emerging TALL (CPT) (M = 1.84, SD = 0.61), to integrate different forms of TALL (IDF) (M = 2.09, SD = 0.57), their awareness of factors that affect technology integration (AFTI) (M = 1.84, SD = 0.61), and their abilities to integrate technology into each stage of EFL instruction (ITS) (M = 1.94, SD = 0.67). Table 3 shows that most were confident in their GA (M = 2.09), while few were confident about CPT (M = 1.84). Most of the values were centered on the mean.

Question 4 examined the three dimensions of PTK, PPTS, and PTI, looking at where teachers showed high self-efficacy. Table 4 presents the results of the four RM ANOVAs conducted to determine whether the subscale scores within each EFL self-efficacy dimension had significant differences from the overall PTK, PPTS, and PTI scores. For all, the results of Mauchly's tests of sphericity were statistically significant (p =.01 for PTK, p <.01 for PPTS, p <.01 for PTI, and p <.01 for the overall model), indicating that the sphericity assumption was not satisfied. The Greenhouse-Geisser adjustment was used to correct the degrees of freedom for the F-statistic for the within-subjects effects.

For PTK, the scores of the four PTK subscales (GRTK, CTK, TPK, and UOTK) showed significant differences; F (2.756, 396.838) = 7.313, p <.01. The results of the pairwise comparisons (Table 5) showed that participants' self-efficacy regarding GRTK was significantly higher than their self-efficacy with respect to CTK (mean difference = −0.153, SE = 0.034, p <.01), TPK (mean difference = −0.129, SE = 0.031, p <.01), and UOK (mean difference = −0.138, SE = 0.036, p =.01). The self-efficacy of the participants showed no significant differences between CTK and TPK (p =.990), CTK and UOK (p =.999), or TPK and UOK (p = 1.000).

However, for PPTS, the scores of the five PPTS subscales (PLLIT, SLLIT, IDLLIT, L2TRCM, and ELLIT) showed significant differences; F(3.368, 484.952) = 7.731, p <.01. In particular, the results of pairwise comparisons (Table 5) show that the participants' self-efficacy regarding:

- PLLIT was significantly lower than for SLLIT (mean difference = 0.172, SE = 0.043, p =.01)
- SLLIT was significantly higher than for IDLLIT (mean difference = −0.175, SE = 0.040, p <.01) and ELLIT (mean difference = −0.210, SE = 0.056, p =.03);
- IDLLIT was significantly lower than for L2TRCM (mean difference = 0.132, SE = 0.037, p =.05)
- L2TRCM was significantly higher than for ELLIT (mean difference = −0.167, SE = 0.047, p =.04)

Table 1. Descriptive statistics for the PTK scale subcategories

PTK Subscale	*N*	Minimum	Maximum	Mean	*SD*	Shapiro–Wilk *W*
GRTK	145	1.00	2.83	1.72	0.42	.97
CTK	145	1.00	3.25	1.88	0.49	.96
TPK	145	1.00	3.00	1.85	0.46	.98
UOTK	145	1.00	4.00	1.86	0.52	.91
Overall				1.81	0.38	.98

GRTK = general related language-learning technological knowledge; CTK = conceptual technological knowledge; TPK = technical pedagogical knowledge; UOTK = updating one's technological knowledge

Table 2. Descriptive statistics for the PPTS scale subcategories

PPTS Subscale	*N*	Minimum	Maximum	Mean	*SD*	Shapiro–Wilk *W*
PLLIT	145	1.00	4.00	1.99	0.62	.95
SLLIT	145	1.00	4.00	1.81	0.62	.90
IDLLIT	145	1.00	3.00	1.99	0.47	.97
L2TRCM	145	1.00	3.50	1.86	0.44	.94
ELLIT	145	1.00	4.00	2.02	0.59	.91
Overall				1.94	0.40	.99

PLLIT = planning language-learning instructional technology; SLLIT = selecting language-learning instructional technology; IDLLIT = implementing and delivering language-learning instructional technology; L2TRCM = *L2 technology-related* classroom management; ELLIT = evaluating language-learning instructional technology

Table 3. Descriptive statistics for the PTI subcategories

PTI Subscale	*N*	Minimum	Maximum	Mean	*SD*	Shapiro–Wilk *W*
GA	145	1.00	4.00	2.09	0.54	.94
CPT	145	1.00	4.00	1.84	0.61	.85
IDF	145	1.00	4.00	2.09	0.57	.95
AFTI	145	1.00	4.00	1.84	0.61	.95
ITS	145	1.00	4.00	1.94	0.67	.90
Overall				2.24	0.49	.95

GA = general ability to integrate technologies effectively into EFL instruction; CPT = connecting EFL pedagogy with emerging TALL; IDF = ability to integrate different forms of TALL; AFTI = awareness of related factors that affect technology integration; ITS = integrating technology into each stage of EFL instruction

Table 4. Results of mauchly's test of sphericity and tests of within-subjects effects using greenhouse–geisser adjustment

	Mauchly's test				Tests of within-subjects effects				
Model	Mauchly's *W*	χ^2	*df*	*p*	v_1	v_2	*F*	*p*	Partial η^2
PTI	.867	20.425	5	.001	2.756	396.838	7.313	< .001	.048
PPTS	.692	52.481	9	< .001	3.368	484.952	7.731	< .001	.051
PTI	.746	41.895	5	< .001	2.555	367.898	15.073	< .001	.095
Overall	.821	28.267	2	< .001	1.696	244.200	27.698	< .001	.161

Mauchly's W = Mauchly's test statistic; χ^2 = *chi-square statistic; df = degrees of freedom; p = p-value; df*1 = denominator degrees of freedom for the F statistic; *df*2 = numerator degrees of freedom for the F statistic; F = F statistic; partial η^2 = effect size

Table 5. Results of pairwise comparisons

Model	Category i	Category j	Mean difference (i − j)	*SE*	*p*
PTI	GRTK	CTK	−0.153	0.034	< .001
	GRTK	PTK	−0.129	0.031	< .001
	GRTK	UOK	−0.138	0.036	.001
	CTK	PTK	0.025	0.040	.990
	CTK	UOK	0.016	0.043	.999
	PTK	UOK	−0.009	0.037	1.000
PPTS	PLLIT	SLLIT	0.172	0.043	.001
	PLLIT	IDLLIT	−0.002	0.042	1.000
	PLLIT	L2TRCM	0.129	0.049	.085
	PLLIT	ELLIT	−0.038	0.056	.999
	SLLIT	IDLLIT	−0.175	0.040	< .001
	SLLIT	L2TRCM	−0.043	0.051	.993
	SLLIT	ELLIT	−0.210	0.056	.003
	IDLLIT	L2TRCM	0.132	0.037	.005
	IDLLIT	ELLIT	−0.036	0.045	.997
	L2TRCM	ELLIT	−0.167	0.047	.004
PTIE	GA	CPT	0.254	0.032	< .001
	GA	IDF	0.003	0.041	1.000
	GA	ITS	0.151	0.049	.016
	CPT	IDF	−0.252	0.043	< .001
	CPT	ITS	−0.103	0.052	.249
	IDF	ITS	0.148	0.050	.022
Overall	PTI	PPTS	−0.122	0.024	< .001
	PTI	PTI	−0.205	0.033	< .001
	PPTS	PTI	−0.083	0.025	.004

The participants showed no significant differences between PLLIT and IDLLIT (p = 1.000), PLLIT and L2TRCM (p =.85), PLLIT and ELLIT (p =.999), SLLIT and L2TRCM (p =.993), or IDLLIT and Eval (p =.997).

For PTIE, the four PTI subscales (GA, CPT, IDF, and ES) showed significant differences, F(2.555, 367.898) = 15.073, p <.01. In particular, the results of the pairwise comparisons (Table 5) showed that the participants' self-efficacy regarding:

- GA was significantly lower than for CPT (mean difference = 0.254, SE = 0.032, p <.01) and ES (mean difference = 0.151, SE = 0.049, p =.16);
- CPT was significantly higher than for IDF (mean difference = −0.252, SE = 0.043, p <.01), and
- IDF was significantly lower than for ITS (mean difference = 0.148, SE = 0.050, p =.22).

The participants' self-efficacy showed no significant differences between GA and IDF (p = 1.000) or CPT and ITS (p =.249). PTI-CPT was not normally distributed (Table 3), so the Friedman test was performed to validate the results of the RM ANOVA. The results agreed with each other; the Friedman test results are not presented.

The overall PTK, PPTS, and PTI scores showed significant differences, F (1.696, 244.200) = 27.698, p <.001. The results of the pairwise comparisons (Table 5) showed that the self-efficacy of participants regarding PTK was significantly higher than their self-efficacy regarding PPTS (mean difference = −0.122, SE = 0.024, p <.001) and PTI (mean difference = 0.205, SE = 0.033, p <.001). Participants' self-efficacy regarding PPTS was significantly higher than that of PTI (mean difference = −0.083, SE = 0.025, p =.004).

Table 6. Results of stepwise regression

	Variable	*B*	*SE*	β	*t*	*p*
Variables included	PLLIT	0.242	0.057	.304	2.533	.012
	IDLLIT	0.250	0.079	.237	4.227	< .001
	SLLIT	0.197	0.058	.249	3.178	.002
	L2TRCM	0.198	0.068	.178	3.378	.001
Variables excluded	GRTK				0.766	.445
	CTK				−1.052	.295
	PTK				0.848	.398
	UOK				0.889	.375
	ELLIT				1.602	.111

R^2 =.791, adjusted R^2 =.614; B = regression coefficient; SE = standard error; Beta = standardized coefficient; t = t-statistic; p = p-value

Table 6 presents the results of the stepwise regression for determining the subset of subscales PPTS and PTI that best predicted the overall PTIE score. PLLIT (t[144] = 2.533, p =.012), IDLLIT (t[144] = 4.227, p <.001), SLLIT (t[144] = 3.178, p =.002), and L2TRCM (t[144] = 3.378, p =.001) were significant predictors for the overall PTI score. These four variables explained 79.1% of the variance in the overall PTIE score (R^2 =.791). The regression coefficients suggest a positive relationship between the overall PTIE score and the PLLIT (B = 0.242), IDLLIT (B = 0.250), SLLIT (B = 0.197), and L2TRCM (B = 0.198). According to the standardized coefficients (β), PLLIT was the strongest predictor (β =.304) of the four significant predictors.

Results of Lesson Observations

Observations occurred in six intermediate and four secondary state schools in Riyadh, Saudi Arabia. Thirteen Saudi EFL teachers, with an average of six years teaching experience and five years using technology to teach EFL, were observed for one class period. Teachers were selected after regular technology use in their English classroom practices was ensured. The classes averaged 30-35 students. Each classroom had one computer and an overhead projector.

The observation form included 44 predetermined classroom indicators across three domains: teachers' TK, teachers' PPTS, and teachers' abilities to integrate technology into EFL instruction. Unfortunately, these 44 elements were either evident during only a limited portion of the classes or not evident at all. Therefore, it was not possible to conduct any analysis of the teachers' practice using technology. The researcher found no evidence of the key features of instructional practices in these teachers' knowledge of technological language-related learning tools (including 16 indicators of classroom practice), PPTS in using such tools (16 indicators), or ability to integrate TALL applications into their English lessons (12 indicators).

The observed classes shared similar features that shaped technological instructional practices. The teachers used technology in superficial ways that were not integral to instructional processes. Classroom technologies were not widely used and did not play major roles in teaching and learning. The teachers simply displayed pages from e-textbooks on overhead projectors and did not engage their learners with

tools or opportunities for deeper content understanding. Using digital tools to deliver content is teacher-centered and does not capitalize on possible benefits. None of the teachers incorporated a range of TALL applications with associated teaching techniques to optimize content delivery. Any of the relatively scarce technological activities were not seamless parts of the lessons. Finally, the teachers incorporated technology whenever they felt chose and, as such, adapted TALL tools on an ad hoc basis. Sustained, robust, and relevant learning experiences through technology were not observed.

Interview Findings

Self-perceived efficacy in TALL

The sixth research question addressed the self-perceptions of Saudi EFL teachers regarding their TK, PPTS, and integration of technology into EFL instruction. Insight was drawn from teachers' responses to 17 open-ended questions. Questions explored self-efficacy in three major dimensions: PTK (six questions), PPTS (five questions), and PTI into EFL instruction (six questions). The remarks were categorized into three main themes: shallow knowledge, curriculum comes first and without genuine and deep understanding, and lack of skills integrating TALL.

Perceived Technological Knowledge

The first theme was: we only have shallow TK. The participants' responses demonstrated that they do not have relevant TK to enable them to know which digital tools to use, or how and when to embed them into a particular EFL lesson, activity, grade level, or goal. One teacher reported, "I rely on information I get from in-service trainings as the basis for knowing which particular technological tools to use to teach EFL." Another said, "I make use of my colleagues' experiences to know about available resources allocated to integrating technology into the EFL classroom." Teachers could name few of the available technology-based teaching and learning tools.

The participants' responses regarding the possibilities/limitations of technological language-learning tools showed shallow, general, and irrelevant values. This was similar to listed constraints, including not having their own digital devices and lacking technical and administrative support. Saudi English teachers proposed that technology can enhance language teaching and learning by allowing EFL learners to use educational programs outside the classroom. One participant stated, "Teachers should encourage EFL learners to use some digital educational applications outside classrooms that give them more opportunities to learn English."

When asked whether effective use of digital tools should be based on EFL pedagogical principles, the respondents were unaware of principles to consider. One teacher said, "I think that it is necessary to use technology in the English classroom as long as it does not conflict with or contradict other educational aids." Another said, "EFL teachers do not have to consider EFL pedagogical principles when using digital tools because they can find other tools that are highly recommended by experts." These comments indicate they lacked knowledge of the pedagogical principles of the digital tools that underlie how the process of teaching EFL is organized in digital learning environments.

Some Saudi EFL teachers follow digital technology experts on Twitter, search the internet for new technologies, interact with more experienced colleagues, join virtual communities and check specialized websites to stay current on emerging language-learning digital tools. The participants seemed unable to balance old and new technology-based tools and didn't know how to stay up to date. Clearly, most Saudi EFL teachers are not skilled users of TALL applications and do not seek to incorporate new tools in their practice.

Perceived Pedagogical Technology Skills

The second theme, the PPTS dimension, was: curriculum comes first. To facilitate optimum EFL teaching delivery with instructional technology, Saudi EFL teachers review each lesson's objectives and find a related technological tool. One teacher said, "The first thing I do is check the lesson objectives in the teachers' book, and then I try to locate digital language-learning resources that serve or support the stated lesson's learning objectives."

Participants believed that consulting the school's learning resources staff, networking with other teachers, predetermining the goals of integrating technological tools, and accommodating students' varying learning styles would enable them to select appropriate technology tools.

According to participants, linking language-learning components to accessible and available technology depends on the language components identified in textbooks. Thus, participants prioritized completing EFL textbook units rather than exploring how a technological tool could serve the target language components in the daily curriculum.

Saudi EFL teachers proposed that digital game-based language learning and other audiovisual tools increased EFL learners' engagement because the tools provide meaningful learning experiences. One teacher stated, "I noticed that when I let my students watch a clip related to the point we are discussing in class, it stimulates their learning motivations and makes the classroom experience more enjoyable." The teachers used several methods to assess the effectiveness of different language-learning technologies, including analyzing the effects of the TALL applications on learning outcomes and measuring students' participation.

Perceived Technological Integration in EFL Instruction

The third theme that emerged was an absence deep understanding about and of skills in TALL integration. The participants maintained that, to incorporate interactive technological materials into English classrooms, EFL teachers should develop specific plans to create effective environments for interactive English learning technology, search for related sources, and select TALL applications that suit a broad range of learners. Teachers should not incorporate

technology for technology's sake. Teachers can successfully implement TALL by adapting interactive English platforms that encourage active participation through content, powerful management tools, and interactive technologies.

The teachers were unable to explain how they integrate technology to ensure that the goals of the EFL curriculum and technology are incorporated. One teacher explained, "I think that teaching English and technology are in fact harmonious." Another said, "this incorporation can be done through using a computer, smartboard, and iPad simultaneously." The teachers were unable to incorporate various TALL tools into English classrooms. They attributed this to a lack of training, limited time, the availability of digital tools and poor technological facilities in schools, and a lack of technical support. One teacher said, "I do not think I have the skill to effectively integrate different digital tools in my English classroom."

The teachers observed that they were not fully aware of how to organize TALL resources to ensure that TALL-based lessons run smoothly. One said, "I do not think that I manage TALL-enhanced lessons in a systematic way; rather, I do it based on my intuition." Conceptually, the teachers agreed on the importance of incorporating TALL at each stage of instruction; however, their answers do not indicate that they used strategies to consider performing this task. Some answers included: "Each [grade level or educational stage] possesses its own technology that no other grade level uses," "Technology should be used in all stages," and "Such incorporation can be done to ease the process of EFL teaching and learning."

DISCUSSION

Discussing the Survey Results and Lesson Observations

The survey findings suggested that participants had low levels of self-efficacy in perceived language-learning technological knowledge and its four subcategories: general language learning, CTK, TPK, and abilities to update TK. This low self-efficacy also applied to perceived language-learning pedagogical technological skills, particularly in essential aspects of pedagogical technology and perceived abilities to integrate technology effectively into EFL instruction. Participants' self-efficacy concerning PTK was significantly higher than their self-efficacy regarding PPTS and PTI. This was confirmed within each scale with significant differences in the four PTK, five PPTS, and four PTI subscales. The observations documented that these teachers demonstrated very low self-efficacy regarding PTK, PPTS, PTI, and their associated subcategories.

The teachers' skills in using technology for teaching were minimal at best. They were not confident in their abilities to incorporate technology into English curriculum activities, so technology serves only as a functional tool for EFL teaching. Andrei (2017) contended that EFL teachers must not only possess extensive technology knowledge but also confidence in their abilities. The teachers did not understand how to leverage the instructional potential of TALL applications and appeared not to have adequate abilities in planning instructional technology that would enable them to establish technology-enriched environments. Further, although teachers seemed to know how to use technology they were not able to develop/implement plans to integrate technology into their EFL teaching. Integrating technology is a complex process and allocating time for such incorporation can be a challenge; new tools are constantly emerging. Johnson et al. (2016) asserted that the number of possible combinations of technologies and pedagogies is overwhelming. Finally, the teachers use technology inefficiently because they don't know how to align TALL tools with EFL curricular goals.

These findings corroborate those of Tseng (2014), Alqurashi and Samarin (2015), Hsu (2017), and Bingimlas (2018), who reported that EFL teachers generally displayed low self-efficacy when performing the three key dimensions of TK, PPTS, and integrating technology. The current study adds to this by examining the adequacy of EFL learners' self-efficacy in relation to TALL. The researcher measured the EFL teachers' TK efficacy in four related sub-dimensions, the efficacy of their skills in pedagogical technology (five related subcategories), and their abilities to integrate TALL into English-language classrooms (five related aspects/sub-dimensions).

Discussion of Self-Perceived Efficacy in TALL

The interviews revealed that Saudi EFL teachers did not have sufficient TK, PPTS, or abilities to incorporate technological applications into their EFL classrooms. The most notable factor in teachers' low TALL self-efficacy is that they lacked well-developed TK and knowledge of the pedagogical principles of digital teaching and English language learning. These teachers were not skillful users of TALL applications and devoted insufficient time to planning instruction incorporating different forms of TALL. Ultimately, Saudi EFL classrooms are not equipped with technologies to assist in the process of teaching EFL, and teachers are unprepared to adopt new technologies and keep up with language-related technological advances. Furthermore, the participants were not trained to use technology effectively in English instruction (Al-Seghayer, 2017a). Assulaimani (2019) also found that appropriate training programs for the use of technology in English instruction are not offered.

PEDAGOGICAL, TECHNOLOGICAL, AND POLICY IMPLICATIONS

This study offers several pedagogical, technological, and policy implications, focusing on the self-efficacy of EFL teachers regarding TALL. To ensure that language-related digital tools are used in the most effective pedagogical manner and to their full potential in EFL instruction, teachers need to acquire the skills and knowledge that are fundamental for using technology. Al-Seghayer (2017b) noted that sufficient TK and skills in pedagogical technology appear to enable EFL teachers to use this knowledge for effective teaching and language learning processes by matching technology with instructional goals and incorporating technology.

Although TK is essential, EFL instructors also need confidence in selecting pedagogical approaches aligned with the technological features of TALL and using their knowledge to facilitate EFL learners' experiences. EFL instructors need help increasing their confidence in areas such as network-based social computing, mobile and portable devices, artificial intelligence, big data, and augmented reality for EFL instruction, to enhance EFL learners' language learning experiences. According to Chaaban and Ellili-Cherif (2017) and Merç (2015), having sufficient confidence with respect to using technology is a determining factor in the successful use of meaningful techno-pedagogical teaching materials and activities in actual EFL classrooms. Yang and Walker (2015) found that sufficient self-efficacy with respect to TALL contributes to helping EFL teachers overcome difficulties in applying new teaching strategies. Anas and Musdariah (2018) also reported that technophobia among EFL teachers caused them to avoid using technology in class.

The technological implications relating to the self-efficacy of EFL teachers regarding TALL point to a need for in-service, long-term or technology-enriched professional development opportunities in all technologies available for TALL. EFL instructors may benefit from trainings that provide hands-on experience in incorporating TALL into lesson plans and delivering EFL instruction based on sound pedagogical principles for using technologies to teach EFL. Such training should include the three major interconnected dimensions this study addresses. Teachers can learn through non-single standalone courses to: (a) use available technological TALL resources, (b) create/select TALL-based activities, (c) design instructional activities that involve technologies, (d) use classroom management techniques to teach with technology and evaluate TALL instruction, (e) integrate different forms of TALL resources into EFL classrooms, (f) make connections between EFL pedagogy and leading-edge TALL applications, (g) increase awareness of factors that affect technology integration, (h) learn how to integrate technology into each EFL instructional stage, and (i) train their EFL learners to use technology in learning. Lue (2015), Yang and Walker (2015), and Kessler (2018) found that inadequate preparation hinders teachers in technology-enhanced language instruction. Limited language-related TK leads to a lack of knowledge and skills for integrating technology and renders teachers technologically illiterate. Egber and Shahrokni (2019) contended that a single TALL course model is not enough to equip EFL teachers with the knowledge and skills to integrate technology effectively.

EFL teachers must be provided with comprehensive technology policy, strategic plans, and robust infrastructure and facilities. Comprehensive and specific TALL policy must be developed according to nationwide standards and curricula and must incorporate: a set of goals, a vision of how to integrate TALL into EFL teaching, clear guidance on how to implement TALL in classrooms, and performance indicators for teachers along with benchmark expectations for students, teachers, and administrators regarding their technology knowledge. A policy that helps EFL teachers develop positive attitudes toward TALL and its value in language teaching is important.

To continue to build their TSE, to improve their technological skills, and to properly avail of their abilities in modern technology, EFL instructors need access to modern and functional TALL facilities with sustained technical support and reliable, high-speed internet, and immediate administrative support at all levels. Access to useful TALL applications, websites, and related technologically enhanced TALL resources is also critical. Technological infrastructure in classrooms is also crucial, to assist teachers in integrating technology and students in using tools.

LIMITATIONS AND SUGGESTIONS FOR FUTURE WORK

The findings of this study should be interpreted in light of a few limitations. This study was limited to a particular context (a Saudi EFL context) and a particular group of teachers (Saudi EFL teachers). The study did not consider other TALL self-efficacy related variables including gender, age, teaching experience, enactive mastery experience, and types of schools. The study did not solicit the perspectives of students and administrators regarding the efficacy of their teachers, and the study was limited to certain subcategories related to the three dimensions. Finally, the study did not examine the interplay among the three core domains of TALL.

Future studies should identify factors that influence the technological self-efficacy of EFL teachers, such as strategies for developing the ability to teach EFL using digital technology. One area could be whether the EFL efficacy regarding TALL is reflected in lesson planning and implementation. Future studies could investigate stakeholders' perceptions of what is required to enhance EFL teachers' technological self-efficacy and should recruit larger participant samples to provide additional perspectives and deeper understanding of TALL self-efficacy. Additionally, studies could consider the self-efficacy of EFL teachers with regard to TALL during different career stages and identify sources that contribute to the formation of self-efficacy regarding technology.

CONCLUSION

The findings of this study contribute to EFL instructional and learning technologies by providing new insights into important constructs of the perceived self-efficacy of EFL teachers in light of the increasing dominance of TALL instructional applications. The study measured key issues around the self-perceived self-efficacy of EFL teachers regarding TK, PPTSs, and their abilities to integrate TALL into EFL classrooms. This study serves as a starting point for future exploration of the self-efficacy of EFL teachers regarding technology and how this relates to the three sources of sub-efficacies in advancing understanding and improving the perceived competence for effective use of TALL tools in EFL instruction.

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APPENDIX A

Participant information

Age	23–26	27–30	31–34	35–38	39–42	43+	Total
	8	20	36	37	40	4	145
	5.5%	13%	24.8%	26.4%	25.5%	2.7%	
Gender	Male	Female					
	87	58					145
	60.6%	40.%					
Educational Background	BA	MA					
	125	20					145
	86.2%	13.7%					
Grade	Elementary	Intermediate	High school				
	36	46	63				145
	24.8%	31.7%	43.4%				
Teaching Experience	1 year	1–4 years	5–8 years	8+ years			
	1	8	41	95			145
	0.6%	5.5%	28.2%	65.5%			
Feeling comfortable using technological tools	Yes	No					
	132	13					145
	91%	8%					
Years using technological tools in teaching	–1	1–2	3–4	5+			
	1	17	45	82			145
	0.6%	11.7%	31%	56.5%			
Feeling confident about using technological tools	Yes	No					
	140	5					145
	96.5%	3.4%					