1:1 iPads in 1st Grade: Two-Year Case Study of a Teacher's Concerns, Use, and Innovation Configuration

Handbook of Mobile Teaching and Learning, 2nd ed.

Lauren Eutsler holds a Ph.D. from the University of Florida and is an Assistant Professor at the University of North Texas. A teacher of literacy and elementary education, her research focuses on children's digital literacy development and pre-service teacher's technology integration practices. She can be contacted at lauren.eutsler@unt.edu.

Abstract

Nearly a decade after the iPad was introduced, studies have demonstrated iPads' usefulness as an educational tool, yet little research has focused on the concerns of the teacher to explain technology acceptance. Framed by the Concerns Based Adoption Model (CBAM), this chapter reports the findings of a two-year case study of how one first-grade teacher in a Florida charter school with 1:1 iPads progresses through stages of concerns and levels of use to achieve technological innovation. Data was systematically collected using monthly video chats and a dialogue journal, which included student work artifacts, documented in a private blog. Findings inform technology integration practices and emphasize the importance of acknowledging change concerns associated with technology acceptance. By assessing where teachers lie on the continuum of concerns and use, schools can create technology integration plans that can guide teachers through their own stages of concern and use levels. Future research in additional contexts with a larger sample to refine technology integration practices that align with the CBAM model is recommended.

Keywords: apps, classroom practices, elementary, one-to-one iPads, technology acceptance

1:1 iPads in 1st Grade: Two-Year Case Study of a Teacher's Concerns, Use, and Innovation Configuration

It is spring 2017 in Ms. Brown's (pseudonym) first-grade classroom, and 22 students are hovering closely over their iPads, moving at their own pace to read and respond to literature. Lizzie (pseudonym) is audio and video-recording herself reading her flip-book one page at a time using Book Creator; Jamal (pseudonym) is audio-recording his personally crafted script for his digital picture book using PicCollage Kids; Rosie (pseudonym) is creating a public service announcement using ChatterPix to share on Twitter about the importance of tree preservation.

1 Introduction: The Need to Study Teachers' Technology Acceptance

This vignette into Ms. Brown's first-grade classroom shows how the iPad enables her students to access and use digital media tools in educational, engaging, and innovative ways. Ms. Brown, in her third-year of teaching, became a part of the 1:1 initiative and was provided with an iPad for each of her students in the fall of 2015. After receiving the iPads, she was given very little direction, which left her searching for guidance on how to use the iPads most effectively to optimize classroom learning. The purpose of this chapter is to describe the 2-year journey of Ms. Brown's 1:1 iPad initiative, to demonstrate how her concerns with iPad integration impacted her students' iPad use.

Tablet computers, such as the iPad, can be used to increase learning outcomes (Haßler, Major, & Hennessy, 2016). While iPads can be a useful educational tool, barriers to effectiveness include acknowledging technology acceptance (Aldunate & Nussbaum, 2013) and providing support for integration (Koehler & Mishra, 2009; Li, Pow, Wong, & Fung, 2010). Although nearly a decade has passed since iPads were introduced in 2010, most research on iPads have

emphasized use (Neumann, 2016; Price, Jewitt, & Crescenzi, 2015), with limited examination of teachers' iPad acceptance (Ifenthaler, & Schweinbenz, 2013).

The policy brief to advance educational technology in teacher preparation released by the U.S. Department of Education declares pre-service teachers must be equipped with effective strategies for integrating technology into formal classroom instruction (King, South, & Stevens, 2016). This presents challenges because pre-service teachers did not support their own academic development using the iPad. For this reason, it is important to investigate teachers' technology concerns because it can reveal barriers which may be impacting technology adoption and use behavior.

1.2 Concerns-Based Adoption Model

The concerns-based adoption model (CBAM, Hall, Wallace, & Dosset, 1973) is a technology acceptance model that addresses an individual's reaction to change, applied most commonly within educational contexts. Understanding factors that contribute to the adoption of an innovation can be of great benefit to educational institutions who seek change. When used in research, adoption models can provide insight about individual thinking that is otherwise inaccessible. "Adoption theory examines the individual and the choices an individual makes to accept or reject a particular innovation," (Straub, 2009, p. 626) which results in a behavior change.

The framework of CBAM was built on the constructs of three main components that together explain the change process of behavior: stages of concern, levels of use, and innovation configuration. Stages of concern identifies attitudes that explain how an individual reacts to an innovation, levels of use depicts individual behaviors that illustrates use of the innovation, and innovation configuration is the description of an innovation.

Hall (1976) divided the developmental process of concerns into seven stages of concern: awareness, informational, personal, management, consequence, collaboration, and refocusing (Figure 1).

<<< insert figure 1 about here >>>

The second component of CBAM focuses on an individual's levels of use. Levels of use identifies what the user is doing, such as orienting, managing, and integrating an innovation (Hall, Loucks, & Rutherford, 1975). There are eight stages concerned with levels of use: non-use, orientation, preparation, mechanical use, routine, refinement, integration, and renewal (Figure 2).

<<< insert figure 2 about here >>>

Adaptations to innovations are likely to occur during implementation. This is known as innovation configuration, the third and highest level of CBAM, achieved when a user has surpassed levels of self and task, which allows them to effect change on impact. Innovation is "any process or product that is new to a potential user" (Hall, 1979, p. 203). Applied to this study's context, innovation configuration is the ability to imagine and shape how the iPad is used by each first-grader, to improve the process and learning outcomes. Following implementation, the user would revert to stages of concern and levels of use as they become familiar with the new innovation.

2 Stages of Concern with 1:1 iPads

Under the CBAM framework, the Stages of Concern Questionnaire was used to survey 659 PK-12 teachers across the United States, where findings revealed the greatest concerns occurred at level 2: Personal and level 5: Collaboration; these concerns centered around how the technology affected them personally and expressed a desire to learn what other teachers know

and what they are doing (Rakes & Casey, 2002). Another study that explored how the iPad could be used for literacy learning found teachers' concerns about iPad implementation are directly related to how creatively the iPads are used for educational learning (Hutchison, Beschorner, & Schmidt-Crawford, 2012).

2.1 Ms. Brown's Stages of Concern

Guided by the CBAM framework, this case study addresses Ms. Brown's stages of concern of the 1:1 iPad initiative throughout her two-year journey. At the onset of the 1:1 iPad initiative in the fall of 2015 when Ms. Brown was given an iPad for each of her students, her level of concern was a 0: Awareness, because she did not have any knowledge of the iPad; she also did not own the device personally and had never used an iPad before. At this same time, Ms. Brown was provided minimal professional development on how to integrate this technology into her teaching. She shared how difficult it was having no knowledge of the iPad, "I'm trying to implement way too much." While "we have a K-6 technology specialist, she covers 30 classrooms, but she also teaches gifted…she's so busy it's really not effective, she's running many different directions."

After one month of having iPads, her level of concern moved to a 1: Informational. It was at this point in her journey with iPads Ms. Brown reached out to the nearby university for guidance to learn more, "if I can see and hear what's more effective, that's what I would like to be using."

By the second half of the first-year, her stage of concern had reached 3: Management, which is when the individual spends a lot of time preparing materials. She confessed her challenge with managing instruction with iPads, "I could do research all day." Shortly after this time period in the spring of 2016 when Ms. Brown was reading and researching about apps to

what seemed like constantly to her, her concerns moved to stage 4: Consequence. At this point, Ms. Brown stated, "I'm not good with technology, I'm still learning."

At the beginning of her second-year of having 1:1 iPads, Ms. Brown was still at stage 4 as she reflected, "I have learned to show myself grace and to take it slowly. Last year I did not allow time for much exploration." She expanded on this statement to say that during her first year, she had been overly concerned about excessively managing the iPads, feeling compelled to show the students exactly what to do and how to do it, when in fact, she realized, but not until the year was over, "my students were 100% capable of learning to use an app on their own; I was holding them back thinking they needed explicit instruction when instead they needed more freedom in their learning."

With the realization that Ms. Brown should spend less time being concerned about iPad management, it appeared Ms. Brown had a breakthrough on her concerns about 1:1 iPad use. She spent most of the beginning of her second year in stage 4: Consequence, thinking about her students and allowing them to explore and learn with apps.

In the spring of 2017 within the last few months of the study, Ms. Brown was still focused on consequence, but her concerns had also expanded to collaboration. Some examples, to be discussed in more detail later in this chapter, her students were creating digital books and sharing them with each other on the Seesaw and class Twitter pages, and her class Facetimed another elementary class to practice their mathematical learning together.

At the end of the two-year period with 1:1 iPads, Ms. Brown had reached the final stage of concern, stage 6: Refocusing, indicated by her desire to conduct additional research to locate new and improved apps that could improve the digital storytelling experience. "I have tested

PicCollage, and Chatterpix Kids. Book Creator will be next!" After implementing Book Creator, Ms. Brown raves about its innovation over previously used literacy instruction methods:

> With Book Creator my students are able to respond in ways they simply couldn't with pencil and paper. With Book Creator my students are able to tell stories, demonstrate their understanding and share their learning with an audience. I have been given the gift of listening in to student voices, capturing their thinking, understanding misconceptions and I have gained a shareable product that documents their growth. For example, students create books to document their response to reading by using video reflections, text, voice recordings, pictures, and more! This has taken my formative assessments to the next level!

3.1 Levels of Use with 1:1 iPads

Technology use in the classroom is highly dependent on the experiences and attitude of the classroom teacher. Teachers who are early adopters of technology are more likely to use technology in their teaching (Aldunate & Nussbaum, 2013). In a review of 1:1 technology initiatives in K-12 classrooms, collectively the studies focusing on students' use were influenced greatest by the teachers' own technology experiences and curriculum and instruction demands (Harper & Milman, 2016).

Following a year-long 1:1 iPad initiative in five kindergarten classrooms, the teachers concluded the following criteria should be considered when using individual iPads for learning in the classroom:

- "Structure, organization, and clear expectations are essential.
- The more the merrier doesn't apply to apps in the classroom—choose wisely.

- Students like to talk, and iPads can be great 'listeners' by providing students with opportunities to record" (Toppel, 2014, p. 2).

3.2 Ms. Brown's Levels of Use

Since Ms. Brown's journey with 1:1 iPads began in the fall of 2015, I encouraged her to vigorously explore new apps that could increase students' connectivity with each other and the digital world. To encourage her to explore new apps, Ms. Brown kept a journal of which apps students used, the purpose of the apps, and students' perceptions of the app.

When Ms. Brown first received iPads, her level of use was defined as Level I: Orientation, since she was actively seeking information and knowledge about how to use the iPads. Her desire to acquire information was evidenced by her admittance, "we use the iPads but not to where I want to be using them." After about a month of researching which apps to place on the iPads, Ms. Brown moved to Level II: Preparation, as she prepared for intentional use of the iPads and learned about the logistics of managing the iPads. For example, "to get apps downloaded on the students' iPads is not a quick process. I have to send the apps to my technology team, they must be approved, and then they work on pushing them through to all first-grade iPads."

Reflecting on the first-year with 1:1 iPads, Ms. Brown's level of use is at Level III: Mechanical Use, due to her focus on the short-term use. "I want technology helping my students not just serving as an extra assignment or something used to practice fluency skills. I know I need to think of the desired, end result when writing my lesson plans for the month. I feel like I struggle with coming up with the big picture and I tend to only focus on the right now."

At the start of the second-year of having iPads, Ms. Brown appeared to be at Level IV B: Refinement, stating how iPad use would be refined. She emphasized, "I don't want my kids to

get on ABCya and play games for 40 minutes. That's just not the teacher I am and I never will be." Instead, "I want them to be confident in creating things." Interestingly, Ms. Brown didn't appear to be at Level IV A: Routine yet, likely because during her first year she was constantly experimenting with new apps and searching for effective ways to incorporate apps that would benefit students' learning.

As Ms. Brown progressed into her second-year with iPads in the classroom, she began to use technology to collaborate with others. According to the levels of use, when an individual uses an innovation that involves collaboration with colleagues, they have reached Level V: Integration. An example of Ms. Brown at the Integration level follows:

> We FaceTimed with another school today to play Mystery Number!! Each class picked a number from 0-120. They had to ask questions such as: Is your number even? Is your number odd? Does your number have 3 digits?...etc. So MUCH FUN!!! We ended our sessions with a game using Kahoot! We love Kahoot!!

Three months prior to the end of the two-year study, Ms. Brown had developed a routine for using iPads and was therefore at Level IV A: Routine, where few changes were made and students and her felt comfortable using iPads often and for specific uses. For example, Ms. Brown described a common routine, which begins with her students using their iPads to access "books from RAZ-KIDS, place them in book creator, record our voices, and finally push them out into Seesaw!" Seesaw is a shared digital portfolio, where students can upload and share their digital creations, and the teacher and parents can view their child's work. Evidenced by routine use, Ms. Brown's students had become familiar with using multiple apps at once.

At the end of the study, Ms. Brown reflected on the quality of her routine practice while using iPads. At this point, by evaluating how iPads had improved her teaching, she was using iPads at Level VI: Renewal.

> The biggest game changer for me is AUDIENCE!! My students LOVE coming to school each day to share their learning with more than just their teachers! The biggest turning point for me was when my shyest student asked to upload and record his finished writing project. Seesaw has given him a reason to be confident, bold, and proud of his learning.

In addition to being at the final level of use, Renewal, at the end of our two-year study, Ms. Brown also continued to search for new apps and how they might be worth considering. At this point, she had moved back to Level 1: Orientation, where she was acquiring information to explore its value. For example, she said, "New Applications I am looking into: Art Lab, Recap, Padlet, Tellagami, Popplet, Puppet Edu, Book Creator, Green Screen, Explain Everything." After previously progressing through the levels of use she reflected on the complexity of using an innovation, "again, I know I would have trouble implementing all of these so I have to research which applications would best suit my class and their purpose for using them."

4 Innovation Configuration with iPads

A case study of four teachers with 1:1 iPads in an early childhood setting found iPads were used to practice basic literacy skills in center activities and to engage in child-centered digital production projects (Lu, Ottenbreit-Leftwich, Ding, & Glazewski, 2017). As students become more constructive users of technology, this requires a shift in teachers' roles, such that teachers require "skills for guiding, questioning, and facilitating" (McKnight et al., 2016, p. 205).

Research on students' use of social media is limited, yet is becoming more prevalent as it becomes a mechanism to expand student's collaboration beyond the walls of their own classroom. A large concern for many teachers who desire to integrate technology in media-safe ways was explored within a second-grade classroom where students spent eight weeks learning to use Twitter to share literature experiences (Marich, 2016). In this study, the teacher spent about a month before she realized she needed to implement some media-safe techniques: students could respond to learning using a shared classroom hashtag; identify themselves by first name only; limit student viewing to pre-determined classroom newsfeed. Others in the field have argued that social media should be used to harness students' creativity and enhance learning by connecting socially on platforms such as Twitter, Skype, Facebook, Instagram, and YouTube (Krutka & Carpenter, 2016).

4.1 Innovation Configuration: Ms. Brown's Literacy Learning with iPads

In January of 2017 before students returned from their holiday break and halfway through her second year of 1:1 iPads, Ms. Brown shared her enthusiasm and ideas for helping introduce her students to using new literacy apps in innovative ways for the very first time.

> I'm going to have them create a Valentine's greeting card using PicCollage Kids. We are then going to push that out into Chatter Pix Kids, allowing them to record their written message…then we will push that out into Seesaw!

The students' experiences with these apps were positive and students were highly engaged in writing their own books and developing their fluency. Interestingly, even though Ms. Brown's students have had their own iPads since August 2016, it wasn't until March 2017 that students began using iPads in innovative ways to disseminate their voices about literature with peers, parents, and the world. The following section details the apps Ms. Brown used to achieve

innovation configuration with iPads within a literacy context in her classroom. These apps include Book Creator, Seesaw, PicCollage Kids, Chatter Pix Kids, and Twitter (Table 1).

<<< insert table 1 about here >>>

Book creator. After students create their own flip-books on paper, they record themselves retelling their stories using the Book Creator app (Figure 3). Each page is carefully video and audio-recorded, which allows the video viewer to read along with the book's author.

<<< insert figure 3 about here >>>

Seesaw. As noted in the above example with Book Creator, Ms. Brown affirms her student's use of Book Creator by saying "I love listening to my kid's thinking!" Seesaw is the app that enables Ms. Brown to hear her students' thinking because of students' ability to publish their work to the class Seesaw page.

Seesaw provides a collaborative space for students to publish and share their work with peers, their teacher, and their parents. Once logged in, there is a scrolling class news feed on the left, identified by an icon of the student's name and chosen cartoon character, which sits next to a class list on the right that shows each student's name and how many items they've posted. To filter and view one student's work, a teacher simply clicks on the individual student's name. Seesaw allows for the following:

- Students can upload and request to submit their own creations to the class news feed
- Students view and like their peers' published work in the class news feed
- The teacher can monitor the news feed as a formative assessment tool
- In addition to teacher's observation of student work, parents are provided access to view only their child's work.

PicCollage Kids. When students want to respond to visual media and use pictures as the basis for storytelling, Ms. Brown's students use the PicCollage Kids app. On a page of his book, one student narrates the story of a photo he encountered, "this is a person that made bees mad and all the bees stung them" (Figure 4). With PicCollage, students are given a choice to identify and respond to visual media that is important and appealing to them.

<<< insert figure 4 about here >>>

ChatterPix. A fun way to enhance and engage students in storytelling, ChatterPix brings movement to a mouth on any image. In Ms. Brown's class, Rosabelle moves the mouth of a butterfly in a public service announcement to save the earth by reducing deforestation. The moving mouth enhances the appeal of the visual image and draws video viewers into the message (Figure 5).

<<< insert figure 5 about here >>>

Twitter. While Ms. Brown's students weren't personally using Twitter (for safety and privacy concerns), she took the examples shared in this study and selectively published them to Twitter. In this instance, Twitter is used as a collaborative tool to share her students' work with other educators, parents, researchers, and app developers, as noted by her hashtags and @ identifiers.

4.2 Innovation Configuration: A Final Reflection

The boundaries of how children read and respond to literature have been expanded by innovative digital media applications. In this brief vignette and examples of how Ms. Brown and her students use iPads and apps to expand the notion of response to literature, students' voices are heard as they challenge the world and harness their creative minds to document and share their stories and ideas with the world around them. Ms. Brown believed her students were more motivated to learn about and respond to literature when utilizing these literacy apps.

Ms. Brown reflects on what she contends was the most useful app:

> Seesaw has proven to be my favorite tool. It has given my students a way to document their learning as it happens. I have witnessed Seesaw empower my students to think deeper and reflect. It has given me the opportunity to teach digital citizenship and 21st century skills. The most rewarding part about implementing Seesaw is creating a community around learning. I have been able to involve families in real time and we have taken student feedback to the next level.

Through this experience, Ms. Brown has learned the importance of continuously searching for advances in app development and giving students a creative space to respond to literature while using an identified set of technology tools.

5 Future Directions

The purpose of this 2-year case study was to identify Ms. Brown's initial concerns with iPads, provide guidance and training support, and monitor how her concerns about the technological innovation changed with iPad use in her classroom. Findings from this case study show how technology concerns and levels of use are impact the ability to achieve innovation configuration. This study also demonstrates how within a 1:1 initiative program, the teacher is provided with a tool to potentially change the learning landscape in their classroom, but actual change requires the teacher to embrace each challenge that accompanies the change process associated with technology adoption.

While this case study is limited to one teacher's experience with the 1:1 iPad initiative, this study is a starting point to understanding the complexity of technology acceptance from the teacher's perspective. Findings inform technology integration practices and highlight the importance of assessing a teacher's stages of concerns and levels of use to achieve innovation

configuration. Future research should investigate a larger sample size of teachers who are also part of the 1:1 initiative, assess their stages of concern and levels of use, and apply some of the principles and practices used by Ms. Brown at each of her developmental processes. This additional research could lead to the development of a comprehensive technology integration guide that accompanies each construct of CBAM, thereby visibly documenting an individual's technology integration practice over the span of the technology adoption process.

References

Aldunate, R., & Nussbaum, M. (2013). Teacher adoption of technology. *Computers in Human Behavior, 29,* 519–524. doi:10.1016/j.chb.2012.10.017

Haßler, B., Major, L., & Hennessy, S. (2016). Tablet use in schools: A critical review of the evidence for learning outcomes. *Journal of Computer Assisted Learning*, *32*(2), 139-156.

Hall, G. E, Wallace Jr., R. C., & Dosset, W. A. (1973). *A developmental conceptualization of the adoption process with educational institutions.* Austin, TX: Research and Development Center for Teacher Education, The University of Texas.

Hall, G. E., Loucks, S. F., Rutherford, W. L., & Newlove, B. W. (1975). Levels of use of the innovation: A framework for analyzing innovation adoption. *Journal of Teacher Education, 26*(1), 52-56.

Hall, G. E. (1976). The study of individual teacher and professor concerns about innovations. *Journal of Teacher Education, 27*(1), 22-23.

Hall, G. E. (1979). The concerns-based approach to facilitating change. *Educational Horizons, 57*(4), 202-208.

Harper, B., & Milman, N. B. (2016). One-to-one technology in K–12 classrooms: A review of the literature from 2004 through 2014. *Journal of Research on Technology in Education, 48*(2), 129-142.

Hutchison, A., Beschorner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad for literacy learning. *The Reading Teacher, 66*(1), 15-23.

Ifenthaler, D., & Schweinbenz, V. (2013). The acceptance of Tablet-PCs in classroom instruction: The teachers' perspectives. *Computers in Human Behavior, 29*(3), 525-534.

Krutka, D. G., & Carpenter, J. P. (2016). Why social media must have a place in schools. *Kappa Delta Pi Record, 52*(1), 6-10.

Lu, Y. H., Ottenbreit-Leftwich, A. T., Ding, A. C., & Glazewski, K. (2017). Experienced iPad-using early childhood teachers: Practices in the one-to-one iPad classroom. *Computers in the Schools*, *34*(1-2), 9-23.

Marich, H. (2016). Twitter in the elementary classroom: A teacher's journey. *Language Arts, 94*(1), 67-70.

McKnight, K., O'Malley, K., Ruzic, R., Horsley, M. K., Franey, J. J., & Bassett, K. (2016). Teaching in a digital age: How educators use technology to improve student learning. *Journal of Research on Technology in Education*, *48*(3), 194-211.

King, J., South, J., & Stevens, K. (2016). Advancing educational technology in teacher preparation: Policy brief. Retrieved from http://tech.ed.gov/earlylearning

Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education*, *9*(1), 60-70.

Neumann, M. M. (2016). Young children's use of touch screen tablets for writing and reading at home: Relationships with emergent literacy. *Computers & Education*, *97*, 61-68.

Price, S., Jewitt, C., & Crescenzi, L. (2015). The role of iPads in pre-school children's mark making development. *Computers & Education*, *87*, 131-141.

Rakes, G., & Casey, H. (2002). An analysis of teacher concerns towards instructional technology. *International Journal of Educational Technology*, *3*(1). Retrieved from http://ascilite.org/archived-journals/ijet/v3n1/rakes/

Straub, E. (2009). Understanding technology adoption: Theory and future directions for informal learning. *Review of Educational Research*, *79*, 625-649.

Toppel, K. (2014). Accelerating learning: Making the most of iPads in kindergarten. *IRA E-ssentials,* 1-10. doi:10.1598/e-ssentials.8047

LIST OF TABLES

Table 1. Literacy apps used to achieve innovation configuration during year-two

App	**Student Use Example**	**Literacy Skill**
Book Creator https://bookcreator.com/	One student transfers a flip-book, originally created on pencil and paper, and records himself reading the book one page at a time.	Fluency (re-telling)
SeeSaw https://web.seesaw.me/	Students share their creations (digital books) with their peers and parents on a password-protected digital portfolio.	Publishing
PicCollage Kids https://pic-collage.com/	Students respond and react to visual media with their own narrative.	Comprehension (oral retelling) Vocabulary (expanding vocabulary by exploring visual media)
ChatterPix http://www.duckduckmoose.com/educational-iphone-itouch-apps-for-kids/chatterpix/	Students take a still image of a mouth and make it interactive by recording their own voice.	Fluency (re-telling)
Twitter	The teacher shares examples of how her students respond to literature with the Twitter community.	Publishing

LIST OF FIGURES

Stage of Concern	Sample Expressions of Concern
0 Awareness	I don't know anything about it (the innovation).
1 Informational	I would like to know more about it.
2 Personal	How will using it effect me?
3 Management	I seem to be spending all my time in getting material ready.
4 Consequence	How is my use affecting kids?
5 Collaboration	I am concerned about relating what I am doing with what other instructors are doing.
6 Refocusing	I would like to know of something that would work even better.

Figure 1. Stages of concern about the innovation (Hall, 1976)

SCALE POINT DEFINITIONS OF THE LEVELS OF USE OF THE INNOVATION **Levels of Use are distinct states that represent observably different types of behavior and patterns of innovation use as exhibited by individuals and groups. These levels characterize a user's development in acquiring new skills and varying use of the innovation. Each level encompasses a range of behaviors, but is limited by a set of identifiable Decision Points. For descriptive purposes, each level is defined by seven categories.**	CATEGORIES		
	KNOWLEDGE **That which the user knows about characteristics of the innovation, how to use it, and consequences of its use. This is cognitive knowledge related to using the innovation, not feelings or attitudes.**	**ACQUIRING INFORMATION** **Solicits information about the innovation in a variety of ways, including questioning resource persons, corresponding with resource agencies, reviewing printed materials, and making visits.**	**SHARING** **Discusses the innovation with others. Shares plans, ideas, resources, outcomes, and problems related to use of the innovation.**
LEVEL 0 NON-USE: State in which the user has little or no knowledge of the innovation, no involvement with the innovation, and is doing nothing toward becoming involved.	Knows nothing about this or similar innovations or has only very limited general knowledge of efforts to develop innovations in the area.	Takes little or no action to solicit information beyond reviewing descriptive information about this or similar innovations when it happens to come to personal attention.	Is not communicating with others about the innovation beyond possibly acknowledging that the innovation exists.
DECISION POINT A	*Takes action to learn more detailed information about the innovation.*		
LEVEL I ORIENTATION: State in which the user has acquired or is acquiring information about the innovation and/or has explored or is exploring its value orientation and its demands upon user and user system.	Knows general information about the innovation such as origin, characteristics, and implementation requirements.	Seeks descriptive material about the innovation. Seeks opinions and knowledge of others through discussions, visits, or workshops.	Discusses the innovation in general terms and/or exchanges descriptive information, materials, or ideas about the innovation and possible implications of its use.
DECISION POINT B	*Makes a decision to use the innovation by establishing a time to begin.*		
LEVEL II PREPARATION: State in which the user is preparing for first use of the innovation.	Knows logistical requirements, necessary resources and timing for initial use of the innovation, and details of initial experiences for clients.	Seeks information and resources specifically related to preparation for use of the innovation in own setting.	Discusses resources needed for initial use of the innovation. Joins others in pre-use training, and in planning for resources, logistics, schedules, etc., in preparation for first use.
DECISION POINT C	*Begins first use of the innovation.*		
LEVEL III MECHANICAL USE: State in which the user focuses most effort on the short-term, day-to-day use of the innovation with little time for reflection. Changes in use are made more to meet user needs than client needs. The user is primarily engaged in a stepwise attempt to master the tasks required to use the innovation, often resulting in disjointed and superficial use.	Knows on a day-to-day basis the requirements for using the innovation. Is more knowledgeable on short-term activities and effects than long-range activities and effects of use of the innovation.	Solicits management information about such things as logistics, scheduling techniques, and ideas for reducing amount of time and work required of user.	Discusses management and logistical issues related to use of the innovation. Resources and materials are shared for purposes of reducing management, flow and logistical problems related to use of the innovation.
DECISION POINT D-1	*A routine pattern of use is established.*		
LEVEL IV A ROUTINE: Use of the innovation is stabilized. Few if any changes are being made in ongoing use. Little preparation or thought is being given to improving innovation use or its consequences.	Knows both short- and long-term requirements for use and how to use the innovation with minimum effort or stress.	Makes no special efforts to seek information as a part of ongoing use of the innovation.	Describes current use of the innovation with little or no reference to ways of changing use.
DECISION POINT D-2	*Changes use of the innovation based on formal or informal evaluation in order to increase client outcomes.*		
LEVEL IV B REFINEMENT: State in which the user varies the use of the innovation to increase the impact on clients within immediate sphere of influence. Variations are based on knowledge of both short- and long-term consequences for clients.	Knows cognitive and affective effects of the innovation on clients and ways for increasing impact on clients.	Solicits information and materials that focus specifically on changing use of the innovation to affect client outcomes.	Discusses own methods of modifying use of the innovation to change client outcomes.
DECISION POINT E	*Initiates changes in use of innovation based on input of and in coordination with what colleagues are doing.*		
LEVEL V INTEGRATION: State in which the user is combining own efforts to use the innovation with related activities of colleagues to achieve a collective impact on clients within their common sphere of influence.	Knows how to coordinate own use of the innovation with colleagues to provide a collective impact on clients.	Solicits information and opinions for the purpose of collaborating with others in use of the innovation.	Discusses efforts to increase client impact through collaboration with others on personal use of the innovation.
DECISION POINT F	*Begins exploring alternatives to or major modifications of the innovation presently in use.*		
LEVEL VI RENEWAL: State in which the user re-evaluates the quality of use of the innovation, seeks major modifications of or alternatives to present innovation to achieve increased impact on clients, examines new developments in the field, and explores new goals for self and the system.	Knows of alternatives that could be used to change or replace the present innovation that would improve the quality of outcomes of its use.	Seeks information and materials about other innovations as alternatives to the present innovation or for making major adaptations in the innovation.	Focuses discussions on identification of major alternatives or replacements for the current innovation.

Procedures for Adopting Educational Innovations Project, Research and Development Center for Teacher Education, University of Texas at Austin, 1975, N.I.E. Contract No. NIE-C-74-0087.

Figure 2. Levels of use (Hall, 1975)

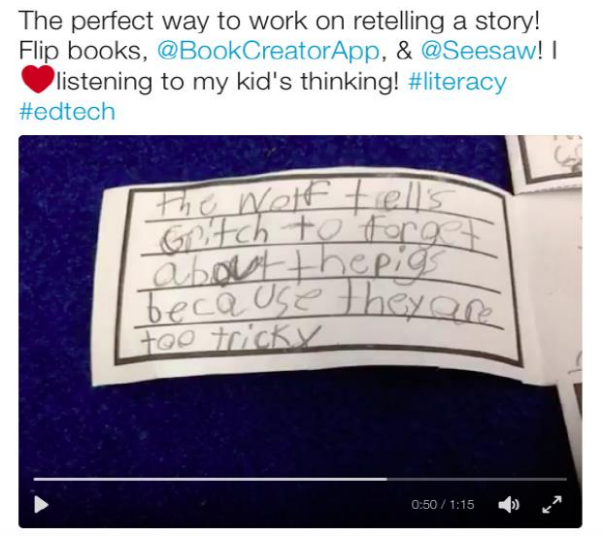

Figure 3. Book Creator to create digital storybooks

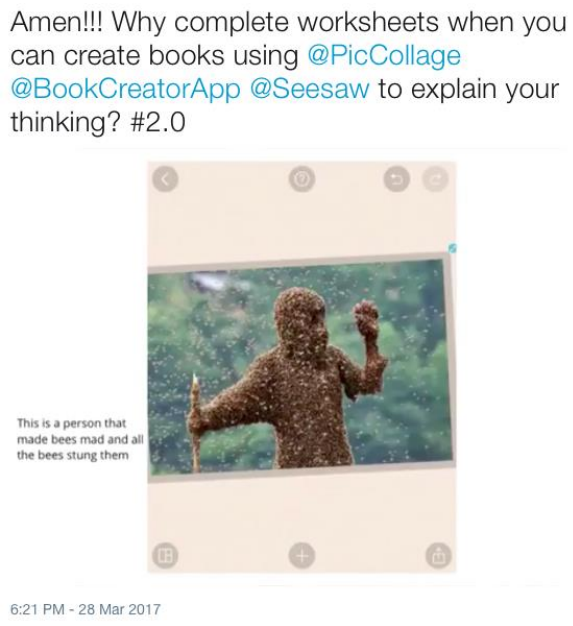

Figure 4. PicCollage to respond to visual media

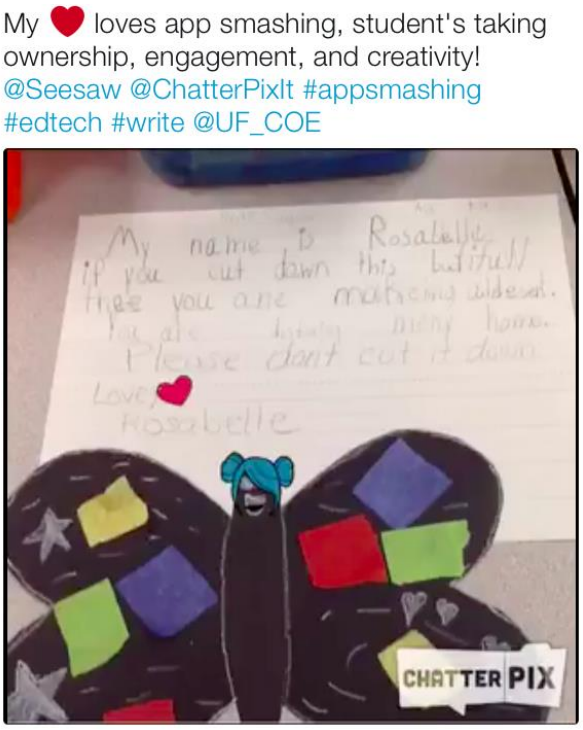

Figure 5. ChatterPix enhances a public service announcement