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The effects of secondary teachers' technostress on the intention to use technology in South Korea

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ABSTRACT

This study aims to investigate the structural relationships between secondary school teachers' TPACK, perception of school support for technology use, technostress, and intention to use technology in Korea, where a SMART education initiative has been announced recently for K-12 education. The study employed structural equation modeling in order to examine the causal relationships among the variables, and data from 312 secondary school teachers were analyzed. The results indicated that TPACK and school support had significant effects on technostress. In addition, technostress significantly influenced teachers' intentions to use technology. Lastly, technostress significantly mediated TPACK, school support and the intention to use technology.

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1. Introduction

Required competencies for learners and teachers have changed in the 21st century. Domain-specific knowledge in addition to 21st century skills are considered important in this digital era. Accordingly, educational researchers and practitioners have tried to develop appropriate educational methods for future learning. Specifically, in Korea, the SMART education initiative has been proposed as a new educational agenda. SMART is an acronym for self-regulated, motivated, adaptive, resource-enriched, and technology-embedded education (Korean Ministry of Education, Science and Technology, 2011). One example of the initiative is the digital textbook project which aims to transform teaching and learning in K-12. According to the SMART education initiative plan, paper-based textbooks in elementary and middle school will be gradually replaced by mobile-based digital textbooks, integrating all existing instructional resources such as textbooks, references, workbooks, and dictionaries in order to provide a personalized learning environment under the facilitation and guidance of competent teachers.

This government-driven educational transformation is in line with the rapid societal change in South Korea. It was reported that 82.5% of the South Korean population were Internet users and 78.5% were smartphone users as of 2012 (KISA, 2012). Given this high rate of technology use in everyday activities, it is not surprising that Korean students won first place for Digital Reading Assessment among 19 participating countries in the PISA (Programme for International Student Assessment) test organized by OECD in 2009. However, neither the widespread use of smartphones nor students' ability to read digital materials guarantees successful integration of technology in education.

Previous research on the use of computers for education already reported that teachers are the key to technology adoption. For example, teachers' computer experiences (Williams, Coles, Wilson, Richardson, & Tuson, 2000), teachers' anxieties or attitudes toward computer use (Shapka & Ferrari, 2003), and teachers' experiences with professional development programs

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on computer use (Vannatta & Fordham, 2004) were critical to technology integration. Now, we have the issue of implementing the SMART initiative in South Korea, which is fundamentally similar to computer adoption a decade ago, given that mobile-based digital textbooks represent another type of technology that requires the process of diffusion of innovation. Hence, researchers claim that teachers are still likely to be the key players in this new era when digital textbooks and mobile devices are introduced in classrooms for teaching and learning. If teachers do not buy into the initiative, there can be no further integration of it. There are many studies supporting this claim, investigating the technology acceptance of teachers as one of the major issues in technology integration in the education field (Yuen & Ma, 2008).

Among various relevant factors for technology acceptance, this study brought up the issue of technostress, that is, psychological and physical stress toward technology use, as defined by Brod (1984). Specifically, the SMART initiative in Korea is a government-driven policy and teachers are busy with teaching and managing students in a highly competitive culture. Adopting the new initiative may cause mental stress for teachers in this situation. In psychology, stress is considered to arise from dynamic interactions between the individual and the environment (Matthews, Zeidner, & Roberts, 2004). For example, Lazarus and Folkman (1984) proposed the transactional theory of stress, which explains the processes of coping with stressful events. The individual first appraises the stressor, and then appraises the internal and external resources at his or her disposal. Adopting this framework, the study defined the internal resource that teachers employ as Technological Pedagogical and Content Knowledge, or TPACK, and the external resource surrounding teachers as school support.

Overall, this study investigated the factors affecting teachers' intentions to use technology in South Korea, and the predictors are hypothesized to be teachers' TPACK and school support, mediated by teachers' perceived level of technostress. This study aims to provide an understanding of the psychological perspective for teachers who are expected to adopt new technology. Also, implications for facilitating technology adoption from the standpoint of teachers' internal and external factors are discussed.

2. Theoretical background and hypotheses

2.1. Teachers' technostress

There exists prior research focusing on how to encourage teachers to use technology more actively. However, as some studies have pointed out, there are many obstacles: For example, lack of training, inadequate infrastructure, and lack of support from technology specialists may induce anxiety and tension in teachers, resulting in psychological and physical stress related to technology use. This phenomenon, defined as technostress (Brod, 1984), is currently receiving attention in the educational context as new technologies such as digital textbooks, cloud computing, and interactive technology spread into classrooms. Weil and Rosen (1997) elaborated the concept of technostress, and defined it as "any negative impact on attitudes, thoughts, behaviors or psychology caused directly or indirectly by technology." Although technostress has been given different labels such as computer anxiety and negative computer attitudes (Wang, Shu, & Tu, 2008), it is characterized by the tenseness and anxiety that an individual feels when using technology. This negative emotion should be considered important because it tends to prevent one from further using the technology.

Empirically, recent studies reported that teachers using new technology in classrooms have experienced technostress, which caused adverse effects in the active adoption of technology. For example, Al-Fudail and Mellar (2008) conducted a qualitative research with nine in-service teachers to determine their level of technostress. Observations of classroom teachings and face-to-face interviews revealed that there exists several factors causing technostress such as technological system failure, insufficient technical and social support for technology use, increased time for setting up and preparing class lectures, and inadequate school culture climate for technology adoption. In a similar vein, Lim (2012) reported that teachers' technostress levels increased after adopting digital textbooks in South Korea. He claimed that teachers felt frustrated when technological system failures occurred, because they felt like they were unable to control the situation. Also, the study reported that guidance for teachers on how to integrate digital textbooks into their teaching was limited, increasing teachers' psychological and physical overload for technology adoption.

These prior studies mainly focused on exploring teachers' experiences regarding technostress. It is now time to investigate causal relationships between the selected predictors and teachers' technology use. Since stress is an outcome of the interaction between an individual and the environment, as mentioned above (Matthews et al., 2004), it is necessary to identify individual as well as environmental factors affecting technostress in order to reduce the stress level that teachers may experience during technology integration. To be more specific, according to the transactional theory of stress, there are two types of appraisal: primary appraisal and secondary appraisal. The former is the individual's evaluation of an event or situation, while the latter is the individual's evaluation of his or her ability to handle an event or situation. This evaluation is dependent on whether the individual has the internal and external resources or not. Thus, this study selected TPACK as the teachers' internal resource and school support as the external resource to examine how teachers cope with technostress.

2.2. Factors relevant to technostress

Shulman (1986) claimed that teachers should be equipped with content knowledge (CK), pedagogical knowledge (PK), and pedagogical content knowledge (PCK), which is an integration of CK and PK. Later on, Mishra and Koehler (2006) expanded

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