Associations between Emotional States, Self-Efficacy for and Attitude towards Using Educational Technology

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Abstract

The purpose of this study was to investigate the associations between alternative certification preservice teachers' levels of depression, stress, educational technology anxiety, self-efficacy for educational technology, and attitude towards using technology in education to provide insight into the interplay between intrinsic factors affecting technology integration. Participants were 451 preservice teachers enrolled in the alternative certification program at a public university in the southwestern part of Turkey (N=451). Data were collected using the Educational Technology Standards Self-Efficacy Scale, Attitude towards Using Technology in Education Scale, Educational Technology Anxiety Scale, Perceived Stress Scale, and Beck's Depression Inventory. In addition to descriptive techniques, Pearson's product-moment correlation coefficient and multiple linear regression were used for data analysis. Findings revealed that preservice teachers suffer from stress, depression, and anxiety, even more so than other undergraduate students. Age did not correlate with any of the parameters. Stress and depression did not differ according to gender; however, females were more anxious about using educational technology. Additionally, findings indicated bidirectional and cyclical relationships between emotional states, self-efficacy, and attitude. Finally, using educational technology for instructional purposes and for secondary purposes such as classroom management were associated with different sets of self-efficacy beliefs, and attitudes. Findings of the research were discussed and suggestions were made.

Keywords: Alternative Certification; Pedagogical Formation; Teacher Training; Technology Acceptance; Technology Integration.

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1.INTRODUCTION

Since most teachers struggle to use (Rebora, 2016), misuse (Fox, 2018; Glendinning, 2018; Hyndman, 2018), or do not use technology in meaningful ways (Guzey & Roehrig, 2012) for educational purposes, despite record amounts of funds being invested in educational technology (Adkins, 2018; Shulman, 2018), it is a matter of great interest to increase knowledge of the factors that affect successful implementation of educational technology, in order to better understand the dynamics influential in the adoption and successful integration of technology. Haddad and Draxler (2002) state that teachers are underpaid and ill-prepared, yet accountable for successfully teaching poorly prepared students in unsafe and inadequately equipped schools while also being expected to satisfy the needs of students, parents, administrators, society, the present, and the future. In the context of this stressful and challenging condition, educators face significant barriers or obstacles to the adoption and integration of technology (Al-Senaidi, Lin, & Poirot, 2009; Johnson, Jacovina, Russell, & Soto, 2016). Integration of technology is not simply a technical issue (Al-Senaidi et al., 2009). Adoption and integration of technology is affected by personal, social, economic, environmental, and emotional factors. Ertmer (1999) classifies the barriers to technology integration into two types: first-order barriers, which are extrinsic to teachers, and second-order barriers, which are intrinsic to teachers. First-order barriers are inadequacies in resources, time, training or support, while second-order barriers are attitudes and beliefs such as self-efficacy beliefs (Beri & Sharma, 2019; Ertmer et al., 2003; Gürer, Tekinarslan, & Gönültaş, 2019; Johnson et al., 2016), affective processes, and emotional states (Al-Awidi & Alghazo, 2012; Beaudry, & Pinsonneault, 2010; Beri & Sharma, 2019; Shank, 2014) such as stress (Joo, Lim, & Kim, 2016; Kurt & Atay, 2009; Saravanan & Nagadeepa, 2017), anxiety (Chatzoglou, Sarigiannidis, Vraimaki, & Diamantidis, 2009; Redmann & Kotrlik, 2009) and depression (Tweed, 2013).

First-order (external) barriers are considered to be reduced (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012), tackled (Johnson et al., 2016) or overcome through investment (Fraillon, Ainley, Schulz, Friedman, & Gebhardt, 2014; Gürer et al., 2019). Second-order barriers are considered to pose the greater challenge (Ertmer et al., 2012); they also create more difficulties than the first-order ones (Hew & Brush, 2007) and are more difficult hurdles (Johnson et al., 2016). There is a need for research to examine barriers of technology integration in greater detail (Hew & Brush, 2007). In addition to the intrinsic and extrinsic barriers, the way teachers are educated and certified is another major concern regarding technology integration. The relationship between teacher education and teacher effectiveness has been hotly debated (Darling-Hammond, Holtzman, Gatlin, & Heilig, 2005). Some argue that alternatively certified teachers are underprepared (Berry, 2001; Darling-Hammond, Chung, & Frelow, 2002; Darling-Hammond et al., 2005; Kee, 2012; Laczko-Kerr & Berliner, 2003; Nagy & Wang, 2006; Washington, 2016), more likely to experience stressors (Schonfeld & Feinman, 2012), and lacking in pedagogical content knowledge (Berry, Montgomery, & Snyder, 2008; Brindley & Parker, 2010; Grossman & Loeb, 2010; Washington, 2016). Yet, there is a lack of knowledge about alternatively certified teachers (Roberts & Dyer, 2004). Therefore, in order to provide insight into the interplay between intrinsic factors affecting technology integration, this study investigates associations between alternative certification preservice teachers' levels of depression, perceived stress, educational technology anxiety, self-efficacy for educational technology, and attitude towards using technology in education.

1.1.Technology Acceptance

Implementation of technology for educational purposes requires the acceptance of that technology by learners and teachers in the first place. Promoting a more comprehensive use of educational technology for learning and teaching requires knowledge of the factors contributing to the acceptance of technology (Wong, 2015). To measure the degree of acceptance and satisfaction for any technology, and to predict the behavior of individuals in this context, technology acceptance theories and models were designed (Momani & Jamous, 2017). One of the models for technology acceptance is the Technology Acceptance Model (TAM), which was first introduced by Davis (1985) (Davis,

Bagozzi, & Warshaw, 1989). The TAM can be applied to teachers' use of educational technologies (Holden & Rada, 2011). The model is depicted in Figure 1.

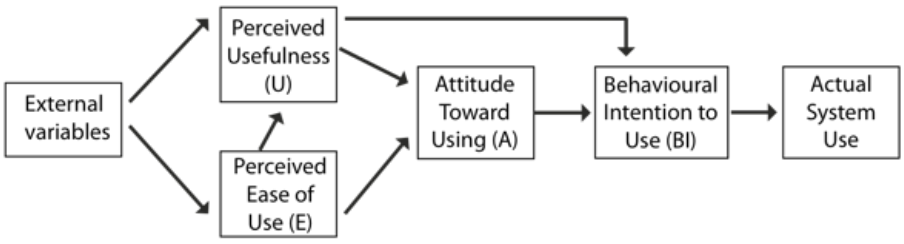

Figure 1. Technology Acceptance Model (Davis, 1989, p. 985).

The TAM postulates that actual use of a technology is determined by behavioral intention to use the technology. Behavioral intention to use, in turn, is determined by attitude towards using the technology and perceived usefulness of the technology. Attitude towards using technology is influenced by perceived usefulness and perceived ease of use of the technology (Davis, 1985; Holden & Rada, 2011). Perceived usefulness and perceived ease of use are two particular beliefs that are of primary relevance for computer acceptance behavior (Davis et al., 1989). Perceived ease of use influences attitude by the mechanism of self-efficacy (Davis et al., 1989; Legris, Ingham, & Collerette, 2003). Teachers' beliefs about and attitudes towards technology are crucial for teachers to pedagogically adopt technology (Somekh, 2008). In addition to the TAM, attitude and self-efficacy belief have critical roles in the formation of intention to use technology according to behavioral intention models such as the Theory of Reasoned Action (Ajzen & Fishbein, 1980), which have been widely used in technology adoption research and studies (Otieno, Liyala, Odongo, & Abeka, 2016). Theory of reasoned action presupposes a causal sequence leading from beliefs to attitude, and from intention to behavior (Sarver, 1983). Therefore, attitude and self-efficacy seem to play a determinant role in the acceptance and, hence, the actual use of technologies.

1.2.Attitude

Attitude is a psychological construct that can direct individuals' behavior. Fishbein and Ajzen (1975) define attitude as an individual's degree of evaluative affect towards the target behavior (p. 216). Attitude is composed of cognitive, emotional, and behavioral elements that are assumed to have internal consistency with each other (İnceoğlu, 2010) and is usually formed through direct experience, imitation, reinforcement, and social learning (Kağıtçıbaşı, 2006). Attitude is not conceived as a constant state or a fixed condition, but rather a variable psychological construct. According to Fishbein and Ajzen's model, which is an influential paradigm for research on technology acceptance, "individual's intention to perform a given behavior is the immediate causal determinant of his or her overt performance of that behavior" (Davis, 1985, p. 15). On the other hand, intention is determined by attitude towards that behavior (Dishaw, Strong, & Bandy, 2002) as well as the perceived social influence of people who are important to the individual (Davis, 1985; Fishbein, & Ajzen, 1975), which is in parallel with Bandura's view that verbal persuasion is a source for self-efficacy. Previous research reveals that attitude is the strongest factor influencing the intention to use technology (Chau & Hu, 2002; Cheung & Vogel, 2013; Davis, 1993; Hussein, 2015; Liu, Liao, & Pratt, 2009; Louho, Kallioja, & Oittinen, 2006; Sánchez-Mena, Martí-Parreño, & Aldás-Manzano, 2019; Schaper & Pervan, 2007; Tosuntaş, Karadağ, & Orhan, 2015; Wu & Chen, 2017). Attitude towards using technology is a barrier to technology integration for teachers (Beri & Sharma, 2019; Hew & Brush, 2007; Ünal, Yamaç, & Uzun, 2017).

1.3.Self-Efficacy

Self-efficacy is an individual's belief about his or her capability in successfully performing required behaviors to produce an outcome or effectively accomplish a certain goal or task (Bandura, 1977, 1995; Pintrich, 1999). Cobb (2003) defines self-efficacy as one's confidence to learn or accomplish a task and as a central mechanism of intentional human action, which regulates motivation and action. Individuals with high self-efficacy show greater persistence in maintaining and achieving the job, even in the face of difficulties (Schunk, 1981, 1985), and are more effective and persistent in their efforts (Bandura, 1995; Bouffard-Bouchard, 1990; Pajares & Schunk, 2002; Schunk, 1981). Kanadlı (2017) states that "teacher self-efficacy is associated with the efforts a teacher makes toward teaching, the goals set and the persistence and resilience shown in the face of difficulties when things go wrong" (p. 1851). According to Bandura (1995), mastery experiences, vicarious experiences, verbal persuasion, and physiological and emotional states are sources of self-efficacy beliefs. Experiences during student teaching and the induction year are among the most powerful influences on the development of teachers' self-efficacy (Hoy & Spero, 2005; Eryaman, et all. 2013). Self-efficacy influences teachers' thoughts and actions regarding technology in the classroom (Abbitt, 2011). In addition to its effect on attitude towards technology, self-efficacy has been shown to influence behavioral intention to use (Schwarzer & Fuchs, 1995; Venkatesh, Morris, Davis, & Davis, 2003; Wong, 2015), actual use (Compeau, Higgins, & Huff, 1999; Oye, Lahad, & Rahim, 2012), and acceptance of technology (Holden & Rada, 2011; Oye, Lahad, & Rahim, 2012).

Significant positive relationships have been reported between self-efficacy for and attitude towards using technology (Arslan, 2008; Kutluca & Ekici, 2010). Regarding the relationship between attitudes and beliefs, Fishbein & Ajzen (1975, p. 216) argue that, "as a person forms beliefs about an object, he automatically and simultaneously acquires an attitude toward that object". Moreover, Davis (1985) argues that "attitudes are altered only through changes in the individual's belief structure" (p. 17). Hence, there seems to be a possible path towards contributing to the successful implementation of educational technology. It seems that strengthening self-efficacy beliefs may contribute to the development of (more) positive attitudes towards computers, information technology, and/or educational technology in general. As a consequence of stronger self-efficacy for and more positive attitude towards educational technology, teachers may better implement educational technology in learning environments. Holden and Rada (2011) state that self-efficacy for technology may be increased by training and "creating an environment where teachers can collaborate about their experiences with the technology" (p. 365). Previous research indicates that increasing self-efficacy for using technology leads to increases in teachers' acceptance of technology (Holden & Rada, 2011), their actual use of technology in the classroom (Abbitt, 2011), their potential to positively influence students' performances (Kanadlı, 2017), and to positive ideas about technology integration (Albion & Ertmer, 2002; Ertmer et al., 2003).

1.4.Stress, Anxiety, and Depression

Teaching is one of the most challenging professions in the world (Haddad & Draxler, 2002). Stress, anxiety, and depression are the most common negative emotional states that teachers experience (Uzman & Telef, 2015) and are intricately tied to use of technology (Shank, 2014). Emotional state is defined as changes in somatic, biochemical, and neurological activity (Lewis & Saarni, 1985), and in the mode of processing within the brain that supports cognition (Damasio, 2000). Emotional states influence the perception of information (Rivers & Brackett, 2010) and decision making (Neto & da Silva, 2012), cause approach or avoidance behaviors (Pengnate, 2013), and have a crucial role in human-computer interaction (Wang & Guan, 2008), e-learning (Juutinen & Saariluoma, 2010) and technology integration (Al-Awidi & Alghazo, 2012). Emotional feedback, which regulates emotional states, has a direct effect on perceived usefulness, perceived ease of use, and behavioral intention to use computer based assessment (Terzis, Moridis, & Economides, 2012). Emotional states affect self-efficacy for technology integration (Ünal et al., 2017). In order to increase self-efficacy,

educators should try to reduce negative emotional states (Kauppinen, Kiili, & Coiro, 2018; Tweed, 2013; Usher & Pajares, 2008).

Stress is reported to affect self-efficacy for technology integration (Kurt & Atay, 2009; Ünal et al., 2017), intention to use technology (Chatzoglou et al., 2009; Joo et al., 2016), and integration of new digital ICT tools and web systems into the educational environment (Saravanan & Nagadeepa, 2017). Anxiety is reported to influence computer self-efficacy (Compeau et al., 1999; Thatcher & Perrewe, 2002), self-efficacy for technology integration (Ünal et al., 2017), attitude towards using technology (Beri & Sharma, 2019; Brown, Fuller, & Vician, 2004; Venkatesh, 2000), intention to use technology (Chatzoglou et al., 2009; Venkatesh et al., 2003), technology use (Beaudry & Pinsonneault, 2010; Compeau et al., 1999), and teachers' technology adoption (Redmann & Kotrlik, 2009). Depression is also argued to influence technology use patterns (Shank, 2014) and self-efficacy (Tweed, 2013). On the other hand, stress, anxiety, and depression are influenced by self-efficacy (Bandura, 1995; Jerusalem & Mittag, 1995).

2.METHOD

The study was designed as a piece of correlational research. Throughout the study, the Ethical Principles of Psychologists and Code of Conduct have been observed (American Psychological Association, 2002).

2.1.Participants

The participants were 451 preservice teachers enrolled in the alternative certification program at a public university in the southwestern part of Turkey (N=451). Participants were determined through convenience sampling at the university where the researcher is also a member of the faculty. There were 283 (62.7%) female and 168 (37.3%) male students. Participants' ages ranged between 19 and 46 ($\bar{x}$=24.51, median=22). Only consenting individuals participated in the research.

2.2. Data Collection Tools

2.2.1. Educational technology standards self-efficacy scale

The educational technology standards self-efficacy scale (ETSSES) was developed by Şimşek and Yazar (2016) to measure self-efficacy for educational technology in accordance with the educational technology standards for teachers set by the International Society for Technology in Education (2014). The ETSSES is a 5-point Likert-type scale consisting of 40 items and five dimensions (1=Strongly Disagree, 5=Strongly Agree). The sub-dimensions (SE1 to SE5) and Cronbach's α values of the scale are as follows: facilitating and inspiring student learning and creativity (α=0.90); designing and developing digital age learning experiences and assessments (α=0.93); modelling digital age work and learning (α=0.88); promoting and modelling digital citizenship and responsibility (α=0.82); and engaging in professional growth and leadership (α=0.91).

2.2.2. Attitude towards using technology in education scale

The attitude towards using technology in education scale (ATUTIES) was developed by Öztürk (2006). It is a 5-point Likert-type scale consisting of 39 items and three dimensions (1=Strongly Disagree, 5=Strongly Agree). The sub-dimensions (AT1 to AT3) and Cronbach's α values of the scale are as follows: reflection of using technology in education on instructional processes (α=0. 90); improving oneself in using technology in education (α=0.90); and using technology in education and classroom management (α=0.89).

2.2.3. Educational technology anxiety scale

The educational technology anxiety scale (ETAS) was developed by Yalçınalp and Cabı (2015) to measure anxiety about using technology on their courses. The ETAS is a 5-point Likert-type scale consisting of 24 items and five dimensions (1=I am not worried, 5=I am very worried). The sub-dimensions (AX1 to AX5) and Cronbach's α values of the scale are as follows: workplace (α=0.89); technological disadvantage-restriction (α=0.81); technology integration (α=0.83); technology management (α=0.92); and technical (α=0.70) anxiety.

2.2.4. Perceived stress scale

The perceived stress scale was developed by Cohen, Kamarck, and Mermelstein (1983) to measure the degree to which situations in one's life are appraised as stressful. The scale is a 5-point Likert-type scale consisting of 10 items (0=Never, 4=Very often). The score range is 0 to 40, and higher scores indicate more perceived stress. Cronbach's α of the scale is 0.84.

2.2.5. Beck's depression inventory

The inventory was developed by Beck, Ward, Mendelson, Mock, and Erbaugh (1961) for measuring the severity of depression; it consists of 21 items. The score range is 0 to 63, and higher scores indicate more severe depressive symptoms. Questions are answered by one of the four forced choices. Every choice of the rating scale is unique. For the standard cut-off scores: 0-9 represents minimal depression; 10-18 represents mild depression; 19-29 represents moderate depression; and 30-63 represents severe depression. Cronbach's α of the scale is 0.86.

2.3. Procedure

Initially, a paper-and-pencil instrument was prepared comprised of the five scales and a demographics form. Permissions required for being able to conduct the research were received from institutional authorities. Data were collected in the classrooms during the lessons and were analyzed by statistical measures.

2.4. Data Analysis

Initially, the completed survey instruments were transferred to a computer. Statistical analyses were performed using the IBM SPSS Statistics computer program (IBM SPSS Statistics version 25). Data were analyzed by Cronbach's α estimate, t-test, Pearson's product-moment correlation coefficient and multiple linear regression.

3. FINDINGS

After calculating scores, descriptive analyses were conducted. The results of descriptive analyses are depicted in Table 1.

Table 1. Results of descriptive analyses.

	Min.	Max.	$\bar{x}$	s	s^2
Stress	0	4	2.06	0.682	0.465
Depression	0	2	0.62	0.405	0.164
Anxiety (ETAS)	1	5	2.90	0.756	0.571
AX1	1	5	3.35	1.047	1.096
AX2	1	5	3.27	0.828	0.685
AX3	1	5	2.62	1.093	1.194
AX4	1	5	2.68	0.916	0.839
AX5	1	5	2.26	0.971	0.943

Self-Efficacy (ETSSES)	2	5	3.97	0.572	0.327
SE1	1	5	3.98	0.665	0.443
SE2	2	5	3.90	0.657	0.432
SE3	1	5	3.98	0.684	0.467
SE4	1	5	3.95	0.646	0.417
SE5	2	5	4.03	0.664	0.441
Attitude (ATUTIES)	1	5	2.66	0.351	0.124
AT1	1	5	1.93	0.619	0.383
AT2	1	5	3.86	0.661	0.437
AT3	1	5	2.11	0.850	0.722

Note: AX1 to AX5, SE1 to SE5, and AT1 to AT3 are sub-dimensions of ETAS, ETSSES, and ATUTIES, respectively.

Subsequently, Pearson's product-moment correlation coefficients were computed in order to investigate whether age correlated with stress, depression, total scale scores or sub-dimensions of ETAS, ETSSES, and ATUTIES. The results of the computations revealed that age did not correlate with stress, depression, total scale scores or sub-dimensions of ETAS, ETSSES, and ATUTIES ($p>0.05$). After Pearson's computations, a series of independent samples t-tests were performed in order to compare the levels of stress, depression, total scale scores and sub-dimensions of ETAS, ETSSES, and ATUTIES in females and males. The results revealed that there were no significant differences in the levels of stress, depression, attitude, self-efficacy, SE1, SE2, SE3, or AX3 for females and males ($p>0.05$). However, there were statistically significant differences between male and female preservice teachers in the levels of anxiety, SE4, SE5, AX1, AX2, AX4, AX5, and all sub-dimensions of ATUTIES, even though scale-scores did not differ according to sex. It should be noted that all effect sizes were small. Table 2 depicts the results of t-test analyses.

Table 2. Results of t-test analyses.

	Female		Male					
Variable	$\bar{x}$	s	$\bar{x}$	s	df	t	p	η^2
Stress	2.11	0.70	1.98	0.63	448	1.81	0.070	
Depression	0.63	0.40	0.60	0.41	449	0.81	0.418	
Anxiety (ETAS)	2.98	0.76	2.76	0.71	449	2.94	0.003**	0.02
AX1	3.43	1.03	3.21	1.05	449	2.09	0.037***	0.01
AX2	3.35	0.83	3.12	0.80	449	2.87	0.004**	0.02
AX3	2.68	1.07	2.53	1.12	449	1.43	0.152	
AX4	2.77	0.95	2.54	0.83	449	2.53	0.012***	0.01
AX5	2.36	0.99	2.09	0.90	449	2.87	0.004**	0.02
Attitude (ATUTIES)	2.64	0.31	2.70	0.40	286	-1.77	0.077	
AT1	1.86	0.56	2.05	0.68	300	-3.02	0.003**	0.02
AT2	3.91	0.61	3.76	0.72	305	2.32	0.021***	0.01
AT3	2.04	0.81	2.22	0.90	321	-2.12	0.034***	0.01
Self-Efficacy (ETSSES)	4.01	0.53	3.90	0.63	304	1.89	0.059	
SE1	4.00	0.62	3.95	0.73	306	0.82	0.411	
SE2	3.94	0.62	3.84	0.70	309	1.58	0.113	
SE3	3.97	0.62	3.99	0.77	294	-0.30	0.759	
SE4	4.04	0.62	3.80	0.66	449	3.79	0.000*	0.03
SE5	4.08	0.60	3.94	0.74	299	2.18	0.030***	0.01

Note: *p <0.001, **p <0.01, ***p <0.05. Sample consisted of 283 females and 168 males. AX1 to AX5, SE1 to SE5, and AT1 to AT3 are sub-dimensions of ETAS, ETSSES, and ATUTIES, respectively.

3.1. Attitude

Three multiple linear regression analyses were applied using stress, depression, and sub-dimensions of ETAS and ETSSES as independent variables (IV), and one of three sub-dimensions of ATUTIES as the dependent variable (DV). The results of these regression analyses are depicted in

Table 3. The first regression model was used to test if the IVs significantly predicted "reflection of using technology in education on instructional processes" (AT1). The results of the analysis indicated that 23.3% of the variance in AT1 was explained by SE1, SE5, AX1, and AX3 (R^2= 0.233, F(12, 430)=10.87, p=0.000). The second regression model was used to test if IVs significantly predicted "improving oneself in using technology in education" (AT2). The results of the analysis indicated that 48.9% of the variance in AT2 was explained by SE1, SE5, AX1, and AX5 (R^2= 0.489, F(12, 429)=34.176, p=0.000). The third regression model was used to test if IVs significantly predicted "using technology in education and classroom management" (AT3). The results of the analysis indicated that 28.2% of the variance in AT3 was explained by SE5 and AX5 (R^2=0.282, F(12, 428)=13.985, p=0.000).

Table 3. Results of regression analyses on the sub-dimensions of ATUTIES.

DV	IV	B	Std. Error	Stand. β	t	p	Tolerance	VIF
AT1								
	SE1	-0,141	0.058	-0.167	-2.44	0.015***	0.38	2.60
	SE5	-0.168	0.068	-0.197	-2.47	0.014***	0.28	3.55
	AX1	-0.079	0.032	-0.146	-2.45	0.014***	0.50	1.97
	AX3	0.078	0.035	0.150	2.23	0.026***	0.39	2.54
AT2								
	SE1	0.277	0.053	0.288	5.25	0.000*	0.39	2.52
	SE5	0.269	0.061	0.277	4.39	0.000*	0.30	3.33
	AX1	0.079	0.030	0.129	2.64	0.008**	0.50	1.99
	AX5	0.096	0.031	0.146	3.12	0.002**	0.54	1.82
AT3								
	SE5	-0.304	0.091	-0.250	-3.34	0.001*	0.30	3.33
	AX5	0.136	0.046	0.164	2.98	0.003**	0.55	1.80

Note: *p <0.001, **p <0.01, ***p <0.05. Sample consisted of 283 females and 168 males. AX1 to AX5, SE1 to SE5, and AT1 to AT3 are sub-dimensions of ETAS, ETSSES, and ATUTIES, respectively. "Std." and "Stand." refers to "standard" and "standardized", respectively.

3.2. Self-Efficacy

Five multiple linear regression analyses were conducted using stress, depression and sub-dimensions of ETAS, and ATUTIES as independent variables (IV), and one of five sub-dimensions of ETSSES as the dependent variable (DV). The results of these regression analyses are depicted in Table 4. The first regression model was used to test if IVs significantly predicted "facilitating and inspiring student learning and creativity" (SE1). The results of the analysis indicated that 36.3% of the variance in SE1 was explained by AT2, AX1, and AX5 (R^2=0.363, F(10, 437)=24.874, p=0.000). The second regression model was used to test if IVs significantly predicted "designing and developing digital age learning experiences and assessments" (SE2). The results of the analysis indicated that 29.5% of the variance in SE2 was explained by AT2, AX1, and AX5 (R^2=0.295, F(10, 439)=18.354, p=0.000). The third regression model was used to test if IVs significantly predicted "modelling digital age work and learning" (SE3). The results of the analysis indicated that 38.5% of the variance in SE3 was explained by AT2, AT3, and AX5 (R^2=0.385, F(10, 431)=26.985, p=0.000). The fourth regression model was used to test if IVs significantly predicted "promoting and modelling digital citizenship and responsibility" (SE4). The results of the analysis indicated that 29.1% of the variance in SE4 was explained by AT2 and AT3 (R^2=0.291, F(10, 436)=17.893, p=0.000). The fifth regression model was used to test if IVs significantly predicted "engaging in professional growth and leadership" (SE5). The results of the analysis indicated that 47.4% of the variance in SE5 was explained by stress, AT2, AT3, AX1, and AX5 (R^2=0.474, F(10, 432)=38.895, p=0.000).

Table 4. Results of regression analyses on the sub-dimensions of ETSSES.

DV	IV	B	Std. Error	Stand. β	t	p	Tolerance	VIF
SE1								
	AT2	0.426	0.046	0.424	9.25	0.000*	0.694	1.44
	AX1	0.175	0.033	0.277	5.32	0.000*	0.538	1.85
	AX5	-0.081	0.035	-0.118	-2.28	0.023***	0.547	1.83
SE2								
	AT2	0.368	0.048	0.369	7.62	0.000*	0.685	1.46
	AX1	0.147	0.034	0.234	4.29	0.000*	0.539	1.85
	AX5	-0.088	0.037	-0.130	-2.38	0.018***	0.539	1.85
SE3								
	AT2	0.457	0.047	0.449	9.76	0.000*	0.675	1.48
	AT3	-0.092	0.039	-0.119	-2.35	0.019***	0.555	1.80
	AX5	-0.095	0.035	-0.140	-2.71	0.007**	0.537	1.86
SE4								
	AT2	0.357	0.047	0.372	7.57	0.000*	0.675	1.48
	AT3	-0.086	0.040	-0.116	-2.14	0.032***	0.556	1.79
SE5								
	Stress	-0.121	0.042	-0.126	-2.87	0.004**	0.630	1.58
	AT2	0.483	0.043	0.478	11.35	0.000*	0.688	1.45
	AT3	-0.078	0.036	-0.102	-2.15	0.032***	0.539	1.85
	AX1	0.133	0.031	0.211	4.34	0.000*	0.515	1.94
	AX5	-0.068	0.032	-0.101	-2.13	0.034***	0.542	1.84

Note: *p <0.001, **p <0.01, ***p <0.05. Sample consisted of 283 females and 168 males. AX1 to AX5, SE1 to SE5, and AT1 to AT3 are sub-dimensions of ETAS, ETSSES, and ATUTIES, respectively. "Std." and "Stand." refers to "standard" and "standardized", respectively.

3.3. Anxiety

Five multiple linear regression analyses were conducted using stress, depression, and sub-dimensions of ETSSES and ATUTIES as independent variables (IV), and one of five sub-dimensions of ETAS as the dependent variable (DV). The results of these regression analyses are depicted in Table 5. The first regression model was used to test if IVs significantly predicted "workplace related anxiety" (AX1). The results of the analysis indicated that 16.9% of the variance in AX1 was explained by stress, AT2 and SE5 (R^2=0.169, F(10, 437)=8.87, p=0.000). The second regression model was used to test if IVs significantly predicted "technological disadvantage-restriction related anxiety" (AX2). The second regression analysis did not produce a significant model (R^2=0.013, F(10, 439)=1.61, p=0.101). The third regression model was used to test if IVs significantly predicted "technology integration related anxiety" (AX3). The results of the analysis indicated that 12.9% of the variance in AX3 was explained by stress, depression and AT2 (R^2=0.129, F(10, 439)=6.507, p=0.000). The fourth regression model was used to test if IVs significantly predicted "technology management related anxiety" (AX4). The results of the analysis indicated that 9.1% of the variance in AX4 was explained by stress and SE3 (R^2=0.091, F(10, 439)=4.4, p=0.000). The fifth regression model was used to test if IVs significantly predicted "technical anxiety" (AX5). The results of the analysis indicated that 11.3% of the variance in AX5 was explained by stress, AT2 and AT3 (R^2=0.113, F(10, 438)=5.567, p=0.000).

Table 5. Results of regression analyses on the sub-dimensions of ETAS.

DV	IV	B	Std. Error	Stand. β	t	p	Tolerance	VIF
AX1								
	Stress	0.342	0.083	0.223	4.13	0.000*	0.653	1.53
	AT2	0.193	0.091	0.122	2.11	0.035***	0.572	1.74
	SE5	0.331	0.128	0.211	2.59	0.010**	0.286	3.49
AX3								
	Stress	0.336	0.148	0.125	2.27	0.024***	0.658	1.52
	Depression	0.332	0.088	0.207	3.77	0.000*	0.659	1.51
	AT2	0.233	0.098	0.141	2.38	0.018***	0.568	1.76
AX4								
	Stress	0.259	0.075	0.193	3.44	0.001*	0.659	1.51
	SE3	-0.223	0.105	-0.166	-2.11	0.035***	0.338	2.96

AX5								
	Stress	0.179	0.078	0.126	2.27	0.023***	0.660	1.51
	AT2	0.324	0.087	0.222	3.71	0.000*	0.565	1.77
	AT3	0.235	0.068	0.207	3.45	0.001*	0.566	1.76

Note: *p <0.001, **p <0.01, ***p <0.05. Sample consisted of 283 females and 168 males. AX1 to AX5, SE1 to SE5, and AT1 to AT3 are sub-dimensions of ETAS, ETSSES, and ATUTIES, respectively. "Std." and "Stand." refers to "standard" and "standardized", respective

4. DISCUSSION

The purpose of this study was to investigate the associations between alternative certification preservice teachers' levels of depression, stress, educational technology anxiety, self-efficacy for educational technology, and attitude towards using technology in education in order to provide insight into the interplay between intrinsic factors affecting technology integration. First of all, it was found that the mean perceived stress level (20.55) was higher than previously reported norms (14.2), with a general population sample ranging in age from 18 to 29 (Cohen, 1994). The mean level of severity of depression (13.00) was also higher than the norm mean value (9.14), as reported by Whisman and Richardson (2015). The proportion of preservice teachers who scored 19 and above on Beck's Depression Inventory, and were therefore showing indications of moderate to severe depression, was 22.6%. This percentage was considerably higher than the proportion of undergraduate students (12%), as reported by Whisman and Richardson (2015). Hence, alternative certification preservice teachers, to a large extent, seem to suffer from stress and depression. Alternative certification programs are beneficiary for those individuals with an undervalued profession, which does not provide them with satisfactory job opportunities (Gülbağcı Dede & Akkoç, 2016; Erol, Özdemir, Turhan, Özan, & Polat, 2017; Polat, 2014). Unemployable graduates who enroll in those programs suffer intense anxiety about the future (Sezgin Nartgün & Gökçer, 2014); they see the program as a source of hope (Erol et al., 2017) to "get rid of the burden on the family by gaining economic independence as soon as possible" (Sezgin Nartgün & Gökçer, 2014, p. 64). Considering the influence of negative emotional states on learning, attitude towards and intention to use technology, technology adoption, and self-efficacy for and attitude towards technology integration, teacher training institutions should consider designing and providing resources to help preservice teachers suffering from negative emotional states.

Findings revealed that age did not correlate with stress, depression, total scale scores and sub-dimensions of ETAS, ETSSES or ATUTIES. Considering the diversity of the bachelor's degrees that participants hold, and that the participants' ages ranged between 19 and 46, the insignificance of all associations between age and the parameters were remarkable. Possible influence of age on parameters may have been overshadowed by the effects of negative emotional states, which were intensified by social and economic factors. It is also possible that the effect of studying educational technology at teacher training institutions on self-efficacy for and attitude towards educational technology may be much stronger than any possible effect of training in or gaining experience in other fields. Without formal training, the variances in self-efficacy and attitude seem to have remained low in a narrower band, thus ruling out a correlation with age.

Mean levels of stress and depression did not differ according to gender. Neither did mean levels of ATUTIES, ETSSES, self-efficacy for "facilitating and inspiring student learning and creativity", "designing and developing digital age learning experiences and assessments", and "modelling digital age work and learning", or anxiety about "technology integration". However, females were more anxious about using educational technology. Remarkably, all of the sub-dimensions of ATUTIES differed according to gender even though total scale scores did not. While females had more positive attitudes towards "improving oneself in using technology in education", males had a more positive attitude towards "reflection of using technology in education on instructional processes" and "using technology in education and classroom management". Moreover, females also had a stronger self-efficacy for "promoting and modelling digital citizenship and responsibility" and "engaging in professional growth and leadership" even though the ETSSES scale scores did not differ according to gender. Therefore, female preservice teachers have a stronger self-efficacy for and more positive attitude towards professional improvement and leadership even though

they suffer more from workplace, technical and management related anxieties. The contrast between gender differences in total scale scores and sub-dimensions indicate that gender differences may exist in the details even though they may not be visible on a macro level. A nuanced understanding of self-efficacy for and attitude towards using educational technology may help teacher training to be more successful regarding technology integration.

Workplace and technical anxiety, as well as self-efficacy for "facilitating and inspiring student learning and creativity" and "engaging in professional growth and leadership", explained attitudes towards "improving oneself in using technology in education". Additionally, workplace and technology integration related anxiety, as well as self-efficacy for "facilitating and inspiring student learning and creativity" and "engaging in professional growth and leadership", explained attitudes towards "reflection of using technology in education on instructional processes". Remarkably, same predictors explained an increase in "improving oneself in using technology in education" and a decrease in "reflection of using technology in education on instructional processes". Moreover, attitudes towards "using technology in education and classroom management" was predicted by self-efficacy for "engaging in professional growth and leadership" and technical anxiety. Self-efficacy for "engaging in professional growth and leadership" was the strongest predictor among the IVs. However, an increase in that sub-dimension of self-efficacy gave way only to attitude towards improving oneself. Negative association of professional-growth related self-efficacy with instructional processes and classroom management related attitudes indicate that the relationship between self-efficacy and attitude is not a unidirectional one. Findings revealed that strengthening self-efficacy beliefs may also weaken the attitude. In a similar way, those who were more anxious about the workplace had a more positive attitude to "improving oneself in using technology in education" and a more negative attitude towards "reflection of using technology in education on instructional processes". On the other hand, those who suffered more from technical anxiety had a more positive attitude towards both "improving oneself in using technology in education" and "using technology in education and classroom management". It seems that anxiety may both hinder and promote desired attitudes. Anxiety about social phenomena such as the workplace seem to motivate individuals to improve themselves, while also making it difficult for them to perform. Anxiety about capabilities such as technical anxiety seems to move the individuals away from primary purposes such as "instructional processes" and closer to secondary purposes such as "classroom management" and self-improvement.

Attitudes towards "improving oneself in using technology in education" was the strongest predictor of self-efficacy for using educational technology, which explains all of the sub-dimensions. Having a more positive attitude towards improving oneself seems to indicate that a certain level of competence already exists. Attitude towards "using technology in education and classroom management" was the second strongest predictor, which explains a decrease in self-efficacy for "modelling digital age work and learning", "promoting and modelling digital citizenship and responsibility", and "engaging in professional growth and leadership". This finding indicates that attitude towards using technology for management, which was predicted by higher technical anxiety, may cause individuals to question their capacities to successfully use educational technology, especially in the context of rapidly-advancing modern technologies. Technical anxiety predicted a decrease in all sub-dimensions of ETSSES with the exception of self-efficacy for "promoting and modelling digital citizenship and responsibility". Remarkably, workplace anxiety predicted an increase in self-efficacy for "facilitating and inspiring student learning and creativity", "designing and developing digital age learning experiences and assessments", and "engaging in professional growth and leadership". Similar with the case in attitude, anxiety about the workplace seems to orient individuals to self-improvement. The same social anxiety explains a stronger belief in the capability in inspiring, designing and developing. Moreover, stress was also a predictor of self-efficacy for "engaging in professional growth and leadership". In contrast with anxiety, stress predicts a decrease in individuals' belief in the capability for self-improvement and leadership.

Stress was the strongest predictor of anxiety about using technology, which explains an increase in all sub-dimensions of ETAS, with the exception of technological disadvantage-restriction

related anxiety. Attitude towards "improving oneself in using technology in education" explains an increase in workplace, technology integration, and technical related anxieties. This echoes the findings from the regressions on sub-dimensions of ATUTIES, which indicate an association of self-improvement with workplace and technical anxieties. Moreover, while self-efficacy for "engaging in professional growth and leadership" predicted an increase in workplace anxiety, self-efficacy for "modelling digital age work and learning" predicted a decrease in anxiety about technology management. These findings indicate that the associations of negative emotional states with self-efficacy for and attitude towards using educational technology are bidirectional.

5. CONCLUSION

Alternative certification programs were developed to help remedy teacher shortages stemming particularly from teacher drop-outs. The findings of this study revealed that alternative certification preservice teachers suffer from stress, depression, and anxiety, even more so than other undergraduate students. They are individuals with an undervalued profession, who are having trouble finding a job and are, therefore, suffering from negative emotional states; thus, they see the programs as a source of hope and enroll in them in order to eradicate the overwhelming social and economic problems that cause the negative emotional states in the first place. It should be noted that teacher shortages are also, to a large extent, a result of social and economic problems with regards to teachers' salaries and working conditions. It seems that teachers who are overwhelmed by the social and economic burdens of being a teacher are being replaced by other poorly-trained teacher candidates, who are willing to bear the 'burden' to save themselves from even more overwhelming problems. This may give way to an increase in the number of in-service teachers suffering from negative emotional states. Teacher training institutions may be provided with better resources and capabilities, which they can utilize to help preservice teachers cope with negative emotional states.

The findings of the study revealed that, rather than a linear sequence leading from emotional states, through beliefs and then to attitude, as suggested in the TAM, there may be bidirectional and cyclical relationships between emotional states, self-efficacy, and attitude. Sub-dimensions of attitude were predicted by sub-dimensions of self-efficacy, and vice versa. In a similar vein, sub-dimensions of attitude and self-efficacy were predicted by negative emotional states while sub-dimensions of anxiety were predicted by sub-dimensions of attitude and self-efficacy. Workplace anxiety seems to orient preservice teachers to improve themselves in using educational technology while making it more difficult for them to actually use educational technology. Additionally, technical anxiety seems to move the individuals away from using educational technology for instructional purposes and closer to using it for classroom management and self-improvement. On the other hand, findings revealed that attitude towards using technology for classroom management, may cause individuals to question their capacities to successfully use educational technology with regards to rapidly-advancing technologies of the digital era. Finally, the findings indicate that both self-efficacy and attitude have a dichotomous nature regarding using educational technology. Using educational technology for instructional purposes in the classroom and for secondary purposes such as classroom management and self-improvement are associated with different sets of self-efficacy beliefs and attitudes. Remarkably, self-efficacy beliefs for self-improvement may adversely affect the attitudinal factors that are in a positive relationship with self-efficacy beliefs for actually using educational technology, and vice versa. Developing a more rigorous and elaborate program on educational technology, which addresses all modern aspects of using educational technology, can help teacher training institutions strengthen the preservice teachers' self-efficacy for and attitudes towards using educational technology that is needed for successful technology integration.

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