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ORIGINAL PAPER

Exploring Influential Factors in Military Instructor Technology Self-Efficacy

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Abstract
Researchers in the K-12 environment have utilized self-efficacy theory and its influencing factors to aid teachers in integrating technology into their classrooms; however, similar research has not been conducted on military instructors. This mixed-methods study examines technology self-efficacy among military instructors at a Southern U.S. military base, specifically focusing on the factors influencing their confidence in integrating technology into their teaching practices. Through the use of the Computer Technology Integration survey and interviews, the research identifies three distinct themes—philosophy, barriers, and confidence—providing insights into the levels of technology self-efficacy among military instructors. With 60 survey participants and 12 interviewees, the findings emphasize the need for customized professional development opportunities to enhance technology integration skills among military instructors, contributing to the broader discourse on technology self-efficacy in educational settings.

Keywords Technology self-efficacy · Military instructors · Professional development · Computer technology integration

Introduction

For decades, policymakers believed that creating abundant access to new technologies in schools would translate into increased teacher use and improved learning (Cuban et al., 2001). However, the technology tools posed a challenge for teachers since they first needed to learn how to use them and subsequently feel comfortable enough planning instruction that integrates such technology (Creighton, 2018). Despite the plethora of educational technologies available in the classroom, instructors do not fully integrate them into their teaching practices (Badia et al., 2013; Bebell et al., 2004; DeCoito & Richardson, 2018). According to the Department of Education (2017), the effective use of technology is not an optional add-on or a skill that we can simply expect teachers to pick up once they get into the classroom. Today's teachers require troubleshooting skills, the ability to assess and manage the integration of technology, and the capacity to identify the credibility of technology to meet the needs of today's students as well as prepare them for the digital workplace.

The challenge of engaging students through technology to empower and enhance learning and prepare them for a digital workplace is not unique to K-12 education. Recruits to the military today are also more tech-savvy and prefer electronic communication and digital devices. Military training must adapt to meet their expectations and make use of the new skills they bring since the military landscape has become increasingly complex and technologically advanced (Bailey, 2016). To compete in this complex and contested security environment, we must realize how the current operational environment has changed with the rise of space and cyber technologies (Nettis, 2020). The Department of Defense must develop multi-domain, joint warfighters to meet the demands of the 21st-century operational environment (Bailey, 2016; Martin, 2016). Advancement in the way education and training are delivered is key to that development (Bailey, 2016; Campbell & Wang, 2023), and training must respond to advances in technology and provide the

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skill sets needed to interact in more complex, systems-based battlespaces (AETCI, 2021; TRADOC, 2017).

Since the early 2000 s, as distance and blended learning were popularized, pressure to integrate technology into military training instruction increased to meet both the demands of the operational environment and the needs of this new generation of students (Garrison & Kanuka, 2004; Martin, 2016). Engaging and relevant training for tech-savvy students demands flexible integration of technology within lessons, meaning that instructors must be able to adapt technological tools and methods based on instructional objectives, learner needs, and the constraints of the training environment (Bailey, 2016). Therefore, military instructors also need to learn how to use the tools and then feel comfortable enough to plan instruction that integrates technology to create such training. Hathaway (2016) emphasizes the crucial role instructors play in fostering learner acceptance of technology. To effectively manage this integration, instructors must stay current on technological advancements, critically evaluate their credibility, and strategically incorporate them into the training environment.

Like K-12 teachers, military instructors have access to a wide array of innovative technological tools, yet actual technology integration in the training classroom is lacking (Kindamo, 2018). Unlike the pressure for K-12 teachers to integrate technology to personalize and enhance learning for authentic engagement, the pressure for military instructors to integrate technology into training also continues to impact force development and mission readiness. Beyond enhancing learning and engaging students, the effective use of technology in the military training classroom increases efficiency in time and manpower to complete all learning objectives in the compressed schedules of military training. The ability of the military instructor to use advanced technology in the classroom is becoming more vital to readiness, especially as the battlefield is also technologically advanced.

Researchers in K-12 education have investigated the impact of teachers' self-efficacy on technology integration (Abbitt, 2011; Abbitt & Klett, 2007; Bakar, et al., 2018; George & Camarata, 1996), explored the factors affecting it (Albion, 2001; Brenner & Brill, 2016; Sadaf et al., 2016), and used the findings to inform teacher training (Brinkerhoff, 2006; Renbarger & Davis, 2019). However, similar research on military instructors is lacking. Military instructors have struggled with the same pressure to integrate technology into the training classroom. As a result, the Department of Defense (DoD) developed guidelines to help military instructors integrate technology into the training classrooms. However, there is little research on the technology self-efficacy of military instructors in general and even less on the factors influencing self-efficacy regarding technology integration in the classroom. Analyzing the factors that shape the technology self-efficacy of military instructors is crucial for advancing their professional development and enhancing the integration of technology in training classrooms. Like K-12 teachers, military instructors underutilize available technology (Kindamo, 2018). In contrast to K-12 research, which has identified and utilized technology self-efficacy findings to support teachers, military instructors lack the benefit of such insights. Bridging this gap is essential for developing targeted strategies that empower military instructors to effectively incorporate technology into their teaching practices.

Barriers to Technology Integration

Integrating technology into teaching is a complex process that may encounter several difficulties, known as barriers (Schoepp, 2005). For decades, researchers worked to group or categorize factors influencing technology integration in the K-12 classroom (Ertmer, 1999; Ertmer et al., 2012; Tondeur et al., 2019). These categories usually include internal, such as lack of knowledge, and external, such as lack of technical support. They may also be described as first or second-order barriers.

First-order barriers such as time, technical support training, and school culture are all external barriers researchers have discovered as detrimental to successful technology integration in the classroom (Abedi & Ackah-Jnr, 2023; Hamutoglu & Basarmark, 2020). Other first-order barriers cited in K-12 research, such as lack of funding, lack of institutional support, or inaccessibility, are not a problem for military instructors. On the other hand, second-order internal barriers include the knowledge and skill of individual teachers, their teaching experiences, values, and teachers' beliefs (Lee & Lee, 2014; Tawfik et al., 2021). With military instructors often exhibiting homogeneity in skill, teaching experience, and age, understanding the factors influencing technology integration, such as beliefs and comfort levels, becomes crucial.

The most highly correlated factor in teachers' integration of technology was their system of values and beliefs about technology (Ertmer et al., 2012). If their values and beliefs supported technology integration, then the teachers were more likely to acquire the skills and knowledge and therefore effectively integrate technology into their classrooms, despite the presence of barriers (Ertmer et al., 2012). Pajares (1992) noted that there is a strong relationship between teachers' educational beliefs and their planning, instructional decisions, and classroom practices. Teachers' beliefs about their ability to use technology in instruction may be key, given the role self-efficacy is proposed to play in determining behavior (Ertmer, 2001).

Teacher Technology Self-Efficacy

Bandura (1977) coined the term self-efficacy and defined it as people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances, suggesting that pedagogical decisions that teachers make are influenced by self-efficacy beliefs regarding their own capabilities. Self-efficacy is a useful indicator of a person's level of motivation and teachers' self-efficacy belief (Wang, et al., 2004), and a skill for increasing technology acceptance (George & Camarata, 1996). Researchers concentrated on tech-savvy teachers to understand how they use technology and subsequently create a picture of their characteristics, motivation, and challenges (Krause, 2017; Miles, 2013; Yerdelen-Damar et al., 2017). These teachers demonstrated that incorporating technology into their professional activities not only enhanced their self-efficacy but also increased student engagement in the classroom. (Schrum et al., 2008).

The identification of teacher technology self-efficacy levels and the factors that influence them was then used to study whether professional development activities would help increase novice teachers' technology self-efficacy in the classroom. Specifically, research suggested that professional development that included opportunities to team teach with tech-savvy teachers would help increase teachers' feelings of self-efficacy and confidence when using computers (Anthony et al., 2011; Renbarger & Davis, 2019; Schrum et al., 2008; Teo, 2009). Pearson correlation in one study revealed a strong relationship, $r = 0.99$, between self-efficacy towards technology integration and teachers' self-evaluation of their effectiveness in the classroom (El-Daou, 2016).

Military Instructor Technology Self-Efficacy

Like K-12 teachers, military instructors are expected to meet the needs of tech-savvy trainees and enhance learning through technology. While K-12 teachers aim to prepare students for a technologically advanced workplace, military instructors focus on developing warfighters that meet the demands of the technologically advanced operational environment. However, despite increasing pressure to integrate technology and the development of policies intended to support instructors, challenges remain in fully implementing technology in instructional settings.

While K-12 researchers identified both internal and external barriers affecting teachers' technology integration efforts, this study concentrates on internal factors, specifically technology self-efficacy, for a few specific reasons about the differences between K-12 teachers and military instructors. One reason is the difference in training. Teachers in K-12 complete teacher training programs as part of their baccalaureate programs, which are typically four years in length, or alternative certification programs, which are typically 1–2 years in length. Teacher training programs usually include a student teaching requirement and ultimately prepare the graduates for certification to teach. Teachers may start their careers at any age and therefore, bring a variety of backgrounds and experiences to the profession. They are professionals in the field of teaching.

In contrast, military instructors assigned to teach in a training schoolhouse are selected because they are proficient in their career fields. Military instructors must have reached a specific rank, typically a non-commissioned officer, to be considered for instructor selection for their career field. For example, any Air Force Security Forces member who has reached a certain rank may volunteer to teach in the Security Forces schoolhouse. They are selected for what is normally a 3–4-year assignment as a military training instructor. However, they rarely have any teacher training or experience. In addition, each newly assigned instructor must attend a basic instructor course specific to the service for which they work (i.e., Army, Navy, Air Force). The courses are 4–6 weeks in length and concentrate on lessons such as communication skills, reviewing lesson materials, and conducting formal assessments (TRADOC Regulation 350–7, 2017). There is no certification process or student teaching requirement for military instructors. They are usually homogenous in age, rank, and experience, and they are only selected to teach for their own career fields. Additionally, the instructor course lacks training on the effective use of technology in the classroom. In fact, in the Army training classroom, technological upgrades from regular classrooms to ensure they meet the Army Learning Concept (ALC) requirements have caused significant issues concerning the approach to learning throughout the Army's Training Command (TRADOC, 2017). While the classrooms have been technologically enhanced, there remains a gap in aligning instructional practices with these advancements.

Kindamo (2018) asserted that some instructors may not have the technical or doctrinal capabilities to be able to exploit the benefits of technology at all. This is a serious problem since, as Hathaway (2016) found, military learners accept new training technologies because they trust their instructors' experience. Neither the Army nor the Air Force assigns instructors through a selection process that accounts for Subject Matter Expertise (SME) or aptitude to facilitate adult learning or the proper use of digital technology found in military classrooms (TRADOC, 2017). Therefore, the selection of an instructor with both teaching experience and technology proficiency with a vast array of instructional technology tools is a rare find.

Besides the training differences between K-12 teachers and military instructors, another significant difference pertains to barriers to technology integration. Many of the external and internal barriers to successful technology

integration identified by K-12 researchers are generally not an issue for military instructors. For example, inaccessibility of equipment is not a problem since the DoD has invested in various technologies, from learning management systems to virtual reality for military training, to keep pace with the technologically advanced battle spaces. Army training classrooms received technological upgrades based on the Army Learning Concept (ALC), including virtual and augmented reality capabilities, mobile computing, and visual data analysis to improve learning (ALC, TRADOC, 2024).

Initial funding for educational technology is another identified barrier for K-12 teachers that is generally not considered a barrier in the military training environment, although maintenance and sustainability funding are still an issue within the DoD (ALC, TRADOC, 2024). Since many of the identified external barriers are not present in the military training environment, research regarding internal barriers, specifically teachers' beliefs about technology, is warranted. Since self-efficacy is the most highly correlated factor about technology integration (Ertmer et al., 2012), research that explores the technology self-efficacy of military instructors, and then identifies factors that influence it, gives military leaders information to aid in increasing technology integration in the training classroom.

It is difficult for military instructors who are on a limited tour and lack the training to be proficient in both technologies available in the classroom as well as emerging instructional technologies that may or may not impact the training environment and prepare trainees for a technologically advanced operational environment. Assessing their technology self-efficacy levels can yield valuable insights to inform training initiatives aimed at enhancing their instructional capabilities. Unlike K-12 educators and researchers, who identified and explored the importance of teacher self-efficacy for technology integration in the classroom, research is lacking on the self-efficacy of military instructors for technology integration. Researching military instructors' self-efficacy, specifically the factors that influence it, represents a logical step in attaining the standards set forward in the ALC and U.S. Air Force Air Education and Training Command Instruction (AETCI) regarding technology integration.

Methodology

Research Questions and Design

This study utilized an explanatory sequential mixed methods design where the quantitative phase is followed by the qualitative phase (Creswell & Clark, 2018). Initially, the quantitative data was collected using the Computer Technology Integration Survey (Wang, et al., 2004) to assess the technology self-efficacy levels of military training instructors. The second qualitative phase was conducted as a follow-up to help contextualize the quantitative results. The study sought to answer the following research questions:

1. What are the technology self-efficacy levels of military training instructors?
2. What factors affect military instructors' levels of technology self-efficacy?
3. How do the themes identified in the interviews help to explain the military instructors' levels of technology self-efficacy as identified through the survey?

Participants

After obtaining approval from a university's Institutional Review Board and the applicable DoD Human Research Protections Offices (Army and Air Force), an email invitation was sent to instructors. This invitation included a consent form, information about the potential for follow-up interviews, and a link to the Computer Technology Integration (CTI) survey.

Approximately 400 military instructors assigned to the Army Training and Doctrine Command (TRADOC) and the Air Force Air Education and Training Command (AETC) at a military base in the southern United States were invited to participate in the CTI survey. Sixty-four agreed to take the survey, resulting in a 16% return rate. After adjusting for incomplete surveys, a total of 60 were analyzed. Of the 60 respondents, 36 (60%) were instructors assigned to the Army Training and Doctrine Command (TRADOC) in the Medical Center of Excellence (MEDCoE), and 24 (40%) were instructors assigned to the Air Force Air Education and Training Command (AETC) in the 37th Training Group (TRG).

The survey results informed the first research question and were used to strategically identify military instructors for the subsequent semi-structured interview phase. A total of twelve instructors were selected—six from the Army and six from the Air Force. Within each branch, three instructors with high self-efficacy and three with low self-efficacy, as determined by their survey scores, were chosen from two distinct school sites. This purposeful selection strategy was designed to ensure a range of perspectives and to explore factors contributing to variations in technology self-efficacy.

Instrumentation and Data Collection

The adapted Computer Technology Integration (CTI) survey (Wang et al., 2004) was used to answer the first research question and quantify teachers' current levels of technology self-efficacy. The CTI was chosen and adapted for this study because it is concise, has only 21 Likert-type questions, is validated, and is easily translatable to the military

environment without major modifications. The adapted survey included 20 Likert scale statements with five possible responses ranging from strongly disagree (1) to strongly agree (5), and two additional questions to discover instructors' service branch and willingness to participate in the interviews.

Wang et al. (2004) established content validity for self-efficacy by a panel of experts before survey administration. To determine reliability, Cronbach alpha coefficients were calculated on the pre-survey and post-survey data. The Alpha coefficients of 0.94 for pre survey and 0.96 for post-survey combined with the factor analysis suggest the instrument "exhibited construct validity," was "highly reliable," and "holds promise for its use in further research" (Wang et al., 2004, p. 236).

Among the changes made to the CTI survey, The last question of the survey: "I feel confident that I can carry out technology-based projects even when I am opposed by skeptical colleagues" was removed based on the recommendation of the focus group of five military instructors who believed the focus of the question was too narrow. In addition, the word "computer" was replaced with "technology" throughout the survey to broaden the types of educational technology military instructors used in the classroom. In question #2, the sentence "various new and existing technology capabilities" was added to aid in determining the technology self-efficacy level of the instructors regarding the instructor's ability to design and develop learning experiences using technology. The reliability of the survey remained at 0.95 after the modifications were made.

To answer the second research question, semi-structured interviews consisted of nine open-ended questions designed to discover factors impacting the self-efficacy of military instructors toward the use of technology in the classroom. These questions underwent a pilot test with a focus group of five military instructors to ensure alignment with Bandura's (1977) Social Cognitive Theory, specifically regarding technology self-efficacy development. The four main sources from which individuals develop self-efficacy, in education and training, include successful experiences of teaching (with technology), the observations of other teachers' experiences (with technology), the type of feedback teachers receive from colleagues (about teaching with technology), and physiological states teachers experience during a teaching-related task, such as satisfaction or anxiety (about teaching with technology) (Zonoubi et al., 2017).

The answers provided by the focus group participants resulted in rewording five of the questions, eliminating one to avoid redundancy, and adding a final question to ensure alignment and discover factors impacting the technology self-efficacy development of military instructors. The first two interview questions concentrated on the instructor's motivations to teach. Question three was developed to evoke an emotional arousal for both high-scoring and low-scoring self-efficacy participants. The emotional arousal, satisfaction, or anxiety that teachers experience while using technology (Bandura, 1977), should align with each interview participant's CTI scores. The alignment did occur in the focus group for four of the five members. Question four helped to discover the perceived technology self-efficacy level of the instructor and helped to explain their CTI score. Questions 5–8 were designed to elicit specific responses regarding factors, including both internal and external barriers, impacting the technology self-efficacy of military instructors. The final question was designed to allow elaboration and inclusion of any factors not discovered and discussed in the previous eight questions.

Data Analysis

The interpretation began with the analysis of the quantitative data (survey) and was conducted using descriptive statistics, including measures of central tendency (mean) and variability (standard deviation), to provide information about the self-efficacy levels of the instructors (Field, 2024). After the confirmation of six instructors with low self-efficacy scores and six instructors with high self-efficacy scores to participate in the qualitative portion, the interviews were conducted, recorded, and transcribed using Google Meet. All interviews were conducted and recorded over two months in early 2023. To establish trustworthiness (credibility), the interviewees were asked to check the transcripts for correctness (Bloomberg & Volpe, 2016).

Following data collection, transcription, and NVivo import, thematic analysis was conducted using a two-cycle coding approach (Saldaña, 2021). Miles et al., (2020) described four foundation approaches to coding, including Descriptive, In Vivo, Process, and Concept. This study used a hybrid deductive/inductive approach using process and concept coding in the first cycle of coding and pattern coding in the second. Process Coding was used to discern the actions, and Concept Coding was used because "conceptual processes consist of smaller observable actions that add up to a bigger and broader scheme" (Miles et al., 2020, p. 66). First-cycle coding was applied to develop concepts regarding the factors, internal and external, impacting military instructor self-efficacy in the data. For example, what the instructors feel about technology in the classroom begins to identify the internal factors related to their self-efficacy levels. Ways in which the instructors are supported, or not supported, may also aid in identifying external factors that contribute to their self-efficacy. Once the process and concept codes had been generated, the second cycle of coding began by generating pattern codes. Pattern codes are explanatory codes that pull first-cycle coding information into more meaningful units of analysis (Miles et al., 2020). Pattern codes were

appropriate in this study because they are used to search for rules, causes, and explanations in the data (Saldaña, 2021). The codes developed during the second cycle were hierarchized, resulting in three parent and six child codes.

Finally, the study integrated quantitative and qualitative phases by analyzing coded transcripts of participants with similar technology self-efficacy levels (high and low). NVivo was used to explore these transcripts, identifying potential inconsistencies and commonalities. Looking for similarities and differences among the cases allowed to find a balance between emergent themes and thick descriptions affecting the technology self-efficacy of military instructors.

Results

Computer Technology Integration (CTI) Survey

The total score for each instructor, provided by summing the corresponding number for each item answer (1–5), was used to determine a level of technology self-efficacy. The total self-efficacy scores were divided into two categories: low to medium (under 50–74) and medium to high (75–100) to differentiate between low and high scores for interview participant selection and to identify emergent themes between them. The survey's mean score was 75.38, placing it at the lower end of the medium-to-high range (75–100) and near the cutoff for the low-to-medium category (under 50–74).

Of the 60 participants, 28 (47%) scored low to medium, and 32 (53%) scored medium to high. Of the 36 Army instructors surveyed, 39% scored low to medium, while 61% scored medium to high. The scores of the 24 Air Force instructors included 58% low to medium and 42% medium to high. Thus, to answer the first research question about military training instructors' technology self-efficacy levels, only one score fell below 50, and most scores fell between 70 and 90.

Ten instructors receiving low to medium scores (50–74) and ten receiving medium to high scores (75–100) were invited to participate in semi-structured interviews. The final twelve who completed consent forms were interviewed over two months in February and March 2023. The twelve respondents included five men and seven women serving as Air Force and Army military instructors and representing five Army career fields and six Air Force career fields.

Factors Affecting Military Instructors' Levels of Technology Self-efficacy

A total of 65 process codes were applied during the first coding cycle. These 65 process codes were then further condensed through concept coding to establish a hierarchy of 6 child codes to three main parent pattern codes: Philosophy, Barriers, and Confidence. The 6 child codes included motivation and beliefs (coded to philosophy), external and internal (coded to barriers), and training and experience (coded to confidence). All codes corresponded to the semi-structured interview questions.

Instructor's Technology Philosophy

The pattern code *Philosophy* encompasses the combination of Bowne's (2017) definition of a teaching philosophy and Alexander et al (2012) definition of a technology philosophy statement. A teaching philosophy reflects an individual's beliefs and values about teaching and learning (Bowne, 2017). A technology philosophy focuses on a teacher's stance toward, and values related to, technology in the classroom. It addresses the tools used to teach, why the instructor uses these tools, and how the instructor assesses their teaching with technology methods (Alexander et al., 2012). An instructor's approach to technology is intricately linked to their teaching philosophy. A belief in the value of technology for students' learning is likely to shape a positive technology philosophy, motivating the instructor to actively integrate educational technology into their classroom practices. Consequently, an instructor's technology philosophy may encompass their motivations and beliefs, as evidenced in the current study (Table 1).

Barriers

A barrier is defined as any condition that makes it difficult to make progress or to achieve an objective, and its removal acts as an aid towards objective achievement (Schoepp, 2005). Concerning technology integration, barriers may be understood as any factor that results in the prevention of instructors' use of technology. Therefore, the study of barriers as they pertain to technology integration is essential because this knowledge could guide ways to enhance technology integration (Schoepp, 2005). Providing teachers with knowledge of barriers and effective strategies to overcome them will help them initiate and sustain effective technology integration practices (Ertmer, 1999). The parent pattern code *Barriers* consists of two child codes: external and internal. They may also be described as first-order (external) or second-order (internal) barriers (Table 2).

Confidence

Confidence is defined as a feeling of self-assurance arising from one's appreciation of one's abilities and is often used in conjunction with self-efficacy. Self-efficacy is the belief in one's ability to complete a task or reach a goal (Bandura, 1977). Teachers' belief in their ability to teach effectively with technology is a critical factor in determining technology

Table 1 Codes Process for Instructor's Technology Philosophy

Parent Pattern Codes	Child Codes	Concept Codes	Process Codes
Instructor's Technology Philosophy	Motivation	Catalyst	- Giving back - Feeling supported - Having a passion for teaching - Having "aha" moments - Becoming a technical expert - Finding purpose - Feeling validated - Preventing mishaps
		Career shapers	- Discovering drive - Having an impact on the force - Making the process better - Making students more capable
	Beliefs	Stance on tech	- Using it or losing it - Supporting tech-savvy students - Enhancing the learning experience - Needing rationale to integrate tech - Needing balance between tech and actuality
		Concern about tech	- Relying too heavily on technology - Worrying about test compromise - Using technology masks instructor ability
		Teaching assessment	- Needing to upgrade teaching methods - Evolving as instructors

Table 2 Coding Process for Barriers

Parent Pattern Codes	Child Codes	Concept Codes	Process Codes
Barriers	First-order (external) Barriers	Connectivity	- Having no connectivity
		Software and Hardware	- Having software issues - Having hardware issues
		Lack of support	- Not being on the same page as leadership - Not having control or input - Having no plan for sustainability - Lack of leadership support
		Utility	- Not having a need to use technology
		Training	- Not knowing what technology is available - Sharing knowledge is lacking - Wanting to discover and correct deficiencies - Not having time to research or learn
		Budget	- Having budget constraints
		Movement	- Military moving instructors
	Second-order (internal) Barriers	Concerns	- Not being tech savvy - Worrying about others not being tech savvy
		Avoidance	- Not embracing change - Preferring PowerPoint
		Reservations	- Having reservations about using tech b/c of sensitive subject matter
		Discomfort	- Being uncomfortable w/tech as an introvert - Wanting to learn more before using tech to teach - Being intimidated by technology in the classroom

use in the classroom (Albion, 2001). Researchers found that confidence grows with professional development and teaching experience (Protheroe, 2008). Training contributes to experience, and the combination of training and experience helps instructors develop confidence using technology in the classroom. Therefore, confidence contributes to self-efficacy.

When instructors grow more confident in their ability to successfully use technology in the classroom, they become more motivated to learn and utilize it (George & Camarata, 1996). In this study, the data on professional development reflected the belief held by instructors that the more training they receive and the more experience they have will build their confidence enough to be comfortable using technology in the classroom. The parent pattern code, Confidence, consisted of two child codes, training, and experience (Table 3).

Mixed Methods Results

An analysis of the results of both the quantitative and the qualitative components of the study provided an answer to the final research question: How do the themes identified in the interviews help to explain the military instructors' levels of technology self-efficacy as identified through the survey? Of the 60 CTI scores, 28 scored low (under 50–74) and 32 scored high (75–100). The low CTI scores consisted of 14 AF and 14 Army, and the high CTI scores consisted of 10 AF and 22 Army. Because the CTI is a Likert-type scale with ordinal responses, wherein the interpretation of scale points can vary between respondents, the results were categorized to measure the technology self-efficacy construct more effectively (Kent & Giles, 2017; Wang et al., 2004). The categories for technology self-efficacy included (1) confidence in utilizing technology to teach content, (2) evaluating and using technology to its full potential to improve instruction, (3) guiding and mentoring students' use of technology, (4) incorporating technology into lesson planning, and (5) utilizing technology for student assessment. The categories allowed for a more meaningful analysis of the perceived self-efficacy of military instructors.

Instructor's Technology Philosophy

The technology philosophy of the interview participants emerged during the qualitative analysis and aligned with the CTI scores of the instructors. Instructors with higher CTI scores exhibited more positive views of utilizing technology in the classroom to teach content, including evolving as instructors and upgrading teaching methods. Conversely, instructors with lower CTI scores exhibited fewer positive views about using technology to teach content, including using "Gucci technology to explain something basic" and "if used incorrectly, it's a distraction."

For the category *utilizing technology to its full potential to improve instruction*, instructors with higher CTI scores exhibited positive views, including descriptions of the use of technology in instruction as an *essential component* and the belief in its ability to enhance the educational experience. Conversely, instructors with lower CTI scores were less positive about the use of technology to improve instruction, including the belief that technology makes instruction "exciting and fun, but not more effective," or even inhibiting effective instruction: "As an instructor, you should be able to connect with your students, but I think technology gets in the way of that."

Overall, both the original CTI scores and the categorical scores aligned with the technology philosophy of the instructor. If the instructor held positive beliefs about the role of technology in education, then they were more motivated to use it in the classroom and generally had a positive

Table 3 Coding Process for Confidence

Parent Pattern Codes	Child Codes	Concept Codes	Process Codes
Confidence	Training	Lack of training	- Needing training to use today's technology
		Professional dev/training	- Wanting to utilize technology better
		Lack formal and professional dev/training	- Not receiving programmed training - Having to sink or swim
		Formal training	- Getting LMS training
		Informal training	- Attending simulator training - Learning through trial and error - Having someone on the team who is good with tech
	Experience	Classroom experience with ed tech	- Using Microsoft tools well - Getting students to respond by using tech - Using technology to build rapport with students - Using videos to supplement didactic training
		Experience teaching without ed tech	- Teaching without tech when it goes down
		Experience using/choosing ed tech	- Using new tech because of COVID - Learning to use tech to enhance training - Using tech that makes sense with subject matter - Using it throughout professional life - Using VR, AR, and simulators

technology philosophy. If the instructor held a more negative view of technology in education, including questioning its impact on learning and raising concerns about potential risks and ethical considerations, then they had less motivation to use it and a generally negative technology philosophy. The motivations and beliefs of the instructor contributed to a positive or negative technology philosophy as expressed in the categorical scores.

Barriers

External and internal barriers impacted the perceived technology self-efficacy levels of the military instructors as was reflected in the overall CTI scores as well as the categorical scores. External barriers on connectivity and bandwidth were mentioned often but did not seem to have an impact on the CTI or categorical scores. However, others, specifically relating to time and support, were impactful to the categorical scores of the instructors because of their impact on internal barriers. Not having time to make technology user friendly or to research, learn, and try new technology in the course had adverse effects on their confidence level and technology self-efficacy.

The lack of control over input into technology chosen for the courses and lack of leadership support also contributed to lower perceived technology self-efficacy as instructors felt left out and discouraged. The adverse impact of external barriers on internal barriers was unanticipated but significant because it functioned as a domino effect. The four main sources from which teachers develop technology self-efficacy, especially physiological states and feedback they receive, were adversely impacted when teachers felt discouraged and lost confidence. The loss of confidence was reflected in the data on internal barriers, especially when it extended to discomfort or intimidation in utilizing technology to teach content or improve instruction. Conversely, when instructors felt supported and confident in their use of technology, their technology self-efficacy tended to be higher, as reflected in their CTI and categorical scores.

Confidence

The four sources from which teachers develop technology self-efficacy were again apparent in the confidence pattern code. The instructors with higher CTI and categorical scores on confidence had observed other teachers' successful experiences and received positive feedback in their attempts at using educational technology. Examples included learning how to operate technology from their predecessors and surrounding themselves with "people who are overly confident with technology and soak up the knowledge." People who were good with technology also made instructors "feel more comfortable." The higher-scoring individuals had also taken various professional training courses, such as IDOL and Elite, which improved their confidence levels. Conversely, instructors who lacked training and were not privy to professional development courses in technology integration had lower perceived self-efficacy levels as reflected in the CTI and categorical scores. These instructors were aware of what they were missing, evidenced by the statement that training "would be beneficial to help us adapt better to doing things online and using the technologies."

Positive experiences in teaching with technology are one of the four sources from which teachers develop technology self-efficacy (Zonoubi et al., 2017). The more positive experiences the instructors had utilizing educational technology, the higher their CTI and categorical scores were. The instructors who said they were *confident* or *competent* using technology because they had "grown up with it" and were comfortable using it had corresponding high CTI and categorical scores. These instructors understood the importance of technology for building rapport with students: "That does a lot for your confidence level knowing you can be there for the student." The instructor's statement also explains why the categorical scores regarding students' use of technology and assessment were lower for Air Force instructors than for any other category. Confidence in their ability to use technology in the classroom does not translate to confidence in their ability to guide students' use of technology or use it to assess students.

This finding was important because the pattern code does not appear to align with the categorical score, in which even high-scoring Air Force instructors scored lower than any other category. Experience equips instructors with enough knowledge to know that there is so much more to learn. Hence, even instructors with professional training in technology integration classes and experience with virtual reality systems and simulators are wary of their limited knowledge and score themselves accordingly. Conversely, three instructors with high CTI scores described their proficiency with PowerPoint and did not mention any other technology. When they build on their experience with other types of educational technology, their perceived technology self-efficacy level may change because of the effect of training and experience on confidence.

Discussion, Implications, and Conclusions

Bandura (1997) posited that people with high levels of self-efficacy exhibit five specific behaviors in response to a given situation: approach difficult tasks as challenges to be mastered; set challenging goals, and maintain a strong commitment to those goals; elevate or sustain their efforts when confronted with setbacks or failures; attribute failure to lack of effort or insufficient knowledge and skills, yet

they know that knowledge and skills may be acquired; and approach threatening situations with the confidence that they can exercise control over them. The findings of the current study align with the behaviors of people with high levels of self-efficacy (Bandura, 1997). Even when military instructors were hesitant or intimidated by technology, they were not averse to using it. Therefore, they approached difficult tasks as challenges to be mastered, and they approached threatening situations with the confidence that they could exercise control over them. When they discussed not knowing how to use the technology, they attributed it to a lack of training that could be attained. Therefore, they attributed failure to insufficient knowledge and skill, yet they knew that the skills could be acquired. Even the instructors with lower perceived self-efficacy levels did not exhibit the behaviors of people with low levels of self-efficacy as described by Bandura (1997): avoid tasks they perceive as personally threatening, have low aspirations and a weak commitment to goals they set, tend to cease and desist from contributing effort and accept defeat when confronted with setbacks or failures, slow to recover any sense of efficacy after experiencing setbacks or failures, and lack confidence in the face of difficult situations and may fall victim to stress and depression.

For instance, three instructors detailed experiences that did not align with either their CTI scores or the behaviors of people with low self-efficacy levels. Instructor 12 had one of the lowest CTI scores, yet he talked about smart technology in the classroom and the fact that he communicated with his students through Canvas. Instructor 11 rated himself lower on the CTI survey because of his inability to use all the capabilities of a simulator during class. He gave himself a lower score because he discovered the simulator had a capability he did not know about, not because he was not already using the simulator for instruction. Instructors 8 and 9 had low CTI scores but discussed in-depth experiences using educational technology, including VR. These are not the behaviors indicative of people with low self-efficacy levels. However, they do explain the instructors' CTI scores.

The development of teacher self-efficacy toward technology integration is significant since many factors contribute to it, and many components are influenced by it (Vadahi & Lesha, 2015). The results of this study further validate previous research as motivation and beliefs contributed to technology philosophy, which was influenced by external and internal barriers and contributed to the confidence levels of military instructors, which could be increased by training and experience. The four main sources from which teachers develop self-efficacy are successful experiences of teaching, the observations of other teachers' experiences, the type of feedback teachers receive from colleagues, and physiological states teachers experience during a teaching-related task, such as satisfaction or anxiety (Zonoubi et al., 2017) may be applied to military instructors as well. The themes found in this study, specifically philosophy and confidence, align with the four main sources from which teachers develop self-efficacy. In the current study, positive experiences with each of the four sources translated to a positive technology philosophy and higher confidence level, which impacted the instructors' perceptions of barriers. This conclusion was most evident in the finding that most military instructors desired to learn more to ensure success in the future.

In summary, the findings of the study align with current research regarding teacher technology self-efficacy and its impact on technology use in the classroom. Because self-efficacy has been used to increase technology acceptance (George & Camarata, 1996), more research on the factors that influence it would be beneficial to military instructors in their attempts to integrate technology. Various research has discovered that the development of self-efficacy is significant to the successful integration of technology in the classroom (Abbitt, 2011; Atabek, 2020; Bakar et al., 2018; George & Camarata, 1996; Hatlevik & Hatlevik, 2018; Keser et al., 2015; Unal, 2013; Vadahi & Lesha, 2015; Zonoubi et al., 2017). Similar research on the military instructor population does not exist. However, the utilization of different surveys measuring levels of technology self-efficacy (Atabek, 2020; Bakar et al., 2018; Keser et al., 2015) on the military instructor population would improve and substantiate the current study. Studies utilizing pre and post-tests (Abbitt, 2011; Unal, 2013) after the application of training would also lend credibility to the current study as one of the findings was that training and experience improve confidence which aids in the development of technology self-efficacy. The results of this study should aid in restructuring professional development opportunities to allow military instructors to learn about technology integration, including technology integration models, how to use the technology already in the classroom, and ways to interact with students and keep them engaged.

Limitations and Future Research

The main limitation of this study was its size and scope. The population of military instructors was concentrated in a single area in the southern United States, limiting the generalizability of the findings. A broader sample of military instructors from across the United States would provide a more comprehensive analysis and enhance the applicability of the results. Additionally, the 16% survey response rate further constrained the representativeness of the data, potentially affecting the reliability of the conclusions drawn.

Because self-efficacy has been used to increase technology acceptance, more research on the factors that influence it would be beneficial to military instructors in their attempts to integrate technology. Additionally, researchers

have discovered that the development of self-efficacy is significant to the successful integration of technology in the classroom. Thus, the utilization of different surveys measuring levels of technology self-efficacy on the military instructor population would improve and substantiate the current study. Finally, studies utilizing pre and post-tests after the application of training would also lend credibility to the current study as one of the findings was that training and experience improve confidence which aids in the development of technology self-efficacy.

Appendix

A Semi-Structured Interview Questions

The following interview questions are designed to discover factors impacting the self-efficacy of military instructors toward the use of technology in the classroom.

1. Could you describe your motivations for becoming a military instructor?
2. How has the experience of being a military instructor shaped your career?
3. What is your opinion about the role of technology in teaching and how has it changed the way you teach?
4. How confident are you teaching with technology and why?
5. How do you feel supported/incentivized in your technology integration efforts?
6. What barriers have you experienced in your attempts to use technology in your classroom?
7. Describe your professional development (formal and informal) targeting the use of instructional technology in the classroom.
8. Describe any concerns you have about using instructional technologies in your classroom.
9. Is there anything else you would like to share that was not asked about or discussed during this interview?

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References

Abbitt, J., & Klett, M. (2007). Identifying influences on attitudes and self-efficacy beliefs towards technology integration among pre-service educators. *Electronic Journal for the Integration of Technology in Education*, *6*(1), 28–42. http://ejite.isu.edu/

Abbitt, J. (2011). An investigation of the relationship between self-efficacy beliefs about technology integration and technological pedagogical content knowledge (TPACK) among preservice teachers. *Journal of Digital Learning in Teacher Education, 27*(4), 134–143. https://doi.org/10.1080/21532974.2011.10784670

Abedi, E. A., & Ackah-Jnr, F. R. (2023). First-order barriers still matter in teachers' use of technology: An exploratory study of multi-stakeholder perspectives of technology integration barriers. *International Journal of Education and Development Using Information and Communication Technology, 19*(2), 148–165.

Albion, P. R. (2001). Some factors in the development of self-efficacy beliefs for computer use among teacher education students. *Journal of Technology and Teacher Education, 9*(3), 321–347. https://www.learntechlib.org/j/JTATE/

Alexander, P., Chabot, K., Cox, M., DeVoss, D. N., Gerber, B., Perryman-Clark, S., Platt, J., Sackey, D. J., & Wendt, M. (2012). Teaching with technology: Remediating the teaching philosophy statement. *Computers and Composition, 29*(1), 23–38. https://doi.org/10.1016/j.compcom.2011.12.002

Anthony, A., Gimbert, B., Fultz, D., Parker, R. (2011). Examining the relationship between e-coaching and the self-efficacy of novice teachers seeking certification through alternative routes. *Journal of the National Association for Alternative Certification, 6*(1), 46–64. https://www.jnaac.com/

Atabek, O. (2020). Associations between emotional states, for and attitude toward using educational technology. *International Journal of Progressive Education, 16*(2), 175–194. https://doi.org/10.29329/ijpe.2020.241.12

Badia, A., Meneses, J., & Sigales, C. (2013). Teachers' perceptions of factors affecting the educational use of ICT in technology-rich classrooms. *Electronic Journal of Research in Educational Psychology, 11*(3), 787–808. http://www.investigacion-psicopedagogica.org/revista/new/index.php

Bailey, L. (2016). Digital natives, media and learning: Implications for the future of army training. *Military Review, 1*, 1–9. https://www.armyupress.army.mil/Journals/Military-Review/Online-Exclusive/2016-Online-Exclusive-Articles/Digital-Natives-Media-and-Learning/

Bakar, N., Maat, S., & Rosli, R. (2018). A systematic review of teacher's self-efficacy and technology integration. *International Journal of Academic Research in Psychology,* 540–557. https://doi.org/10.46886/IJARP/v8-i8/4611

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191–215. https://www.apa.org/pubs/journals/rev/

Bandura, A. (1997). *Self-efficacy: The exercise of control.* Freeman.

Bebell, D., Russell, M., & O'Dwyer, L. (2004). Measuring teachers' technology uses: Why multiple-measures are more revealing. *Journal of Research on Technology in Education, 37*, 45–63. https://doi.org/10.1080/15391523.2004.10782425

Bloomberg, L. & Volpe, M. (2016). *Completing your qualitative dissertation: A road map from beginning to end.* SAGE.

Bowne, M. (2017). Developing a teaching philosophy. *The Journal of Effective Teaching, 17*(3), 59–63. https://wayback.archive-it.org/18777/20220511073115/https://uncw.edu/jet/

Brenner, A., & Brill, J. (2016). Investigating practices in teacher education that promote and inhibit technology integration transfer in early career teachers. *TechTrends: Linking Research & Practice to Improve Learning, 60*(2), 136–144. https://doi.org/10.1007/s11528-016-0025-8

Brinkerhoff, J. (2006). Effects of a long-duration, professional development academy on technology skills, computer self-efficacy, and technology integration beliefs and practices. *Journal of Research on Technology in Education, 39*(1), 22–43. https://doi.org/10.1080/15391523.2006.10782471

Campbell, K. C., & Wang, S. (2023). Military Instructors' perspectives on interactive multimedia application in military classrooms. *Journal of Military Training, 7*(3), 46–61. https://www.armyupress.army.mil/Portals/7/journal-of-military-learning/Archives/October-2023/Military-Instructors/Military-Instructors.pdf

Creighton, T. (2018). Digital natives, digital immigrants, digital learners: An international empirical integrative review of the literature. *Education Leadership. Review, 19*(1), 132–140.

Creswell, J. & Plano Clark, V. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal, 38*(4), 813–834. https://doi.org/10.3102/00028312038004813

DeCoito, I. & Richardson, T. (2018). Teachers and technology: Present practice and future directions. *Contemporary Issues in Technology and Teacher Education, 18*(2), 362–378. https://www.learntechlib.org/primary/p/180395/

Department of Education Office of Educational Technology (2017) *National Education Technology Plan.* https://tech.ed.gov/netp/

EL-Daou, B. (2016). The effect of using computer skills on teachers' perceived self-efficacy beliefs towards technology integration, attitudes, and performance. *World Journal on Educational Technology Current Issues, 8*(2), 106–118.

Ertmer, P. (2001). Responsive instructional design: Scaffolding the adoption and change process. *Educational Technology, 41*(6), 33–38. https://www.jstor.org/journal/eductech

Ertmer, P. (1999). Addressing first and second order barriers to change: Strategies for technology integration. *Educational Technology Research and Development, 47*(4), 47–61. https://doi.org/10.1007/BF02299597

Ertmer, P., Ottenbreit-Leftwich, A., Sadik, O., Sendurur, Ee., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education, 59*(2), 423–435. https://doi.org/10.1016/j.compedu.2012.02.001

Field, A. (2024). *Discovering statistics using IBM SPSS statistics* (6th Ed.). SAGE

Garrison, D., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education, 7*, 95–105. https://doi.org/10.1016/j.iheduc.2004.02.001

George, G., & Camarata, M. (1996). Managing instructor cyberanxiety: The role of self-efficacy in decreasing resistance to change. *Educational Technology, 36*(4), 49–54. https://www.jstor.org/stable/44428349

Hamutoglu, N. & Basarmark, U. (2020). External and internal barriers in technology integration: A structural regression analysis. *Journal of Information Technology Education, 19*, 17–40. https://doi.org/10.28945/4497

Hathaway, M. (2016). The military learner: The acceptance of new training technology for C-130 aircrews. *International Journal of Aviation, Aeronautics, and Aerospace, 3*(2), 1–30. https://doi.org/10.15394/IJAAA.2016.1102

Hatlevik, I., & Hatlevik, O. (2018). Examining the relationship between teachers' ICT self-efficacy for educational purposes, collegial collaboration, lack of facilitation and the use of ICT in teaching practice. *Frontiers in Psychology, 9*(935). https://doi.org/10.3389/fpsyg.2018.00935

Kent, A., & Giles, R. (2017). Preservice teachers' technology self-efficacy. *SRATE Journal, 26*(1), 9–20. https://files.eric.ed.gov/fulltext/EJ1134392.pdf

Keser, H., Yilmaz, F., & Yilmaz, R. (2015). TPACK competencies and technology integration self-efficacy perceptions of pre-service teachers. *Elementary Education Online, 14*(4), 1193–1207. https://doi.org/10.17051/io.2015.65067

Kindamo, B. (2018). Enhancing soldier performance through virtual and augmented reality. *Military Technology*, *42*(12), 26–28. http://www.miltechmag.com/

Krause, J. (2017). Physical education student teachers' technology integration self-efficacy. *Physical Educator, 74*(3), 476–496. https://doi.org/10.18666/TPE-2017-V74-13-7329

Lee, Y., & Lee, J. (2014). Enhancing pre-service teachers' self-efficacy beliefs for technology integration through lesson planning practice. *Computers & Education, 73*, 121–128. https://doi.org/10.1016/j.compedu.2014.01.001

Martin, J. (2016). Perceptions of digital technology in military education. *Doctoral Dissertations and Projects.* http://hdl.handle.net/10415/5033

Miles, G. (2013). How is teacher self-efficacy and attitude toward technology affected by extended intrusive training? *Instructional Technology Education Specialist Research Papers*. http://digitalcommons.georgiasouthern.edu/edu-papers/8

Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). Qualitative data analysis: A methods sourcebook (4th ed.). SAGE Publications.

Nettis, K. (2020, March 16). Multi-domain operations: Bridging the gaps for dominance. *Wild Blue Yonder.* https://www.airuniversity.af.edu/Wild-Blue-Yonder/Article-Display/Article/2109784/

Pajares, F. (1992). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*, 543-578. https://journals.sagepub.com/home/rer

Protheroe, N. (2008). Teacher efficacy: What is it and does it matter? *Principal, 87*(5), 42–45. https://naesp.org/resources/publications/principal-magazine

Renbarger, R., & Davis, B. (2019). Mentors, self-efficacy, or professional development: Which mediate job satisfaction for new teachers? A regression examination. *Journal of Teacher Education and Educators, 8*(1), 21–34.

Sadaf, A., Newby, T., & Ertmer, P. (2016). An investigation of the factors that influence preservice teachers' intentions and integration of Web 2.0 tools. *Educational Technology Research & Development, 64*(1), 37–64. https://doi.org/10.1007/s11423-015-9410-9

Saldaña, J. (2021). The coding manual for qualitative researchers (4th ed.). SAGE Publications.

Schoepp, K. (2005). Barriers to technology integration in a technology-rich environment. *Learning and Teaching in Higher Education: Gulf Perspectives, 2*(1), 56–79. https://doi.org/10.18538/lthe.v2.n1.02

Schrum, L., Shelley, G., & Miller, R. (2008). Understanding tech-savvy teachers: Identifying their characteristics, motivation, and

challenges. *International Journal of Technology in Teaching and Learning, 4*(1), 1–20. http://stelar.edc.org/publisher/international-journal-technology-teaching-and-learning

Tawfik, A. A., Shepherd, C. E., Gatewood, J., & Gish-Lieberman, J. (2021). First and second order barriers to teaching in K-12 online learning. *TechTrends, 65*, 925–938. https://doi.org/10.1007/s11528-021-00648-y

Teo, T. (2009). Examining the relationship between student teachers' self-efficacy beliefs and their intended use of technology for teacher: A structural equation modeling approach. *The Turkish Online Journal of Educational Technology, 8*(4), 7–16.

Tondeur, J., Scherer, R., Baran, E., Siddiq, F., Valtonen, T., & Sointu, E. (2019). Teacher educators as gatekeepers: Preparing the next generation of teachers for technology integration in education. *British Journal of Educational Technology, 50*(3), 1189–1209. https://doi.org/10.1111/bjet.12748

U.S. Army Training and Doctrine Command (TRADOC). (2017). *The US Army Learning Concept for Training and Education*. https://adminpubs.tradoc.army.mil/regulations/TR1-8.pdf

U.S. Army Training and Doctrine Command (TRADOC). (2024). *The US Army Learning Concept for Training and Education.* https://adminpubs.tradoc.army.mil/pamphlets/TP525-8-2.pdf

U.S. Air Force Air Education and Training Command Instruction (AETCI 36–2651). (2021). *Basic Military and Technical Training.* https://static.e-publishing.af.mil/production/1/aetc/publication/aetci36-2651/aetci36-2651.pdf

Unal, E. (2013). An examination of the relationship between preservice teachers' perceptions of technology integration self-efficacy and technological pedagogical content knowledge competencies (Unpublished master's dissertation). Graduate School of Educational Sciences, Ankara University.

Vadahi, F. & Lesha, J. (2015). Enhancing teachers self-efficacy: Theoretical and research considerations. *European Scientific Journal, 11*(19), 82–29. https://eujournal.org/index.php/esj

Wang, L., Ertmer, P. A., & Newby, T. J. (2004). Increasing preservice teachers' self-efficacy beliefs for technology integration. *Journal of Research on Technology in Education, 36*(3), 231–250. https://doi.org/10.1080/15391523.2004.10782414

Yerdelen-Damar, S., Boz, Y., & Avdin-Gunbatar, S. (2017). Mediated effects of technology competencies and experiences on relations among attitudes toward technology use, technology ownership, and self-efficacy about technological pedagogical content knowledge. *Journal of Science Education & Technology, 26*(4), 394–405. https://doi.org/10.1007/s10956-017-9687-z

Zonoubi, R., EslamiRasekh, A., & Tavakoli, M. (2017). EFL teacher self-efficacy development in professional learning communities. *System, 66*, 1–12. https://doi.org/10.1016/j.system.2017.03.003