Teacher Efficacy in 1:1 Tablet Integration

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Abstract: This poster details the theoretical framework and current progress of a one-to-one tablet initiative at an urban middle school in the southeastern United States. Results of the first iterative cycle are examined. Issues of teachers’ efficacy with technology and TPACK integration, teachers’ interview data, examples of the collaboration between teachers and researchers around effective technology integration, and observational data will be shared.

Introduction and Background

Many schools are beginning to adopt one-to-one computing with the goal of developing students’ 21st century skills, which allow students to learn not only content but also acquire critical skills (e.g. creativity, collaboration, and digital literacy) (Pellegrino & Hilton, 2012). Researchers (e.g. Keengwe, Schnellert, & Mills, 2012) have demonstrated that technology integration is essential to meet this goal; however, the existing technology infrastructure is insufficient to develop the desired outcomes of these implementations (Greaves et al., 2012). Currently, there has been little research (e.g. Fleisher, 2012; Greaves et al., 2012) that examines teacher appropriation of the tablets into their pedagogy. Teachers often do not understand or have the time to spend learning about the functionality of the devices. According to Ifenthaler and Schweinbenz (2013), a majority of teachers are open to integrating tablets and feel they would enhance their practice, but others are not confident about using a new device in their everyday instruction. In addition, how teachers actually integrate devices into their practice is often dictated by school culture (Fleisher, 2012; Greaves et al., 2012). When teachers lack the knowledge of how to use technology, their attempts to integrate technology successfully are often limited (Koehler, Mishra, Kereluik, Shin, & Graham, 2014). Others (e.g. Kim et al., 2013) have shown that internal barriers, attitudes, beliefs, and efficacy with technology still impact levels of technology integration. Teachers who have more student-centered pedagogical beliefs are better at integrating technology as a part of their classroom whereas those with teacher-directed pedagogical beliefs are more likely to use technology as enrichment to the lesson (Kim et al., 2013). Using a TPACK framework (Mishra & Koehler, 2006), this research project aims to help middle grades teachers integrate technology effectively and redefine (Puente, 2009) teaching and learning in the content areas. The following questions guide our research: 1) How do middle school teachers develop pedagogies that integrate technology within their discipline?; 2) How can teachers integrate tablet computers (e.g. iPads) into content specific applications that move beyond a level of substitution?

Theoretical and Methodological Frameworks

This study is part of a larger design-based research project (Brown, 1992) that is examining the use of iPads within specific content contexts. Design-based research emerged from the dialectic between theory and design in research, with theory suggesting an improved design and design suggesting new dimensions to theory. While theory and design can and do
exist independent of one another, there is still an inherent connection between them. Design-based research is an iterative process that is based upon outcomes that can impact the modification of instructional practice through monitoring and self-regulation (Schoenfeld, 2006).

A TPACK framework (Mishra & Koehler, 2006), which permits a teacher to draw on his or her knowledge of all three domains – content, pedagogy, and technology – in a synergistic manner, provides the lens for this study. An educator’s TPACK or technology integration knowledge is operationalized when he or she identifies an effective combination of curriculum content, a particular pedagogical approach, and a use of a technology tool or resource to support the learning experience. Additionally, the SAMR lens (Puentedura, 2009) was utilized to examine how technology is impacting teaching and learning in the classroom. This model also demonstrates the trajectory that those who adopt educational technologies often take as they navigate the use of educational technologies in their teaching and learning practices.

**Research Design and Methods**

*Study Context - School* - Caldwell Middle School [Pseudonyms are used for schools, teachers, and students] is an urban middle school in the southeastern portion of the United States. The school is a Title I school with a diverse population (N=647): White 8%, African American/Black 66%, Asian 3%, Hispanic 21%, Native American 2%, Multiracial 2%. Eighty-percent of the students receive free or reduced lunch. 81% of the students are classified as ED; 11% are identified as LEP, and 19% are identified with disabilities. This study focused on a sixth grade team (Students n=100; Teachers n=4). Ninety-six percent of the teachers at Caldwell meet the federal guidelines for highly qualified, and 39% have advanced degrees. There is a high degree of teacher turnover (23%) in the school.

*Data Sources* – Multiple sources of data collection are part of this study. These include: Semi-structured interviews with teachers, teacher surveys, field notes and observations, teacher lesson plans, and video data. This allows for the triangulation of the data. The data collected documents teachers’ perceptions and uses of technology, mainly the iPad, in their pedagogy. Teacher reasoning was captured through the interviews. This data supported and refuted the emerging hypothesis about teachers’ efficacy and use of technology in their classroom practice.

*Data Analysis* - Interview data was transcribed and analyzed using HyperResearch. Researchers coded the transcripts using a grounded theory, constant comparative method (Strauss & Corbin, 1998). Open coding was utilized to develop the initial codes. Once the data was saturated with codes, a second level of coding was completed and axial codes were identified. These codes were organized into broad categories or core codes (Strauss, 1987) which provided a framework to analyze the data. At least two members of the research team coded transcripts and inter-rater reliability was calculated.

**Results and Analysis**

The findings reported in this proceeding are preliminary and based primarily upon self-reported interview data and classroom observations. Even at this early stage, a number of interesting findings and themes have begun to emerge from the teacher and classroom data. Themes include: teacher perceptions, technology uses, and levels of comfort. These will be discussed below.
Themes 1 and 2: Teacher Perceptions and Technology Uses - As part of the semi-structured interviews, teachers were asked to complete a circle of technology influence on their teaching practices. This was completed using Inspiration software with technology practices being at the center and various technology software, hardware, and practices on the outside. Teachers were asked to place the various technologies close to or at a distance from the center circle based upon how the technology influenced their own teaching practices. As they completed this activity, we asked them to reflect on their reasoning for the placement, talking through their reasoning as it was occurring. In addition to this teacher-generated map, the research team completed a similar map based upon classroom observations that had previously occurred.

What emerged was a dichotomy between what teachers perceived their pedagogical practices entailed and what researchers had observed in their classrooms. The first example of this was demonstrated in the science classroom. While the teacher had placed using a laptop fairly close to the center circle, there was still some distance observed. From the classroom observations, the research team had noted the daily use of the laptop by the instructor. The uses included management types of activities such as attendance, but also included using the laptop to...
stream videos, websites, and other software used in instruction. It was clear that the laptop was an important component in how he presented his content material and planned for instruction.

A second example emerged from the use and influence of specific websites on his teaching practice. All websites mentioned in the interview were not websites that the researchers have observed being used during instruction. For example, the science teacher referenced sites like Bob the Alien, Enchanted Learning, and Pete's Power Point during the interview; however, the researchers have observed the science teacher using sites such as Discovery Learning, Quizlet, YouTube, and AAAS Science Assessment for instructional purposes.

Another area of interest was the discussion of QR Codes. QR Codes were positioned to show high influence on teaching practices, but we have yet to see this form of technology utilized or even mentioned in the classroom. When asked to clarify the position of the QR Code it was noted by the teacher that “students really, really liked QR codes,” which seemed to be his justification for why the square was placed closer to the circle. At the same time, he noted that “you had to be 13 to use QR codes.” This was repeated several times, almost as a justification for why he was not using QR Codes. The research team, on the other hand, had placed the same QR Code square a great distance from the circle. No member of the team, during many hours of classroom observation, had observed any use of the codes, nor had they been mentioned in any way during class discussions.

Theme 3: Teacher Comfort Levels with Technology - Upon the completion of the interview and classroom observations in the first iterative cycle, it was clear that the science teacher’s definition of technology was very limited. Everyday technologies (e.g. DVR or flat screen televisions) were not seen in the same category as laptops and iPads. These perceptions of what is “technology” and what is “not technology” have an impact on both his planning and pedagogical practices. It influences how he thinks about using technology in his own practice. This limited knowledge and experience of what is available lends him to stick with websites, videos, and other applications that he is comfortable using. In turn, this leads to less variety in lesson implementation and positions his technology use in the substitution level of the SAMR model.

Discussion and Implications

During this first iterative cycle, emergent themes have developed from teachers’ interview data and initial classroom observations. Our data is demonstrating that there is a distinct difference between teachers’ perception of technology use in the classroom and teachers’ actual practice; what teachers mentioned about technology integration during interviews was not always observed in practice. The use of QR Codes as previously described is an example. Second, teachers are not aware of all the ways technology can be incorporated into lessons in an authentic manner. As would be expected within a team of teachers from a variety of backgrounds and experiences, teachers’ comfort levels with technologies available and their perceptions of other teachers’ integration are varied. However, what we have observed thus far was that when new applications were introduced and modeled for teachers, they would begin to reach out beyond their traditional comfort zone. Third, and finally, several challenges have presented themselves during the early parts of this long-term study: school connectivity issues, requirements for downloading apps on student iPads, concerns about the effectiveness of professional development about technology, and varied access to teachers.

It is our hope that continued work in the classrooms will reveal areas of
professional development that can be offered to the teachers. In addition, as this design experiment evolves we endeavor to have a positive impact on students’ learning. Ultimately, our goal is to help students and teachers use technology in effective ways that redefine (Puente, 2009) teaching and learning in each of the content areas.

References


