A Learning Sciences Perspective on the Development of Teachers' Digital Identity

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Abstract: This case study explored pre-service teachers' development of digital identity by uncovering their thinking on technology as connected with pedagogy to construct learning activities. 27 participants' learning artifacts (e.g. an open-ended questionnaire about digital tool selections) were collected throughout a 14-week licensure course. Primary findings showed that teachers' perceptions of digital tools shifted from a single-purpose to a versatile-purposed approach, presenting the growth of digital identity with pedagogical changes toward to student-centered design.

Keywords: Digital Identity, Teacher Development, Technology Integration

Introduction

From a learning sciences perspective, it is essential to know the trajectories of growth in teachers' knowledge and practice (Fishman, Davis, & Chan, 2014). With the growing need for integrating technology into teaching and learning, education in the digital age is being redefined by the ubiquitous of learning with emerging technologies. With these new learning opportunities, digital thinking along with digital identity are developed by educators who teach themselves a new technology, redesign pedagogies to amplify the use of technology, and redefine learning environments for students. In other words, our thoughts can be shifted and transformed with digital tools that foster creative learning, reconstruct learning identities (Loveless & Williamson, 2013) and situate digital identity (Goode, 2010). While teacher preparation programs are keeping up with the digital changes to develop pre-service teachers' pedagogical mindsets and skills (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012), there is a need to understand how pre-service teachers reconstruct their digital thinking through their own technology integration practice (Burden, Aubusson, Brindley & Schuck, 2016).

Therefore, the purpose of this study is to understand pre-service teachers' conceptual changes on digital identity through technology integration. This study intends to provide further insight into how teachers cultivate their own digital thinking in their instruction and curriculum and transform their own pedagogy in digital age. In order to uncover pre-service teachers' thinking process, the research questions have two facets: (1) how do pre-service teachers perceive the use of technology in teaching and learning? and (2) how do pre-service teachers conceptualize their digital thinking?

Method

This study utilized case study methods (Yin, 2014) with an aim to support the development of tech-integration theories within teacher preparation programs. Data were collected from a 14-week licensure course about technology integration in teaching and learning at a midwestern university in the U.S. Throughout the 14-week course, 27 participants engaged in course discussion to reflect on general topics of technology in education, including technology integration frameworks, digital citizenship, 21st century learning skills, instructional media, classroom management, alternative assessments, differentiation, and culturally responsive teaching. In addition to course discussion, participants had opportunities to share their reflections through different digital tools and create a digital portfolio by using the features on Google Sites. Data sources were 27 pre-service teachers' learning artifacts, including: (1) open-ended questionnaires, (2) online postings, and (3) self-reflections. A content analysis was performed using both open coding and constant comparative methods (Miles, Huberman, & Saldana, 2013) to investigate the conceptual changes of teachers' digital thinking.

Primary findings

The frequency and percentage of technology tools used that were pre-service teachers' self-reported favorites both in the first week and the fourteenth week were investigated. During the first week, a majority (65.5%) of responses identified a specific device that was useful for a teacher, whereas the rest (34.5%) identified a specific software application that was useful for a teacher or student. However, at the 14th week, teachers expressed their thinking differently. The reasons these tools were named as favorites in the majority of responses were categorized by the researcher as enabling student-centered creation (32%) and enabling teacher assessment (32%). For instance, teachers liked the ability to have learners create digital stories and to evaluate learners'

performances instantly. The rest responses were categorized as classroom management (21.4%) and teaching materials (14.3%), such as recognizing a platform to manage learning materials for students or using a technology to create instructional media for students.

These results indicate a technological and pedagogical knowledge shift among pre-service teachers during the course. The researcher took a closer look at their thinking. In the first week, the device and software application responses represented a perception of the technology tool on an efficient '*single-purpose level*'. This can be seen from a participant's statement identifying the computer as a favorite tool because it "*allows students to search and become intrigued. It improved my research skills over the years and I know it can do the same for my students as well*" (PT#2). In contrast, in response to the same question at the end of semester, all the digital tools declared as favorites by participants were categorized as diverse software usages. To be more specific, their responses about these software applications showed that their thinking developed and expanded to connect technology with pedagogical knowledge, such as creation or assessment. Participants started to describe a favorite tool with mindful educational purposes by saying that "*it is a different way for students to express themselves and show what they learned in a way that isn't a written paper*" (PT#10). Given the fact that participants considered diverse educational purposes when choosing tools for their instructional design, the researcher found this perception pattern as the '*versatile-constructed level*' during their post-training.

Conclusions

Based upon this initial study, the researcher found that pre-service teachers' perceptions of digital tool usage are interfering with teaching beliefs. As participants gained opportunities to explore their choice of different technology tools throughout the 14-week course, they looked at the tools' uses from a more constructivist mindset. Thus, at the end of the course, their selection of a favorite tool was no longer based on a specific device for efficiency; rather, they considered more which tools best support teaching and learning in practical ways. The researcher argues that the development of digital identity is not only overlapped between technological knowledge (e.g, participants' self-learning of the applications of a new tool) and pedagogical knowledge (e.g., participants' reflection on how to integrate a tool with pedagogical approaches), but also fostered by community of practice (Wenger, 1998). This implies that with the rapid change in technology products, future teachers are starting to teach themselves to use a new technology tool and develop their digital identity through wider participation with an attempt to transform pedagogies for students.

In addition, professional development could foster both transformative use and learning by facilitating teachers rethinking their personal pedagogical mindsets and redefining a tool to meet students' learning purpose when integrating technology into classrooms. Furthermore, this study suggests that teachers be mindful of their development of digital thinking and identity to transform learning through technology integration. To validate primary study results and examine the above patterns and assumptions, future research of this study will continue exploring and analyzing other participants' artifacts, including teachers' digital portfolios and lesson plans to triangulate the initial findings of this study.

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