Teacher educators' competences in fostering student teachers' proficiency in teaching and learning with technology: An overview of relevant research literature

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HIGHLIGHTS
- Literature on teacher educators’ competences as role models is scarce.
- Four domains of competence for teacher educators can be identified.
- Most research focuses on competences to teach with technology.
- Research on teacher educators’ level of competences is limited.

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ABSTRACT
Teacher educators play an important role in preparing student teachers to integrate technology into their classrooms. This article presents an overview of research literature on teacher educators’ competences in preparing their students to teach with technology. A literature search yielded 26 relevant research articles. Four domains of competence were identified: technology competences, competences for pedagogical and educational technology use, beliefs about teaching and learning and competences in professional learning. The literature focuses on teacher educators’ competences in using technology for teaching. Research on the competences that teacher educators need and have as second-order teachers is lacking. Recommendations for future research are discussed.

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1. Introduction

Technological developments are changing what is required of teachers in several ways. Firstly, it is increasingly expected that teachers use technology to support new ways of teaching and learning (Drent & Meelissen, 2008). Secondly, they are supposed to develop their students’ technological literacy in order to prepare them for working and learning in twenty-first-century society (International Society for Technology in Education [ISTE], 2008; United Nations Educational, Scientific and Cultural Organization [UNESCO], 2011; Voogt & Pareja Robin, 2010). New requirements for (student) teachers also make demands on teacher education. Student teachers and in-service teachers in primary and secondary education need to be educated to use technology as a tool for teaching and to support students’ technological literacy (Agyei & Voogt, 2011; Drent & Meelissen, 2008; Sang, Valcke, Van Braak, & Tondeur, 2010; Tondeur et al., 2012). These demands are reflected in diverse international frameworks of professional standards (e.g., ISTE, 2008). In recent years research on teacher educators’ use of technology and their competences in this area has also been emerging. No overview of this literature exists, however. Therefore, this study investigates what competences teacher educators need both to teach and learn with technology and to foster student teachers’ technological literacy, based on an overview of the existing research literature.

2. Theoretical framework

Both current and future teachers have to deal with the requirements that technological developments make of them. Teachers are expected to develop innovative ways to use technology as a tool to enhance the learning environment and to effectively support their teaching and students’ learning with technology (Drent & Meelissen, 2008; ISTE, 2008; UNESCO, 2011). At the same time, technology is a goal of learning; teachers need to encourage students’ technological literacy in order to prepare them for working and learning in ‘twenty-first-century’ society and to help them develop the necessary skills for cooperation, communication, problem solving and lifelong learning (ISTE, 2008; UNESCO, 2011; Voogt & Pareja Robin, 2010).

The innovative use of technology in education lags behind expectations. Many teachers are only beginning to integrate technology into their classes, though the level of use varies widely within and between schools (Tondeur, Kershaw, Vanderlinde, & Van Braak, 2013). Midousser, Nachmias, Tubin, and Forkosh-Baruch (2003) along with Tondeur et al. (2013) argue that technology is predominantly used to support existing practices and not so much as a means to transform pedagogical practices. Tondeur et al. (2012) state that the use of technology for changing pedagogical practices is still limited among in-service teachers, as well as among student teachers and beginning teachers. Teachers and student teachers often feel that they are not sufficiently well equipped for teaching and learning with technology in their classrooms (Houston & Pierson, 2008; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010; Sang et al., 2010; Tondeur et al., 2012).

New requirements for (student) teachers also make demands on teacher education. Student teachers and in-service teachers in primary and secondary education need to be educated to use technology as a tool for teaching and to support students’ technological literacy (Agyei & Voogt, 2011; Drent & Meelissen, 2008; Sang et al., 2010; Tondeur et al., 2012). These demands are also reflected in diverse international frameworks of professional standards (e.g., ISTE, 2008).

The question then arises of how teacher education institutions can meet these demands, and especially what is required of teacher educators within this context.

To answer this question, the unique character of the profession of teacher educators (Lunenberg, Korthagen, & Swennen, 2007) should be taken into account. Teacher educators are not just teachers. In fact, they are second-order teachers (Murray & Male, 2005): they educate student teachers who will be working with pupils, as opposed to first-order teachers who work directly with pupils. In addition to being teachers themselves, teacher educators serve as role models for their students in teaching with technology as well as in fostering students’ technological literacy. Acting as a role model in teaching means that teacher educators’ pedagogical behaviour is congruent with the pedagogical behaviour they want to promote in their students (Lunenberg et al., 2007; Wright & Wilson, 2007). Teacher educators not only deliver the content of their courses, they also teach and model technology use, pedagogical beliefs and instructional strategies (Bai & Ertmer, 2008; García & Rose, 2007). Modelling is an effective technique to help student teachers learn to use technology (Garcia & Rose, 2007; Groth, Dunlap, & Kidd, 2007; Matthew, Stephens, Callaway, Letendre, & Kimbell-Lopez, 2002). To prepare student teachers to integrate technology as a tool and as a goal in their future practices, teacher educators need to do more than just model technology use: they have to justify the modelled behaviour, substantiate the underlying pedagogical and educational choices and explicitly connect aspects of technology, pedagogy and content and the underlying relationships (Koehler, Mishra, Hershey, & Peruski, 2004; Lunenberg, Dengerink, & Korthagen, 2013).

Teacher educators are therefore faced with an even more complex task than first-order teachers concerning the use of technology in education. Research on teacher educators’ teaching with technology in pre-service teacher education expanding, but is still far less voluminous than research on teaching and learning with technology by teachers in primary or secondary schools. Several studies describe how teacher education institutes are searching to integrate new professional standards for their students in their curriculum and are starting to reshape their curriculum with technology (e.g., Ottenbreit-Leftwich et al., 2010; Tømte, Enochsson, Buskvist, & Kärstein, 2015). And although the importance of fostering student teachers’ competences in teaching with technology has been stressed in recent frameworks of professional standards (e.g., ISTE, 2008), it is not always reflected in the teacher education classrooms.

Some studies suggest that teacher education institutes are struggling to provide student teachers with sufficient inspiring role models as there are not enough teacher educators that use technology effectively themselves (e.g., Gronseth et al., 2010; Tondeur