Needing TPACK without Knowing It: 
Integrating Educational Technology in Social Studies 

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Preparing future elementary teachers to connect social studies content and skills with technology necessitates the integration of technology into teacher preparation methods courses. Such integration hinges on the identification of pre-service teachers’ level of Technological, Pedagogical, and Content Knowledge (TPACK). These three knowledge areas help shape smart uses for educational technology beyond entertainment that utilize technology in educationally profitable ways. The TPACK model is useful for identifying the knowledge required by pre-service teachers for the purpose of wedding instructional technology to social studies content and instruction. The purpose of this mixed-methods study was to describe and to analyze the integration of an instructional technology lesson in an elementary social studies methods course in a large Midwestern university. The study, specifically, describes and reports on 25 pre-service teachers’ perceptions of the utilization of a social studies software technology called Timeliner. The study reports on the level of TPACK awareness of the study’s pre-service teachers and offers implications related to instructional technology integration in elementary social studies methods courses. 

Keywords: educational technology, elementary schooling, social studies methods, teacher preparation, technology integration, TPACK 

Purpose 

Educational technologies are seldom utilized in elementary social studies classrooms (Swan & Hofer, 2008). If used, social studies educational technology integration often has been limited to the playing of software games like The Oregon Trail or Where in the World is Carmen Sandiego (Swan & Hofer, 2008; Taylor & Duran, 2006). These edutainment games are marketed as fun ways to learn social studies (Buckingham, 2007). Such games neglect the Technology, Pedagogy, and Content Knowledge (TPACK) for educationally profitable technology integration in elementary school content areas. 

Preparing future elementary teachers to connect social studies content and skills with technology necessitates the integration of technology into teacher preparation methods courses. Such integration should allow pre-service teachers to recognize how pedagogical practice and social studies content can be enhanced with instructional technology. This study examines an initial step in the process, describing and analyzing the integration of instructional technology into an elementary social studies methods course. 

Theoretical Framework 

Technological, Pedagogical, and Content Knowledge (TPACK) provides the theoretical framework for this study. The TPACK model is commonly defined as the interconnection and intersection of content, pedagogical practice, and technology in educational contexts (Koehler & Mishra, 2008; Mishra & Koehler, 2006, 2007, 2009). Reporting a 2010 study, Mark Hofer and Judi Harris explained “in order for teachers to effectively integrate technology in their teaching, they must synthesize their knowledge of curriculum content and teaching strategies along with
the affordances and constraints of technological tools” (p. 3857) and the blending of these knowledge areas are what is known as TPACK. In social studies methods courses, TPACK is useful for identifying the knowledge required by pre-service teachers in order to match instructional technology to social studies teaching and content. A technology meeting this prerequisite is Google Earth™ as a teacher could utilize it to teach geographic regions.

This article describes how pre-service teachers utilized, assessed, and negotiated TPACK through the integration of an instructional technology that allowed for the creation of timelines. The technology, Timeliner (Snyder, 2010), is a social studies software that facilitates the creation of digital multimedia timelines. Pre-service teachers’ perceptions of Timeliner in relationship to their level of TPACK awareness are examined. The article concludes with a discussion of the implications related to educational technology integration in elementary social studies methods courses.

Relevant Literature

A decade and a half ago, the National Council of Social Studies (NCSS) asserted the integration of social studies teaching with instructional technology “can add important dimensions to students’ learning” (National Council for the Social Studies, 1994, p. 165). The way in which instructional technology enhances the dimensions of teaching and student learning, however, is not well understood. Elementary school teachers often integrate technology with little thought as to how it could be educationally profitable or pedagogically meaningful (Buckingham, 2007; Cuban, 2001; Selwyn, 2002). Teacher education programs are implicated for neglecting to support and train pre-service teachers with instructional technology skills.

The literature suggests teacher education programs should do more to train future teachers on how to integrate technology (Ertmer, Ross, & Gopalakrishnan, 2000; Hare, Howard, & Pope, 2002). The literature further calls upon teacher education programs remedy the situation (Ertmer, et al., 2003; Zhao, Byers, Pugh, & Sheldon, 2002). A 2003 study, Cheryl Bolick, Michael Berson, Christopher Coutts, and Walter Heinecke found elementary social studies methods instructors seldom used instructional technologies. Accounts of instructional technology integration in elementary social studies methods courses are rare (Brush & Saye, 2009; Hew & Brush, 2006; Good, O’Connor, Greene, & Luce, 2005).

Since the publication of Expectations Of Excellence: Curriculum Standards for the Social Studies (NCSS, 1994) researchers have called for pre-service teachers to gain experience implementing meaningful ways to use available technologies (Beisser, 1999; Bolick et al., 2003; Franklin, 2007). In their 2007 longitudinal study of 23 elementary social studies teachers, Cheryl Franklin and Philip Molebash posited a relationship between successful technology integration and the practice pre-service teachers have integrating technology in methods courses. The literature tends to conclude: if pre-service teachers are to integrate instructional technology into their teaching practice, then instructional technology integration in methods courses are vital. The literature emphasizes the need for more empirical research into the integration of instructional technologies in elementary social studies methods courses (Beisser, 1999, 2005; Bolick et al., 2003; Brush & Saye, 2009; Franklin & Molebash, 2007; Friedman & Hicks, 2006; Taylor & Duran, 2006).

Methodology

There is a gap in the literature empirically documenting the integration of instructional technology in elementary social studies methods courses. To address the gap, this study
examined technology integration in a social studies methods course. The following research questions guided the study: (a) What are the perceptions of elementary, pre-service teacher candidates of the integration of technology in a social studies methods courses? (b) To what degree, if any, do pre-service teachers recognize their TPACK when utilizing the Timeliner software? The TPACK theoretical lens helped to shape the hypothesis of this mixed-methods study.

The hypothesis that guided this study was: pre-service teachers will develop social studies TPACK curricula when provided opportunities to plan, organize, implement, and assess the integration of social studies instructional technology. In order to explore the hypothesis, the researcher combined qualitative and quantitative research paradigms in a mixed-methods approach. The quantitative data allowed some generalizations to be drawn about pre-service teacher perceptions relative to the integration of social studies instructional technology. By using the participants’ own language and artifacts, the qualitative data provided rich descriptions of the emergent themes. The data for both the quantitative and qualitative analyses were drawn from the same convenience sample. The participants in this mixed-methods study were 25 pre-service teachers at the senior undergraduate level (N = 25). The participants were part of a section of an elementary social studies methods course at a large, Midwestern university.

The Context: Timeliner Activity
The 25 participants took part in a multiple class session activity in which they created interactive timelines around United States Civil War themes using Timeliner software. For this activity, the participants were divided into groups of five. Each group was assigned a different perspective or theme for their interactive timeline. The following perspectives were represented: cultural and literary influences of the Civil War, political and economic influences of the Civil War, military and political influences of the Civil War, significant local events (i.e. Midwest region) that influenced the Civil War, and global events happening at the same time. Groups used the Internet to conduct their background research on these perspectives. Each group had to identify at least five images and stories that represented their perspective about the Civil War. The timeline was confined to a specific time frame, from 1830 to 1870. One requirement was the inclusion of a short group summary description of each image or event’s significance. Groups, likewise, were asked to include a title for their interactive timeline. At the end of the project, each group’s interactive timeline was merged, using the Timeliner software, to produce a strong representation of the causes and effects of events of the Civil War.

Data Sources and Analysis
Quantitative. The quantitative source was a four-item Likert scale survey of the participants. The survey instrument addressed factors assessing the development of TPACK in pre-service teachers. The instrument was designed to identify the participants’ perceptions of the (a) technology skills and knowledge, (b) pedagogical practice, and (c) depth of content learned because of the integration of the timeline creator software. See Appendix A for the specific Likert scale survey questions. Print versions of the surveys were distributed to the participants after completing the Timeliner activity. Out of the 25 participants, 23 completed and turned in the survey, a 92% response rate. While all students agreed to participate in this study, two had to leave early on the day the survey was distributed. These two students only participated in a small percentage of the Timeliner activity and did not complete the survey.
The quantitative analysis was at a descriptive level. One limitation with using quantitative data from only one classroom of pre-service teachers was small sample size, which does not provide for generalizing to a larger population. An advantage, however, of using quantitative results is the participants provided an overview of the levels of TPACK, which pre-service teachers enact when given a social studies activity which integrates an instructional technology. The quantitative data also provided a way to triangulate with the study’s qualitative findings.

Qualitative. There were four qualitative data sources. Field notes written in short hand during the class session provided one source. These notes were based on field observations and written after the activity was complete. Artifact collection provided a second source of data. The artifacts for this study were the five digital timelines, which the participants created about the United States Civil War. Comments from the Likert surveys were the third source. Of the pre-service teachers to turn in the survey 65% or 15 of the 23 pre-service teachers included comments. The fourth qualitative source was the large group interview conducted with 23 of the 25 participants. The interview questions focused on the knowledge and skills necessary for using Timeliner as well as how the participants would integrate a similar activity as professional teachers. The interview took place two weeks after the initial class activity.

Qualitative research methods were used for the analysis of the collected data. Field notes, artifacts, and interviews were analyzed using a three-step interpretive approach (Miles & Huberman, 1994). Data were organized according to categories. The constant-comparative method (Glaser & Strauss, 1967) then was used to find patterns within and across categories. Each source of data was compared and contrasted in order to identify similarities, differences, and frequencies within the data. The frequencies were further analyzed to establish patterns in the data. While reading the data and using the initial broad categories, patterns and themes were made into codes (Merriam, 1998). Meta-matrices were created in order to allow for contrasts, comparisons, quotes, and additional themes to be probed (Miles & Huberman, 1994).

Results

Three key findings emerged from data analysis. The first finding suggests pre-service teachers identify technological knowledge as an increasingly necessary part of their future teaching careers. A second finding, yet, suggests while many pre-service teachers in this study perceived technology to be useful in teaching, they were unsure about how it is to be utilized. The study’s participants exhibited a beginning level of technological knowledge as related to TPACK. The third finding suggests the pre-service teachers are likely to separate technological knowledge from pedagogical and content knowledge rather than integrate the knowledge areas. In the rest of this section, the findings are examined in greater detail.

Technology in the Social Studies Classroom is Inevitable

The pre-service teachers in this study understood instructional technology integration as a growing part of their professional teaching practice. Question 1 on the study’s Likert scale survey asks, “As a future teacher, how much educational technology, like the Timeliner software, can you envision using for teaching about social studies?” In response to that question, 22 of the 23 or 96% of the participants indicated they would use educational technology, like Timeliner “somewhat” or “to a great extent,” in teaching about social studies.

In the large group interview as well as within their comments on the Likert scale survey, participants further indicated “it is very important to expose students to technology because it is
a big part of our culture” and “technology can help liven up history and social studies.” Another participant added, “technology is important to keep up with since students are now exposed to so much technology outside of class, and we as teachers need to work with their prior knowledge and relatable experiences.” The comments appeared to reflect how pre-service teachers perceive educational technology as something they will use in their future classrooms, including in social studies.

While the majority of the study’s pre-service teachers were committed to utilizing technology, some did so with a cautious view about educational technology. One respondent stated, “I’ll be honest . . . I am not a big fan of technology of in the classroom, I think it is too distracting.” Another added, “I think bringing tech to a class is a good idea, but other ways of teaching are equally important to involve all student learning styles.” While another participant shared, “Technology needs to be an educational tool, not just a crutch. Technology can not make up social interaction.” Such comments reflect the contested nature of the field of educational technology (Buckingham, 2007; Cuban, 2001). Even though the participants who voiced these admonitions of technology were in the minority; their critical comments, perhaps, are indicative of the limited ways that educators understand how technology can impact learning. The majority of the study’s participants concurred with the sentiments of one of their fellow pre-service teacher, who said, “Technology in the classroom is inevitable, it connects students to a modern society.”

**Developing Beginning Technological Knowledge**

A few of the pre-service teachers in this study, however, had an idea of how technology connects to student learning. Question 2 on the Likert scale survey asked, “Did the *Timeliner* software help you to stay more engaged in learning the social studies content?” The question was designed to measure the participants’ engagement of the content through the utilization of the *Timeliner* software. Of the 23 participants, all responded positively to this question. Almost 70% or 16 participants selected “to a great extent” and 7 participants or 30% selected “somewhat.” The participants’ responses to Question 3 on the Likert survey were equally positive. Question 3 asked, “Did you learn more about events surrounding the Civil War because of *Timeliner*?” More than 82%, or 19 of the 23 participants selected, “Yes, to a great extent” whereas 16% or 4 participants selected, “Yes, to some extent.” When asked, the participants had a difficult time explaining why *Timeliner* helped them learn more about the United States Civil War or how *Timeliner* kept them engaged in the social studies content. When participants were asked to comment on either question during the large group interview or on the comment section of the Likert scale survey, one participant responded by saying, “The technology was cool!” Another participant explained, “*Timeliner* provided the freedom to search what I wanted, but enough focus that I could stay on task without getting bored.” The responses revealed how pre-service teachers valued educational technology, but were unclear or could not verbalize how the educational technology engages the learner. The responses were nebulous and centered on the “coolness factor” or how educational technology provided freedom from boredom.

While the participants were enthusiastic about being engaged with *Timeliner*, their interview responses and comments on the Likert scale survey did not include connections to the purpose of the activity in relationship to the *Timeliner* technology. The technology was viewed as more of a cool tool for searching and hands-on learning rather than as a way to gain a richer
perspective on the Civil War. In sum, this study’s pre-service teachers tended to reflect an emergent level of technological knowledge as it relates to social studies content learning. They understand the potential of using educational technology, but neglect how it helps support content learning.

**Separate Technological Knowledge from Pedagogical Knowledge**

The third finding to emerge from the data was a tendency by the pre-service teachers to dissociate technological knowledge from pedagogical knowledge rather than connect the two. This theme emerged from the interview responses and comments related to Question 4 of the Likert scale survey, which asked, “How likely, as a teacher, would you use the *Timeliner* software in social studies?” In responding to that question, 4 participants, or 17%, selected “very likely”; about 70%, or 16 participants, selected “likely”; and 3 participants, or 13%, selected “not likely.”

The participants provided the reasons why they would use the software. During the interview, one participant said, “I would use it, because for me, seeing historical events on a timeline is very helpful.” Another participant explained, “I would use Timeliner whenever dates or recognition of time is a crucial element to the class goal and objectives.” While another participant wrote this comment in the survey, “To introduce the software, I think it would be positive to create a personal timeline so students could ‘see’ their own history.” This sampling of comments reflects a certain amount of developing pedagogical knowledge. Each participant speaks of using the technology to fit within a lesson theme or to help improve a lesson. During the interview, the comments were followed up with questions about how the pre-service teachers would integrate educational technology in social studies. One pre-service teacher replied, “It really depends on what is available and how much time it would take to set up.” Another participant responded, “I am not sure exactly how, I know I would like to use technology to teach social studies, but it seems that social studies is dependent on a lot of book knowledge.” Both quotes are telling. The first quote relates pedagogical decision making with hardware setup rather than the actual repurposing of technology in educationally profitable ways. While time management is an important part of teaching and learning, the response focuses on barriers (i.e., availability and time constraints) to educational technology integration rather than on possibilities. The second quote reflects the uncertainty pre-service teachers may feel when it comes to integrating technology with social studies. Most would like to integrate technology with social studies, but are unsure about how and, even more worrisome, do not connect social studies content with affordances of enhancing the content with educational technology.

**Discussion and Recommendations**

It is easy to wonder how many pre-service teachers associate social studies with just a lot of book knowledge. Many pre-service teachers are considered digital natives as they have been reared in the Information Age where activities such as tweeting and texting are commonplace. This study’s findings, however, show many of these same digital natives are bewildered about ways to integrate social studies content and pedagogical knowledge with their technological understandings. They need TPACK without knowing it. They need the framework that TPACK offers about how to merge their technological know-how with what they teach and how they teach it. The study uncovered how pre-service teachers often separate technological and pedagogical knowledge when working on a social studies activity. The study also suggests many
pre-service teachers may be at a beginning level of technological knowledge as it relates to TPACK.

Before discussing of the study’s findings, the article acknowledges the study’s limitations. The first limitation was small sample size. The data from this study were collected over three class sessions so there is a limited time frame. The study, as such, does not allow generalization to the entire elementary pre-service teacher population or to social studies methods courses for elementary pre-service teachers. As a researcher conducts research, he or she becomes the instrument of research (Gall, Gall, & Borg, 2007). The interpretations of a researcher are found in stages of the research methodology. Subjectivity, therefore, influences the research design and conclusions. The article’s author, for example, has a bias toward educational technology. The author is a user of technology and a teacher educator who integrates educational technology in his classroom. Likewise, the author advocates for the benefits of educational technology and privileges the integration of instructional technology in elementary schools as being a strength and reality for the future despite the study’s limitations. Another limitation of the research was the interview because of potential bias due to the wording of questions. While the study does not have evidence for this and tried to design the interview questions to guard against reflexivity, it is still a possibility. Participants can give biased responses and state what they believe the interviewer wants to hear. Potential language bias in wording of questions could have led participants to certain responses.

While these limitations exist, this study is intended to be an initial exploration of TPACK development in elementary pre-service teachers. As such, there are two important implications for teacher educators and, more broadly, for the field of social studies. The study, first, offers insight into perceptions of a small group of pre-service teachers regarding the integration of instructional technology in a social studies methods course. Such perceptions were found to be indicative of basic or beginning TPACK knowledge which most pre-service teachers possess. In response to this finding and the study’s limitations, the study calls for additional research related to the development of a TPACK curriculum that would help pre-service teachers cultivate TPACK.

Margaret Niess (2011) asserts that one area of research is the development of a TPACK type instrument that could provide an initial assessment of pre-service teachers’ TPACK awareness. An example of this kind of instrument is the kind used by Mark Hart and Swapna Kumar (2014) in their research on the early identification of pre-service teachers’ TPACK. They developed a pre-course survey instrument that pre-service teachers can use to begin self-assessing their TPACK knowledge. Such a survey provides a way to launch into explicit instruction of what the TPACK model entails and how it could prove to be useful to a pre-service teacher when designing and implementing lessons using educational technology, especially in social studies. Teacher education courses should include explicit instruction about the TPACK model and give pre-service teachers opportunities to design and reflect on lessons that include the intersection of technology, pedagogy, and content. This process is especially important in social studies, so the field can move from a mere reliance on edutainment type software to more authentic uses of technology that mesh with the content and pedagogy.

At the start of the article, the point was made that instructional technologies are seldom used by elementary social studies teachers (Swan & Hofer, 2008). Research shows that teaching with instructional technology is not modeled by social studies methods instructors (Bolick, et al.,
Preparing future elementary teachers to connect social studies content and skills with technology necessitates the integration of technology into teacher preparation methods courses. This point was emphasized by Keith Wetzel, Ray Buss, Teresa Foulger and LeeAnn Lindsey (2014) in their research on TPACK in teacher preparation courses. They recommend teacher preparation include a greater modeling of hands-on learning with a focus on content and the pedagogical uses of technology. In social studies methods courses, such modeling could include the pedagogical investigation of Internet based technologies such as TimeToast.com (Todd, 2009), a free interactive timeline creator, and Gapminder.com (Rosling, Rosling, & Rosling, 2005), an excellent site for visual data displays that can be used to explain global and historical changes over time. These are just two examples of the many Internet-based websites that can be used to model TPACK in social studies. The modeling of TPACK must also include the integration of mobile technologies comparable to cell phones (Burke & Foulger, 2014).

Such modeling should also incorporate an understanding of social networking, an important point related to social studies and TPACK. Microblogs and wikis are examples of social networking tools that have great potential to be blended with social studies content and pedagogical knowledge. Pre-service teachers can follow and utilize Twitter updates, for example, from international news agencies in order to stay up-to-date on current events that happen at a global scale. A digital platform designed to connect people via video, text, or audio, Skype™, another social networking tool, has great potential for connecting with people and classrooms all around the world. Such technologies need to be examined through the TPACK framework in order to enhance teaching and learning in teacher preparation programs. The findings from this research suggest teacher preparation programs, particularly those in social studies preparation, would benefit by including a framework for the integration of instructional technology in their methods courses. The TPACK model could be a useful framework in this regard because it understands that the development of technological knowledge works side by side with pedagogical know-how and content mastery.

Conclusion

Pre-service teachers can feel ambiguous about the integration of technology within the social studies classroom. Though they are excited about the possible uses of technology in the classroom, when given a specific social studies technology application (e.g., Timeliner software) they may question its practicality. The ambiguity found among this study’s sample may indicate pre-service teachers need a stronger understanding of TPACK. At best, TPACK may be muddled in the minds of many pre-service teachers. Perhaps explicit instruction about the relationship between technological, pedagogical, and content knowledge is needed if pre-service teachers are to reexamine their prior knowledge and experiences related to their technological knowledge. In order for a pre-service teacher to develop TPACK, instructors may need to consider including technology within methods courses, especially in social studies.

References

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Web-based References


Appendix A

Likert Scale Survey

Directions: Please evaluate the Timeliner activity by circling the category that describes your experience. Here are the questions:

1. As a future teacher, how much educational technology, like the Timeliner software, can you envision using for teaching about social studies?

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<td></td>
<td>Not at all</td>
<td>Very Little</td>
<td>Some technology</td>
<td>To a great extent</td>
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Additional Comments:

2. Did the Timeliner software help you stay more engaged in the social studies content?

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<td></td>
<td>Not at all</td>
<td>Very Little</td>
<td>Somewhat</td>
<td>To a great extent</td>
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Additional Comments:

3. Did you learn more about events surrounding the Civil War because of Timeliner?

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<tr>
<td></td>
<td>No, not at all</td>
<td>No, not much</td>
<td>Yes, Somewhat</td>
<td>Yes, a great deal</td>
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Additional Comments:

4. How likely, as a future teacher, would you use the Timeliner software in social studies?

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<tbody>
<tr>
<td></td>
<td>I would not use it</td>
<td>Not likely</td>
<td>Likely</td>
<td>Very likely</td>
</tr>
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Additional Comments:

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