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More of the Same? Understanding Transformation in Tablet-based Academic Library Instruction

Abstract

A number of academic librarians have shared their experiences with tablet computers, but fewer examine how librarians use tablets in their instruction design. While the education literature provides models for understanding technology integration, the unique nature of academic library instruction requires adapting these models to the library classroom. After reviewing literature related to tablets in library instruction and a number of educational technology integration frameworks, this paper demonstrates an application of the SAMR framework to analyze observations of an iPad-equipped classroom at a single university library. Demonstrating the use of a framework in this way provides librarians with an approach to technology integration and continues the discussion about tablets' potential to promote innovative pedagogy.

Introduction

The 21st century technology landscape promises to transform nearly every area of the librarian's daily work. For many academic instruction librarians, this means capitalizing on new technologies to facilitate active, learner-centered information literacy instruction. And with trends like "mobile learning" cited as the future of educational computing, many librarians are experimenting with tablet technology as the next step in classroom computing.

Interest in tablet computers in higher education and academic libraries is moving beyond simply device ownership. While the 2012 and 2013 *Horizon Report Higher Ed Editions* list tablet computing as an emerging technology poised to significantly impact teaching, learning, and research in higher education (Johnson, Adams, & Cummins, 2012; Johnson et al., 2013), other reports highlight students' interest in using tablets during classroom instruction, as well as students' beliefs that tablets have educational value (Dahlstrom, Walker, & Dziuban 2013;

Pearson Foundation, 2012). Academic librarians have also found that student tablet owners use their devices for educational purposes (Cassidy et al., 2014), and that the majority of students would be willing to use tablets as their only educational device during a semester (Havelka, 2013). These findings suggest an opportunity for academic librarians to integrate tablet computers into instruction and explore technology-enhanced pedagogy.

It may be tempting to consider the tablet as just another computer in the classroom; however, the 2013 *Horizon Report* cautions, "it is increasingly clear that tablets are not a new kind of lightweight laptop, but rather a completely new technology" (16). Instructional approaches should take into account the unique teachable properties that tablet computers bring to the classroom and it is important to understand their value as instructional tools distinct from other computing devices. The transition to tablet computers also supports other hybrid learning trends, such as moves to greater online content in face-to-face classrooms, flipped classroom models, and data-driven learning (Johnson, Adams, Estrada, & Freeman, 2014). While academic libraries continue to document their use of mobile technology in the classroom, we must also examine whether tablet computers change classroom instruction design.

This paper adds to the existing body of literature describing the use of tablets in library and information literacy instruction by demonstrating how a framework may be used to understand tablet integration, offering librarians ideas for constructing learning activities and evaluating the way technology is integrated into typical library instruction.

Literature Review

New technologies are often thought of as opportunities to create new and innovative learning opportunities. However, as MacPhee (2009) notes, "When technology entered the traditional classroom, it did not immediately transform instruction. In most modern classrooms,

the lectern remains the nerve center of the classroom. And while the technology lecturen is an undisputed part of any modern classroom, it still represents a teacher- or teaching-centered approach to instruction" ("Formal Spaces" para 1.). Careful design of learning environments that take advantage of new or unfamiliar tools remains essential, as research also suggests that students may attribute negative aspects of instructional technology to poor implementation, rather than to the technology itself (Armstrong, 211). Information literacy instruction is a key component of academic library public services, and pressure remains for librarians to leverage new technologies in effective, innovative ways.

Mobile Learning and Tablets in Instruction

One of the most notable changes to personal and educational computing in the last decade has been the rise of mobile devices, and, more specifically, tablet computers. While Microsoft first coined the term "tablet computer" in 2000 – 2001 (Griffey, 2012), tablets began to have a major impact on personal computing after Apple released the iPad in 2010. It was also after this time that libraries took major notice and began to implement tablet initiatives. In 2012, the *Association of College and Research Libraries* included mobile environments as a top trend poised to affect academic libraries (Connaway et al., 2012). Academic librarians continue to explore tablet computers in a variety of use cases, including:

- *Lending programs* (Capdarest-Arest, 2013; Thompson, 2011; Tomlin, 2012)
- *Reference services* (Gadsby & Qian,, 2012; Lotts & Graves, 2011; MacDonald & McCabe, 2011; Maloney & Wells, 2012; Sharman, 2014; Sharman & Walsh, 2012)
- *Professional development communities* (Aagard, Armstrong, Cooper, & Nuxoll, 2013; Salem, Cronin, & Bliss, 2012)

- *Instruction* (Calkins & Bowles-Terry, 2013; Copper, 2014; Foley & Bertel, 2015; Gibeault, 2015; Havelka, 2013; Julian, 2013; Miller, 2012; Moore, et al., 2015; Newell & Soohoo, 2014; Sullivan, 2014).

Although *mobile learning*, or *m-learning*, has appeared in the higher education literature since the first mobile devices became popular, authors differ in their definition or interpretation. Rossing, Miller, Cecil, and Stamper's (2012) definition suggests *m-learning* can be broadly understood as "the efficient and effective use of wireless and digital technologies to enhance learners' individual outcomes during participation in learning technologies" (p. 2). Romrell, Kidder, and Wood (2014) further specify that *m-learning* is "personalized, situated, and connected [learning] through the use of a mobile device" (p. 2). Most *m-learning* literature relies on the "Bring Your Own Device" (BYOD) principle, where students use their personal devices in the classroom. Indeed, personal device ownership has been found to be an important factor for educators wishing to successfully integrate mobile devices into the classroom (Burden, Hopkins, Male, Martin, & Trala, 2012), and borrowed devices used during instruction may lead to more impersonal learning (Romrell, et al.).

Less information is available regarding short-term, classroom-based mobile technology use as experienced in the typical academic library one-time instruction scenario. Instruction in academic libraries is often integrated within another semester-long academic course. This means librarians often meet their learners only once during a semester (aka in "one-shot"), must meet multiple learning objectives in a limited amount of class time, and are acutely aware of using class time and new technology in an efficient, high-impact manner. As more is understood about "mobile information literacy," or the ways engaging in mobile information seeking is different from "fixed" information seeking (Walsh, 2012; Walsh & Goodwin, 2012), librarians will need

to continue to adapt their instruction. This is particularly relevant as technology aids creation of "intuitive discovery landscapes," creating less need for librarians to interrupt the research process with information literacy sessions and a push for discovering new ways to embed librarians into the larger critical literacy picture (Cowan, 2014, p. 29).

Early tablet adopters highlight the devices' benefits and drawbacks as possible instructional tools. The devices' size, portability, and long battery life are often cited as important features concerning the impact on education. Fisher, Lucase, and Galstyan (2013) found that the size and portability of iPads enhance collaboration by allowing students to easily transition from public to private learning spaces. An interdisciplinary team at IUPUI found iPad-based instruction improves access to information for research and problem solving, increases opportunities for group work, and facilitates instruction design that appeals to a wider variety of learning styles (Rossing, Miller, Cecil, & Stamper, 2012). Students and faculty at Texas Tech University describe benefits such as "boot up" speed, battery life, and the availability of applications ("apps") as advantages iPads have over other devices like laptops, netbooks, and smartphones (Dodds, Callender, & Henry, 2014). Although benefits are well documented, less is written about the impact of these unique features when designing classroom instruction.

The few existing studies investigating tablet-based information literacy instruction in the common one-off library workshop environment report mixed results. In their study of iPads and concept mapping in first-year information literacy instruction, Calkins and Bowles-Terry (2013) found no significant difference in student participation, attentiveness, and evaluations of the library instruction sessions (when compared to non-iPad classes), and hypothesized that students need more explanation into why tablets are used during library instruction. Julian (2013) found that librarians felt iPads were not efficient research tools when used in an iPad-equipped

classroom and they were uneasy about adapting instruction to their new classroom. However, librarians who chose to alter their instruction to fit the flexible space were more satisfied than those who did not. Librarians also noted that students in the flexible classroom space were more relaxed, talkative, and collaborative. In addition, while the team at IUPUI shares their successes using iPads (Miller, 2012), they also call for a further investigation into the impact these devices have on student learning outcomes. Taken together, these studies suggest that the manner in which tablets are integrated into library instruction should be carefully considered, and librarians need more methods to understand and evaluate the way they use technology in information literacy instruction.

Technology & Transformative Instruction

At the same time, in academic libraries, librarians' lack of formal education in instruction design and learning theory is a long-standing and well-documented concern (e.g., Brecher & Klipfel, 2014), and it is likely this gap extends to instructional technology integration. Instructors' approaches to classroom technology integration is well-studied in other areas of education and in school libraries, little research is available about how academic librarians approach educational technology integration. Rarely is technology use an either-or decision, and instruction librarians routinely make decisions about *which* technology to use as well as *how* to use it during an instruction session. Literature adjacent to traditional library science research, such as from K-12 and higher education specialties, provides librarians with several theoretical models with which to consider classroom technology integration.

One common framework, "Technology Pedagogical Content Knowledge" or TPACK, is an extension of Shulman's (1986) pedagogical content knowledge (PCK), which emphasizes the intersection between what teachers know about the content of their instruction with what they

know about methods of instruction. PCK "goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge *for teaching*" [emphasis in original] (Shulman, p. 9). TPACK adds to PCK and highlights the relationship between three variables - technology, pedagogy, and content - and the overlapping areas in which all three domains are used to construct a learning environment (Mishra & Koehler, 2006). In TPACK, a teacher has three distinct areas of knowledge: 1) The content of their instruction (e.g. math, science, grammar, etc.) 2) Effective methods of teaching (e.g. hands-on learning, group discussions, etc.) 3) Technical expertise (e.g. iPads, computer programs, etc.). These three knowledge groups can overlap in a learning environment in a variety of ways. Voogt et al. (2013) found that teachers with a strong TPACK competency were more successful in their classroom technology integration. While TPACK is useful for providing instructors with a common vocabulary to discuss technology integration and its relationship to content and/or pedagogy (Hunter, 2015), it does not necessarily evaluate the way technology is used during instruction.

The International Society for Technology in Education (ISTE) created the ISTE Classroom Observation Tool (ICOT) to help standardize technology review. Based on the National Educational Technology Standards (NETS), ICOT was created in 2008 and walks observers through the following criteria

- "Student groupings (individual, pairs/small groups, whole class)
- Teacher roles (lecture, model, interactive direction, moderation, facilitation)
- Learning activities (a lengthy list, with space for additions)
- Technologies used by teachers and by students (a lengthy list, with space for additions)
- Technology use time (recorded as presence during 3-minute segments of the class period)

- Percent of students engaged (estimated by noting students distracted during any two 3-minute segments)" (Bielefeldt, 2012, p. 206)

ICOT is a large-scale evaluative tool used to determine whether technology standards are being met, and is meant for an in-depth analysis of an entire class but not the type of one-time sessions so common to academic libraries.

In their study of tablet PCs in university students, van Oostveen, Muirhead, and Goodman (2011) suggest that *transformative* use of technology in the classroom is more likely to lead to meaningful learning opportunities. Therefore, an important component of integrating tablet computers into library instruction is examining how librarians use technology to change their instruction. The Substitution Augmentation Modification Redefinition (SAMR) framework can be used to evaluate the transformative impact of technology on teaching and learning (Puentedura, 2006). The model emphasizes transformation as a key element to implementing effective technology-supported instruction.

The original SAMR model proposes the following levels of technology integration:

- "*Substitution* – [technology] acts as a direct tool substitute, with no functional change
- *Augmentation* – [technology] acts as a direct tool substitute, with functional improvement
- *Modification* – [technology] allows for significant task redesign
- *Redefinition* – [technology] allows for the creation of new tasks, previously inconceivable" (Puentedura, 2006).

Moving on a continuum from "enhancement" (substitution/augmentation) to "transformational" (modification/redefinition), this model may help examine how technology is used to change classroom instruction. SAMR has been cited as a useful framework for evaluating

the impact of technology on classroom tasks, and can be used for "assessing the richness of the technology task itself" (Kirkland, 2014, p. 14). The key to transformation in SAMR is using classroom technology to *change* how instruction happens; at the "transformational" levels instructional activities could not occur without the use of technology.

While there are examples in the literature illustrating how a single task might move from "enhancement" towards "transformational" (see for instance, Jacobs-Israel & Moorefield-Lang, 2013), fewer researchers tailor SAMR to examine real world tablet-based classroom environments. Cavanaugh, Hargis, and Kamali (2013) used the SAMR framework to analyze teaching conference abstracts that described early adopters' use of iPads in higher education classrooms in the UAE. After the first six months of tablet integration, the study found no significant differences between the numbers of instructors describing "substitution"-level technology integration when compared to other levels of integration. Chou, Block, and Jesness (2012) found that most 9th grade Geography teachers teaching in iPad-equipped classrooms stayed within the "substitution" and "augmentation" categories. And van Oostveen et al. (2011) similarly found little evidence of transformational use of pre-iPad tablet technology when employing the SAMR framework to study undergraduate students' use of tablet computers in academic work; the authors hypothesized that this may have been "attributable to the type of pedagogy utilized by the instructor and the expectations held by the students" (p. 89). Therefore, while technology is often touted for its ability to change instruction, so far there is little evidence to demonstrate that real change is occurring during tablet-based instruction and there is little guidance for librarians looking to assess their own technology integration.

iPads at Albert S. Cook Library

Towson University is a large public comprehensive university in the mid-Atlantic United States, with a current total enrollment of just over 22,400 students. This includes nearly 18,000 undergraduate students and 3,700 graduate students. Albert S. Cook Library provides library services to all students, faculty, and staff. As liaisons to academic departments, Cook Library's 20 subject librarians regularly conduct face-to-face, course-integrated information literacy instruction classes. During the 2014-2015 academic year, librarians conducted more than 900 information literacy sessions, reaching over 14,000 students.

When renovating a library classroom during the summer of 2013, Cook Library wanted to create a flexible, multi-use learning space that could meet the needs of 21st century students and librarians alike. The library decided to replace the more traditional PC lab set up with a variety of modular furniture and add a technology suite that includes 30 Apple iPads for individual student computing. This decision hinged on the priority to engage students in active learning opportunities, recognizing the potential mobile technology represents in the future of education, and the desire to promote agile and creative instruction.

As renovations neared completion, a survey of librarians (approved by the Towson University Institutional Review Board) revealed although librarians felt confident as instructors (Fig. 1) and felt comfortable using tablet computers themselves (Fig. 2), a significant number felt uncomfortable planning information literacy instruction to take place in an iPad-equipped classroom (Fig. 3). In support of this technology change, librarians were provided with in-house professional development opportunities to familiarize themselves with iPads and consider how the devices may be used during instruction. These opportunities included multiple workshops, an intranet resource site, regular monthly meetings of an “iPads in Instruction” community of

practice, and the option to receive a library-owned device for personal and professional use. While librarians remained excited about the potential of mobile devices for information literacy instruction, many were still looking for a way to understand integrating such technology into their regular instruction practice.

The authors conceived the current study as an exploratory opportunity to 1) understand how librarians were using iPads during typical, course-integrated information literacy instruction, and 2) provide librarians with inspiration for using iPads to change or transform their instruction.

The authors used non-participant, direct classroom observations at their institution to document how librarians use tablets during information literacy instruction. Observation techniques are frequently used as a research method when it is necessary to "study and understand people within their natural environment" (Baker, 2006), such as the way librarians naturally integrate technology into their instruction. Hilberg, Waxman, and Tharp (2004) note classroom observations are useful for "describing the current status of instructional practices," and single out the study of technology integration because observations can be used to "observe and record the extent to which technology is used in classrooms," while self-report data "tend[s] to be upwardly biased in the direction of overreporting actual technology use" (p. 3-4). However, direct observations are time and labor intensive, and the authors chose to limit the current investigation to the study of a single institution with the hopes of informing current instruction design and future large scale research.

Classroom observations included the types of technology used, artifacts created, and the structure of classroom activities. See the Appendix for the final direct observation form (adapted from Chou et al., 2012). Observations of iPad-equipped library instruction were conducted

during the 2014 - 2015 academic year. Additional observations of library instruction in PC-equipped classrooms were also conducted during the Spring 2015 semester to facilitate an understanding of the difference between PC and iPad-based technology integration. The authors observed 11 library instruction sessions (8 iPad-based classes and 3 PC-based classes), varying in lesson plan, pedagogy, and library instructor. Lessons focused around typical academic library instruction learning outcomes such as finding resources, using databases, and understanding plagiarism. The study was reviewed and approved by the Towson University Institutional Review Board for the Protection of Human Participants.

SAMR Adaptation

The SAMR framework was chosen because its spectrum moving towards transformation may inspire library instructors to think about ways they can use technology to create new learning environments. Although changing instruction for the sake of changing instruction is unwise, Hunter (2015) also notes, "If the purpose of purchasing iPads is to redefine and transform teaching, teachers should be aiming to design teaching and learning experiences that address the Modification and Redefinition levels of the model. If tasks are planned at the lower two enhancement levels... then perhaps the cost of the devices and the work involved in the required technical support may not be justified" (p. 50). Instruction classified into a higher area of the SAMR framework is not, by default, good teaching, but instruction that does not seek to use the affordances of new technology in ways that create new learning opportunities may not take full advantage of the technology-enhanced classroom environment.

Based on the observational data, the authors used Puentedura's (2006) SAMR framework as a system to analyze iPad-based instruction during course-integrated academic library instruction. The authors present here a tailored SAMR coding scheme for understanding

iPad integration in the context of typical, one-shot academic library instruction. In addition to the original SAMR framework, the authors consulted Puentedura (2013) and previous SAMR rubric adaptations by Anderson (2013) and Guhlin (2012). The authors sought to apply the general SAMR model to fit a contemporary academic library instruction environment, examining the transition from PC to tablet-based instruction. Given that most information literacy instruction at Towson University occurs in PC computer labs, the application presented in this paper specifically looks at whether or not iPads are used to change instruction when compared to a PC-enabled environment.

After reviewing notes and artifacts from the five sessions observed during Fall 2014 semester, the authors met to discuss observable evidence that indicated markers for each level of technology integration. This norming process allowed the authors to discuss and establish examples of class activities (discrete components of the class that used iPads and met distinct learning objectives) that fell into the four SAMR categories, and was helpful for establishing which activities fell into the enhancement categories (substitution/augmentation) and the transformational categories (modification/redefinition). Then, the observation notes and artifacts were independently reviewed a second time and codes were applied to classify all activities. A total of eight activities were reviewed. Finally, the authors met once more to reconcile their coding and modify the codes. Three iPad classroom observations from Spring 2015 were similarly coded and reconciled; four additional activities were included in data analysis.

Coding Definitions

The following coding definitions were developed around Puentedura's (2006) original SAMR framework and then applied to the activities that utilized the classroom iPads. A brief discussion accompanies the coding definitions with examples from the observational data.

Substitution.

***Applied definition*.** While instruction uses iPads, the instruction occurs in the same manner in which it may occur in another classroom. That is, while either students or the instructor librarian use iPads during instruction, the instructional task and lesson could be carried out for the learning objective in a baseline, PC-equipped classroom. The same task is performed with the iPads with no purposeful change in teaching and learning. While lecture-based instruction is not strictly necessary or exclusive to this level, it should be noted that lectures can occur anywhere with any technology. If students are given the option to use an iPad or another PC (e.g., a personal laptop) to complete the activity, it is likely to be at the substitution level. Changes to the iPad-based tasks would not be required if these tasks were used to teach in a PC-based classroom.

Discussion. The majority of classroom activity observations in the study sample were in the Substitution category. Of the twelve iPad activities observed, eight were classified as "Substitution." This means the majority of instruction observed in the iPad equipped classroom largely used the same pedagogy, approach to instruction, and artifacts (e.g., handouts, PowerPoint presentations, course websites, etc.) that may have been used in a PC classroom. Additional artifacts or verbal instruction for the technical steps of completing tasks on iPad computers were sometimes provided at this and other levels, suggesting librarians may be concerned that students are less familiar with tablet technology than with PC technology. Examples of instruction activities included database searching through a web browser on the iPad and supplemental iPad use (e.g., leaving the iPads out as an optional tool for students to use during the class session). The use of websites, such as visiting the library catalog, was equivalent to what was done within a PC lab environment, and iPads were clearly a PC replacement. These

lessons would be just as suitable for any PC classroom and do not make use of any unique iPad features. One student group was observed discussing whether iPads were an equivalent laptop replacement, concluding with the annoyance that the iPads did not have a keyboard.

Augmentation.

Applied definition. At this level, students or librarians use the iPad as a substitute for a PC but with some change to the educational task and meeting learning objectives. There should be small, noticeable improvements for students, which may include appealing to multiple preferences for learning (e.g., moving around the classroom, interacting with touch screens, etc.) or other student-centered features. Improvements might also include fewer steps in an educational task or a more streamlined process. The iPad is generally used to make the educational task easier or enriched in some way through the use of one or more of the iPad's unique features (e.g., portability, built-in camera or microphone, etc.). The instructional task may be possible in a PC-based classroom with few adaptations or the addition of other tools, but the task is easier or improved with the use of iPads due to the device's unique attributes.

Discussion. In the current sample, only one instruction activity of twelve was classified as "Augmentation." Some class activities in the study sample encouraged a more creative and active student role using Padlet <http://padlet.com>, an online board that users can post notes to for any viewer to read. Padlet can be used from a PC, and does not have a separate app for the iPad; however, the mobility of the device allowed students to pass the iPad between each other essentially functioning as an electronic worksheet as students completed tasks and filled their wall. In one instance, the librarian filled the Padlet wall with URLs, and students used multiple iPads to view online resources in addition to a separate iPad to complete the in-class assignments. Arguably, students could do this in a PC lab environment, but the iPads allowed

student groups to work more closely without the barrier of computer screens between them during instruction. A worthwhile side observation occurred when a power outage caused the classroom to lose access to the group and presenter station PCs, but the class activity was able to continue as student used the iPads to continue database searching. The iPads augmented the class, by allowing a greater flexibility when the situation forced librarians to adapt but was not necessarily the result of instruction design.

Modification.

Applied definition. At this level, the iPad becomes an essential instructional tool. Meeting the learning objective or completing the educational task requires the use of an iPad; the activity cannot be completed as designed without the iPad. Change is evident in the design of classroom tasks, and student activities for completing a learning objective using iPads is different from the activities for achieving the learning objective in the PC-equipped classroom. Two or more of the iPad's unique attributes are central to instruction (e.g., portability, interactive touch screen, built-in camera or microphone, etc.). New collaboration opportunities may emerge. A task designed to meet a learning objective at this level may consist of a number of smaller activities that fall at lower areas of the SAMR framework but together they create a unique, cohesive task not possible to complete in a PC-classroom.

Discussion. Three of the twelve observed iPad activities were categorized as examples of the "Modification" category. Both of these classes included scavenger hunt activities, asking students to leave the classroom, take iPads around the library, find various resources (e.g., the reference desk, a book on the shelf, etc.), then take a picture with the iPad and post the picture to Padlet. Students returned to class, and the scavenger hunt results were shared and discussed. The use of the iPads beyond the classroom takes this activity into the Modification category, as the

task would require significant redesign, including the likely addition of other equipment or technology, to accomplish without the mobile devices. This is because instruction design at this level relies on multiple unique attributes of the iPad for educational tasks to take place, and those attributes would not be easy to replicate in a PC-classroom. For example, although scavenger hunts are not new in library instruction, the use of mobile devices meant students could work on their tasks from any location in the library (due to device mobility), allowed students to document the activity with the built in camera, and the librarian could monitor their real-time progress via each team's Padlet wall. Notably, this activity required a longer class period (75 minutes versus 50 minutes) and was troublesome if the iPads could not connect to a strong Wi-Fi signal.

Redefinition

Applied definition. Using iPads allows for creating new tasks or capitalizing on new technologies that are not possible when teaching in a PC-based classroom. Instruction activities at this level use the iPad to connect learners to each other or to others in new ways and require instructors to replace PC-based tasks with new tasks only the iPad and associated technology make possible. This may include using the iPad as a tool to tap into a new technology system unavailable in a PC-classroom, such as new applications (or "apps") that leverage a combination of unique attributes of the iPad itself while also significantly changing the educational tasks for students. New technology should not be used as ends themselves, but as means for supporting student-centered learning. Librarians may be able to accomplish pedagogical goals or meet new objectives as a by-product of the new classroom environment.

Discussion. No observed activities fell into this category and it is therefore the most difficult to describe accurately; however, the Redefinition category serves as a useful tool by

prompting the authors to consider what might be possible, imagining how librarians may integrate multiple unique iPad attributes to grow their instruction in unexpected directions. For instance, an augmented reality app is not a far-fetched idea. If the library's books all contained RFID tags, a user could potentially scan a shelf for a book using an iPad camera app to highlight where exactly a book is, rather than reading call numbers on spine labels. This type of task both requires the integration of multiple iPad features (e.g., the "app" itself in connection to RFID tags, plus the iPad as a tool to decipher and display the incoming data) and changes the way students approach an educational task. The "what if" prompt of the Redefinition category is a good reference point for librarians to anticipate future library changes, and be ready to remain flexible as changes inevitably occur.

Discussion & Future Directions

Although the SAMR model is not new to the world of education or libraries, particularly areas like school librarianship (e.g., Green, 2014; Jacobs-Israel & Moorefield-Lang, 2013; Kirkland, 2014), its application may be a useful model for academic librarians struggling to understand where to start with regards to integrating new or unfamiliar technologies in their classroom. Integrating new technology into information literacy instruction is an exciting yet stressful task. Already challenged to create active, learner-centered instruction sessions, academic instruction librarians may look excitedly towards instructional technologies to supplement their work in the classroom. Models like SAMR provide librarians with aspirational instruction targets and act as tools for understanding technology integration in their typical, day-to-day teaching environment.

In this paper, the authors advocate that understanding the impact of tablet technology on the broader library classroom environment can start with exploring the way librarians integrate

technology into their instruction design. If we are to take the next step and understand how technology impacts student outcomes, it is equally important to clarify the wide spectrum of choices librarians have when using technology to facilitate instructional goals. Rarely is technology integration black-and-white, use vs. non-use. If librarians are truly using technology as a tool, it is possible that there are variety of different ways any given tool may be used and those choices themselves may influence student outcomes. This paper demonstrates that it is possible to explore a wider gradation of technology use by applying an appropriate educational framework to study technology integration in real-world classrooms.

Librarians should note that models and theories alone are not good options for characterizing good versus bad instruction. In this case, we do not have evidence that lessons observed at the "Modification" or "Redefinition" levels of SAMR are necessarily better than lessons at the "Substitution" or "Augmentation" level. Instead, we must stay true to what models *can* tell us. As Shaw (2015) notes, SAMR can be a way to help teachers consider "Is the technology adding value to what I am doing?"(para. 3). The original SAMR model and the application presented in this paper cannot address how technology integration affects student learning outcomes. A body of critique exists around this shortcoming, criticizing that SAMR can distract teachers from focusing on student learning outcomes, instead placing their focus on whether their use of classroom technology is classified as "redefinition" or not (Shaw, 2015; Webster, 2015). This can lead to choosing technology for technology sake rather than focusing on balancing pedagogy with the most effective tools. In order to refocus, instructional technology integration models should be paired with additional assessments and librarians should investigate whether transformational instruction does indeed lead to better student learning outcomes

Technology is also often used as an attempt to increase student engagement in the classroom, and engagement is a critical component to student success in college. Kuh, Kinzie, Schuh, and Whitt (2005) discuss the importance of effective educational practice to enhance student engagement, and suggest that student engagement consists of both student motivation and the "ways the institution... organizes learning opportunities and services to induce students to participate in and benefit from such activities" (p. 9). That is, the structure of the learning experience (which may or may not include technology) is an essential component of student engagement. Across disciplines, learning environments, and grade levels, creating an engaging classroom environment is critical for student learning. Tablet computers' unique attributes like portability, information visualization, and novelty may be useful for stimulating classroom engagement in information literacy instruction. "Student engagement" may also be a component of learning that can be observed across learning environments, allowing librarians to compare different classroom technology environments independent of specific learning objectives.

Limitations

While this study is presented to prompt librarians to consider transformational uses of technology and the use of educational models to understand technology integration, there are a number of limitations that should be addressed in future research. Observations are a useful research method; however, the authors' dual role as observers and colleagues to participant librarians may introduce unintentional bias into the data and affect participation rates. The authors attempted to address this bias through using a structured observation form and reminding librarian participants that observations were not evaluative. Future research should rely on an objective third party to collect observational data. Additionally, the low sample size and focus on a single institution prevents generalization to a larger population and restricts the scope of the

current study. Moreover, this paper cannot not address important student variables like attainment of learning outcomes. Given these limitations, the value of this study should be considered the discussion of SAMR tailored to the academic library instruction, suggesting a platform for assessment and future study.

Conclusions

Just as librarians must evolve their instruction away from lecture-based bibliographic demonstrations toward student-centered, active learning environments, so too must they think critically about the way technology is integrated into instruction. While the SAMR framework was introduced nearly a decade ago and has since been widely referenced in the education literature, there has been less conversation about instructional technology transformation in the library and information literacy classroom. The ideas explored in this paper are just one example of how librarians can use educational frameworks to understand the way technology is incorporated into the classroom to create new learning opportunities.

Thoughtful integration requires understanding the unique properties any technology brings to the classroom. Technology is not a panacea for bad teaching, and there is no "one-size-fits-all" device for every classroom. Rather, librarians should choose tools that align with or support their instruction goals. Devices like tablet computers may be seen as new opportunities to meet these goals in ways that were not possible without the use of such technology. Through becoming familiar with models for understanding the role of technology in instruction, librarians can continue to leverage whatever new technology is just around the corner.

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Appendix

Classroom Observations Guidelines

The purpose of these classroom observations is to understand the design of the library instruction session. Your notes should make clear not only the instruction's subject matter or goals, but also provide details about how the instruction actually happened (e.g., the flow of the class, the details of activities, how technology was used, etc.)

Try to complete the beginning of the observation form (Date through # of students) before the session or at the very beginning of the session.

Date:

Start time: **End time:**

Class (course and section number):

Classroom:

Observer:

Librarian:

Number of students: *Note the number of students who attended the session. This is important for survey sample size and response rate information. Make sure to account for students who arrive late. Check the class listing in PeopleSoft before/after the session to anticipate if your count is reasonable.*

Learning objectives:

What is the purpose of the session? What are students supposed to learn? Librarians may state this at the beginning of the session, or you may need to pay attention to the session and note what the learning objectives appear to be from your observations.

Ask yourself, at the end of the session what should students be able to do or what should they have learned?

Technology used in lesson plan (select all that apply):

- ❑ iPads
- ❑ PCs
- ❑ Library databases. List:
- ❑ Native apps. List:
- ❑ Web apps. List:
- ❑ Other software. List:
- ❑ Other hardware. List:
- ❑ Other online resources (e.g., Google):

List all technology (devices, websites, software, databases, apps, etc.) used in the session; cross out technology not used

If you're not sure which category a type of technology belongs to, make a note of if under "Other." For example, websites (e.g., Google), etc. that may not fit into other categories could be listed as "Other software."

Phases of the class: **Start Time** **End Time**

Track the start and end times for each section of the class. As much as possible, note which phase lines up to each learning objective and a brief description of the instruction method (e.g., lecture, activity, class discussion, etc.).

List artifacts collected during instruction, including items like handouts, powerpoint slides, and worksheets.
List all session artifacts here. This may include: powerpoints, slides, handouts, worksheets (print and digital), etc.

Gather items during the session, if possible, to inform your observations. Otherwise, follow up with the librarian after the session to ask for and gather artifacts. Save artifacts with the observation notes.

Also note the location of saved artifacts

Student participation – *Every 10 minutes, try to count the number of students who are actively participating or are on-task.*

Describe each discrete activity included in the lesson. Also include as much detail as possible about how technology (if any) is used during the activity, how many students are engaged in the activity (e.g., groups of 3, all 27 students working individually, etc.), how librarians approach technology in the classroom, and students' reaction or interaction with technology.

What happens during the session? Describe in as much detail as possible.

Try to tie observations to the learning outcomes/phases of the class as much as possible. Notes in this session should also tie technology used, librarian actions, student reactions, etc. to the instruction design and learning objectives. You may need to organize your notes to pay to learning objectives after the session, but try to represent the chronological flow of the session as much as possible (or, link to the "Phases of the class" so the flow can be reconstructed).

If observations are not related to the instruction design (or, if you're not sure) add to the "general notes" area and try to reference the time/activity during which the note occurs.

Make sure to include all instruction elements. For example, don't just note what students do with an iPad – also record how the librarian introduces the activity and/or any sharing and wrap-up activities at the end of the activity. Observe and describe all elements of the instruction and how those elements fit together.

Refer to artifacts or add details from artifacts to observations, as necessary.

General Notes. Include here your observations about the pros and cons of classroom technology use and other observations.

Note other observations that may not be related to the instruction design. This may also include methodological issues (e.g., problems with your observations) or technology issues not related to the instruction design.