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The development of digital competence in first year pre-service teachers

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2017

http://hdl.handle.net/10539/23667

Muller, Claudette Ann (2017) The development of digital competence in first year pre-service teachers, University of the Witwatersrand, Johannesburg, <http://hdl.handle.net/10539/23667>

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Abstract

This thesis reports on the first year pre-service teaching students' development of digital competence at a South African university in 2013 and 2014. The aim of the study was to investigate the students' levels of digital competence as they commenced their first year of study. I also examined the barriers and enablers, as identified in the literature, and their impact on the students' successful engagement with Information and Communication Technologies (ICTs). In addition to this, the possible influence of computer attitude and a belief in one's own ability (self-efficacy) supplement the research findings in this area. I present quantitative and qualitative data that explore the students' digital competence levels and their understanding of what it means to be digitally literate. A definition particular to this group of students is proposed. In their definition of digital competence, the majority of the first year pre-service teaching students perceived digital competence to be a functional skill. This is the ability to operate digital devices and their relevant applications in the quest to learn and become self-reliant. This definition is aligned to Covello's (2010) description of an understanding of how to use computers and application software for practical purposes. This ability to functionally operate various devices (FutureLab, 2010), the ability to use computers and other technology to improve learning, productivity and performance (JISC and Mc Hardy, 2013), links to one part of Ferrari's (2012) digital competence definition as the knowledge, skills, attitudes, values and awareness required when using ICTs and digital media.

After completing a baseline digital competence test as they entered the HEI, I found that 43% of the first year pre-service teaching students failed the test. I identified three main factors that impacted negatively on a first year pre-service teaching student's engagement with ICTs and ultimate development of digital competence. These include inexperience with ICTs, access and user-unfriendliness of software. Four main enablers to the effective use of ICTs include previous experience using ICTs, previous and current access to ICTs, user-friendliness of software, and finally, support in the form of support material or people.

Using quantitative findings obtained from the completion of the Loyd and Gressard Computer Attitude Scale (CAS), I ascertained the students' computer attitudes. Through the application of the Murphy's (1989) Digital Self-Efficacy test, the current levels of the students' digital self-efficacy (DSE), or beliefs in their own abilities, were established. I found no correlation between computer attitude and a student's digital competence. The majority of students who failed the baseline test had a positive computer attitude. I also found the majority of students surveyed had a strong or very strong belief in their own ability. The majority of the students who passed the test had a very strong DSE and the majority of students who failed had an average to strong DSE. Students who passed the test tended to have higher DSE levels than students who failed the baseline test. A strong belief in one's own ability was found to be a strong determiner in learning to become digitally competent.

A unique application of Actor Network Theory was employed in the data analysis. The analysis methodology was informed by an adaption of Barab, Hay and Yamagata-Lynch's (2001) node components. The use of Actor Network Theory as an analytical lens in the data analysis, confirmed the importance of zooming in on and unpacking a student's network of learning to better understand the hidden processes at work. Through an analysis of six students' networks of learning, I found that each student's learning network was unique. Using actor network theory to scaffold my analysis it became apparent the differences in the students' learning networks told a more important story than the few commonalities. The only commonalities evident between the six students in the moment I unpacked each learning network were that they were both initiators and participant in their networks. They interacted with digital devices and were not first time ICT users. These commonalities seem quite immaterial when compared to a minimum of 16 differences. A few of the identified differences include the digital resources the students relied on, their computer attitudes, levels of digital self-efficacy and their baseline test results.

My study contributes to knowledge in four ways. Firstly, I establish the digital competence skills of first year pre-service teaching students. Secondly, I identify the barriers first year pre-service students encountered when using ICTs. Thirdly, I look at the possible impact of computer attitude and digital self-efficacy on the development of digital competence. Finally, I detail the networks of learning to be digitally competent. Through this expansion of students' networks of learning, the connections between the various nodes and actants at work become apparent. This gives readers insight into what nodes are at play within these networks and what the pre-service teaching students identify as significant in their learning. In this study, I confirm the necessity for a first year digital competence or ICT course. My study shows that the students entered the HEI with low levels of digital competence and encounter multiple barriers when accessing ICTs. While literature suggests computer attitude impacts on the development of digital competence, in the reality of my study, I found digital self-efficacy to have a higher statistical correlation with digital success. Studies such as mine provide detailed descriptions and analyses of the practice of coming to be digitally competent. The identification of, and investigation into the possible factors impacting on a pre-service teaching student's development of digital competence better assists Higher Education Institutions and course designers alleviate possible barriers, while increasing enablers.

Keywords:

Digital competence; Actor Network Theory; pre-service teachers; computer attitude; digital self-efficacy