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The Technological Pedagogical Content Knowledge-practical (TPACK-Practical) model: Examination of its validity in the Turkish culture via structural equation modeling

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ABSTRACT

The purpose of this study was to examine the construct of the Technological Pedagogical Content Knowledge [TPACK] Practical Model in the Turkish culture using structural equation modeling. The research was conducted on 296 teachers working in 13 different schools. To test the validity and reliability of the 22-item TPACK-Practical scale, item-total and item-rest (sometimes referred to as remainder) correlations, item discrimination, confirmatory factor analysis and Cronbach's alpha reliability analyses were performed. The item-total and item-rest correlation coefficients were high, and all values were significant. The powers of all of the items to differentiate between the top 27% and the subgroup averages were significant ($p < .01$). The original construct was validated according the confirmatory factor analysis that was performed to determine the construct validity. Additionally, Cronbach's alpha reliability coefficient of the scale was determined to be 0.89.

1. Introduction

Today, the expectations of teachers are continuously increasing with changes in teacher roles. The qualifications that a teacher should have and their reflections on the teaching-learning process are constantly being questioned by educational researchers; specifically, the number of studies featuring the integration of technological developments with the education system appears to be increasing. The factors affecting teacher roles and competencies in technological development constitute the basis of these studies.

Studies featuring the integration of technology with education are based on different models. The following models stand out among the studies featuring the *teacher* dimension of technology: (*i*) the Technology Integration Planning Model (Robyler, 2006), (*ii*) the Systematic ICT Integration Model (Wang & ve Woo, 2007), (*iii*) the Apple Future Classes Model (Dwyer, Ringstaff, Sandholtz & Apple Computer Inc., 1990), (*iv*) the Social Model (Wang, 2008), (*v*) the Enhanced Pearson Model (Woodbridge, 2004), and (*vi*) the Technological Pedagogical Content Knowledge [TPACK] model (Koehler & Mishra, 2005). Koehler and Mishra (2005) suggested that in recent years, these models have shifted from technology-oriented to pedagogy-oriented models. Technology-oriented models target teachers' acquisition of the knowledge and skills required to use technology, whereas pedagogy-oriented models target the integration of the teachers' use of the technology with their pedagogical knowledge in the teaching process. The foremost model among the pedagogy-oriented models that focus on the integration of technology with education is the TPACK model.

2. Related literature

2.1. Technological Pedagogical Content Knowledge (TPACK)

The TPACK model has taken its final shape by integrating the '*Technology*' dimension with Pedagogical Content Knowledge [PCK], which is a model that features the necessary characteristics that teachers should have (Koehler & Mishra, 2005). The following are components of TPACK (*see* Fig. 1); (*i*) *technology,* which comprises technical knowledge about equipment about technological tools, including tools such as

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computers, the internet, video, measuring devices, and e-books; (*ii*) *pedagogy,* which considers teaching methods, strategies, and models and consists of subdomains that include how students learn, how to use classroom management skills, course planning and effective student assessment; and (*iii*) *content knowledge*, including subject area knowledge, which varies according to grade level and discipline, and all of the theories and ideas of the concepts belonging to this discipline.

Pedagogical Content Knowledge [PCK] is the combination of knowledge and pedagogy and involves the presentation of the content area via interactions with pedagogical issues; i.e., the selection of appropriate teaching approaches, methods and techniques. *Technological Content Knowledge* [TCK] is the combination of technology and content and refers to the use of technology that is more appropriate for representing the subject and content of a particular discipline. *Technological Pedagogical Knowledge* [TPK] is the combination of technology and pedagogy and considers the effects of technology usage on learning in the teaching process. TPACK addresses the three different skills of technology, pedagogy and content together rather than considering them independently. TPACK involves the presentation of the subject area for effective teaching within the framework of pedagogical approaches in environments that involve the use of technology (Angeli & Valanides, 2009; Graham et al., 2009; Koehler & Mishra, 2005; Koh, Chai, & Tsai, 2013).

In the literature, in addition to the original structure of the TPACK model, the TPACK-converter, TPACK-deep, TPACK-ICT and TPACK-Practical models have also been created by bringing different interpretations to the model (Angeli & Valanides, 2009; Graham, 2011; Kabakci Yurdakul et al., 2012; Yeh, Hsu, Wu, Hwang, & Lin, 2013).

2.2. TPACK-Practical Model

According to Van Driel, Verloop, and De Vos (1998), teacher application knowledge and PCK play an important role in the regulation of the teaching process and in the fulfillment of learning objectives via appropriate teaching strategies. In this context, application knowledge (teaching experience) with the combined use of content and pedagogy skills is involved in the process as much as PCK. The TPACK models have evolved from different perspectives in the literature and tackle knowledge and skill dimensions independent of teaching experience and performance. From this perspective, the TPACK- Practical model is a model that considers the teaching process as the basis upon which application knowledge (teaching experience) and TPACK skills work together. The consideration of TPACK and the teaching process together is important in terms of the skills used through the process and the consideration of the interaction between these two processes in addition to providing immediate feedback. Specifically, it should not be ignored that the processes requiring different technologies, such as the recognition of students, planning, design, and evaluation, require different TPACK skills. According to Yeh et al. (2013), the TPACK skills of teacher candidates are not the same as those of experienced teachers. Thus, teaching processes and outcomes are affected by the interaction of possessed knowledge and skills with teaching experience. Jang and Tsai (2012) stated that the lack of experience and naivety of teachers may act as the limiting factor in the use of TPACK skills. Thus, variables, such as the experience and performance of the teacher, must be involved in the process. The implementations of TPACK skills in different disciplines are also different.

The TPACK-Practical model (see Fig. 2) consists of eight knowledge dimensions from five pedagogical areas. These pedagogical areas include the following: (*i*) learners, (*ii*) subject content, (*iii*) curriculum design, (*iv*) practical teaching, and (*v*) assessments. The knowledge dimensions belonging to these areas are the following: (*i*) using ICT to understand students, (*ii*) using ICT to understand subject content, (*iii*) planning ICT-infused curricula, (*iv*) using ICT representations, (*v*) using ICT-integrated teaching strategies, (*vi*) applying ICT to instructional management, (*vii*) infusing ICT into teaching contexts, and (*viii*) using ICT to assess students (Yeh et al., 2013).

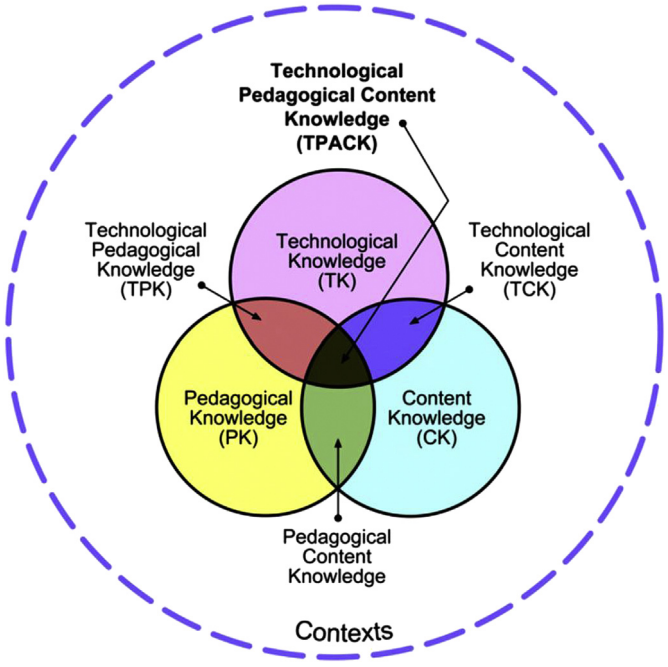

Fig. 1. Graphic representation of technological pedagogical content knowledge (TPACK).