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Do the Technostress Creators Predict Job Satisfaction and Teacher Efficacy of Primary School Teachers in Korea?*

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The purpose of this research is to analyze the predictive powers of the five technostress creators – techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty – in job satisfaction and teacher efficacy of primary school teachers in Korea when they incorporated mobile technology into teaching. A questionnaire was designed to measure the level of teacher's stress from technology, job satisfaction and teacher efficacy. Data were collected from 164 teachers. Multiple regression analysis was conducted to explain which area of technostress led to varying degrees of job satisfaction and teacher efficacy. The results showed that techno-complexity alone predicted both job satisfaction and teacher efficacy. The reason why techno-complexity was the only predictor is that teachers would have first needed to understand how to incorporate mobile technology into teaching, before feeling overloaded, invaded, insecure, or uncertain about it, meaning techno-complexity precedes other constructs. Therefore, the only stress factor that affected them was how to understand the complexity of mobile technology. This calls for adequate training and support from schools and governments in order for the teachers to fully incorporate technology into teaching.

Keywords : Technostress, Teacher efficacy, Teacher job satisfaction, Primary school teacher

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Introduction

In 1913, Thomas Edison said, "Books will be obsolete in schools...it is possible to teach every branch of human knowledge with motion pictures. Our school system will be completely changed in ten years" (Saettler, 1990). Although the traditional structure of the school in 1913 still prevails today, education is now undergoing a major transition (Traxler, 2007) and adding new ways of learning. First, ICTs enabled self-directed learning. Learners who used to learn mostly from reading textbooks or listening to teachers' lectures in a classroom can now learn independently (Traxler, 2007). Second, learning is not delivered to students, but sometimes constructed by them, enabling any individuals to provide, edit, and share knowledge (Stevenson & Liu, 2010). Lastly, ICTs provided opportunities for equal access to quality education (Jhurree, 2005).

However, as learners become more used to learning with mobile technology, teachers are reported to be struggling (Jena, 2015). When teachers were asked whether they incorporate mobile technology into teaching and how they feel about it, the collective response shows a mixed result. While some teachers believe that mobile technology is an important part of teaching that enables learners to accomplish tasks more effectively (Naismith, Lonsdale, Vavoula, Sharples, & Series, 2004), many others have responded that they incorporate mobile technology in a limited manner and that teaching with mobile technology can be a struggle (Aldunate & Nussbaum, 2013; García-Peñalvo, Griffiths, Johnson, Sharples, & Sherlock, 2014).

Not only do teachers refrain from using mobile technology, they also feel anxious, afraid, or stressed from it (Jena, 2015; Russell & Bradley, 1997). Many scholars have identified this phenomenon as techno-anxiety, techno-phobia, computer-anxiety, or internet-anxiety; however, the most recognized term is "technostress," coined by Brod (1984). As technology advances at an alarming rate, many individuals have been showing negative reactions to use of technology.

Researchers have asserted that this leads to technostress and started analyzing how it affects our daily lives, including teaching and learning. To measure the level of technostress, Tarafdar and Ragu (2007) introduced a tool by classifying technostress into the five creators; techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty.

Studies have examined the effects of technostress in various contexts. Many have proved that there is a relationship between technostress and job satisfaction. In educational contexts, job satisfaction is worth examining as it shows how committed the teachers are and how long they remain as teachers. Some researchers have emphasized that technostress affects teacher's job satisfaction (Jena, 2015), but did not explain which dimensions of technostress cause this. In addition, job satisfaction of primary school teachers in Korea has not been studied enough in terms of its relationship with technostress.

Teacher efficacy is another critical element in education as it is deeply related with learner outcomes (Ashton & Webb, 1986). However, the relation of technostress with teacher efficacy has been overlooked to date. Although some have argued that stress is significantly related to the level of teacher efficacy (Aston, 1984), researchers have not found out which element of technostress most affects efficacy of primary school teachers in Korea, thus calling for a deeper investigation.

The reason why this research studies teachers in primary school is because technology initiative usually starts with primary schools, particularly in Korea. Kim and Kim (2016) analyzed studies from the late 1990s to 2015 and found that technology in student-centered learning occurs more in primary schools as primary school teachers have more freedom in selecting tools for instruction. In secondary schools, students focus on improving test scores and pay less attention to studying with new tools and technologies; in turn, teachers refrain from introducing new initiatives with technology (Roblyer & Doering, 2010). Also, secondary school teachers usually teach a dedicated subject only; therefore it is difficult to see a relationship between the usage of technology and learning in general (So, 2013).

Based on this, government initiatives in rolling out innovative ways of learning (e.g., SW education, coding, STEAM, and digital textbooks) start with primary schools (Korea's Ministry of Education, 2016). Hence, it is safe to assume that teachers in primary schools are the best-suited target for researchers to analyze how mobile technology is adopted at school and how teachers feel about it (So, 2013).

The role of mobile technology in the classroom depends on whether teachers value its potential and whether they implement it in classrooms or not (Kent & McNergney, 1999). Grabe and Grabe (2008) noted that if teachers experience stress when using mobile technology, it is likely that they will not find value in it and will not use it as much. This leads to the widening of the gap between teachers who refrain from mobile technologies and learners who welcome them (Kent & McNergney, 1998). A growing number of learners are turning to learning with smartphones and tablet PCs; consequently, they will pay less attention to learning at school or with teachers, thus leaving teachers feeling helpless and incompetent, perhaps jobless in the end. It is inevitable that learners will be immersed in mobile technology regardless of teacher preferences (Knight, Knight, & Teghe, 2006). Hence, it is critical that teachers welcome mobile technology, freely use it, and do not experience stress from using it.

Bearing in mind that there remain unanswered questions about technostress and its effects on job satisfaction as well as teacher efficacy of primary school teachers in Korea, this research intends to ascertain whether creators of (i.e., factors causing) technostress predict teacher's job satisfaction and efficacy. This research believes technostress is a critical factor in teaching and learning; therefore, it hopes to curb its incidence and intensity in primary school teachers to enhance learning and teaching with mobile technology.

The purpose of this study is to examine the predictive power of technostress creators caused by mobile technology on job satisfaction and teacher efficacy of primary school teachers in Korea. The research questions are set forth as follows:

(a) Do the five creators of technostress (techno-overload, techno-invasion,

techno-complexity, techno-insecurity, and techno–uncertainty) predict job satisfaction of primary school teachers in Korea?

(b) Do the five creators of technostress (techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno–uncertainty) predict teacher efficacy of primary school teachers in Korea?

Theoretical Background

Technostress

Teacher and Technostress

Teacher and Technostress

Technostress describes a situation of stress experienced by an individual because of an inability to adapt to the introduction of new technology in a healthy manner (Brod, 1984). Since the late 1990s, when mobile devices became widely available, users have become highly dependent on them, getting many things done with mobile phones or tablet PCs (Lu, Yao & Yu, 2005). Today, it is difficult to imagine a day without mobile technologies. We send e-mails and text messages, shopping online via mobile applications, managing relationships on social network services, etc. While a great number of studies shows that these tools benefit productivity of individuals (Compeau, Higgins, & Huff, 1999), businesses (Black & Lynch, 2001), and learning alike (Hew & Brush, 2007), a growing number of scholars suggest people experience stress from using it.

Technology in classrooms also became more accessible as the years passed, but stress caused by technology appears to persist. Vlăduţ and Kállay (2010) stated that teachers become frustrated and showed a negative attitude towards technology in the classroom. Jena (2015) analyzed the relationship between technostress creators, technostress inhibitors, and technostress effect among Indian academics in collaborative teaching and learning environments and found a strong relationship

between each of them. Al-Fudail and Mellar (2008) found that teachers experienced stress from using technology in classroom as there were problems in technical and social support and a lack of training.

Researchers in Korea only became active in studying teacher's technostress recently. Joo, Lim, and Kim (2016) hypothesized that secondary school teachers' technology, pedagogy and content knowledge (TPACK), perception of school support for technology use, technostress, and intention to use technology in Korea show a structural relationship and found that (a) TPACK and school support had significant effects on technostress, (b) technostress had significant effects on teachers' intentions to use technology, and (c) technostress significantly mediated TPACK, school support, and the intention to use technology. Kim (2013) described that secondary school teachers with a higher level of understanding in technology show a lower level of technostress, calling for a system for providing training to teachers on how to use technology. She also mentioned that sufficient support will curb the level of technostress in teachers and claimed that more physical resources (e.g. a computer lab) and a community of practice within schools are critical. However, there is a lack of findings on relationships of mobile technology and technostress, especially in primary school settings in Korea.

Assessing Technostress Creators

Various studies have conceptualized what constitutes technostress. Tarafdar and Ragu (2007) presented a method to assess technostress creators in individuals. The five creators are techno-overload (describing situations where technology forces users to work faster and longer), techno-invasion (the invasive effect of technology when users are connected and reached by others any time, leading to a blurring between work and home), techno-complexity (individuals feeling inadequate when faced with technology that does things faster and longer, thereby forced to spend time and effort in learning and understanding technology), techno-insecurity (associated with situations in which users feel threatened about losing their jobs

either to automation resulting from technology or to other people), and techno-uncertainty (where continuing changes and upgrades in technology create uncertainty, making users worry about constantly learning and educating themselves about the new changes). These five creators of technostress have been adopted in various works to find out what cause technostress in individuals.

Chen (2015) measured the level of technostress of employees and proved that only one of the components of technostress – techno-overload – showed a significant positive effect on individual productivity. Ahmad, Amin, and Ismail (2012) adopted this questionnaire in investigating the relationship between technostress creators and organizational commitment among academic librarians and found that techno-overload and techno-uncertainty explained the variance in organizational commitment. Yim and Han (2013) found that techno-overload significantly increased organizational commitment as more work generated from technology induces employees to work harder and attaches them more to the work. However, they also pointed out that techno-uncertainty decreased organizational commitment as employees spend more time catching up with technology rather than the work itself. As witnessed in these studies, there is no predominant factor in creating technostress; it is heavily dependent on who uses the technology and where it is used.

Teacher's Job Satisfaction

Research on Teacher's Job Satisfaction

Researchers have applied concepts of job satisfaction to educational settings (Miskel & Heller, 1973; Kim & Loadman, 1994). Prior studies on job satisfaction in education have been concerned with teachers in particular and explored what influences teacher's job satisfaction. Dinham and Scott (1998) classified the sources of teacher's job satisfaction into three domains: (a) intrinsic rewards of teaching, (b) factors extrinsic to the school, and (c) school-based factors. Additionally, some believed that teacher autonomy is among factors highly associated with job

satisfaction (Skaalvik & Skaalvik, 2009; Zembylas & Papanastasiou, 2006). Others claimed supportive school environments and positive social relations with parents, colleagues, and the school leadership are also predictive of teacher's job satisfaction (Johnson & Birkeland, 2003), whereas time pressure and discipline problems explained lower levels of job satisfaction (Scheopner, 2010).

To measure job satisfaction, various instruments have been introduced. Kim and Loadman (1994) and Klecker and Loadman (1996) measured teacher's job satisfaction on salary, opportunities for advancement, professional challenge, professional autonomy, working conditions, interaction with colleagues, and interaction with students, etc. Roh (2001) defined that job satisfaction is a state of mind determined by what extent a person perceives his or her needs as being met.

Technostress and Job Satisfaction

Job satisfaction has received substantial attention due to its contributions toward productivity and job performance (Somvir, 2012). A number of cases presented findings on the relationship between technostress and job satisfaction, particularly in the private business sector (Ayyagari et al., 2011), revealing that technostress affects how employees function at work, which results in significant costs to the organization (Ragu-Nathan et al., 2008). Smith and Carayon (1995) discovered that changes in how employees work due to the arrival of computers are correlated with job satisfaction, and that stress caused from technology will lead to a high level of dissatisfaction at work. Doll and Torkzadeh (1989) also found that employee job satisfaction is negatively correlated with stress caused from working with technology, as it provides far too much information, frequently requires users to upgrade operating systems or software, and blurs the distinction between work and home.

Despite the growing adoption of technology in organizations, technostress has become an even bigger problem that can affect employees' job satisfaction and has drawn more attention from researchers on that basis. Tarafdar and Ragu (2007) reported that employees who experience stress from using technology at work will

show a lower level of job satisfaction, affecting the overall productivity of the outcome within the entire organization. Ragu-Nathan and colleagues (2008) presented that technostress is negatively correlated with job satisfaction, which then affects organizational commitment and continuance commitment.

In Korea, Park and Choi (2013) tested the hypothesis that technostress negatively affects job satisfaction. They found that technostress decreases job satisfaction and individual productivity, and that technical support moderates the relationship of technostress and job satisfaction/individual productivity. Kim and Kim (2014) stated that there is a negative correlation between technostress and job satisfaction, as well as technostress, organizational commitment, and continuance commitment.

However, job satisfaction and technostress in the educational context has received little attention. Jena (2015) is one of the few researchers who studied the relationship between technostress and teacher job satisfaction. He analyzed the relationship between technostress creators, technostress inhibitors, and technostress effect (in terms of job satisfaction, organizational commitment, and job performance) among Indian academics in collaborative teaching and learning environments and found that technostress creators affect job satisfaction. Yang and colleagues (2009) indicated that ambiguity and techno-change frequency affect teachers' techno-exhaustion, which in turn negatively impact job satisfaction and teacher retention.

Unfortunately, studies on teacher's job satisfaction and technostress are even more limited in Korean academia in any settings, not to mention in primary school classrooms where teachers use mobile technology to teach.

Teacher Efficacy

Research on Teacher Efficacy

Teacher efficacy is defined as "a judgment of his or her capabilities to bring

about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated" (Bandura, 1977). Teacher efficacy is critical as it is strongly related to students' learning outcomes and teachers' attitudes and efforts (Ashton & Webb, 1986). Greater efficacy enables teachers to avoid criticizing students when they make errors (Ashton & Webb, 1986) and to try harder with a student who is struggling (Gibson & Dembo, 1984), thereby enabling students to learn better. In addition, efficacy affects the efforts teachers invest in teaching, attitudes, aspirations, and goals in teaching. Teachers who are more efficacious tend to provide greater levels of planning and organization skills (Allinder, 1994), exhibit greater enthusiasm for teaching (Allinder, 1994), have greater commitment to teaching (Coladarci, 1992; Evans & Tribble, 1986), and are more likely to stay in the profession (Glickman & Tamashiro, 1982).

Tschannen-Moran and Hoy (2001) introduced a tool called the Ohio State Teacher Efficacy Scale (OSTES) to measure teacher efficacy in three areas: efficacy for instructional strategies, efficacy for classroom management, and efficacy for student engagement. A large number of researchers have adopted OSTES since its introduction and it is one of the most used tools to measure teacher efficacy (Skaalvik & Skaalvik, 2007). In Korea, Lee (1998) claimed that a teacher efficacy measuring tool needs to reflect regional attributes. She then introduced a tool to assess primary school teachers' efficacy in three categories: self-confidence, self-regulatory efficacy, and task difficulty preference in Korea. Kim and Kim (2004) expanded the usability of the scale to teachers of all school levels. The instrument they proposed is one of the most credited tools today and has been validated by many scholars (Lee & Lee, 2012; Kim & Park, 2008).

Technostress and Teacher Efficacy

Many researchers have examined relations between computer efficacy and technostress/usage of technology, and found that a higher level of computer efficacy leads to less technostress and more usage of technology. Brosnan (1998)

examined how computer anxiety and computer usage are related using a self-efficacy framework and found that individuals who have experience in using computer software show less. In the same vein, Compeau and colleagues (1999) argued that computer anxiety lowers levels of self-efficacy, which then diminishes user's performance with computers. Similarly, Shu, Tu, and Wang (2011) proposed that a negative correlation exists between individuals with a higher level of computer self-efficacy and the level of technostress they feel. Chung, Rho, and Yoo (2013) also pointed out that computer self-efficacy affects technostress and called for managerial support to train employees to learn how to use technology. Based on these findings, it is reported that individuals with a higher level of computer efficacy show less technostress.

Researchers have illustrated that the extent to which teacher adopts technology in classroom affects teacher efficacy level, and also that teacher efficacy level affects teacher's usage of technology. Abbott (2010) argued that self-efficacy beliefs play a role in a teacher's thoughts and actions regarding technology in the classroom: stronger teacher efficacy beliefs lead to more uses of technology. Sahin, Akturk, and Schmidt (2009) found a positive relationship between pre-service teachers' perceived knowledge in teaching with technology and how they believed in their own abilities to teach effectively. In Korea, So (2013) analyzed correlations among TPACK, perceived instructional professionalism, and teaching efficacy, which revealed that that one's knowledge on how to use technology directly and indirectly affected perceived instructional professionalism, mediated by teaching efficacy.

However, exploring technostress as a predictor of teacher efficacy is an area that has been overlooked. Ashton (1984) posited that stress lowers teacher efficacy, which in turn affects student's motivation and ultimately hinders the productivity of education. Schwarzer and Hallum (2008) stated that teacher efficacy is negatively correlated with burnout and job stress, though they did not consider technology as an element of job stress. Albion (1999), on the other hand, proposed that proper use of technology in classroom induces an increase in teacher efficacy. Lee (2018)

have explored the association between early childhood teachers' technostress and teacher efficacy and posited that technostress was negatively correlated with teacher efficacy. However, few looked at whether there is a relationship between technostress and teacher efficacy of primary school teachers in Korea.

Method

Participants

Convenient sampling was conducted to collect data. A hundred sixty-four primary school teachers participated online via Google Form in answering the survey. Out of 164 participants, 105 (64%) answered that they have adopted mobile technology into teaching in the classroom in the last one year. The mean age of participants was 35.2 years old (SD = 8.842, widely distributed from 23 to 62). The mean age of the entire primary school teachers in Korea, as of 2016, is 39.7-year-old (Korean Educational Statistics Service, 2016), thus indicating that this research targeted participants who are relatively younger. The participants in this study included 46 (28%) males and 118 (72%) females, reflecting the proportion of the current primary school teacher population in Korea. A hundred four (63%) reported that they teach in Seoul. When combined with those teaching in Kyeonggi/Incheon province, the number rises to 128 cases (78%). Ninety-five (58%) of the participants have less than 10 years in teaching at a primary school, 41 (25%) of them have 10 to 19 years and the rest 20 years and above, indicating that the participants have relatively less experience than the mean of the entire population, which is nearing at 12 years of experience (Korean Educational Statistics Service, 2016).

Measurement instruments

The questionnaire was designed to measure how much a teacher feels technostress, job satisfaction and teacher efficacy with some demographics including age, gender, region, years of experience and grade level. To measure a teacher's technostress, teacher efficacy and job satisfaction, this research applied three instruments for each variable, shown in table 1. All the items used 4-point Likert scales (4 = strongly agree, 3 = agree, 2 = disagree and 1 = strongly disagree).

Table 1. The framework used to code the monitoring modes

Variable		Instrument	No. of questions	Cronbach's α
Technostress	Techno-overload	Technostress Creators	5	.80
	Techno-invasion		4	.84
	Techno-complexity		5	.76
	Techno-insecurity		5	.72
	Techno-uncertainty		4	.65
Job Satisfaction	-	Teacher Job Satisfaction Questionnaire	28	.84
Teacher Efficacy	-	Teacher Efficacy Scale	25	.82
Demographics			5	-
Total			81	

To measure the level of technostress, twenty-three questions were adopted from Tarafdar et al. (2007), translated into Korean and edited. The original questionnaire showed a composite reliability of .84. Items such as "I feel like I am forced to work much faster when I incorporate mobile technology into teaching" were used. For each construct, reliability ranged from .65 to .89. Reliability tests were conducted on each construct for this study and showed Cronbach's alpha values above .70, except techno-uncertainty which showed .65. Thus techno-uncertainty was removed from

any further analysis due to its lack of reliability.

Regarding teacher job satisfaction, 28 questions were adopted from Roh (2001)'s Teacher Job Satisfaction Questionnaire and edited to fit the research context. One of the items was, "I feel I am compensated enough for my workload". The original questionnaire showed a composite reliability of .83. For this study, reliability tests were conducted and reported .84 in Cronbach's alpha.

Lastly, 25 questions were adopted from Kim and Kim (2004)'s Teacher Efficacy Scale. The original questionnaire used items like, "I am able to assess how capable a student is.", and showed a composite reliability of .83. For this study, Cronbach's alpha was reported as .82.

Data Analysis

The data collected for this study was analyzed and tabulated using SPSS software according to the procedure, with a significance level at .05. First, descriptive analysis and correlation analysis was performed. Second, multiple regression analysis was conducted to explain which area of technostress led to varying degrees of job satisfaction and teacher efficacy of primary school teachers in Korea.

Results

Descriptive Analysis

The descriptive analysis for this study was conducted as shown in Table 2. Results indicated that techno-overload (M = 2.59, SD = .56) had the highest mean followed by techno-invasion (M = 2.40, SD = .66), techno-complexity (M = 2.38, SD = .56), and techno-insecurity (M = 1.95, SD = .47).

Table 2. Descriptive analysis (n = 164)

Variable	Min	Max	M	SD	Skewness	Kurtosis
Techno-overload	1	4	2.59	.56	-.15	.16
Techno-invasion	1	4	2.40	.66	.23	.48
Techno-complexity	1	4	2.38	.56	-.04	.65
Techno-insecurity	1	4	1.95	.47	.13	-.20
Job Satisfaction	2	3.89	2.87	.30	.33	.76
Teacher Efficacy	1.84	3.60	2.64	.30	.39	.45

Lower mean (M = 1.95) of techno-insecurity lies in the fact that primary school teachers in Korea are entitled to a very high level of job security and their social status as public official (Kim, 2014). Standard deviation of all variables showed that respondents hold quite a relatively uniform perception on each variable. The results of descriptive statistics also showed that all variables were normally distributed, as skewness estimates of all the variables ranged between 2 and -2, and the kurtosis estimates of all the variables ranged from 4 to -4 (Mardia, 1970).

Correlation analysis was conducted to explore the relationships among variables in order to proceed with multiple regression analysis. Most correlation values in this study range from -.36 to .66, interpreted as a weak to moderate relationship between constructs, as show in Table 3, with an alpha level of .05.

Table 3. Correlation analysis (n = 164)

	1	2	3	4	5	6
1. Techno-overload	-					
2. Techno-invasion	.66*	-				
3. Techno-complexity	.51*	.47*	-			
4. Techno-insecurity	.19*	.26*	.45*	-		
5. Job satisfaction	-.14	-.24*	-.36*	-.28*	-	
6. Teacher efficacy	-.06	-.04	-.31*	-.17*	.09	-

*$p < .05$

Multiple Regression Analysis

Multiple regression analysis was used to investigate how techno-invasion, techno-complexity, and techno-insecurity predicted primary school teacher's job satisfaction and teacher efficacy.

(a) Do the creators of technostress (techno-invasion, techno-complexity, and techno-insecurity) predict job satisfaction of primary school teachers?

Correlation analysis reported that techno-overload did not show any significant correlation with job satisfaction, with an alpha level of .05 and, therefore, was removed for multiple regression analysis. As shown in Table 4, techno-invasion, techno-complexity, and techno-insecurity explained 13% of the variance in job satisfaction of primary school teachers in Korea. It was found that techno-complexity significantly predicted job satisfaction (β = -.25), while other variables did not show significant predictive power on job satisfaction. Figure 1 shows the regression model, including regression coefficients.

Table 4. Results of multiple regression analysis for technostress creators' predictive power in job satisfaction (n = 164)

Predictor Variable	Criterion Variable	*B*	*SE*	β	*t*	*p*	Tolerance	VIF
Techno-invasion	Job Satisfaction	-.04	.12	-.09	-1.09	.28	.78	1.29
Techno-complexity		-.14	.05	-.25	-2.81*	.01	.67	1.50
Techno-insecurity		-.09	.05	-.14	.-1.70	.09	.80	1.26
R^2*(adj.* R^2) = .15(.13). *F* = 9.36*								

* $p < .05$

(b) Do the creators of technostress (techno-invasion, techno-complexity, and techno-insecurity) predict teacher efficacy of primary school teachers?

Techno-overload and techno-invasion did not show any significant correlation with teacher efficacy, with an alpha level of .05 and, therefore, were removed from

multiple regression analysis for teacher efficacy. As shown in Table 5, it was found that the two predictors explained 8 % of teacher efficacy of primary school teachers in Korea. Techno-complexity alone predicted teacher efficacy (β = -.28), whereas techno-insecurity alone did not show significant prediction (see Figure 2).

Table 5. Results of multiple regression analysis for technostress creators' predictive power in teacher efficacy (n = 164)

Predictor Variable	Criterion Variable	*B*	*SE*	β	*t*	*p*	Tolerance	VIF
Techno-complexity	Teacher Efficacy	-.15	.04	-.28	-3.39*	.00	.80	1.25
Techno-insecurity		-.03	.05	-.05	-.54	.59	.80	1.25
R^2 *(adj.* R^2*)* = .09(.08). *F* = 8.40*								

* $p < .05$

Discussion and Conclusion

Out of three variables that were used in multiple regression analysis to measure the predictive power of technostress creators on job satisfaction, only techno-complexity proved to predict job satisfaction. The results indicate that the reason why techno-complexity was the only predictor is that teachers would have first needed to understand how to incorporate mobile technology into teaching, before feeling overloaded, invaded, insecure, or uncertain about it, meaning techno-complexity precedes other constructs. In addition, as teaching with mobile technology is not mandatory in most primary schools, teachers that decided to incorporate mobile technology are early adopters who voluntarily chose to do it. Therefore, the only stress factor that affected them was how to understand and use mobile technology. The fact that the mean age of the participants in this paper was 35.2 years old, which is younger than the mean age of the entire primary school teacher population, 39.7 years old (Korean Educational Statistics Service, 2016),

also represents that the respondents are relatively mobile technology-friendly and willing to take up the new initiative.

Technostress creators explain teacher efficacy at 8% of the variance, where techno-complexity alone has a beta of -.28. This shows that as teachers experience stress due to the complexity of mobile technology, they are less likely to try new pedagogies incorporated with mobile technology and to believe that the complexity of mobile technology will affect the instructions negatively. Scholars who studied the complexity of technology and teacher efficacy have produced similar results. Alger and Kopcha (2010) explained that technology plays an important role in positively impacting the self-efficacy of novice teachers. Motshegwe and Batane (2015) reported that perceived ease of technology positively influences instructors' attitude toward the adoption of technology. Lee (2018) has argued that techno-complexity, techno-overload, techno-invasion and techno-uncertainty are all negatively correlated with teacher efficacy of early childhood teachers. Studies posit that the use of technology in classroom not only enhances learning but also affects teacher's job satisfaction as well as teacher efficacy; however, there are few studies that investigated the predictive powers of technostress creators for teachers. By analyzing the creators inducing stress in teachers, this research seeks to enhance the classroom learning itself. The reason why techno-complexity explains teacher efficacy less than it does job satisfaction is that job satisfaction is more affected by external factors (e.g. innovation, professional commitment, professional fulfillment and working conditions), whereas teacher efficacy focuses more on core tasks—namely teaching and guiding students.

Implications, Limitations and Future Research

This study shows that complexity caused by mobile technology is a predicting factor in job satisfaction and teacher efficacy of primary school teachers in Korea. This yields some implications for the educators or managers in Korea's primary school education, especially for those who plan to roll out mobile technology into

primary school classrooms, e.g. digital textbooks. First of all, in order for the teachers not to experience stress from the complexity of mobile technology, adequate training on how to use mobile technology for teaching is critical. Second, it is important to give teachers an opportunity to share know-how, latest trends and tips on mobile technology with other colleagues. Ongoing feedback, peer teaching, and one-to-one support also underpinned the lecturers' approach to integrating technology. In fact, mobile technology itself may play an important role in positively impacting job satisfaction and teacher efficacy via various mobile-based activities (e.g., networking on social network services where mobile technology expert teachers interact with novices). Third, government-mandated initiatives on implementing mobile technology needs to have a consistent, long-term plan so educators in schools will be able to work their way up to using new technologies.

Although this research contributed to early investigations of technostress in educational settings in Korea, it does bear some limitations. First, the instrument to measure technostress of teachers in Korea needs to be developed. Even though current instrument was carefully examined and localized to reflect more of the attributes of the locale and target group, a more adequate scale will greatly enhance the reliability of the data, especially since attributes that measure techno-uncertainty did not show reliability for this study. Second, this study adopted convenient sampling which may have provided self-selection bias in the responses. Third, observing the respondents feel stressed out from using mobile technology in classroom will be helpful to measure the level of technostress as 'stress' is a feature that is displayed physiologically.

Technostress is relatively a new topic in education. However, as learners start adopting mobile technology, technostress in teachers is a topic that cannot be overlooked. Thus, this research calls for deeper analysis on two topics. First, a Korea-specific technostress measurement for educators needs to be developed and validated. Second, conducting an observation on primary school teachers on-site when they incorporate mobile technology into teaching will be helpful to measure as stress will be measured physiologically.

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