Predicting and explaining pre-service teachers' social networking technology adoption

Predire e spiegare l'uso di tecnologie per il social networking da parte di insegnanti in formazione

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ABSTRACT This research study examined pre-service teachers' (N=250) intentions to adopt Twitter for professional development. The study used the Technology Acceptance Model to test research hypotheses grounded in the literature. The data were collected with a survey questionnaire and analyzed with Structural Equation Modelling. Findings indicated that ease of use, subjective norms, and perceived connectedness explained the variability in intentions to use Twitter. Perceived mobility, mediated through perceived behavioral control, explained participant differences in the perceived ease of use. Implications for stakeholders include highlighting the role subjective norms and mobile applications play in facilitating the ease of use and connectedness because both variables appear to positively impact behavioral intentions to use Twitter for professional development. Supporting pre-service teachers with self-efficacy, resources, and positive social media subjective norms will positively influence Twitter adoption for cross-cultural collaboration and professional learning. Technology adoption mediates global collaboration among educators in heralding innovation and creativity.

KEYWORDS Twitter; Structural Equation Modelling; Technology Acceptance Model; Social Networks; Preservice Teachers.

SOMMARIO Questo studio ha preso in esame l'intenzione da parte di un campione di insegnanti in formazione (N=250) di utilizzare Twitter per il proprio sviluppo professionale. Lo studio utilizza il Technology Acceptance Model per verificare ipotesi di ricerca basate sulla letteratura. I dati sono stati raccolti attraverso un questionario e analizzati tramite un Modello di Equazioni Strutturali. I risultati indicano che la facilità d'uso, le norme soggettive e la percezione di essere connessi spiegano la variabilità delle intenzioni d'uso di Twitter. La mobilità percepita, mediata dal controllo comportamentale percepito, spiega le differenze tra partecipanti in merito alla facilità d'uso percepita. Le implicazioni dello studio mettono in evidenza il ruolo che le norme soggettive e le applicazioni mobili giocano nel facilitare l'uso e la connessione perché entrambe le variabili hanno un impatto positivo sull'intenzione di usare Twitter per lo sviluppo professionale. Aiutare gli insegnanti in formazione favorendone l'auto-efficacia, le risorse e le norme soggettive positive sui social media può influenzare positivamente l'adozione di Twitter

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per la collaborazione interculturale e lo sviluppo professionale. L'uso di tecnologia è un mediatore della collaborazione globale tra educatori nel favorire processi innovativi e creatività.

PAROLE CHIAVE Twitter; Modelli di Equazioni Strutturali; Technology Acceptance Model; Social Networks; Insegnanti in Formazione.

1. INTRODUCTION

The purpose of this study was to examine factors that impact Twitter adoption for professional development in pre-service teachers. Social media is viable in higher education with the emergence of learner-driven, informal learning as it addresses the needs of globally connected learners (Hung & Yuen, 2010; Selwyn, 2010). Informal learning has challenged educators to re-think their learning design and pedagogy to leverage social media in education (Greenhow & Askari, 2017). Information technology must be adopted to avail of the benefits of emerging technologies (Venkatesh, Morris, Davis, & Davis, 2003). User acceptance research is one of the most researched areas in information systems (Hu & Bentler 1999). Understanding technology adoption enables learning designers to proactively design tools and interventions to address stakeholder needs. Examining social networking technology adoption is important to prevent the underutilization of online social networks in teacher education programs (Lemon, 2014). The Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989) is one of the most commonly used models to assess technology adoption. Technology Acceptance Model (TAM) is a robust, parsimonious model that has been applied in various contexts (Lee, Kozar, & Larsen, 2003). TAM theorizes that user acceptance is based on two fundamental determinants of technology acceptance: Perceived ease of use and perceived usefulness. Perceived ease of use is defined as "*The degree to which a person believes that using a system would be free of effort*", and Perceived Usefulness as "*The degree to which a person believes that using a particular system would enhance his or her job performance*" (Davis et al., 1989, p. 320). TAM effectively predicts and explains the effects of external factors on internal beliefs and intentions. Due to the simplicity of the model and the strong correlation between intent and use (Fishbein & Ajzen, 1975), TAM serves as a robust model to assess technology acceptance in this research.
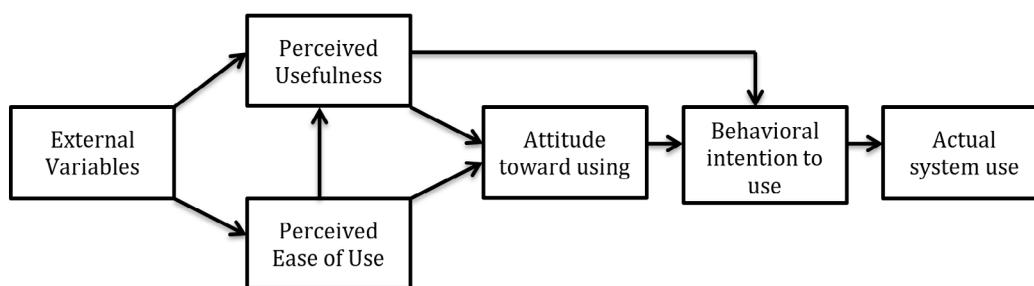
Figura 1. Technology Acceptance Model.

2. THEORY OF REASONED ACTION THEORETICAL FRAMEWORK

Fishbein and Ajzen (1975) stated that a reasoned approach to prediction and explanation of social behavior is based on the assertion that people's behavioral intentions formulate rationally from their beliefs associated with performing the behavior. They proposed a framework of beliefs, attitudes, intentions, and behaviors to describe and predict human behavior based on the foundation of cognition, affection, and conation

(Hilgard, 1980). Behavioral beliefs are the beliefs about the consequences of an action; they influence the formation of either a positive or a negative attitude. Normative beliefs manifest in the formation of subjective norms. Subjective norms are reflected in the consideration of approval or disapproval of behavior by significant others that exerts a perceived social pressure on the individual (Fishbein & Ajzen, 1975). Cultural influences, personal background, and situational factors influence the formation of behavioral intention and normative beliefs.

Behavioral intention is a good predictor of behavior in particular when the behavior is under one's volition control (Fishbein & Azjen, 1975). In the end, the Theory of Reasoned Action implies Behavior (such as technology use) is affected by an intention to act (Behavioral Intention), which, in turn, is rooted in one's attitudes, beliefs, and perceptions of what other's think (Subjective Norms). They work in conjunction with one another, as illustrated, in the figure below to determine the observed behavioral performance.
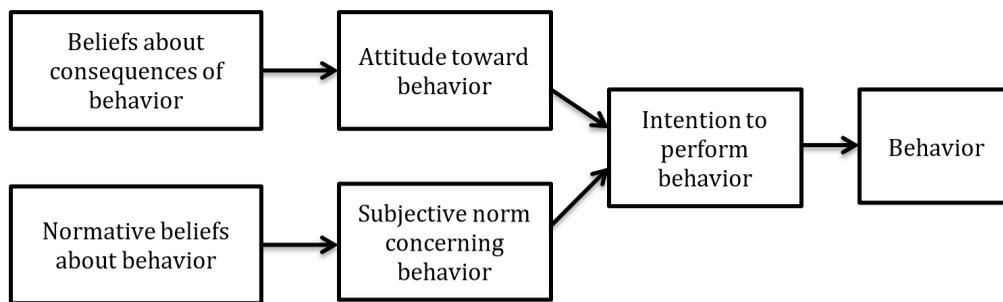
Figure 2. The Theory of Reasoned Action.

3. AN OVERVIEW OF BACKGROUND LITERATURE

The background research in technology acceptance provides insights into pertinent factors in social networking technology adoption. Subjective norms, one of the constructs in the Theory of Reasoned Action (Fishbein & Ajzen, 1975), positively impacted intentions (Ajzen, 1985; Hartwick & Barki, 1994; Taylor & Todd, 1995; Venkatesh & Davis, 2000; Venkatesh et al., 2003). The importance of social influence in determining participants' intentions to use Twitter is supported by prior research (Choi & Chung, 2013; Hu, Kettinger, & Poston, 2011). In specific cultural contexts, social conformity positively impacted the social appearance and social capital in the decision to adopt social networking technology (Yoo, Choi S., Choi M., & Rho, 2012). Perceived social capital in social networks predicted users' perceived ease of use directly and the intent to use indirectly (Choi & Chung, 2013). Perceived ease of use, perceived enjoyment, and perceived social norms explained 69% of the variance in behavioral intentions of non-adopters to use social networks (Hu et al., 2011).

Further, perceived ease of use has consistently been shown to have a positive effect on intentions (Agrifoglio, Black, Metallo, & Ferrara, 2012; Beach & Mitchell, 1978; Birch & Irvine, 2009; Davis et al., 1989; Radner & Rothschild, 1975). Ease of use of social networks positively impacted perceived usefulness as well (Davis et al., 1989; Shipps & Phillips, 2013). Additionally, utilitarian attitudes were found to be proximal antecedents to future intentions (Barnes & Bohringer, 2011; Cocosila & Igonor, 2015; Davis et al., 1989; Lowe, D'Alessandro, Winzar, Laffey, & Collier, 2013). Utilitarian use (perceived usefulness), and hedonic use (pleasure/enjoyment), cost usage, and social value explained 72% of the variance in behavioral

intentions (Cocosila & Igonor, 2015). Perceived usefulness, satisfaction, and habit predicted continuance use of social networks (Barnes & Bohringer, 2011). Motivational factors relevant to social networking technology have been examined as well. Enjoyment and satisfaction, considered as intrinsic motivators, had more explanatory power than extrinsic motivators on continued use of Twitter (Agrifoglio et al., 2012; Kleijnen, Lievens, de Ruyter, & Wetzels, 2009; Shin, 2010; Zhao & Lu, 2012).

Perceived mobility has also been associated with the adoption of social networks (López-Nicolás, Molina-Castillo, & Bouwman, 2008; Yang & Zhou, 2011). For instance, perceived mobility, perceived connectedness, and perceived security explained 78.1% of the variance in the perceived usefulness of Twitter (Kwon, Park, & Kim, 2014). Finally, perceived behavioral control as manifested in the sense of self-efficacy, and the technology and resource facilitating conditions also impacted technology adoption in prior research (Ajzen, 1985; Compeau, Higgins, & Huff, 1999; Igbaria & Iivari, 1995; Mathieson, Peacock, & Chin, 2001; Taylor & Todd, 1995). This synopsis of previous research has indicated that perceived usefulness, perceived ease of use, subjective norms, motivational factors (Tao, Poston, & Kettinger, 2011) and perceived behavioral control impact users' decisions to adopt social networking technology.

4. METHOD

4.1. *Research Design*

A survey research design was conducted using Structural Equation Modeling to test a hypothesized model grounded in the literature. Criterion-referenced sampling sought voluntary participation of undergraduate and graduate elementary and secondary pre-service teachers, N=250 working on their teacher certification. The 33-item questionnaire was adapted from previously validated instruments (Davis et al., 1989; Kwon et al., 2014; Pan, Sivo, & Brophy, 2003; Smith & Sivo, 2012; Sivo, Ku, & Acharya, 2018; Taylor & Todd, 1995). The instrument had a 7-point Likert scale: 7 (strongly agree), 6 (agree), 5 (somewhat agree), 4 (neither agree nor disagree), 3 (somewhat disagree), 2 (disagree), and 1 (strongly disagree). The data analysis consisted of two sections: data exploration and structural equation modeling (SEM) to evaluate the model fit and the weights of research constructs. Reliability analysis for the Cronbach's (1951) alpha value was conducted. Adjustments were made for multivariate non-normality during the data analysis with the Satorra-Bentler scaled (mean-adjusted) chi-square. Structural Equation Modeling (SEM), a multivariate technique, was applied to empirically examine the hypothesized TAM model on its ability to predict and explain pre-service teachers' intentions of Twitter usage. SEM accounts for the measurement error and also allows the researcher to examine the relationships between multiple dependent and independent variables simultaneously (Gefen, Straub & Boudreau, 2000).

4.2. *Hypothesized technology acceptance model*

for this research, the Technology Acceptance Model was extended with the following constructs: Subjective norms (SN), perceived connectedness (PCO), perceived mobility (PM), perceived security (PS), and perceived behavioral control (PBC). The relationships between constructs were hypothesized based on previous research.
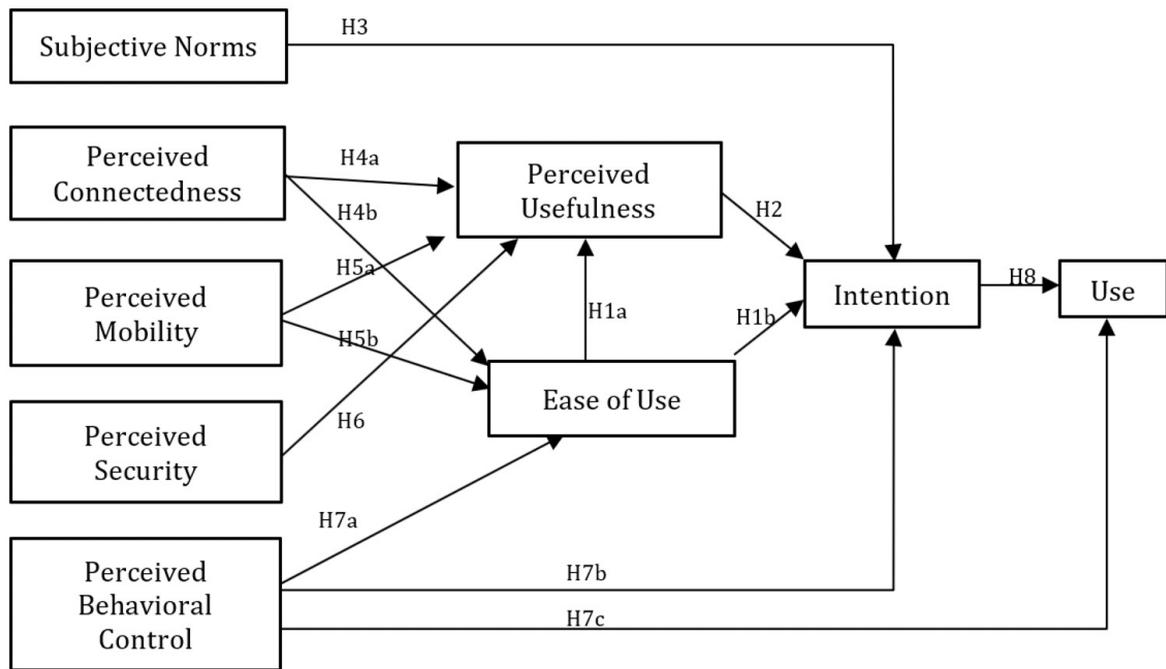
Figura 3. The Hypothesized Research Model.

4.2.1. *Perceived ease of use*

perceived ease of use is one of the key determinants of user acceptance of a system (Birch & Irwin, 2009; Davis et al., 1989). Davis (1989) associated "*ease*" with "*freedom from difficulty or great effort*" (p. 320) and contended that people may not use a system if it was perceived to be too difficult to use. The effort is posited to be a finite resource that people allocate to different responsibilities, duties, and obligations (Radner & Rothschild, 1975). If an application were perceived to be easy to use, it would be favored over another one requiring a great deal of effort. Perceived ease of use is, therefore, a determinant of continued behavioral intention to use. It also has a direct effect on perceived usefulness because even if a system were perceived to be beneficial, its advantages would be outweighed by the amount of effort required to use it (Davis et al., 1989). Perceived ease of use aligns with the cost-benefit paradigm (Beach & Mitchell, 1978) where the cognitive trade-offs of a task are evaluated against the results gained from it in making technology adoption decisions.

H1a: Preservice teachers' *perceived ease of use* has a positive effect on their *perceived usefulness* of Twitter.
H1b: Preservice teachers' *perceived ease of use* has a positive effect on their *intention to use* Twitter.

4.2.2. *Perceived usefulness*

Perceived usefulness is viewed as the other key determinant of user acceptance of a system. Perceived usefulness has been referred to as "*the prospective user's subjective probability that using a specific application system would increase his or her job performance within a context*" (Yuen & Ma, 2008, p. 232). Perceived usefulness was found to be a strong predictor of continued behavioral intentions in previous research (Venkatesh & Davis, 2000). Venkatesh et al. (2003) compared the constructs of all eight user acceptance models and perceived usefulness was the strongest predictor across all eight models which was significant

in both voluntary and non-voluntary settings.

H2: Preservice teachers' *perceived usefulness* has a positive effect on their *intention to use* Twitter.

4.2.3. *Subjective norms*

Fishbein and Azjen (1975) stated that along with a person's behavioral beliefs, normative beliefs also played a significant part in influencing the behavioral intentions of a person. Normative beliefs reflect the social norms and values that are manifested in consideration of opinions of important referents. Subjective norms are more influential in mandatory settings than in voluntary settings (Fishbein & Azjen, 1975), and their influence diminishes with experience (Venkatesh et al., 2003). Hartwick and Barki (1994) found subjective norms to have a significant influence on intentions in mandatory settings. The influence of subjective norms on behavioral intentions also happens indirectly through perceived usefulness, as in the case of internalization (Kelman, 1958) of social norms of individuals in a position of power or authority. Internalization of social norms occurs mostly in mandatory settings, and hence it impacts users' perceived usefulness of a system. The influence of peers or significant others in voluntary settings leads to intentions to use (Taylor & Todd, 1995; Venkatesh et al., 2003). Many studies substantiate that subjective norms play a significant role in intentions to adopt technology in education (Chen, Sivo, Seilhamer, Sugar, & Mao, 2013; Sivo, Ku, & Acharya, 2018; Smith & Sivo, 2012).

H3: Preservice teachers' perception of *subjective norms* has a positive effect on their *intention to use* Twitter.

4.2.4. *Perceived connectedness*

Perceived connectedness was defined as the degree to which users felt that they were emotionally connected with the world, its resources, and people (Shin, 2010). Boyd and Ellison (2007) indicated that social networks enabled continued connections among people. Kwon et al. (2014) found that perceived connectedness, perceived mobility, and perceived security accounted for 78.1% of the variance in the perceived usefulness of Twitter. Access and connectivity emerged as significant points when participants were surveyed about their reasons for using social media (Vie, 2015). Perceived connectedness was also associated with satisfaction among users (Zhao & Lu, 2012). Furthermore, Perceived connectedness also led to higher levels of knowledge creation (Kleijnen et al., 2009). Therefore, the following hypotheses were formulated for perceived connectedness.

H4a: Preservice teachers' *perceived connectedness* has a positive effect on their *perceived usefulness* of Twitter.

H4b: Preservice teachers' *perceived connectedness* has a positive effect on their *perceived ease of use* of Twitter.

4.2.5. *Perceived mobility*

Perceived mobility is referred to user awareness of the mobility value of a specific system (Huang, Lin, & Chuang, 2007; Liang, Huang, Yeh, & Lin, 2007). Mobility enables immediate and ubiquitous access; therefore, it is generally associated with quality and satisfaction among users who use mobile-based information systems (Huang et al., 2007). Additionally, since Twitter provides short bursts of information, it is compatible with mobile applications (Yan, Chu, Ganesan, Kansal, & Liu, 2012). The mobility of a system has been associated with its perceived usefulness in several research studies (López-Nicolás et al., 2008; Yang & Zhou, 2011). Therefore, the following hypotheses were proposed.

H5a: Preservice teachers' perceived mobility has a positive effect on their perceived usefulness of Twitter.

H5b: Preservice teachers' perceived mobility has a positive effect on their perceived ease of use of Twitter. In the respecified research model (see figure 5), the following relationship was explored:

H5c: Preservice teachers' perceived mobility has a statistically significant indirect effect on perceived ease of use mediated through perceived behavioral control.

4.2.6. *Perceived security*

Perceived security is the degree to which users believe a social network system's security measures are reliable (Yenisey, Ozok, & Salvendy, 2005). It denotes the subjective belief of the users that the system can protect their privacy (Linck, Pousttchi, & Wiedemann, 2006). Madden and Rainie's (2015) PEW Internet research survey on Americans' attitudes about privacy, security, and surveillance demonstrated that privacy and data security was very important to a majority of Americans. The survey results indicated that 93% of adults believed who can access their information was important to them with 74% emphasizing it as very important. Furthermore, 90% of adults expressed that controlling the type of information collected about them was important. Perceived security led to positive feelings toward the system (Kwon et al., 2014).

H6: Preservice teachers' *perceived security* has a positive effect on their *perceived usefulness* of Twitter.

4.2.6. *Perceived behavioral control*

Ajzen (1985) defined perceived behavioral control as control beliefs that reflect an individual's perceptions of internal and external constraints on behavior that may encompass self-efficacy, resource facilitating conditions, and technology facilitating conditions. Compeau and Higgins (1995) and Compeau et al. (1999) posited that self-efficacy has an impact on the adoption of computer technologies. Fishbein and Ajzen (1975) posited that behavioral intention could only predict the actual performance of a behavior if the behavior was under volition control. It represents the presence or absence of the requisite resources necessary to perform a particular behavior.

H7a: Preservice teachers' *perceived behavioral control* has a positive effect on their *perceived ease of use of* Twitter.

H7b: Preservice teachers' *perceived behavioral control* has a positive effect on their *intention* to use Twitter.

H7c: Preservice teachers' *perceived behavioral control* has a positive effect on their *use* of Twitter.

4.2.7. *Behavioral intention*

The behavioral intention is strongly related to actual usage; it was considered as an antecedent to the specific behavioral performance in previous research (Gollitzer, 1993). Davis et al. (1989) research confirmed that the user's intentions do predict user behavior. More broadly, sufficient evidence exists to suggest that intention to use technology in educational contexts has a direct impact on Use (Chen et al., 2013; Pan, Gunter, Sivo, & Cornell, 2005; Pan, Gunter, Sivo, & Cornell, 2005; Pan, Sivo, & Brophy, 2003; Siegel, Acharya & Sivo, 2017; Sivo et al., 2018; Sivo & Pan, 2005; Sivo, Pan, & Brophy, 2004; Sivo, Pan, & Hahs-Vaughn, 2007; Smith & Sivo, 2012).

H8: Behavioral Intention to use will positively impact use.

5. RESULTS AND DISCUSSION

The research results are presented in two parts: The first part presents the descriptive statistics with the participant and data characteristics, and the second part discusses the Structural Equation Modeling results with the model fit and the hypotheses testing results.

5.1. *Participant characteristics*

As table 1 below indicates, most preservice teachers were Caucasian females in the age group of 20-30, junior in status, doing elementary certification while being part-time employed.

Demographic Factors	Demographic Characteristics	Percentage
Gender	Female	92%
	Male	7%
Age	Under 20 years	4%
	20-30 years	86%
	31-40 years	5%
	41-50 years	2%
	51-60 years	0
Academic Status	Freshman	0
	Sophomore	3%
	Junior	57%
	Senior	37%
	Graduate	4%
Twitter Account	Yes	46%
	No	53%
Ethnicity	Caucasian	60%
	Hispanic	18%
	African American	6%
	Asian	1%
	Other	3%
Certification Status	Elementary	81%
	Secondary	18%
Employment Status	Full time	11%
	Part-time	53%
	Self-Employed	2%
	Unemployed	32%

Table 1. Characteristics of the participants.

5.2. *Data characteristics*

The mean scores of the constructs were as follows: Perceived Ease of Use (PEU)= 5.45, Perceived Usefulness (PU)=3.25, Subjective Norms (SN)=3.43, Perceived Connectedness (PCO)=4.27, Perceived Mobility (PM)=5.26, Perceived Security (PS)=3.73, Perceived Behavioral Control (PBC)=5.44, Intentions (INT)=4.16, Usage of Twitter (USE)=2.10. The internal consistency measure and the descriptive statistics are delineated in Table 2.

Construct	Mean	SD	# of items	Cronbach's Alpha
Perceived Ease of Use (PEU)	5.45	1.46	3	.88
Perceived Usefulness (PU)	3.25	1.57	4	.93
Subjective Norm (SN)	3.43	1.65	2	.93
Perceived connectedness (PCO)	4.27	1.76	2	.93
Perceived Mobility (PM)	5.26	1.37	3	.91
Perceived Security (PS)	3.73	1.60	3	.90
Perceived behavioral control (PBC)	5.44	1.62	5	.88
Intention (INT)	4.16	1.20	3	.92
Use (USE)	2.10	1.57	2	.51

Table 2. Mean, Standard Deviation, and Reliability Estimates.

5.3. *Structural equation modeling*

SAS Proc CALIS (i.e., covariance analysis of linear structural equations) was used to test the hypothesized Structural Equation Model (Bollen & Long, 1992) for this research. The Satorra-Bentler Maximum Likelihood Estimator was used to correct for any non-normality characteristic of item data. When the initial model was fitted to the data, the maximum likelihood estimator converged in 9 iterations, and the results suggested the model fitted well, *Satorra Bentler X^2 (184) = 357.46; the SRMR and the RMSEA were both .06, and the CFI was .95, meeting well established fit criteria (Fan & Sivo, 2005; Fan & Sivo, 2007; Hu & Bentler, 1999;* Sivo, Fan, Witta, & Willse, 2006; see Table 3).

Statistical Tests	Initial Model Results	Revised Results	Acceptable Model Fit Standard
SB Chi-Square	357.46	366.27	
Df	184	191	
p-value	< .0001		
Absolute Fit Index			
SRMR	0.06	0.06	< .08
Parsimony Fit Index			
RMSEA	0.06	0.06	< .06
Incremental Fit Index			
CFI	0.95	0.95	> .95

Table 3. Model Fit of the Initial and Revised Research Models.

Note. SB Chi-Square = Satorra-Bentler Scaled Chi-Square, SRMR= Standardized Root Mean Square Residual, RMSEA= Root Mean Squared Error of Approximation, CFI= Comparative Fit Index.

Although the model fitted the data well, as can be seen in the initial model results in Figure 4, several parameters were not statistically significant.
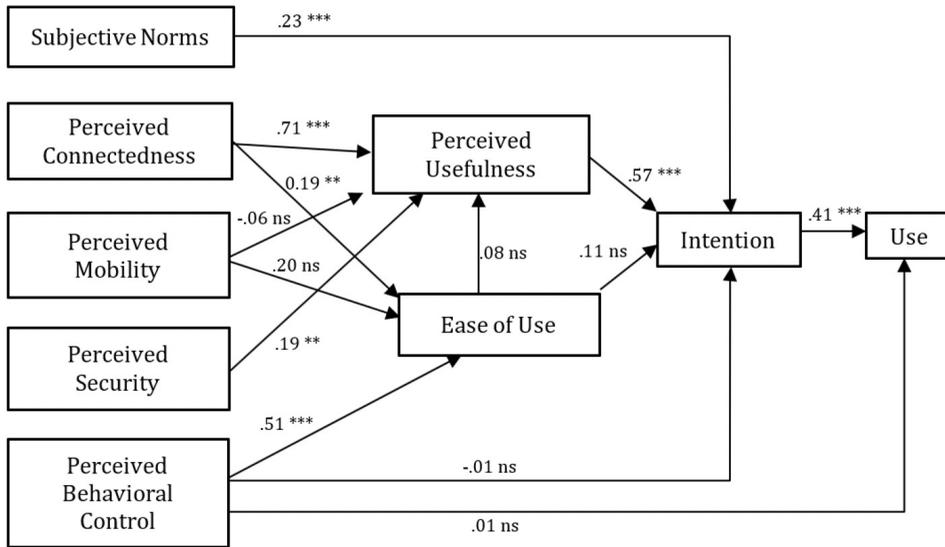
Figure 4. The Hypothesized Research Model Standardized Results (*£.05, **£.01, ***£.001).

Refitting the model with statistically insignificant paths removed was performed iteratively by removing the least significant path and then re-running the SAS program because all parameters change at least a little with each iteration. The path between Ease of Use and Intention became statistically significant as this process was conducted and therefore was retained eventually. Statistical tests made it clear that Perceived Mobility did not have a direct impact on either Perceived Ease of Use or Usefulness as originally specified; however, an examination of the indirect effects pertinent to Perceived Mobility suggested that Perceived Behavioral Control mediates the effect of Perceived Mobility on Perceived Ease of Use, as shown in Figure 5. As expected, removing the statistically insignificant paths does lead to a marginal increase in the Satorra-Bentler Scaled Chi-Square, but the good fit of the model according to the CFI (Bentler, 1990; Bentler & Bonett, 1989), SRMR, and RMSEA persisted, as shown in Table 3.
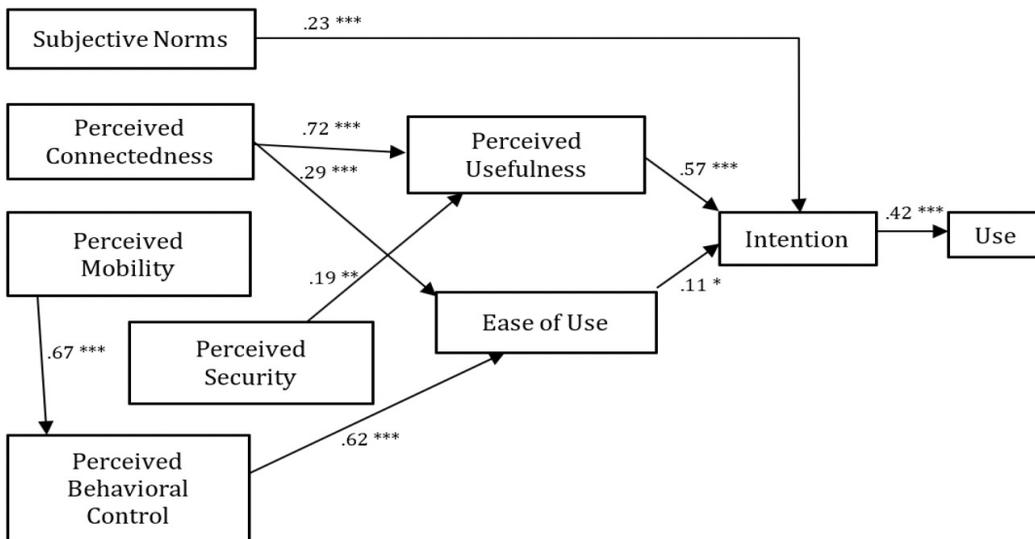
Figure 5. Respecified Model with non-significant paths removed (*£.05, **£.01, ***£.001)

STANDARDIZED EFFECTS IN LINEAR EQUATIONS				
Path	Estimate	Standard Error	T value	Pr > I t I
PCO → PEU	0.28	0.05	5.10	<.0001
PBC → PEU	0.61	0.04	12.41	<.0001
PCO → PU	0.71	0.04	14.68	<.0001
PS → PU	0.19	0.06	3.06	0.0022
PEU → INT	0.10	0.05	1.99	0.0457
PU → INT	0.57	0.05	9.55	<.0001
SN → INT	0.22	0.05	4.04	<.0001
INT → USE	0.41	0.04	9.81	<.0001
PM → PBC	0.66	0.05	11.63	<.0001

Table 4. Standardized effects in linear equations.

Perceived Ease of Use (PEU); Perceived Usefulness (PU); Subjective Norms (SN); Perceived Connectedness (PCO); Perceived Mobility (PM); Perceived Security (PS); Perceived Behavioral Control (PBC); Intentions (INT); Usage of Twitter (USE).

5.3.1. *Results of the hypotheses testing*

H1b: Preservice teachers' perceived ease of use has a positive effect on their behavioral intention to use Twitter was deemed favorable, as the path between the variables was statistically significant (t=1.99, p=0.0457). This indicated that if users found something to be free of effort and relatively easy to use, they were most likely to continue using it (Agrifoglio et al., 2012; Davis et al., 1989; Birch & Irvine, 2009; Radner & Rothschild, 1975; Shipps & Phillips, 2012). The cost-benefit paradigm (Beach & Mitchell, 1978) supports this hypothesis as well. Therefore, teacher education needs to ensure ease of use to positively influence preservice teachers' usage intentions through training and ongoing support.

H2: Preservice teachers' perceived usefulness has a positive effect on their intention to use Twitter was supported as the path between the variables was statistically significant (t=9.55, p = <.0001). Performance expectancy or perceived usefulness proved to be a strong predictor of behavioral intentions (Barnes & Bohringer, 2011; Lowe et al., 2013; Venkatesh et al., 2003). The perceived usefulness of social networks can be developed through authentic learning design in teacher education (Gurjar, 2020).

H3a: Preservice teachers' perception of the subjective norm has a positive effect on their intention to use Twitter was deemed favorable (t = 4.04, p = <.0001). This research finding is supported by Choi and Chung's (2013) research that indicated that subjective norms had a significant direct effect on the intention

to use social networks. Olmstead, Lampe, and Ellison (2016) stated that even though digital platforms foster connections, the workplace norms discourage social media use. Social norms at educational institutions or at home influence pre-service teachers' intentions to use social networks.

H4a: Preservice teachers' perceived connectedness has a positive effect on their perceived usefulness of Twitter was supported as the path between the variables was statistically significant (t =14.68, p = <.0001). This finding was supported by prior research (Kleijnen et al., 2009, Vie, 2015; Zhao & Lu, 2012). Being ubiquitously connected in the digital age makes social networking technology useful for preservice teachers.

H4b: Preservice teachers' perceived connectedness has a positive effect on their perceived ease of use of Twitter was supported as the path between the variables was statistically significant (t = 5.10, p = <.0001). This hypothesis is supported by previous research (Kwon et al., 2014; Shin, 2010; Vie, 2015). Being connected through social networks makes it easier to access distributed expertise (Brown et al., 1993) and connections globally surpassing spatial, temporal, and cultural boundaries to facilitate professional learning (Greenhalgh & Kohler, 2017; Greenhalgh, Rosenberg, Willet, Koehler, & Akglau, 2020; Greenhow & Askari, 2017). Preservice teachers can leverage this affordance of social networks in their education.

H5c: Preservice teachers' perceived mobility has a positive indirect effect on perceived ease of use of Twitter mediated through perceived behavioral control was supported. The direct pathway between perceived mobility and perceived behavioral control was significant (t = 11.63, p = <.0001). This finding is supported by Yan et al.'s (2012) research that indicated that perceived mobility had a positive effect on the perceived ease of use. Perceived behavioral control develops self-efficacy in preservice teachers to make it easier to use mobile devices to stay connected.

H6: Preservice teachers' perceived security has a positive effect on their perceived usefulness of Twitter was supported as the path between the variables was statistically significant (t =3.06, p =0.0022). This hypothesis is supported by previous research (Kwon et al., 2014; Madden & Rainie, 2015). Perceived security is important to assess the usefulness of a social network for preservice teachers.

H7a: Preservice teachers' perceived behavioral control has a positive effect on their perceived ease of use of Twitter was deemed favorable as the path between the variables was statistically significant (t = 12.41, <.0001). This hypothesis is supported by prior research (Igbaria & Ivari, 1995) that indicated perceived ease of use to be significantly influenced by self-efficacy. Mathieson et al.'s (2001) research indicated that perceived resources have an impact on an individual's intention to use a system. Teacher education programs may examine how to build perceived behavioral control in preservice teachers through training, resources, and infrastructure support.

H8: Intention to use will positively impact use.
Intention to use will positively impact use was statistically significant (t=9.8122, p=<.0001). This finding is supported by previous research (Davis et al., 1989; Gollwitzer, 1993). Therefore, preservice teachers' intent to use will positively impact their social networking technology usage.

Implication for policy and practice is to leverage social networks in teacher education considering the theory behind technology acceptance that guides teacher educators. Creating conditions where ease of use

and social norms positively influence preservice teachers' intentions of usage will pave the way for Twitter adoption for professional development. Preservice teachers need to be given training within their methods coursework to incorporate social media use for professional purposes. Globally connecting preservice teachers will enrich educational discourse through a diversity of perspectives; humanize people from other cultures; and promote creativity and innovation. It will help center marginalized perspectives to develop intercultural understanding and empathy to advocate for social justice and equity in education. Leveraging informal learning spaces will create a supportive, global learning community for strengthening academic resilience through camaraderie and intercultural dialogue.

6. CONCLUSION AND LIMITATIONS

This research supported the theory that perceived ease of use impacts intentions (Agrifoglio et al., 20212; Birch & Irvine, 2009; Davis et al., 1989) to adopt a technology. Further, subjective norms impact intentions as well (Choi & Chung, 2013; Fishbein & Ajzen, 1975). Therefore, it is wise to be cognizant of ease of use and subjective norms to influence intentions to adopt a technology system in teacher education. In addition, mobility of a system mediated through perceived behavioral control positively impacts the perceived ease of use.

Perceived connectedness leads to both perceived ease of use and perceived usefulness. Therefore, a concerted effort should be made to facilitate the ease of use through demonstration and modeling. Providing the app in a mobile format and getting the community on board to positively influence subjective norms will build intentions for social networking technology adoption in teacher education.

The limitation of this research study is that it mainly had participation from one large university. The geographic location being confined to the Southwest region of the USA makes the generalizability of the findings difficult on a broader scale. An international study across different institutions is recommended for future research. The demographic make-up of the participants in this research also poses limitations. First, an overwhelming majority of the participants were females. Therefore, this gender imbalance may have skewed the data toward a feminine perspective. However, it should be pointed out that the gender distribution of the elementary preservice teachers in this study is consistent with the U.S. national distribution, as evidenced by the National Center for Education Statistics (2021). Second, not all ethnicities were equally represented in the sample. The perspective of the people of color may not have been equally represented, as the majority were Caucasians. Nevertheless, the distribution of ethnicities among teachers is largely comparable to the distribution of teacher ethnicities overall in the U.S (https://nces.ed.gov/programs/coe/indicator/clr). Caucasians are comparably underrepresented (60% in the sample compared to 79% in the US teacher population) and Hispanics are overrepresented (18% in the sample compared to 9% in the US teacher population) relative to the U.S. distribution of teachers. The distribution of other ethnicities is comparable. Intergenerational perspective may be missing from the data as most participants were below 30 years old. This indicates an inadequate representation of non-traditional students who are generally in the middle age or older category. Lastly, since the majority of participants were from elementary education, the results may be limited to the perspective of participants coming from one disciplinary area. Future research may broaden the scope to a national or international study across universities to get a more representative sample and examine the effect of moderating variables such as motivation, age, gender, ethnicity, and areas of study to build on the contributions of this research.

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