Educating online student teachers to master professional digital competence: The TPACK-framework goes online

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ABSTRACT

In this article we study how online teacher education programmes may enhance innovative ways of teaching and learning with Information and Communication Technology (ICT). We explore how online teachers are practising professional digital competence, in general and within subject areas, and to what extent they encourage student teachers to develop their own professional digital competence. Based on online teacher education programmes at two distinct higher education institutions (HEIs), we applied mixed method design including quantitative and qualitative approaches to illuminate the aims and the scope. Our study revealed that even if online teacher education programmes represent good avenues for stimulating teachers and student teachers to develop digital competence for pedagogical purposes, this aspect is poorly integrated within the actual programmes, although some interesting examples were demonstrated. By looking at the origins of the discourses on online education and on digital competence, we found that they derive from different stakeholders: while the discourse on online education originated from the management side at both HEIs, the discourse on digital competence derived from certain teaching staff at the two HEIs. Our study indicated that there is still some way to go to innovative solutions and to develop the potential of professional digital competence in online teacher education programmes.

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1. Introduction

Teacher education programmes in Norway and Sweden are based on national curricula, which include digital competence (Norwegian Ministry of Education and Research, 2010; SFS 2010:541). Student teachers are obliged to master the use of information and communication technology (ICT) for pedagogical purposes as part of their education. However, recent findings confirm that this aspect is poorly integrated within teacher education programmes (Enochsson, 2010; Granberg, 2011; Tømte, Hovdhaug & Solum, 2009). Nonetheless, more than half of the Higher Education Institutions (HEIs) in Norway, and more than a third of the HEIs in Sweden, offer teacher education programmes that include various versions of online solutions (Tømte, Kårstein, & Olsen, 2013). This means that ICT is implemented at some stage within many teacher education programmes. However, being able to follow an online class does not necessarily equip students to teach by using digital media and learning resources (Enochsson, 2010), but these online settings might serve as good avenues for developing digital competence for the teaching profession, since the students develop their general digital competence (Enochsson, 2010).

Nordic nations are the most frequent users of the internet in Europe. Norway, Sweden and Iceland are the countries with the highest percentage of the population with internet and computer skills (Digital Agenda Scoreboard, 2013). Most Norwegians and Swedes use the internet every day (Findahl, 2013; SOU, 2014). In Norway, most employees and students, along with the population with higher education, use the internet; their frequency of use, including use for educational purposes, has increased over the years (Ørnes, Wilhelmsen, Breivik, Solstad, Aure & Abelsen, 2011). In other words, the technological infrastructure and the generic digital skills in these countries are

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considered good for HEIs and for future students in the teaching profession to further develop their digital competence for professional purposes.

Online education derives from distance-based education or distance learning, which existed long before modern information and communication technology (ICT) was introduced (Bates, 2014; Casey, 2008). One approach to understand the diversity in online teaching would be to distinguish between four axes that group content and approach in online education, as suggested by Bacow et al.: 1) purely online versus hybrid approaches that also include face-to-face interaction; 2) self-paced systems versus systems where all students participate simultaneously in teaching within established schedules; 3) systems that rely on social games/peer based approach versus systems oriented towards individual learners; and 4) Massive Open Online Courses, (MOOCs), i.e. large-scale teaching generated by hardware, versus approaches that require significant efforts of teaching staff to ensure interaction with students (Bacow, Bowen, Guthrie, Lack, & Long, 2012). Many institutions have also developed their own training packages (and sometimes entire educational programmes) exclusively based on online teaching, usually with little or no face-to-face interaction between students and teaching staff or students themselves. Nevertheless, most of these training packages represent imitations of traditional campus education. The main difference between these courses and campus-based education is that educators interact with students through technology (Bacow, Bowen, Guthrie, Lack, & Long, 2012). The attempt by Bacon and colleagues to group content and approach in online education is useful in the way that it demonstrates the complex landscape of online learning. However, to make such categories will often call upon exceptions; as in our case studies covering two online teacher education programmes. Our teacher education programmes comprise both parts of 1 and 2 in the indexing above; they involve face-to-face interaction as described in 1, in mandatory campus based meetings, and they are systems where all students participate simultaneously in teaching within established schedules. These practices are carefully described in the method section of our paper.

1.1. Aim of the article

The online teacher educational programmes at Telemark University College (TUC) and Karlstad University (KAU) represent institutions, which started out by imitating campus education, since the need has been to reach students in remote areas. Based on empirical findings from the study of these two online teacher education programmes in Norway and Sweden, we explore the ways in which online teachers are practising digital competence, in general and within subject areas, and the extent to which they encourage student teachers to develop their own professional digital competence. Moreover, we explore how online teacher education programmes may enhance innovative ways of teaching and learning with ICT. We consider these perspectives as valuable to the research community for several reasons: first because online education and learning is expanding worldwide and due to its complexity in content and pedagogical approaches, as demonstrated by Bacon and colleagues and in our two case studies, it would benefit from new insights from research; second, because teacher education institutions, at least in the Nordic countries, are to include digital competence in their curricula; and third, because there seems to be little research on digital competence development for teacher staff at higher educational institutions, as will be demonstrated in the research review.

The article opens with a research overview where recent contributions on theories of digital literacy and digital competence are introduced, along with a discussion on how these may be embraced within teacher education and within online educational programmes in general and within online teacher education programmes. In this, various theoretical contribution are introduced, such as the Technological-Pedagogical-Content-Knowledge (TPACK) framework. This is followed by the introduction of two cases, which provide the empirical data for this article; this section also includes the methods and data applied in the case studies. The next section presents findings, and discusses how these may relate to the previous research literature. The final section draws conclusions from the findings and discusses these in the context of professional digital competence and online learning.

2. Research overview

2.1. ICT and education

Information and Communication Technology (ICT) in education has for many years been important in the Nordic countries and elsewhere. ICT in education is often associated with increased opportunities for flexibility, efficiency and availability. Technology can for example help to reach out with education for more and new groups of students, and to increase flexibility for institutions, staff and students. In addition, technological solutions to administrative tasks along with communication activities have been highlighted at educational institutions. Such arguments have often dominated when ICT in education has been on the agenda (e.g. Norwegian Ministry of Education, 2013). Another important aspect that has been stressed is to provide students with relevant education for a knowledge society where technology continues to gain ground (ibid.). Furthermore, ICT in education also means that different technologies, media and resources are increasingly used in educational teaching and learning contexts in education. In this numerous studies suggest that to teach with ICT requires diverse areas of competence, such as pedagogical, technological and subject related ones (Eshet, 2004; Koehler & Mishra, 2008; 2009; Krumsvik, 2011; Mishra & Koehler, 2006; Shafer, 2008; So & Kim, 2009). In the following paragraphs we elaborate on what previous studies suggest as important avenues for understanding what kind of competencies would be relevant for teachers' pedagogical use of ICT and how teachers might be trained to allocate these kinds of competencies and skills.

In the earliest years of ICT and education, teacher training was mainly offered as isolated courses purely concentrating on how to use technology. To master diverse software and hardware was stressed more than how these could be integrated didactically within the subjects (Enochsson, 2010; Mishra & Koehler, 2006). Along with these discussions, researchers recognised that teachers ought to possess awareness for context in order to integrate technology into pedagogical practice (e.g. Graham et al., 2009). In these discussions the terms 'digital literacy' or 'digital competence' emerged. Several researchers have elaborated on what it takes to be digital literate or digital competent. Among these are Lankshear and Knobel (2006) and Buckingham (2006). While 'digital literacy', with some exceptions (e.g. Ferrari, 2012), seems to be the concept most commonly used internationally, 'digital competence' is the most commonly used concept in the Scandinavian countries in educational contexts. In these countries Krumsvik (2007; 2008; 2009) has been an important contributor to the development of