

Teacher educators' use and needs of digital competence to support students' online learning

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Abstract

The paper is based on a study at two universities in Sweden with the aim to identify and analyse teacher educators' expressed use and needs of digital competence in higher education. The research questions are: a) How do teacher educators use digital tools? b) How do teacher educators evaluate their competence to effectively use ICT? c) What training do teacher educators need to make students functional online? Methodically, a digital survey was distributed via e-mail to 405 teacher educators representing two faculties at the two different universities, 105 respondents answered (26%). The survey included 28 questions with both closed-ended questions (Likert six-point scale), as well as open-ended questions. Two theoretical foundations are applied to analyse different aspects of the teacher's use and need of ICT knowledge and competence: 1) The TPACK model and the interaction between the three knowledge domains: Pedagogical knowledge (PK), Technical knowledge (TK) and Content knowledge (CK), and 2) three dimensions of Computer Self-Efficacy (CSE), magnitude, strength and generalizability. Results show that 92.3% of respondents use a laptop and 18.3% use interactive boards in their work. Further, respondents who report a low competence regarding digitalization of teaching (16.3%) report a significantly higher need of training ($p < 0.05$) compared to respondents reporting a high competence (27.9%). Also, respondents who report a high competence regarding digitalization of teaching, report creating digital learning environments as something unproblematic to a significantly higher extent ($p < 0.001$) compared to respondents reporting a low competence. 26.3% of the teacher educators ($n=15$) want trainings in content knowledge and 17.5% ($n=10$) in technical knowledge, as well as interactions between them. The findings show that all teacher educators use digital tools in planning and executing teaching. However, few teacher educators rate their ICT competence as high and want more training regarding subject didactic knowledge in the students teaching practice.

Extended summary

Background: teacher educators have a fundamental role in training teachers for teaching and serve as role models for ICT-based teaching (Ungar & Baruch, 2016). According to Koehler et al. (2013) digital technologies, by contrast to traditional pedagogical technologies, are protean (i.e. usable in many different ways), unstable (rapidly changing) and opaque (the inner workings are hidden from users). Research shows that digital tools for pedagogical purposes is still poorly integrated in teacher education programs and there is a need for innovative solutions as an important part of teachers professional competence of using ICT for students learning (Tømte et al., 2015). The use of technology also needs to be developed professionally by tutoring and underlying educational pedagogy (Lakkala & Ilomäki, 2015) as well as to enhance understanding of the skills, dispositions, and knowledge for teaching-learning contexts where information and communication technologies are increasingly pivotal (Forbes & Khoo, 2015). Digital competence consists of, among other things, dealing with different digital devices and its software to use digital technology for pedagogical purposes and to enhance critical thinking.

Consequently, teacher educators are required to use more technology and present new pedagogical challenges in their design and teaching of online-based learning activities.

Aim: to identify teacher educators' expressed use and needs of digital competence in higher education. The following research questions are addressed:

1. How do teacher educators use digital tools?
2. How do teacher educators evaluate their competence to effectively use ICT?
3. What training do teacher educators need to make students functional online?

Method: a digital survey was distributed to 405 teacher educators at two different universities, representing two faculties of each. The survey included 28 questions regarding use and needs of digital competence to support students' online learning. The instrument included background variables (sex, age, department, highest education, years of employment, and task assignment). The questions included both closed-ended questions (Likert six-point scale), as well as open-ended questions with a field for own comments. The total number of respondents were 105 (62.5% females, 37.5% males), with an overall answering frequency of 26%,

Theoretical foundation: in the study, the technological pedagogical content knowledge, TPACK model with three knowledge domains: Pedagogical knowledge (PK), Technical knowledge (TK) and Content knowledge (CK) are used as tools to analyse the results concerning effective teaching with digital tools (Koehler et al., 2013). The analysis of the open questions is complemented with Computer Self-Efficacy (CSE) with three mutual dimensions; magnitude (teachers cognitive knowledge processes), strength (teachers ability to teach and learn with technology and support students) and generalizability (the ability to connect different technologies to an educational purpose). The teacher's self-efficacy, connected to their knowledge and capability to successfully influence and design online-based learning activities supported with different digital tools, is a key to success (Compeau & Higgins, 1995).

Results: Firstly, the digital survey showed that the majority of the respondents (92%) use a laptop in their work whereas only 18% use interactive boards. Two-thirds of them (66.7%) are using a learning management system, LMS and over half of them (52.9%) digital communication tools (e.g. Skype, Hangouts and Zoom). Half of the respondents (49%) are using an e-meeting system tool (e.g. Adobe Connect) and 46% some form of mobile applications. Regarding situations and in what ways they used digital tools and programs the analysis reveal four different themes; teaching, communication/meetings, daily administration and research. Using ICT for teaching practices included planning, implementing and evaluating. An important theme was communication/meetings with students outside the teaching situation as well as a collaboration instrument with colleagues and researchers at other universities. Situations that could be connected to students' learning more indirectly include daily administration such as documentations and for their own research.

Secondly, respondents who reported a low competence regarding digitalization of teaching (16.3%) reported a significantly higher need of training ($p < 0.05$) compared to respondents reporting a high competence (27.9%). Also, respondents who report a high competence regarding digitalization of teaching report creating digital learning environments as something unproblematic to a significantly higher extent ($p < 0.001$) compared to respondents reporting a low competence.

Thirdly, a little more than half of the respondents (55.4%) reported having taken part in training regarding digitalization of teaching. A third of them reported their competence regarding effective use of ICT as high (37.5%) and less than a tenth (8.9%) as low.

Fourthly, the categorizing of 57 answers of the open question on what type of training the respondents need show that over a quarter of the teacher educators (26.3%) want trainings in

content knowledge, and barely one fifth of them (17.5%) in technical knowledge, as well as interaction between them (17,5%). Surprisingly, only a few (3.6%) report a need for pedagogical knowledge in interaction with content knowledge (5.3%), as well a need for all three domains TK-PK-CK (14%).

Conclusions: The findings show that all teacher educators use digital tools in planning and executing teaching. However, few teacher educators rate their ICT competence as high and want more training regarding subject didactic knowledge in the students teaching practice. Highlighted activities teacher educators have are didactic workshops and tutoring in underlying pedagogy to enhance knowledge and capability required in different learning situations where media and information literacy are an important part of future teaching.

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