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The Effects of the Acquisition of Digital Badges on Second Grade Literacy

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Abstract

School leaders are continuously searching for innovative educational practices such as the use of digital badges to curtail illiteracy. Digital badges are electronic representations of academic achievements that offer a more cohesive and comprehensive account of learning. The purpose of this quantitative quasi-experimental research study was to determine the impact of digital badge acquisition on reading level growth of second grade students in a K–12, Title I, rural, public elementary school in the southeastern United States. The results revealed that the elementary students who earned digital badges (experiential group) for reading outperformed the students who did not earn badges (comparative group). Consequently, the null hypothesis which stated that there would be no difference between the reading level growth of the experiential and comparative group was rejected. The acquirement of digital badges impacted reading achievement. The digital badge program led to increased learner motivation with reading activities, which may have led to higher reading achievement. The results of the study may increase the use of digital badges in elementary classroom settings promoting reading instruction.

Keywords: digital badges, elementary school, illiteracy, literacy, reading achievement

Dedication

This dissertation would not have been possible without the love and support of several people. First, I would like to acknowledge my husband and son. For the entirety of this multi-year academic journey, they have tolerated me working endless hours on the computer, listened to me complain about the process of writing a dissertation, and allowed me to sacrifice time away from family. To my parents, I would like to say thank you for emotionally and financially providing me the opportunity to pursue this dream. For the countless phone calls just to gripe, the numerous times you proofread my work, and the infinite amount of encouragement you gave me, I will forever be grateful. You always believed in me! This degree is as much yours as it is mine. To my extended family and friends, thank you for being cheerleaders during this endeavor. Sometimes I just needed to hear a word of encouragement to keep going, and you always were there to do just that. Lastly, to my grandmother who passed away in 2013, I know you are looking down and are proud of me. I feel your presence often, and I hope you know that you were a huge part of my growth into the person that I am today. There is a reason God does not let us know what lies ahead. If I had known in January of 2014 when I began my doctoral studies that I would endure my son undergoing major scoliosis surgery, see my father tackle prostate cancer, and unexpectedly fight breast cancer myself, I may not have made the decision to begin this journey. However, during all these trials, I persevered with the help of my family and friends. As I begin this new chapter of my life, I most of all want to make others proud of what I have accomplished and will accomplish. I never dreamed I would achieve this goal in my lifetime, and I pray it will allow me to make a positive difference in the lives of others. "If you believe you will receive whatever you ask for in prayer." – Matthew 21:22 NIV

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Chapter 1: Introduction

Introduction to the Problem

According to Neilson (2014), "The power of literacy lies not just in the ability to read and write, but rather in a person's capacity to apply these skills to effectively connect, interpret, and discern the intricacies of the world in which they live" (p. 1). This broadened definition signifies the functional aspect of literacy, making its relevance even more compelling in the educational realm. However, even with this realization, illiteracy continues to elude society. Fourteen percent of adults in America read below a functional literacy level, and 32 million cannot read at all (Statistic Brain Research Institute, 2016). Furthermore, illiteracy is inextricably linked to violence, crime, failure, and poverty (Write Express, 2015). For these reasons, leaders are continuously searching for innovative educational practices such as the use of digital badges to curtail illiteracy. Digital badges are web-enabled tokens representing achievements, creating learning pathways, and building a cohesive and interconnected knowledge base (O'Byrne, Schenke, Willis, & Hickey, 2015). Rich metadata are connected to badges, and often badges represent soft skills that are not easily evaluated by traditional assessments, such as collaboration and teamwork (Devedzic et al., 2015).

Badges were first introduced at a conference in Barcelona, Spain in 2010 by the Mozilla Foundation (Ash, 2012). Since that time, a scarce amount of research has been completed on the efficacy of badges in educational settings (Hickey & Willis, 2015). Only a few studies are available on the connection between learning outcomes and the acquisition of digital badges, so this relationship was a focal point of the study. According to Filsecker and Hickey (2014), "Students earning badges had a deeper understanding of the scientific inquiry and its relation to broader social issues" (p. 146). However, Abramovich, Schunn, and Higashi (2013) found, "Effects of educational badges vary with different ability learners: badge acquisition patterns were

quite different across learners with different levels of prior learning" (p. 13). The study adds to existing literature by providing a causal impact framework for examining the difference between the acquisition of digital badges and reading level growth.

Background, Context, History, and Conceptual Framework for the Problem

Digital badges are an alternative to traditional assessments and are viewed as the next generation of evaluative tools, accentuating student achievement in formal as well as informal settings (Anzalone, 2015). Digital badges offer a m ulti-faceted approach to measuring different areas of student achievement, painting a comprehensive picture of growth. Visible recognition is provided that connects metadata to existing evidences of achievement (Gibson, Ostashewski, Flintoff, Grant, & Knight, 2015). Unlike school report cards, digital badges are electronic representations of specific goals accomplished that follow learners into college and subsequent careers. Valid badges are issued by credible sources and include evidence-based achievements (Devedzic et al., 2015).

Although few peer-reviewed empirical studies validate the use of digital badges to improve learning outcomes, previous studies indicate the success of digital badges is dependent upon individual situations, specifically learner motivation and interest (Abramovich, Schunn, & Higashi, 2013). The gap in available literature exists because of an inability to pinpoint specific and relevant learning outcome results based upon the acquisition of badges "because the research is new, and themes in education are emerging" (Gamrat & Zimmerman, 2015, p. 1). Hence, the study explored the difference between digital badge acquisition and student reading level growth.

A potential drawback of digital badging is the educators' focus on external motivation. However, according to Filsecker and Hickey (2014), "The negative consequences of external rewards may be more indicative of impoverished learning environments and the lack of feedback and opportunity to improve than of a fundamental consequence of the rewards themselves"

(p. 139). By using digital badges as an unconventional means of credentialing, students associate learning claims with evidence-based achievements and can share accomplishments with school leaders and potential employers. This broadens the educational landscape so learners from cultural, economic, and social settings maintain equal access to a platform highlighting learning achievements. Although badges will not take the place of traditional credentials, digital badges serve to demonstrate competencies in coordination with certificates and diplomas (Dalby, Merriman, & Dalby, 2013). For this reason, according to Glover (2013), "Digital badges have recently been identified as an educational technology with significant potential to 'disrupt' formal education" (p. 2).

The study adds to available literature on the causal impact of learning outcomes and digital badge acquisition. Data was collected through an analysis of second grade reading scores using the mCLASS 3D Reading Assessment (Amplify, 2017). The mCLASS 3D Reading Assessment is a balanced literacy tool for grades K–5 that measures foundational skills with text and reading comprehension (About mCLASS: Reading 3D, 2017). According to Amplify (2017), "The mCLASS Reading 3D solution is the only validated, research-based assessment that combines quick indications of early skill development with deep observations of students' interactions with authentic texts" (p. 1). Furthermore, the results provide second grade teachers with the best predictor of student literacy success in third grade (Amplify Education, Inc., 2013). Previous studies indicate digital badges are not widely recognized as legitimate evidence of students' accomplishments (Davis & Singh, 2015). To address this issue, documentation of acquired badges was placed in students' portfolios. Since student portfolios follow students through grade school and are an assessment tool used by current and future educators, this provides a "visible, enduring record of achievement" (Davis & Singh, 2015, p. 78).

Data from the mCLASS 3D Reading Assessment was collected for two classes of self-

contained, regular education second grade students during the 2017–2018 school year. Both groups participated in RAZ-Kids, a research-based, online reading program to enhance fluency and comprehension where students earn stars for practice, completion, or success with different activities (RAZ-Kids, 2017). For every 500 stars accrued, the experiential group received digital badges. The comparative group completed assignments from the program but did not receive digital badges. The mCLASS 3D Reading Assessment was administered September 11, 2017 through October 9, 2017 as a pre-badge assessment to determine each child's beginning reading level. According to Amplify (2017), students in second grade are considered proficient readers on a Level J at the beginning of the school year, on a Level L at the middle of the school year, and on a Level M at the end of the school year. Since the final post-badge assessment for the study was administered January 10, 2018 through February 5, 2018, students were expected to achieve middle-of-year proficiency levels. The study sought to determine if the use of digital badges affected reading level growth with the experiential group. The mCLASS 3D Reading Assessment assessors were homeroom teachers to avoid researcher bias.

By issuing badges to the experiential group, a gamification strategy was used. Gamification is using concepts associated with playing games such as competition and strategy in diverse environments (Hall, 2014). Various research studies use achievement goal theory to explain participants' reactions to gamification in the context of learning (Bierly, 2014). Abramovich et al. (2013) promoted gamification as leading to "evidence of improvements in interest and a decrease in counter-productive motivational goals from a system using educational badges" (p. 5). Other researchers found that situational interest also affects the acquisition of badges (Plass, O'Keefe, Biles, & Homer, 2014). The findings suggest that badges are individualistic to learner interest and motivation. By using RAZ-Kids in the study, students received individualized, online instruction to increase learner motivation (RAZ-Kids, 2017).

Digital badges are used routinely, yet they are not widely recognized by employers and admissions' departments. This makes them less valued by learners (Hickey, Willis, & Quick, 2015). The study addressed the credibility issue by conveying the purpose of badges and connecting the badges to traditional credentials by using common core-based RAZ-Kids and issuing consent forms to validate the digital badge initiative. Furthermore, documentation of acquired digital badges was added to students' portfolios. This added relevance for the student participants and teachers. According to Hickey et al. (2015), "Since credentialing systems evolved alongside the education and employment sectors over the past century, it is logical that the transition to badging will be deliberate and must be seen as a cohesive partner with traditional grades" (p. 4). Badges will eventually be studied in the context of improving entire badge ecosystems, but until then will partner with traditional credentialing systems to study efficacy and improve overall credibility to a wider audience (Davis & Singh, 2015).

The constructivist learning theory was the foundation for the theoretical framework for the study. Socrates used constructivism when directing students to answer questions and assess weaknesses in thought patterns (Constructivism: From philosophy to practice, 1997). According to Piaget and Dewey (1929), childhood development and education theories are built upon the transformation of constructivism (Open Educational Resources of UCD Teaching and Learning, University of College Dublin, n.d.). Constructivism is based upon active learning where senses construct meaning and contends that learning originates in the mind, but is also social and contextual (Ultanir, 2012). Students are responsible for constructing meaning based upon active engagement and are not blank slates, but rather beings that bring a wealth of past experiences and cultural factors to each new learning situation (Educational Broadcasting Corporation, 2004). In the study, students engaged in RAZ-Kids, an individualized, online learning program. The program is used in over 165 countries worldwide, is aligned to common core and state standards, and

includes more than 400 leveled electronic books and electronic quizzes for purposeful practice (RAZ-Kids, 2017). Students accessed an online reading room where listening comprehension was built, increased knowledge of various texts, broadened vocabulary, and participated in treasure hunts that corresponded with specific reading levels. Through participation in RAZ-Kids, students constructed reading knowledge based upon interaction with program components, thereby using the constructivist theory of learning. The RAZ-Kids' program assigns stars for successful completion of program activities. The experiential group acquired digital badges for every 500 stars earned with the program, while the comparative group participated in RAZ-Kids without any added incentives.

The teacher is a facilitator with the constructivist approach, motivating students to measure academic progress as knowledge is gained (Educational Broadcasting Corporation, 2004). The two homeroom teachers in the study dialogued with students to formulate knowledge, and communication was interactive in nature. According to the constructivist theory, motivation is connected to learning, is the result of social and individual differences, and leads to a competently functioning classroom (Ultanir, 2012). This relates to the study because according to Wu, Whitely, and Sass (2015), "Digital badges offer a way to engage students in the learning process, a key concept to increase student learning outcomes" (p. 49). Quantitative comparative data results were based upon digital badge acquisition with RAZ-Kids and mCLASS 3D Reading Assessment scores. Collected data was statistically analyzed to determine if a difference existed between digital badge acquisition and mCLASS 3D Reading Assessment scores.

Statement of the Problem

Does a difference exist between the acquisition of digital badges and second grade students' reading level growth? The study sought to answer this question to add to existing literature on the comparison between the acquisition of digital badges and academic growth. It is important to

determine this difference because of decreased learning outcomes and an educational system less able to meet rising academic expectations (Jones, 2012). Failures are represented by declining test scores, uncomplimentary international achievement comparisons, an increase in high school dropout rates, and the failure of extra funding to create positive learning outcomes (Jones, 2012; Levin, 1998). The United States performs below other nations with comparable economic status, and American students are falling behind because of underdeveloped basic skills (Tucker, 2011; Snow, 2002). Hence, there is "elevated pressure on elementary and secondary schools to improve their instructional effectiveness" (National Institute for Direct Instruction, n.d.).

Teaching students to read and write is a social practice that varies according to environment, knowledge, and behavior, rather than a process that disseminates information (Verhoeven & Snow, 2001). To meet this need, a multitude of instructional techniques are implemented by the educational system in the United States. However, illiteracy continues to haunt society. Innovative practices such as the use of digital badges could be used to improve learning outcomes. According to Glover and Latif (2013), "The use of Badges has a 'High' potential impact, likely to be felt within 2–5 years" (p. 1399). The study hoped to add legitimacy to the instructional practice of issuing digital badges for learning achievements.

Purpose of the Study

The purpose of the quantitative comparative research study was to examine the difference between reading level growth and digital badge acquisition of second grade students in a K–2, Title I, rural, public elementary school in the southeastern United States. Two self-contained, regular education second grade classes participated October 23, 2017 through January 7, 2018 in RAZ-Kids, a comprehensive leveled reading program. The experiential group earned digital badges for every 500 points accrued with the program, while the comparative group participated in the program with no added incentives. The mCLASS 3D Reading Assessment was administered

September 11, 2017 through October 9, 2017 as a pre-badge assessment to determine each child's beginning reading level and January 10, 2018 through February 5, 2018 as a post badge assessment to determine each child's ending reading level. A comparative analysis was conducted to determine if a difference existed between reading level growth and digital badge acquisition.

Research Question and Hypotheses

Research Question. How does the acquisition of digital badges sustain the motivation of second graders to improve their reading performance?

Null Hypothesis. The acquisition of digital badges does not sustain the motivation of second graders to improve their reading performance.

Alternative Hypothesis. The acquisition of digital badges sustains the motivation of second graders to improve their reading performance.

Rationale, Relevance, and Significance of the Study

Research on the efficacy of digital badges is still in its infancy (Abramovich et al., 2013). As noted by Hickey et al. (2015), "Digital badges are so new that just a handful of studies have made it through the peer review process" (p. 1). If badges are to support the traditional credentialing system in education, more empirical studies are needed (Abramovich et al., 2013). The studies should address issues with digital badges such as credibility among stakeholders, potential consequences of gamification to learning, and the lack of evidence demonstrating the efficacy of badges to learning outcomes and student success (Davis & Singh, 2015). Digital badges are multi-faceted, representing a variety of skills. Like traditional credentials, digital badges are based upon set standards and allow students to take ownership of learning and create accumulated pathways of achievements (Davis & Singh, 2015). Badges are stocked with metadata, which provide rich and cohesive evidence of learning achievements and represent a shared meaning of academic developments (O'Byrne et al., 2015). For these reasons, according to Ahn et al. (2014), "There is rising investment in using open

badges to award credentials for individuals' learning experiences across a variety of life settings as a way to develop skills in the workforce" (p. 1). The study adds to existing literature regarding digital badges and learning outcomes to validate the use of badges in classroom settings.

A synthesis of the research findings regarding digital badges reveals duplications, comparisons, and central issues for future research. Research articles focus on badges in relation to motivation, learning outcomes, and badge design (Ash, 2012; Filsecker & Hickey, 2014; Ford et al., 2014). According to Parker (2015), uncertainty surrounds the utilization of digital badges in education. Research reveals underlying themes of contextual biases in findings and a broad claim of credibility issues that surround the acquisition of digital badges (Casilli & Hickey, 2016; Dona, Gregory, Salmon, & Pechenkina, 2014). "In addition to investigating the ways in which formal learning - and more particularly, traditional means of assessment and evaluation - may be challenged by badges, there is an increasing need for research and analysis of how a common approach to assessment and credentialing of badges may impact learning" (Casilli & Hickey, 2016, p. 127). The study determined the difference between second grade reading achievement and digital badge acquisition. It adds to the instructional practices that optimize literacy instruction.

There is the need for additional research related to digital badges (Abramovich et al., 2013; Filsecker & Hickey, 2014). "Though there is considerable enthusiasm and speculation around using digital badges to promote educational change, whether they succeed at empowering learners and connecting their learning across contexts remains largely untested" (Davis & Singh, 2015, p. 73). The study focused on learning outcomes of participants as affected by the acquisition of digital badges. According to Wu, Whiteley, and Sass (2015), minimal research is available on the efficacy of digital badges in varied educational settings. To contribute to literature regarding the use of badges affecting learning outcomes, the research study evaluated the impact of digital badges on second

grade reading achievement. By engaging students in the learning process and using the digital badging gamification tool, it was anticipated that reading fluency and comprehension of second graders would improve.

Definition of Terms

Digital Badge: Digital badges are an alternative to traditional assessments and are viewed as the next generation of evaluative tools as they encompass measurement of student achievement in informal as well as formal settings (Anzalone, 2015).

Metadata: Open digital badges capture essential information about learning and achievements by storing metadata inside the badge image. If made public, this information can be accessed and viewed by anyone. Verified issuing organization and attached evidence by the badge earner improves credibility of badges. (BadgeCraft, 2017).

*mCLASS 3D**:*** The standardized assessment program gives **"**a complete picture of how students find meaning in text, using quick indicators of foundational skills development and a running record to measure reading comprehension" (Amplify, 2017, para. 1).

RAZ-Kids: An online reading program that "provides meaningful online reading practice on computers and mobile devices with hundreds of leveled books and corresponding quizzes offered at 29 levels of reading difficulty" (RAZ-Kids, 2017, para. 2).

Proficient Reading Levels for Second Grade: Proficient reading levels for the study were synonymous with mCLASS 3D's proficiency standards, which are research-based and followed by the state of North Carolina for promotion and retention purposes in second grade. The following are the proficiency level goals for second grade:

- Beginning of Year (BOY) Proficiency Level: J
- Middle of Year (MOY) Proficiency Level: L
- End of Year (EOY) Proficiency Level: M

(Amplify, 2017).

Hawthorne Effect: "The Hawthorne effect concerns research participation, the consequent awareness of being studied, and possible impact on behavior" (Epidemiol, 2014, p. 1).

Stakeholders: Stakeholders are people who have an interest in an outcome or course of action (Rabinowitz, 2017.) In the study, stakeholders were current teachers, future teachers, students, parents, the broader community, and educational leaders.

Assumptions, Delimitations, and Limitations

Leedy and Ormrod (2010) concluded, "Assumptions are so basic that, without them, the research problem itself could not exist" (p. 62). An assumption for the study was that second grade participants would put forth effort to complete program requirements for RAZ-Kids (RAZ-Kids, 2017). Furthermore, students would understand reading proficiency level goals that correspond with the mCLASS 3D Reading Assessment and their subsequent importance to promotion and retention. Another assumption was that the two homeroom teachers would implement the RAZ-Kids program and digital badge initiative with fidelity and communicate outliers or threats to validity that may have occurred during the study. According to Osborne and Overbay (2004), "The

presence of outliers can lead to inflated error rates and substantial distortions of parameter and statistic estimates" (p. 1).

The limitations of the study included comparing heterogeneous groups of students. Cultural, economic, and social differences were present with the control and experimental groups of participants. These differences were recognized when interpreting results. Another limitation was acknowledging immeasurable, external factors that may have contributed to academic growth. These external factors included the use of certified tutors with at-risk students, varying amounts of parental support, and the inclusion of exceptional education students in the study. Another limitation for this study was recognizing the abstractness of digital badges to young research participants. "Badges will not unlock tangible opportunities for students until they hold value for key stakeholders, and these stakeholders must be convinced of their worth" (Davis & Singh, 2015, p. 78). In response, documentation of digital badges was placed in student portfolios. This connected the study to the traditional credentialing system to which students succinctly relate.

A delimitation included not issuing grades based upon completion of the study. Issuing grades would have been counterproductive because the program was based upon earning incentives. Adding grades to the research would have compromised the conclusions formulated about the results. In association with not grading participants' work, badges were not leveled. According to Gonzalez (2015), the rigor outweighs the significance of differentiating digital badges.

Summary

This chapter provides an overview of the study, which includes an introduction to the problem, background, context, history, and a conceptual framework for the problem, a statement of the problem, the purpose of the study, the research question and hypotheses, the rationale, relevance, and significance of the study, definition of terms, and assumptions, limitations,

and delimitations of the study. Innovative strategies such as the use of digital badges were examined to possibly improve reading proficiency. This study sought to add to existing literature concerning the efficacy of digital badges in comparison to learning outcomes. A difference between second grade reading level growth and badge acquisition was explored in a quantitative quasi-experimental research study. The results of the study may increase the use of digital badges in classroom settings promoting reading instruction.

Chapter 2: Literature Review

Introduction

Digital badges are network-based symbols of learning achievements that, unlike traditional credentialing systems, recognize learning in formal as well as informal settings (Anzalone, 2015). Badges include metadata such as the issuer and earner's names, the date, and evidences of the learning achievement to create a standardization that can be transferred and verified by a plethora of organizations (Gibson, Ostashewski, Flintoff, Grant, & Knight, 2015). According to Hurst (2015), by encoding metadata, a more detailed profile of a learner's achievements is provided rather than by viewing a grade. Furthermore, digital badges are accumulated and shared through badge ecosystems. As stated by Hammond (2017), "Pathways are made of elements that represent requirements, competencies, or other 'real-world' experiences and take the form of a hierarchy of nested elements" (para. 5). These ecosystems generate a network of connectivity between stakeholders, creating artifacts of communication and increasing credibility for academic institutions and potential employers. Furthermore, ecosystems provide a platform for learners from all cultural, economic, and social settings to market themselves to educational organizations as well as future employers (Gibson et al., 2015). According to Seitzinger (2015), ecosystems are a way to mimic lifelong learning developed in work each day. Additionally, "it's when a badge is shared and recognized that its 'mint' value hits reality and becomes exchangeable currency" (Presant, 2016, para. 16).

The first digital badges were introduced in 2010 in Barcelona, Spain by the Mozilla Foundation (Ash, 2012). Mozilla continues to be at the forefront of the digital badge initiative in education and in a broader context (Mozilla Foundation, 2017). As stated by Gonzalez (2015), "Mozilla and its partners sought to bring early coherence to this effort by establishing a common expectation of what badges were and how they could be used" (p. 35). One expectation is that

digital badges create an integrative learning experience that allows for learning pathways to develop. These pathways produce accumulative learning achievements that personalize learning and show a logical progression in understanding across a hybrid of learning environments (Ahn et al., 2014). Unlike traditional credentialing systems, badges move away from skill-based, isolated assessments to more global measures that include the recognition of micro-credentialing and macro-credentialing (Knight, 2015). According to Knight (2015), "It provides a methodology for mapping out a more flexible array of learning trajectories, including pathways that cut across traditional courses and educational settings" (p. 6).

Along with creating a scaffolded learning environment, digital badges act as motivational tools for learners. According to Filsecker and Hickey (2014), "Cognitive theorists suggested that rewards are detrimental for individuals' intrinsic motivation and subsequent engagement by undermining their perception of competence and autonomy and/or by deviating the perceived source of motivation to external causes" (p. 137). This argument is grounded in the belief that extrinsic rewards undermine intrinsic motivation, which leads to a decrease in learning engagement over time (Filsecker and Hickey, 2014). In contrast, many scholars view digital badges as a gamification tool, using a strategic game framework for learning and teaching, which is highly motivating (Hall, 2014). There is a minimal amount of research on the impact of badges on student motivation, and the research available is complex. As evidenced by Abramovich, Schunn, and Higashi (2013), the design of digital badges and the students for which they are created are critical indicators of learning motivation.

According to Priest (2015), "Overall, there are an estimated 25,000 badge issuers, up from approximately 1,500 only a few years ago" (p. 6). Even though digital badges are becoming mainstreamed, uncertainty surrounds them. Traditional credentialing systems are rooted in the foundations of the educational system as networks of trust, making standardized assessment

measures such as degrees and diplomas valued at institutions of learning (Hickey & Willis, 2015). However, according to Rediehs (2009), human learning is extremely complex, and traditional grading fails to appropriately measure and signify the authenticity associated with a learning achievement.

As districts and schools face the challenges of documenting student learning, internal capacity should be built and new learning opportunities should be considered (Mozilla, 2013). One avenue for achieving this mission resides in the use of digital badges. According to Diaz (2016):

> As a marker of achievement, a digital badge looks both backward and forward at the same time: backward to the experience or assessment that was completed to qualify for it, and forward to the benefits, rewards, or new opportunities available to those who have earned it. As nothing more than a vessel for communicating and transporting information about an achievement, digital badges can serve very different functions and convey different kinds of value depending on how and where they are employed. (para. 7)

Digital badges possess the potential to create a disruption to the traditional credentialing system as there is an increase in digital badge usage in diverse settings (MacArthur Foundation, 2017). Academic diplomas and degrees provide little to evaluate the quality of personalized learning compared to the use of digital badges (Wharton University of Pennsylvania, 2015). According to Casilli and Hickey (2016), badges offer a functional and meaningful alternative to current grading. Massive potential may exist for badges to widen the educational landscape in teaching, learning, and assessing because "the power of the digital badge is that it provides assessment for what normally goes ignored" (Abramovich, 2015, para. 18).

Topic of Study

The study analyzed the reading level achievement of second grade students as impacted by the implementation of a digital badge initiative. According to Abramovich et al. (2013), more

research is needed to fully comprehend the impact of badges on learners of different ages and in various environments. The study responded to this gap in literature by examining the difference between reading level achievement and digital badge acquisition in second grade students in a K–2, Title I, rural, public elementary school in the southeastern United States. Data from the mCLASS 3D Reading Assessment were collected for two classes of self-contained, regular education second grade students during the 2017–2018 school year. Both groups participated in RAZ-Kids, a research-based, online reading program to enhance fluency and comprehension where students earn stars for practice, completion, and success with different activities (RAZ-Kids, 2017). For every 500 stars accrued, the experiential group received digital badges. The comparative group of students completed assignments from the program but did not receive digital badges.

The mCLASS 3D Reading Assessment was administered from September 11, 2017 through October 9, 2017 to determine each child's pre-badge assessment reading level. According to Amplify (2017), students in second grade are considered proficient readers on a Level J at the beginning of the school year, on a Level L at the middle of the school year, and on a Level M at the end of the school year. Since the post-badge assessment for the study was administered from January 10, 2018 through February 5, 2018, students were not expected to achieve end-of-year proficiency levels. Instead, the study sought to determine if the experiential group utilizing digital badges attained higher reading achievement compared to the comparative group not utilizing digital badges. The mCLASS 3D Reading Assessment assessors were the participants' homeroom teachers to avoid researcher bias. A quantitative statistical assessment of reading achievement for both groups was analyzed to determine the difference between issuing digital badges to learning outcomes of participants.

Context of the Study

The study was completed at a public elementary school in the southeastern United States.

The research site was a Title I, kindergarten through second grade school. The school had approximately 600 students and was in a rural area. Forty-one students participated in the study from two heterogeneous second grade classrooms. The participants were representative of the larger second grade population at the research site as class rosters were created randomly by administration. The researcher had no control over the creation of class rosters. The experiential group received digital badges for every 500 stars accrued on RAZ-Kids, while the comparative group did not receive added incentives for completion of assignments (RAZ-Kids, 2017). Research was conducted from September 11, 2017 through February 5, 2018. Homeroom teachers assessed students using the mCLASS 3D Reading Asessment from September 11, 2017 through October 9, 2017 to establish a pre-badge reading level and from January 10, 2018 through February 5, 2018 to establish a post badge reading level. The mCLASS 3D Reading Assessment is a balanced literacy tool for grades K–5 that measures foundational skills with text and reading comprehension (About mCLASS: Reading 3D, 2017). According to Amplify (2017), "The mCLASS Reading 3D solution is the only validated, research-based assessment that combines quick indications of early skill development with deep observations of students' interactions with authentic texts" (p. 1). The results provide second grade teachers with an effective predictor of student literacy success in third grade (Amplify Education, Inc., 2013). The difference between reading level achievement and badge acquisition was statistically analyzed using a quantitative quasi-experimental research design.

Significance of the Study

Digital badges are gaining widespread interest as a multi-faceted means of assessing learners (Carey, 2012). Yale University, MIT, NASA, the U.S. Department of Education, and the Smithsonian are utilizing digital badges in some capacity (Opperman, 2015). However, badges are not widely valued by admissions or hiring officials (Hickey et al., 2015). According to Acclaim

(n.d.), “Badge-based conduits must solve issues of identity, verification, validation, and ongoing management to enable a secure and trusted ecosystem to emerge around credentials” (p. 6). Badges possess the potential to communicate an expansive amount of achievements and serve as an alternative to traditional credentialing systems. As studies continue to explore relationships between badges and learning outcomes, the likelihood of integration into traditional credentialing systems will increase and a standardization of badges will emerge (Hickey & Willis, 2015). Digital badge research will also serve to improve the learning ecosystems established through badge accumulation. The study sought to add to the existing literature on the difference between digital badge acquisition and reading level achievement in second grade students.

Statement of the Problem

While promising positive disruptions to the available credentialing system, digital badges are not widely recognized by academic institutions and employers (Hurst, 2015). Digital badges tend to lack trusted traditions of existing credentialing systems such as numerical grades, diplomas, and degrees (Priest, 2015). As stated by Ford, Izumi, Lottes and Richardson (2014), “Scholarly research on using badges for competency-based education is incipient and little has been published on the matter” (p. 34). There is also the issue of organizations with diverse expressions of outcomes, making standardization of badges difficult to manage (Casilli & Hickey, 2016). However, as education moves toward open learning formats, badges will become significant. According to Schwarz (2016), the achievement of digital badges is highly probable because of the far-reaching benefits to a growing number of learners who seek recognition and validation for achievements.

Digital badges support a more personalized learning environment that fosters collaboration and relevant learning practices (Bowen & Thomas, 2016). Specific design structures of badges maximize learner benefits. This requires continued research exploring learning potential of badges

(Rughinis & Matei, 2011). As stated by Hickey et al. (2014), the way in which badges are used in education should be weighed responsibly against the backdrop of assessment practices. According to Strunk and Willis (2017), "In terms of assessment alone, badges offer granular evidence of skills acquisition and demonstration, a specific pathway to learning complex concepts, and a clear picture of how far the learner has progressed" (para. 4). The study analyzed the difference between the acquisition of digital badges and reading level achievement, adding to the existing literature regarding the impact of badges on learning outcomes.

Conceptual Framework

Digital badges are web-enabled tokens that represent formal as well as informal achievements (Abramovich et al., 2013). Badges allow for the formation of learning pathways, creating a cohesive and interconnected knowledge base (Bowen & Thomas, 2016). According to The National Conference of State Legislatures (2015), "Badges can help young people create cross-institution pathways for learning that propel them toward college, a career, or involvement in their community" (para. 4). Digital badges assign rich metadata such as the issuing institution, specific criteria given to the badge, and evidence-based artifacts that are demonstrative of learner achievements (O'Byrne, Schenke, Willis, & Hickey, 2015). Badges provide a detailed and skills-based lens for displaying learning achievements (Strunk & Willis, 2017). Often badges represent soft skills, skills that are not easily evaluated by traditional measures, such as collaboration and teamwork (Devedzic et al., 2015). Since digital badges were first introduced to the educational infrastructure, few studies examined digital badge efficacy in relation to learning outcomes (Anzalone, 2015). Even so, digital badges are emerging as a continuing trend in education (Career and Technical Education Consortium of States, 2017).

The study built upon existing digital badge research to determine if the acquisition of badges impacted reading level achievement for second grade students on the mCLASS 3D Reading

Assessment (Amplify, 2017). The difference between reading level achievement and badge acquisition was statistically analyzed using a quantitative quasi-experimental research design. In similar studies, the issue of credibility was identified as a challenge. According to Davis and Singh (2015), although badges are a valuable documentation tool for learning achievements, they are also widely criticized for not being a valid piece of evidence for chronicling student learning. Documentation of acquired digital badges was placed in student portfolios to decrease this challenge. The documentation broadened the pool of relevant stakeholders to include students, parents, current teachers, future teachers, and administrators and provided a long-term display of achievement (Davis & Singh, 2015).

A focal point of the study was the evaluation of learning outcomes associated with digital badge acquisition. Previous studies indicated a connection between the acquisition of badges and learning outcomes (Filsecker & Hickey, 2014). According to Filsecker and Hickey (2014), students who earned badges harbored a genuine understanding of the scientific process and its connection to real life. However, other studies revealed minimal links between badges and learning outcomes. As stated by Kehoe and Goudzwaard (2015), all students will not succeed based upon the same learning opportunities. For digital badges to strengthen learning outcomes, students need to be invested in the process, and the learning must be integrative and personal (Abramovich et al., 2013). In the study, criteria for earning badges was linked to RAZ-Kids, a research-based, online reading program to enhance fluency and comprehension where students earn stars for practice, completion, and success with different activities (RAZ-Kids, 2017). For every 500 stars accrued, the experiential group received digital badges. The comparative group of students completed assignments from the program but did not receive digital badges. The mCLASS 3D Reading Assessment was administered from September 11, 2017 through October 9, 2017 to determine each child's pre-badge reading level. Since the study's post badge assessment

was administered mid-year from January 10, 2018 through February 5, 2018, proficiency level L was the intended reading level goal. The study compared reading level achievement between the experiential group and the comparative group. A quantitative analysis was conducted to determine if any difference existed between reading level achievement and digital badge acquisition.

By issuing badges to the experiential group, the gamification strategy was used. Some studies use achievement goal theory to explain participants' reaction to gamification in the context of learning. Abramovich et al. (2013) found "evidence of improvements in interest and a decrease in counter-productive motivational goals from a system using educational badges" (p. 4). Similarly, other researchers found that situational interest affects the acquisition of badges. According to Plass, O'Keefe, Biles, Frye and Homer (2014), learners that are interested in specific situations attained more mastery badges than learners with less interest in specific situations. These findings suggested badges are individualistic to learner interest and motivation. Assessment data from both groups indicated individualistic learning experiences, coupled with badge acquisition, impacted reading level achievement. Since "badges are thought to motivate students to complete tasks, learn more deeply, and make good decisions about what to learn next," a positive difference between reading level achievement and badge acquisition was predicted (Schenke, 2013, para. 2).

Even the most passionate supporters of digital badges admit the biggest problem is perceived value among stakeholders (Hickey, Willis, & Quick, 2015). According to Hickey, Willis and Quick (2015), "While numerous digital badge systems are functioning in many contexts, badges are still not widely valued by admissions or hiring officials" (p. 1). In turn, digital badges are not widely valued by learners. The study sought to respond to this need by conveying the purpose of badges and connecting subsequent value to traditional credentials. Documentation of acquired badges was placed in student portfolios to connect the study to mainstream grading

practices. Furthermore, the acquisition of digital badges for the experiential group was reliant upon completion of Common Core-based activities with RAZ-Kids (RAZ-Kids, 2017). Over the past century, credentialing systems such as report cards and college credits were used in employment sectors. Transition to badging will be deliberate and needs to be connected to traditional grading systems (Hickey et al., 2015). Badges will eventually be studied in the context of improving entire badge ecosystems. The study partnered badges with traditional standards and objectives to study efficacy and improve overall credibility.

Emerging Themes from Literature Review

Theme One: Digital Badges as an Alternative and Innovative Solution to Traditional Credentialing Systems.

There are few empirical studies comparing digital badges and learning outcomes. According to Hickey and Willis (2015), "Many of the most important ideas that might be tested in experimental research are unlikely to be discovered with experimental studies, which seems certain to be the case with digital badges in education" (p. 1). There is an excitement surrounding digital badges and the potential investment to develop cohesive and integrated skills in education and the broader workforce. According to Ahn et al. (2014), if badges continue to be used across educational environments, there is greater potential for examination and development as a more established credential. "Technology is a critical tool to propel the vast increases in educational access and quality that this nation must achieve in the next decade" (Duncan, 2011, para. 29).

Digital badges connect learning in a multiplicity of venues. This flexible environment allows for learning connectivity and encourages long-term engagement by creating learning pathways (Davis & Singh, 2015). According to Hammond (2017), "Pathways are made of elements that represent requirements, competencies, or other 'real-world' experiences and take the form of a hierarchy of nested elements" (para. 5). Unlike one-dimensional, competency-based

assessments, badges exist in multiple contexts and demonstrate skills and qualifications to a broader audience (Ahn, 2014). By offering information-rich data, digital badges explain the context, meaning, process, and result of an activity. Furthermore, badges may be linked to standards or objectives for higher quality evaluative purposes but can also be used to measure soft-skills and community engagement (Pagowsky, 2017). According to Hurst (2016), digital badges are tools that aid in tracking, managing, and displaying competencies across an array of settings. As stated by Abramovich (2015):

> So much important learning occurs in so many different settings. There are all kinds of skills learned in a classroom, or informally such as in a museum, or in reading websites at night. And while that learning is often so valuable to success in life, it's also often ignored by formal educational processes. The power of the digital badge is that it provides assessment for what normally goes ignored. (para. 19)

Digital badges communicate what is expected of learners and broadcast accomplishments, but little research on utilizing digital badges in competency-based education remains (Hickey et al., 2015). Existing research acknowledges digital badges are a disruption to the status quo of traditional credentialing, including the difficulties enacting and formalizing use. According to Gerstein (2013), "A potential downfall of this system revolves around the difficulties and dilemmas of deciding what the badges represent, how one earns the badges, and how badges will be standardized for recognition of 'institutions' of learning and of employment" (p. 1). Therefore, digital badges cohabitate with existing practices for evaluating student achievement. According to Hickey, Willis, and Quick (2015), "Perhaps the most promising avenue is associating digital badges with formal credit and external recognition, while also ensuring that those badges contain multiple levels of detailed additional claims and evidence" (p. 1). This democratizes education while creating a more autonomous learning environment (Madsen-Brooks, 2013).

Research conducted on digital badges occurring in informal settings revealed the more badges are used, the more established credentialing systems such as degrees and diplomas are replicated. A more concise and accurate representation of individual achievements is created through consistent usage (Ahn, Pellicone, & Butler, 2014). This is deemed micro-credentialing, requiring a reshaping of ideas about teaching, learning, evaluation, and motivation to successfully share evidences related to skills and knowledge acquired in formal as well as informal settings (Reynolds, 2016). Badges offer a platform for a more equitable form of assessment and emphasize strengths over weaknesses (Reynolds, 2016). According to Priest (2015), "In this sense, badges can be data-rich in a way that traditional transcripts, resumes, degrees, and certificates, even electronic ones, typically are not" (p. 8).

Theme Two: The Future Implications of Digital Badges as Related to Badge Ecosystems. One appealing aspect of digital badges as an alternative means of assessment is the rich metadata contained about a learner (Devedzic et al., 2015). Metadata includes information such as the issuer's name, the earner's identity, the badge's description, the criteria set forth to earn the badge, the date of acquisition, and the learner-specific evidence for the attainment of the badge. Metadata translates into a badge ecosystem, in contrast to traditional forms of credentialing because it is more specific, contextualized, and cohesive. Wright (2016) noted that:

> Digital badges have the capacity to transform the way students share their academic accomplishments. Right now, students rely upon paper degrees, transcripts, and certificates to prove to employers that they have the skills and abilities they need to succeed in a given job. These are challenging to understand, challenging to verify and, ultimately, don't do much to communicate the work a student has put into their education. (para. 1)

According to the Mozilla Foundation (2017), badges play a pivotal role in connecting knowledge, acting as a bridge between contexts and impactful learning experiences. However,

even with the clear advantages of an evidence-based system, challenges remain. One challenge of a badge ecosystem is the inconsistency of standards for the information contained in the metadata (BadgeCraft, 2017). This challenge can be eradicated through collaboration among institutions in defining requirements for badge acquisition (Finkelstein, Knight, & Manning, 2013). Another challenge is the nonexistence of badge recognition outside of closed learning communities (Jovanovic & Devedzic, 2014). Badges are developed to function within larger learning ecosystems, making value contingent upon participants within an established communal system of organizations. Badge ecosystems allow for the translation of skills into needed workplace and professional settings. This integrated process drives the success of badges in the educational realm. According to the Michigan Department of Education (2012), "Alignment of standards to badges provides transparency within the credential and improves communication" (p. 2).

Digital badge credibility was a recurring issue in the literature. According to Meyer (2013), "To be credible, digital badges must include information about when and how they were earned and who issued them, that they should be stackable to demonstrate multiple achievements, and that earners should be free to share them with a variety of audiences" (para. 6). Valid digital badge recognition mandates evidence of achievements through valid organizations, providing a cohesive picture of the knowledge, skills, and abilities achieved (Jovanovic & Devedzic, 2014). Classifying badges into custom profile groups makes the transition of credentialing across different contexts and boundaries more efficient and accurate. According to Everhart, Derryberry, Knight, and Lee (2016), "In order for badges to gain acceptance, structures must be in place to ensure transparency and confidence in the badging process, as well as trust amongst badge earners, issuers, and consumers" (p. 1). Online programs such as BadgeKit and Mozilla Backpack help create, assess, issue, and connect badges (BadgeCraft, 2017; Mozilla Foundation, 2017). Such programs allow for integrated learning experiences and serve as digital archives for work over time (Kehoe &

Goudzwaard, 2015).

Digital badges are a more effective means of demonstrating ascertained skills and achievements than traditional assessment measures (Ford, Izumi, Lottes, & Richardson, 2014). Embedded in each badge is a clear set of metadata containing information that includes existing evidence to validate learning outcomes (Reynolds, 2016). Badges can be accumulated and grouped together to create a cohesive and integrated portrait of a learner. According to Priest (2015), digital badges "provide a methodology for mapping out a more flexible array of learning pathways and trajectories, including pathways that cut across traditional courses and educational settings" (p. 6). Ecosystems offer equitable learning environments as long as awareness exists about the uses and benefits of badge acquisition to students and educational leaders (Reynolds, 2016). According to The Mozilla Foundation and Peer 2 Peer University (2012), digital badge ecosystems are open and decentralized to support diverse learning situations, provide sustainable value, and give the learner ultimate control.

Theme Three: The Credibility of Digital Badging Programs. A recurring acknowledgement in the literature was badges lack the inherent value represented by traditional credentials (Casilli & Hickey, 2016). According to Casilli and Hickey (2016), "The correlation between educational and professional credentials and employment suggests an unspoken assumption about credential value" (p. 1). Traditional credentials such as grades, diplomas, and degrees have evolved over the past century and are viewed as dependable, unchanging, and trustworthy (Hickey, Willis, & Quick, 2015). Furthermore, pre-existing trust networks between institutions and employers rely upon this system. There is little specific evidence regarding levels of competency, experience, or quality that corresponds with a paper degree (Merisotis, 2016). Digital badges represent the soft skills that degrees have traditionally overlooked, making them more compatible with the educational and professional demands of society. According to The

Mozilla Foundation and Peer 2 Peer University (2012), "Learning is not just 'seat time' within schools, but extends across multiple contexts, experiences and interactions. It is no longer just an isolated or individual concept, but is inclusive, social, informal, participatory, creative, and lifelong" (p. 3). This transformational view of learning demands a multi-faceted assessment tool such as digital badges.

The literature claimed digital badges should coexist with the traditional credentialing system in education. According to Helsinki (n.d.), "Grades are still commonly seen as the way to represent an individual's knowledge gained through traditional learning, but externally gained skills are very hard to spotlight in a standardized manner" (para. 2). Digital badges can be used to assess a broader and deeper set of skills and capture competencies so that learning paths, critical skills, and experiences are not negated or lost (The Mozilla Foundation and Peer 2 Peer University, 2012). The integration with traditional credentialing systems allows for alignment with existing learning standards, adding reliability and credibility to digital badges.

Since minimal research studies exist to support the effectiveness of digital badges, it is imperative that a slow process be employed when introducing badges into existing assessment systems (Merisotis, 2016). However, an increasing number of businesses and educational institutions are seeking avenues to validate learning that reflects skills that cannot be measured on a traditional grading scale. For this reason, according to Bowen and Thomas (2016), digital badges maintain the capacity to change the current assumptions about the way students learn. Widespread acceptance of badges is needed by major organizations and professional bodies to break the credibility barrier and become widely used across the landscape of education (Glover, 2013). According to Reid and Paster (2013), "Although digital badging originated from an informal learning philosophy that bucked the traditional university setting, its application is inherent in all of academia; drawing on this open movement technology can help us motivate learners and create

memorable experiences for them along the way" (para. 13). Ultimately, the success of digital badges in organizations will determine its sustainability and achievement over time, establishing clear criteria and meaningful evidence included in metadata attached to badges. Furthermore, designing digital badges to complement existing content and related skills works better than measuring isolated skills (Fontichiaro & Elkordy, 2015). This allows for the development of a cohesive badge ecosystem that "reduces the historic disconnect between institutions" (Fontichiaro & Elkordy, 2015, para. 14).

Theme Four: The Future Implications of Digital Badges as Related to Motivation and Behavior. Digital badges have the potential to transform formal as well as informal learning experiences. According to Duncan (2011), "Badges can help engage students in learning, and broaden the avenues for learners of all ages to acquire and demonstrate—as well as document and display – their skills" (p. 1). Diverse organizations are beginning to issue badges, emphasizing the importance of understanding the varied roles badges play in the promotion and interaction of knowledge (MacArthur Foundation, 2017). According to Fain (2016), "One in five colleges issued digital badges, according to the results of a recent survey of 190 institutions" (para. 15). However, even with the expanded use of digital badges, a pivotal question in many research studies involved the role of badging as a motivator for behavior (Abramovich, et al., 2013). According to Ahn et al. (2014), studies normally link badges and other incentives to increased user participation. Research also suggested varied connections between learners, motivation, and knowledge against the backdrop of the types of badges sought (Ahn et al., 2014). According to Priest (2017), the issuance of digital badges is a complex undertaking which takes on different meanings, depending on situational factors such as how they are used, where they are used, for whom they are used, and how they are positioned and implemented. Furthermore, "While badges are much discussed as

incentives, they also have an attention-focusing role, as signposts that map learning systems and make visible significant learning outcomes" (Rughinis & Matei, 2011, p. 4). Further research is needed to determine the most effective badge designs to fit the motivational needs of learners.

If structured properly, badges are a visible representation of learning pathways and serve as guideposts for learning (Ahn et al., 2014). This increases the interconnection of learning and eliminates learning skills in isolation. Linking learning pathways to traditional credentialing systems is the key, giving badges additional meaning and value. Bolder connections should be established between digital credentials and existing standards (Hickey et al., 2015). According to Grant (2014), "Badges are connectors in this new culture, part of the dynamic scaffolding being built to make learning more visible both within and beyond classroom walls" (p. 10). Additionally, by strengthening trust networks during the badge design process, inherent value increases (Grant, 2014). This may lead to clear application for learning initiatives.

Review of Research Literature and Methodological Literature

Differing from traditional Girl and Boy Scout badges, digital badges contain metadata and are an alternative and innovative means of documenting learner achievement in formal as well as informal settings (Ash, 2012). As iterated by Pearson (2013), digital badges use metadata to create additional information about achievements and tell stories about what is represented. According to Grant (2014), "They are interconnected, or interoperable, which refers to an open data exchange or infrastructure that allows badges to be shared across multiple platforms or systems" (p. 10). Badges allow for a more learner-controlled environment where pathways can be forged to create a progressive learning scenario. Pathways create a cohesive and realistic picture of a learner's academic as well as social learning achievements (Davis & Singh, 2015). Furthermore, badges can serve as supplements to established credentialing systems to enrich the learning process that surpasses the efficacy of traditional tools (Abramovich, 2015). However, studies conducted to

evaluate the impact of badging on learning outcomes of participants indicate the need for more research (Abramovich et al., 2013). As affirmed by Mah, Bellin-Mularski, and Ifenthaler (2016), "There is further research needed on how digital badges can be implemented in different learning environments, how digital badges affect learner motivation and engagement, as well as long-term knowledge transfer" (p. 517).

As previously noted, one of the biggest challenges facing digital badges is credibility, and a related concern is the interpretation of the meaning of badges. Additionally, some researchers argued badges may negatively impact intrinsic motivation because an extrinsic motivator is being introduced (Abramovich et al., 2013). However, digital badges are still seen as a positive disruption to the traditional credentialing system in education and are being used on an increasing basis with practitioners, education-oriented companies, and non-profit organizations (Glover & Latif, 2013).

According to Diaz (2016):

> As digital badges become more widely recognized by employers, institutions and students alike, the breadth of learning experiences in which they're offered will likely grow—as will demand. Microcredentials like these could become a strong currency in a job market with requirements that outpace traditional degree programs. In some fields such as programming, digital badges are already proving to be a competitive advantage. With lower costs, greater access and less time to completion involved, they may one day rival the once-coveted university degree. (para. 10)

Another common issue evidenced in the literature was a need for additional research related to digital badges. For this reason, the gap in literature remains. The study focused on the reading level achievement of participants as impacted by the acquisition of digital badges. According to Wu, Whiteley, and Sass (2015), digital badge research is lacking in a variety of curricular and co-

curricular settings. However, digital badge efficacy is realized by researchers. As stated by Finkelstein et al., 2013:

> A wider variety of activities and demonstrations of ability become the subjects of recognition. The visual nature of badges also enhances the ability to see progress; they are motivational and engaging. Consequently, badges can improve learner retention and reduce attrition by encouraging learners along the way and rewarding previous learning. (p. 10)

Summary

The study contributed to the literature regarding the impact of digital badges on second grade reading achievement. By engaging students in the learning process through RAZ-Kids and using a digital badging gamification tool, it was anticipated that second grade reading levels would improve. This prediction was based upon literature that frames digital badges as a "flexible, inclusive ecosystem that connects formal and informal learning, skills and dispositions, and competencies and abilities" (Fontichiaro & Elkordy, 2015, para. 33).

Chapter 3: Methodology

Introduction

The level of reading attained in primary grades is a pivotal determinant of functional literacy in adulthood (Literacy Project Foundation, 2017). The inability to fluently read and comprehend text leads to difficulties completing print-rich tasks, attaining a well-paying career, and interacting in a word-saturated society. Understanding this need, governmental leaders consistently strive to improve the functional literacy of students in public education. However, even with the emphasis placed on teaching students to read and write, 50% of adults still cannot read a book written above an eighth grade level, and 20% of Americans read below a level needed to earn a living wage (Literacy Project Foundation, 2017). Illiteracy statistics translate to societal issues involving poverty and crime. According to Write Express Corporation (2015), "The link between academic failure and delinquency, violence, and crime is welded to reading failure, and 90% of welfare recipients are high school dropouts" (p. 1).

Standards-based educational reform began in the 1990s, and since that time, national reading scores have fluctuated a bit, but overall have remained at the same levels since 1970 (Shanahan, 2015). This demonstrates that traditional instruction has not resulted in higher academic achievement. Standards-based reading is taught in a systematic fashion, differing by the theoretical and educational biases that are prevalent at any given time (Martinez & McGee, 2011). This leads to a standardization of instruction that lacks consideration for a repertoire of teaching strategies. According to Cole (2008), "Instruction in too many U.S. schools tends to be abstract, devoid of application, overly sequential, and redundant" (p. 1). Additionally, literacy instruction includes phonics-based approaches as well as whole-language strategies (Moats, n.d.). In 1997, the National Reading Panel delineated five essential components of literacy instruction: phonemic awareness, phonics, reading fluency, vocabulary development, and reading comprehension (Moats,

n.d.). Combining these five elements into daily instruction is deemed balanced literacy, but the downfall of balanced literacy is its incapability to help at-risk students on a consistent basis (Nazaryan, 2014). Few students attain the necessary tools to fully benefit from the rigors of a balanced literacy approach (Nazaryan, 2014). This is evident as according to The Literacy Project Foundation (2017), "Illiteracy has become such a serious problem in our country that 44 million adults are now unable to read a simple story to their children" (para. 2).

Innovative instructional and assessment practices such as the use of digital badges are adopted to combat illiteracy. Badges are complex representations of student learning that create cohesive learning pathways (Davis & Singh, 2015). According to Anderson and Staub (2015), digital badges are more powerful demonstrators of learning than traditional forms of assessment for a wealth of reasons. As stated by Education Scotland (2014):

> The advantage that a digital badge has over a cloth badge is that a digital badge can contain a lot of additional information (called 'metadata'). This might include details of the organization and individual who awarded the badge, the specific competencies the learner has demonstrated, and even contain links to some of the learners' work to illustrate their competence. (p. 2)

Additionally, unlike traditional grades, digital badges represent formal and informal learning achievements. This allows a more comprehensive picture of student learning and "validates specific skill development that may be missing from traditional learning assessments and evaluations" (O'Byrne et al., 2015, p. 454). However, because the use of digital badges in education began in the last decade, best practices for badge design are still emerging (Bell & Davis, 2016). The study sought to add to existing literature surrounding digital badges by exploring the difference between digital badge acquisition and second grade reading achievement.

Purpose of the Study

The purpose of the quantitative quasi-experimental research study was to examine the difference between reading level achievement and digital badge acquisition of second grade students in a K–2, Title I, rural, public elementary school in the southeastern United States. Two self-contained, regular education second grade classrooms participated in a comprehensive leveled reading program with digital books and corresponding electronic quizzes called RAZ-Kids (RAZ-Kids, 2017). RAZ-Kids was used by students in the experiential and comparative groups from October 23, 2017 through January 7, 2018. Stars were earned for successful completion of program components. For every 500 stars accrued, the experiential group received digital badges. The comparative group of students completed assignments from the program but did not receive digital badges.

The mCLASS 3D Reading Assessment was administered September 11, 2017 through October 9, 2017 to determine each child's pre-badge reading level and January 10, 2018 through February 5, 2018 to determine each child's post badge reading level. The mCLASS 3D Reading Assessment tool allows teachers to "record observations with a running record to quickly analyze reading comprehension and assign reading levels and monitor progress to support mastery of increasingly complex texts" (Amplify, 2017, p. 1). According to Amplify (2017), students in second grade are considered proficient readers on a Level J at the beginning of the school year, on a Level L at the middle of the school year, and on a Level M at the end of the school year. Since the post badge assessment for the study was administered January 10, 2018 through February 5, 2018, the mid-year proficiency goal of level L was expected. The study sought to determine if there was a difference between digital badge acquisition and reading level achievement. The mCLASS 3D Reading Assessment assessors were the participants' homeroom teachers to avoid researcher bias. A quantitative statistical assessment of reading achievement for both groups was

analyzed to determine the difference between issuing digital badges to learning outcomes of participants.

Research Question and Hypotheses

Research Question. How does the acquisition of digital badges sustain the motivation of second graders to improve their reading performance?

Null Hypothesis. The acquisition of digital badges does not sustain the motivation of second graders to improve their reading performance.

Alternative Hypothesis. The acquisition of digital badges sustains the motivation of second graders to improve their reading performance.

Research Design

A quasi-experimental research study was conducted to analyze a real-life learning situation over time through quantitative data collection, including mCLASS 3D Reading Assessment scores and digital badge acquisition documentation. The mCLASS 3D Reading Assessment scores of both groups of student participants was compared, with the controlled variable being the implementation of the digital badge program with the experiential group. A quasi-experimental study was determined to be an effective research design because "it establishes cause and effect relationships among the variables and an independent variable is identified, but not manipulated, by the experimenter" (Baltimore County Public Schools, 2017). The independent treatment variable was applied to the experiential group through the acquisition of digital badges for every 500 stars accrued with RAZ-Kids. The dependent variable measured in the experiential and comparative group was reading level achievement as assessed using the mCLASS 3D Reading Assessment tool. The study was limited to determining the impact of digital badges on 2 second grade classes from the 2017–2018 school year as indicated by reading scores on the mCLASS 3D Reading Assessment.

The quasi-experimental research method was chosen for several reasons. Data was collected

in a consistent and planned manner, and inferences were drawn from the data collected to answer the research question. A quantitative analysis was completed regarding the difference between digital badge acquisition and learning outcomes. Quasi-experimental studies are quantitative and continuous in nature, are carried out in real life context, and allow for a thorough critique of data collected over a significant amount of time (Kalla, 2017). The study investigated two groups of student participants from the 2017–2018 school year. The study was comparative in nature, reviewing the contexts in which badges are acquired. There were no leveled badges in the study. Badges were skill-based and earned by the experiential group upon completion of tasks on RAZ-Kids, including listening to books, reading books, passing quizzes, and completing assignments. Metadata attached to the badge indicated the specific task completed by the student, along with the earner's name and issuer's name. An example of the digital badge students earned is included in the Appendices. A comparison based upon the quantitative data collected from digital badge acquisition documentation and mCLASS 3D Reading Assessment scores was represented on a scatterplot. Since the variables studied do not readily lend themselves to experimental manipulation, a quasi-experimental study established a comparison in the context of a naturalistic environment (Cherry, 2017).

Target Population, Sampling Method, and Related Procedures

The target population for the study included two groups of second grade students from a K–2, Title I, rural, public elementary school in the southeastern United States. Students were randomly assigned to groups since administration heterogeneously created rosters. The researcher had no control over the placement of students in the comparative or experiential classrooms. Both groups of second grade students were in self-contained, regular education classroom settings during the 2017–2018 school year. Since there were 39 student participants, data was collected and analyzed from all participants. Students in both groups came from culturally, economically, and

socially diverse backgrounds. Participants and participants' parents signed consent forms for the study, and permission was obtained from the school district's superintendent for the employment of the research and the collection of data from the study. A copy of the written permission form given to participants and participants' parents is inclu ded in the Appendices. The school district's superintendent's permission form is also documented in the Appendices.

Instrumentation

The experiential and comparative groups participated in a comprehensive leveled reading program with digital books and corresponding electronic quizzes called RAZ-Kids from October 23, 2017 through January 7, 2018 (RAZ-Kids, 2017). RAZ-Kids is a research-based, online reading program used to enhance fluency and comprehension. Students earn stars for practice, completion, and success with different activities (RAZ-Kids, 2017). According to Lazel, Inc. (2017), "The student and teacher resources on the Reading A-Z website have been developed to reflect the instructional practices and reading strategies that are best supported by research findings from a wide variety of sources." (p. 1). Stars were earned for successful completion of program requirements with RAZ-Kids. For every 500 stars accrued, the experiential group received digital badges. The digital badges were issued and stored at classbadges.com, a password protected program (classbadges.com, 2017). Homeroom teachers administered the MClass 3D Reading Assessment September 11, 2017 through October 9, 2017 to determine each child's pre-badge reading level and January 10, 2018 through February 5, 2018 to determine each child's post badge reading level. The mCLASS 3D Reading Assessment is a balanced literacy tool for grades K–5 that measures foundational skills with text and reading comprehension (About mCLASS: Reading 3D, 2017). According to Amplify (2017), "The mCLASS Reading 3D solution is the only validated, research-based assessment that combines quick indications of early skill development

with deep observations of students' interactions with authentic texts" (p. 1). Furthermore, the results provide second grade teachers with the best predictor of student literacy success in third grade (Amplify Education, Inc., 2013).

Data Collection

Assessment data from mCLASS 3D was collected for two classes of self-contained, regular education second grade students in a K–2, title I, rural elementary school in the southeastern United States during the 2017–2018 school year. The first assessment was administered September 11, 2017 through October 9, 2017 to determine each participant's pre-badge reading level. The post badge assessment was administered January 10, 2018 through February 5, 2018 to determine each participant's post badge reading level. The assessors were the participants' homeroom teachers. Reading level achievement was measured against the acquisition of digital badges using a scatterplot to determine if a difference existed. According to Mindrila and Balentyne (2013), "The most useful graph for displaying the relationship between two quantitative variables is a scatterplot" (p. 2).

A quantitative quasi-experimental research study was used to analyze the difference between independent and dependent variables. The independent variable was the digital badge initiative that was used with the experiential group. The dependent variable was the measure of reading level achievement for the experiential and comparative groups as evidenced by the mCLASS 3D Reading Assessment. An explanatory design for the study was implemented because data for each variable was collected at the same time. According to Zikmund, Babin, Carr, and Griffin (2012), explanatory studies normally offer the benefit of replication if necessity arises and are associated with higher levels of internal validity due to systematic selection of subjects.

The t-test used in the study measured whether the two groups of participants' reading level

achievement was statistically different. This type of analysis is appropriate for measuring differences and similarities between two groups, especially with a two-group randomized experimental design (Trochim, 2006). Statistical data were collected for the difference between reading level achievement and badge acquisition and may inform digital badge design and implementation for reading level achievement.

Operationalization of Variables

The operationalization of variables involved taking the conceptual framework and creating measurable outcomes. According to Witt (n.d.), "The researcher must bridge the gap between the hypothetical ideal (the Concept) and empirical measurable reality (the Variable) by resorting to estimates" (p. 1). In the study, reading level achievement was a dependent variable with the comparative and experiential groups. According to mCLASS 3D, reading level proficiency for second grade is defined as level J at the beginning of the school year, level L at the middle of the school year, and level M at the end of the school year (Amplify, 2017). Proficiency was determined by a one-on-one standardized assessment session between the test administrator and student. The test administrators for the study were the participants' second grade homeroom teachers. Reading fluency, oral comprehension, retell, and writing comprehension were factored into the formula which determined the reading level. In the study, digital badge acquisition was an independent variable with the experiential group. Students in the experiential group received digital badges in accordance with successful completion of RAZ-Kids' assigned activities. "Digital reports provide instant feedback on every activity or assessment a student completes, including the activity progress, assessment score, and feedback on specific Common Core skills" (RAZ-Kids, 2017, para. 1). Statistical significance indicated a comparison between reading level achievement and digital badge acquisition.

The student demographics were also a variable in the study. Students in both groups were

randomly assigned to classrooms. This was done through the creation of heterogeneous rosters by administration, and the researcher had no control over student placements. This reduced the threat of confounding population variables because the control and experimental groups were as similar as possible. Students in the comparative and experiential groups were academically, culturally, economically, and socially diverse. Since the purpose of the study was to measure reading level achievement, differences in beginning reading levels impacted by these factors were notated, but not integral to the results of the study. According to Fischler (n.d.), "It is rare to find an ideal control group. Instead, researchers try to obtain a control group that controls some of the most important potential confounding variables" (p. 5). The research was completed at a K–2, Title I, rural, public elementary school in the southeastern United States. The mCLASS 3D Assessment was utilized for the study because standardized end-of-the year testing is not administered until third grade.

Data Analysis Procedures

Reading level achievement data were collected for the comparative and the experiential groups September 11, 2017 through October 9, 2017 and January 10, 2018 through February 5, 2018 using the mCLASS 3D Reading Assessment. Data of the acquired badges from the experiential group were collected October 23, 2017 through January 7, 2018. A quantitative difference between reading level achievement and digital badge acquisition was explored using a chi-square analysis. According to Fisher and Yates (n.d.), "A chi-square is a statistical test commonly used to compare observed data with data we would expect to obtain according to a specific hypothesis" (para.1). This test was best suited for the study because data was analyzed for the likelihood ratio. Furthermore, a chi-square analysis was used to determine if results deviated from expected values. A chi-square analysis was conducted to analyze the frequency counts of

positive level changes between the experiential group that acquired digital badges and the comparative group that did not acquire digital badges.

Limitations and Delimitations of the Research Design

According to Simon (2011), "Limitations are potential weaknesses in your study and are out of your control" (p. 2). One limitation of the study included comparing heterogeneous groups of students. Administrators at the research site placed students in heterogeneous groups without the input of the researcher. This was recognized when interpreting results. Another limitation included acknowledging immeasurable, external factors that may have contributed to academic achievement. These external factors included the use of tutors with at-risk students, differences in levels of parental support, and the inclusion of exceptional education students in the study. The abstractness of digital badges to young research participants was another limitation to the study. "Badges will not unlock tangible opportunities for students until they hold value for key stakeholders, and these stakeholders must be convinced of their worth" (Davis & Singh, 2015, p. 78). In response, students were given usernames and passwords for classbadges.com to view acquired badges. Additionally, documentation of acquired badges was placed in students' portfolios. This enhanced the traditional credentialing system because digital badges communicated the standards used to determine grades (Bull, 2014). This also contributed to more interest and participation from students in the experiential group because digital badge research generally finds a positive comparison between learning and academic performance and a negative relationship between performance avoidance and learning outcomes (Elliott et al., 2006).

According to Creswell (2008), delimitations are choices made by the researcher that describe the boundaries set for the study. A delimitation associated with the study was utilizing one research site, two classrooms that accurately represent the broader population of second grade

students at the research site, and two homeroom teachers. This allowed for continuity in data collection and reduced the number of variables in the study. Another delimitation included not issuing grades and not leveling badges. Issuing grades and leveling badges would have been counterproductive because the program was based upon earning incentives. Adding grades to the research would have compromised the conclusions formulated about the results. According to Bowen (2017), "Critical thinking, oral communication, intercultural awareness, and teamwork are desirable skills students may develop through coursework, co-curricular and extracurricular activities, or from work experience; however, such skills are difficult to measure with grades" (para. 6).

Internal and External Validity

According to Onwuegbuzie (2000), "An experiment is deemed to be valid, in as much as valid cause-effect relationships are established, if the results are due only to the manipulated independent variable and are generalizable to groups, environments, and contexts outside of the experimental settings" (p. 1). Internal validity refers to the control exhibited in a research study, reducing or eliminating extraneous variables from interfering with the relationship between the manipulated independent variable and the dependent variable (Trochim, 2006). Since there were 39 participants in the study, it was necessary to use all subjects in the collection and analysis of data to formulate comprehensive conclusions. However, by using two groups of similar students, the strength of internal validity was increased (Creswell, 2008). Internal threats that arose were documented and subsequently factored into the results of the research. Homeroom teachers also reported external threats that occurred.

The Hawthorne Effect was a possibility in the study. According to Epidemiol (2014), "The Hawthorne Effect concerns research participation, the consequent awareness of being studied, and possible impact on behavior" (p. 1). In the study, the Hawthorne Effect included increased

extrinsic motivation for students receiving badges. This could have added to an increased motivational factor with the experiential group and a decreased motivational factor for the comparative group. By analyzing student behaviors and learning over a five-month period for both groups of participants, the Hawthorne Effect was minimized. Only quantitative data from the number of badges acquired and the mCLASS 3D Reading Assessment was collected by the researcher. The data were collected discreetly so participants could not change behavior patterns based on researcher observations.

According to Michael (n.d.), "External validity refers to the degree to which the results of an empirical investigation can be generalized to and across individuals, settings, and times" (Figure 12). External validity was considered so relationships drawn between reading level achievement and digital badge acquisition could be generalized outside the boundaries of the study (Michael, n.d.). External validity was established by homeroom teachers administering the mCLASS 3D Reading Assessment, decreasing the occurrence of researcher bias. Population validity was considered as the two groups of students participating in the study were randomly assigned to two second grade teachers' classrooms and were representative of the entire second grade population at the research site (Michael, n.d.). Time validity was considered as the study mimicked the traditional school year calendar for both sets of participants (Michael, n.d.). Environmental validity was considered as results were generalized across two second grade classrooms at the same research site (Creswell, 2008). This allowed for a more valid generalization of results to the broader educational system.

Expected Findings

The quantitative quasi-experimental study yielded a causal relationship between second grade reading level achievement and digital badge acquisition. It was anticipated that the acquisition of digital badges for the experiential group would result in a positive change in reading level

achievement when compared to the comparative group of student participants. The difference was predicted as students in the experiential group were completing text-rich activities as well as receiving added incentives for participation in the RAZ-Kids' program. According to Fontichiaro et al. (2015), digital badges help "students set goals and envision success, and students are conditioned to think in 'do the work, get a prize' mode" (p. 1).

A common issue evidenced in the literature was a need for additional research related to digital badges. Digital badges were introduced as educational tools in 2010 by the Mozilla Foundation, and only a few studies are published on efficacy related to badges and learning (Hurst, 2015). "Though there is considerable enthusiasm and speculation around using digital badges to promote educational change, whether they succeed at empowering learners and connecting their learning across contexts remains largely untested" (Davis & Singh, 2015, p. 73). Furthermore, according to Wu, Whiteley, and Sass (2015), there is a need for additional research regarding the impact of digital badges in curricular as well as co-curricular settings. The research study sought to evaluate the effect of digital badges on second grade reading achievement in an elementary school setting. By using the digital badging gamification tool, it was anticipated that reading level achievement of second graders would positively change, and the innovative practice of using digital badges would become a more widespread tool in elementary school settings.

Ethical Issues in the Study

According to the National Institute of Environmental Health Services (2017), "Since research often involves a great deal of cooperation and coordination among many different people in different disciplines and institutions, ethical standards promote the values that are essential to collaborative work, such as trust, accountability, mutual respect, and fairness" (p. 1). In the study, mCLASS 3D Reading Assessment scores remained anonymous and confidential. The mCLASS 3D Reading Assessment teacher website was password-protected. Student participant scores were shared by the

homeroom teachers with the researcher, participants, and participants' parents. Reporting of scores for the study protected the anonymity of participants, identifying students through terms such as "Student 1 in the Comparative Group." Badge acquisition was anonymous and confidential. Participants were assigned a username and password to track digital badge acquisition progress at classbadges.com. Access to each participant's information was limited to the participant, the participant's parents, the participant's homeroom teacher, and the researcher. Both programs utilized in the study were research-based, eliminating the possibility of researcher bias.

The subject recruiting and informed consent process was obtained to gain Internal Review Board (IRB) approval. This included information such as the purpose, duration, and procedures related to the research, the right to decline or withdraw from participation, the foreseeable consequences of declining or withdrawing, potential risks, discomfort, or adverse effects, possible research benefits, confidentiality limitations, incentives for participation, and contact information (American Psychological Association, 2017). Consent forms are included in the Appendices.

The researcher held the position as an observer and data collector. The researcher was objective in collecting and sharing findings from the study. The research followed the study design, worked according to the theoretical framework, and was guided by the research question. Data were stored on the mCLASS 3D Reading Assessment site and classbadges.com. All data were safeguarded through password protection and were shared with the dissertation committee first. An IRB approval letter and permission to conduct research form were collected to protect the participants and institution involved in the study. Permission from the school district was also collected.

Summary

According to Duncan (2009), "Literacy, or the ability to understand, interpret, use, create, compute, evaluate, and communicate information associated with varying contexts and presented in varying formats, plays a pivotal role in shaping a youth's trajectory in life" (p. 1). Even though the

functional importance of literacy is widely understood, illiteracy continues to elude society. Educational leaders are in constant search of innovative practices such as the use of digital badges to improve learning outcomes. The purpose of the quantitative quasi-experimental research study was to examine the reading level achievement of second grade students in a K–2, Title I, rural, public elementary school in the southeastern United States. In the study, two groups of second grade students participated October 23, 2017 through January 7, 2018 in an online, research-based reading program titled RAZ-Kids (RAZ-Kids, 2017). Both groups of second grade students were in self-contained, regular education classroom settings during the 2017–2018 school year. The experiential group received digital badges for successful completion of RAZ-Kids' program requirements. The comparative group participated in the program with no added incentives. Pre-badge reading levels were attained September 11, 2017 through October 9, 2017, and post badge reading levels were attained January 10, 2018 through February 5, 2018.

A quasi-experimental research study was conducted to analyze a real-life learning situation over time through quantitative data collection, including mCLASS 3D Reading Assessment scores and digital badge acquisition documentation. A scatterplot showed the relationship between the two quantitative variables, which were reading level achievement and badge acquisition. The overall pattern of the scatterplot was described by the strength of the relationship.

Operationalization of variables for the study were reading level achievement, digital badge acquisition, student demographics, and a K–2, Title I, rural, public elementary school in the southeastern United States. Limitations are certain weaknesses and potential issues in any research study that might influence generalization of the study to other people or situations (Creswell, 2008). Limitations for the study included working with two heterogeneous sets of participants, external factors such as the use of tutors with some students, differences in parental support, and the inclusion of exceptional education students. The abstractness of a digital badge program to

young students was also noted as a limitation of the study (Davis & Singh, 2015). This was addressed through allowing student participants in the experiential group to view acquired badges at classbadges.com and by placing documentation of earned badges in student portfolios. Delimitations are choices made by the researcher that describe the boundaries set for the study (Creswell, 2008). Delimitations included using one research site, using two heterogeneous classrooms, using two homeroom teachers, not assigning grades based on the program, not leveling badges, and including documentation of acquired badges in student portfolios. Internal threats to the validity of the study included factors such as participant selection, testing, and instrumentation. The Hawthorne Effect was also emphasized as a threat to the validity of the study's results. All study participants were included in the data collection process, and the data were discreetly collected to minimize the threats to validity. Furthermore, ethical considerations such as anonymity and confidentiality of data, informed consent, and research-based programs used in the study all negated the chances of researcher bias (American Psychological Association, 2017).

It was predicted that the acquisition of digital badges for the experiential group would cause a positive change in reading level achievement because "when carefully designed and thoughtfully applied, technology has the potential to accelerate, amplify, and expand the impact of powerful principles of learning" (Metiri Group, n.d., para. 1). A common issue evidenced in the literature was a need for additional research related to digital badges. To contribute to literature regarding the use of badges affecting learning outcomes, the research study evaluated the impact of digital badges on second grade reading level achievement. By using the digital badging gamification tool, it was anticipated that reading level achievement of second graders would positively change, and the innovative practice of using digital badges would become a more widespread tool in elementary school settings.

Chapter 4: Data Analysis and Results

Introduction

The purpose of this quantitative quasi-experimental research study was to examine the difference between reading level achievement and digital badge acquisition of second grade students in a K–2, Title I, rural, public elementary school in the southeastern United States. Two self-contained, regular education second grade classrooms participated in a comprehensive leveled reading program with digital books and corresponding electronic quizzes called RAZ-Kids (RAZ-Kids, 2017). RAZ-Kids was used by students in the experiential and comparative group from October 23, 2017 through January 7, 2018. Stars were earned for successful completion of program components. For every 500 stars accrued, the experiential group received digital badges. The comparative group of students completed assignments from the program, but this group did not receive digital badges.

The mCLASS 3D Reading Assessment was administered from September 11, 2017 through October 9, 2017 to determine each child's beginning reading level and from January 10, 2018 through February 5, 2018 to determine each child's ending reading level. The study sought to examine if a difference existed between digital badge acquisition and reading level achievement. The mCLASS 3D Reading Assessment assessors were the participants' homeroom teachers to avoid researcher bias. All information regarding student registration and assessments was password protected. Student information was also password protected and only accessible to homeroom teachers, participants' parents, and the primary researcher in the study. A quantitative statistical assessment of reading achievement for both groups was analyzed to determine the difference between issuing digital badges to learning outcomes of participants.

Research Question and Hypotheses

Research Question. How does the acquisition of digital badges sustain the motivation of second graders to improve their reading performance?

Null Hypothesis. The acquisition of digital badges does not sustain the motivation of second graders to improve their reading performance.

Alternative Hypothesis. The acquisition of digital badges sustains the motivation of second graders to improve their reading performance.

A quantitative quasi-experimental research study was used. The independent variable was the motivation system that was used with the experiential group. The dependent variable was the measure of reading level achievement for the experiential and comparative groups as evidenced by the mCLASS 3D Reading Assessment. This type of analysis is appropriate for measuring differences and similarities between two groups, especially with a two-group randomized experimental design (Trochim, 2006). Statistical data were collected on the difference between reading level growth between second graders academically motivated to learn using digital badges or the traditional stickers. A chi-Square analysis was computed. It was revealed that the acquisition of digital badges translated to more reading level achievement for the experiential group.

Description of the Sample

The research participants in this study included 39 second grade students in a K–2, Title I, rural, public elementary school in the southeastern United States. At the onset of the study, it was anticipated that closer to 50 second grade students at the research site would participate, but class size was smaller than anticipated and some students in the comparative group and experiential group's rosters transferred from the research site during the study. Therefore, data were collected for 20 students in the comparative group and 19 students in the experiential group during the

entirety of the study. The 20 comparative participants and the 19 experiential participants were randomly assigned to groups since the creation of rosters were heterogeneously designed by the administration. The researcher had no control over the placement of students in the comparative or experiential classrooms. The comparative and experiential groups of second grade students were in self-contained, regular education classroom settings during the 2017–2018 school year. The comparative and experiential participants came from culturally, economically, and socially diverse backgrounds. In the comparative group, 10 students were 7 years old, 8 students were 8 years old, and 2 students were 9 years old. The comparative group had 9 females and 11 males. Three students were served in the English as Second Language program, and 3 were identified as exceptional education students. One student was previously identified as an exceptional education student, but this student tested out of the program. Five students in the comparative group were previously retained. Two students in the comparative group were in the MTSS (Multi-Tiered System of Support) process, which means they were receiving research-based interventions and being monitored for academic progress. This process is used when students are at-risk for failure because of low test scores or classroom performance. In the experiential group, 11 students were 7 years old, and 8 students were 8 years old. Eight students were female, and 11 students were male. Four students were served in the English as Second Language program, and 2 students received speech therapy. One student had been retained, and 2 were in the MTSS process.

Summary of the Results

According to Trochim (2008), "The key question in internal validity is whether observed changes can be attributed to your program or intervention and **not** to other possible causes" (para. 1). It was necessary to use data from all participants since there were only 39 research subjects. Both classes were culturally, economically, and socially similar. Administration randomly assigned students to classrooms, so the possibility of researcher bias was eliminated. Data were not

available for several students who began the study in the comparative and experiential groups because they transferred to another school during the study. Two students transferred into the comparative group during the study, but these students were not included in the statistical analysis since they were not a part of the comparative group when the study began. By establishing the comparative group and experiential group at the onset of the study and not changing the participants during the study, internal validity was enhanced.

According to Cambridge, Witton, and Elbourne (2014), "The Hawthorne effect concerns research participation, the consequent awareness of being studied, and possible impact on behavior" (para.1). In the study, there was a possible increase of extrinsic motivation with the students receiving digital badges, leading to an increased motivational factor for the experiential group and a decreased motivational factor for the comparative group. To eliminate this possibility, the researcher did not allow the comparative group to have any knowledge of the experiential group's digital badge acquisitions. The experiential group received passwords to view their acquisition of digital badges, but no physical badges or verbal recognition were issued. The researcher was discreet in collecting data, so students did not realize their participation was being documented. Additionally, since the study was approximately five months long, both groups of research participants became adjusted to the routines of RAZ-Kids, and the experiential group became accustomed to receiving digital badges for the accruement of stars on the RAZ-Kids' program. This allowed the study to become immersed in regular classroom routines and made the data collected more valid.

According to Trochim (2006), "External validity is the degree to which the conclusions in your study would hold for other persons in other places and at other times" (para. 1). External validity was important for this study because any relationships drawn between the acquisition of badges and reading level achievement needed to be the result of variables from the study, not

external factors beyond the scope of the study. External validity was achieved by several means. First, homeroom teachers administered the pretest and posttest to determine students' reading levels. This reduced the occurrence of researcher bias. Comparative and experiential groups were randomly assigned by administration and representative of the entire second grade population at the research site, assuring population validity (Michael, n.d.). The study followed the traditional school calendar, and research results were generalized across two second grade classrooms at the same research site. These factors assured time and environmental validity (Michael, n.d.). These measures served to maintain validity of data that allowed for generalizations to be made to the broader educational system.

Detailed Analysis

A quantitative quasi-experimental design was chosen for this study to effectively examine the difference between the variables of digital badge acquisition and reading level achievement. The following hypotheses guided the study:

Null Hypothesis. The acquisition of digital badges does not sustain the motivation of second graders to improve their reading performance.

Alternative Hypothesis. The acquisition of digital badges sustains the motivation of second graders to improve their reading performance.

Comparative Group's Data Analysis

The comparative group's data is listed in Table 1 below. This table represents the mCLASS 3D pre-badge assessment given September 11, 2017 through October 9, 2017, the mCLASS 3D post-badge assessment given January 10, 2018 through February 5, 2018, and the change in number of reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post-badge assessment. Student participants are identified as CS (comparative student) with a corresponding number from one to 20. The number given to student participants and the order of

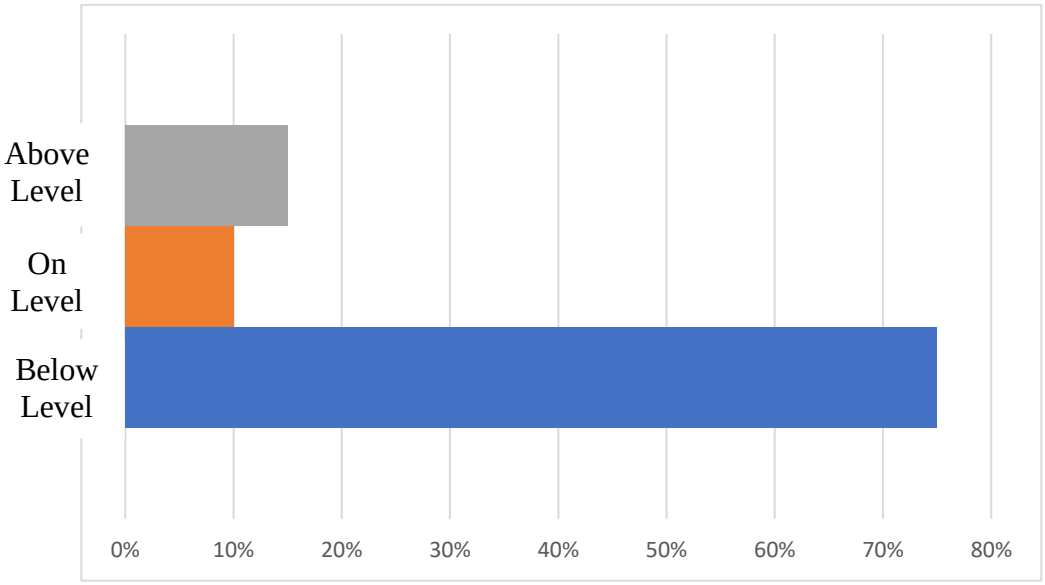
student participants in the table is random. The reading proficiency level goal for the beginning of the school year is level J. The first number by each student participant indicates the number of levels above or below proficiency level J in which a student scored on the mCLASS 3D pre-badge assessment. Negative numbers indicate levels below proficiency level J a student scored on the mCLASS 3D pre-badge assessment. Positive numbers indicate levels above proficiency level J a student scored on the mCLASS 3D pre-badge assessment. "On level" represents students who scored proficiency level J on the mCLASS 3D pre-badge assessment. The reading level goal for the middle of the school year is level L. The first number by each student participant indicates the number of levels above or below proficiency level L in which a student scored on the mCLASS 3D post-badge assessment. Negative numbers indicate levels below proficiency level L a student scored on the mCLASS 3D post-badge assessment. Positive numbers indicate levels above proficiency level L a student scored on the mCLASS 3D post-badge assessment. "On level" represents students who scored proficiency level L on the mCLASS 3D post-badge assessment.

Table 1

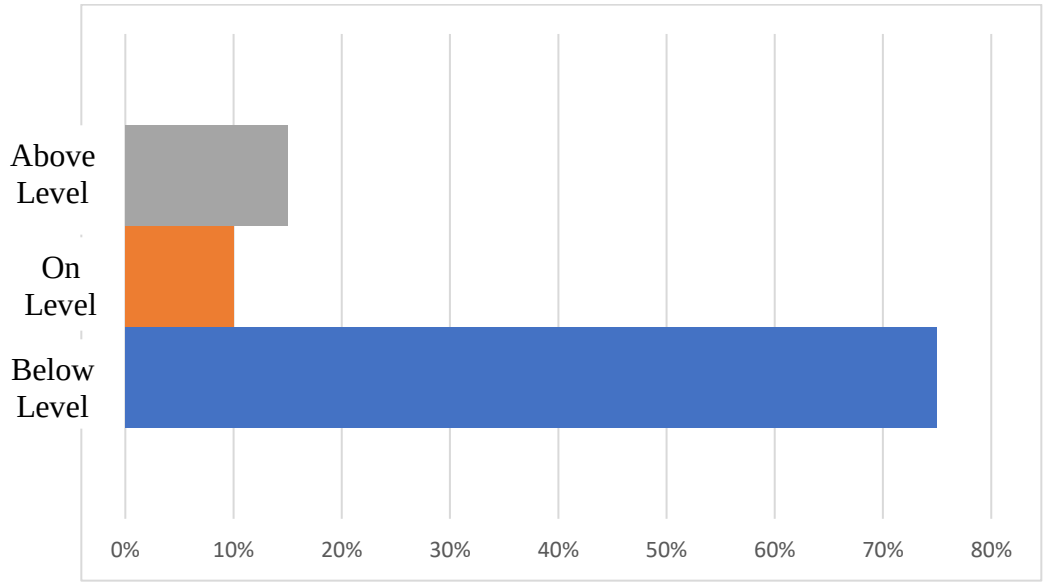
Comparative Group's mCLASS 3D Pre-Badge and Post-Badge Assessment Data 2017–2018

Participants	Pre-Badge (2017)	Post-Badge (2018)	Level Change (2017–2018)
CS1	-1	-1	+2
CS2	-1	-2	+1
CS3	-5	-4	+3
CS4	+2	+2	+2
CS5	On Level	-1	+1
CS6	-5	-5	0
CS7	-2	-3	+1
CS8	On Level	On Level	+2
CS9	-5	-6	+1
CS10	-1	-2	+1
CS11	+1	+2	+3
CS12	-5	-7	0
CS13	-3	-4	+1
CS14	-8	-10	0
CS15	+2	On Level	0
CS16	-2	-3	+1
CS17	-4	-4	+2
CS18	-7	-6	+3
CS19	-1	-2	+1
CS20	-2	-2	+2

The comparative group grew a total of 16 levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post-badge assessment. This calculated a mean growth of .8 levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post-badge assessment. The comparative group had 15 participants (75%) reading below proficiency level J on the mCLASS 3D pre-badge assessment, a total of 52 deficiency levels below the proficiency level J. The mCLASS 3D pre-badge assessment also indicated that two participants (10%) were reading on proficiency level J, and three participants (15%) were reading above proficiency level J, a total of 5 levels above proficiency level J. On the mCLASS 3D post-badge assessment, the comparative group had 16 participants (80%) reading below proficiency level J, a total of 62 levels behind proficiency level L. The mCLASS 3D post-badge assessment indicated two participants (10%) were reading on proficiency level L, and two participants (10%) were reading above proficiency level J, a total of 4 levels above proficiency level L. The reading level achievement from the mCLASS 3D pre-badge assessment to the mCLASS 3D post-badge assessment was averaged for the comparative group. Sixteen students (80%) made reading level growth from the mCLASS 3D pre-badge assessment to the mCLASS 3D post-badge assessment. Four students (20%) made no reading level growth.



Comparative Group's mCLASS 3D Pre-Badge Assessment



Comparative Group's mCLASS 3D Post-Badge Assessment

Figure 1. Comparison of Comparative Group's Reading Levels from the mCLASS 3D Pre-Badge Assessment to the mCLASS 3D Post-Badge Assessment 2017–2018

Experiential Group's Data Analysis

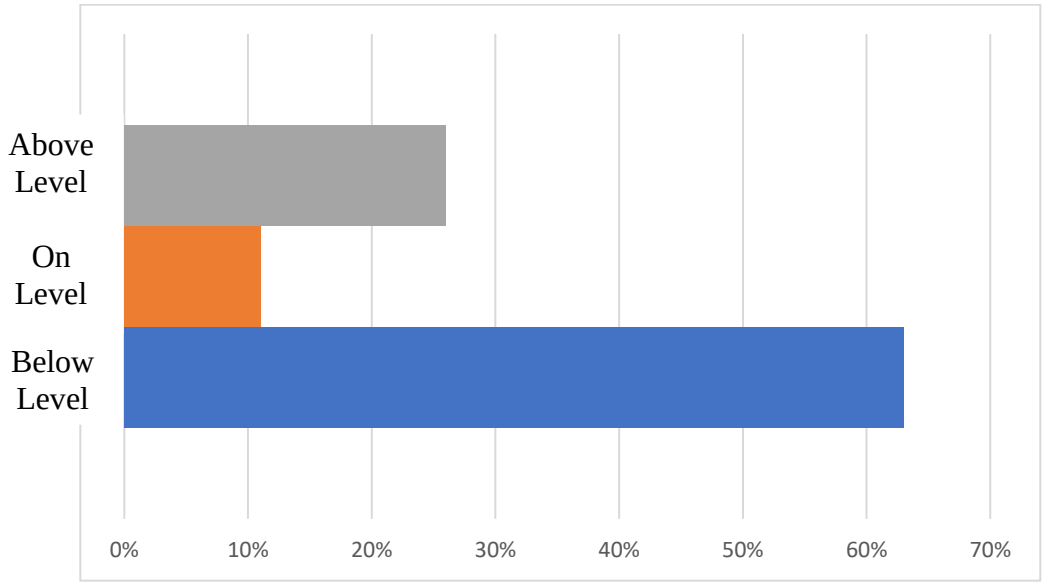
The experiential group's data is listed in Table 2 below. This table represents the mCLASS 3D pre-badge assessment given September 11, 2017 through October 9, 2017, the mCLASS 3D post-badge assessment given January 10, 2018 through February 5, 2018, and the change in number of reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post-badge assessment. Student participants are identified as ES (experiential student) with a corresponding number from one to 19. The number given to student participants and the order of student participants in the table is random. The reading proficiency level goal for the beginning of the school year is level J. The first number by each student participant indicates the number of levels above or below proficiency level J in which a student scored on the mCLASS 3D pre-badge assessment. Negative numbers indicate levels below proficiency level J a student scored on the mCLASS 3D pre-badge assessment. Positive numbers indicate levels above proficiency level J a student scored on the mCLASS 3D pre-badge assessment. "On level" represents students who scored proficiency level J on the mCLASS 3D pre-badge assessment. The reading level goal for the middle of the school year is level L. The first number by each student participant indicates the number of levels above or below proficiency level L in which a student scored on the mCLASS 3D post-badge assessment. Negative numbers indicate levels below proficiency level L a student scored on the mCLASS 3D post-badge assessment. Positive numbers indicate levels above proficiency level L a student scored on the mCLASS 3D post-badge assessment. "On level" represents students who scored proficiency level L on the mCLASS 3D post-badge assessment.

Table 2

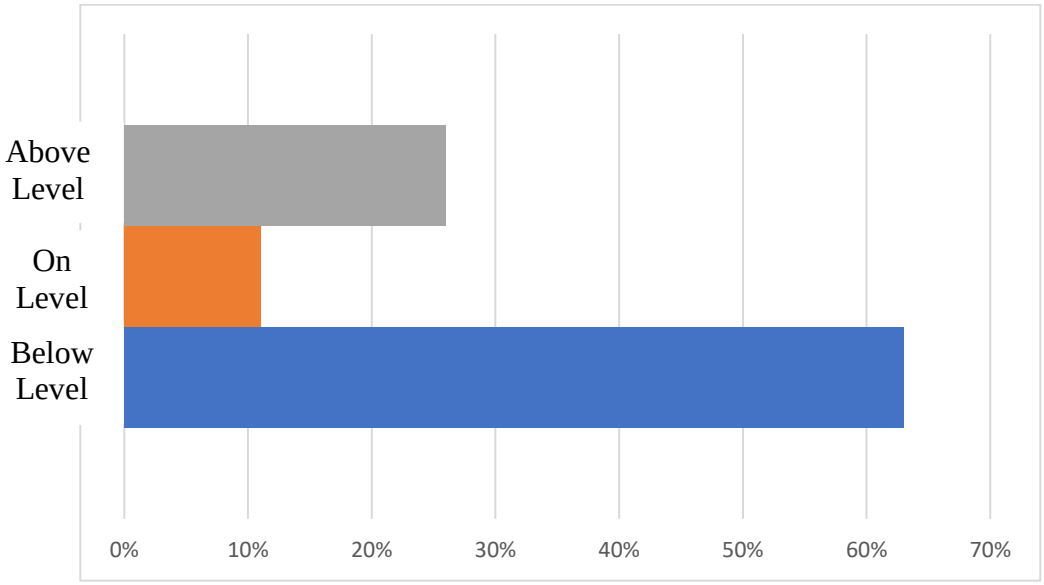
Experiential Group's mCLASS 3D Pre-Badge and Post-Badge Assessment Data 2017–2018

Participants	Pre-Badge (2017)	Post-Badge (2018)	Level Change (2017–2018)
ES1	-1	-2	+1
ES2	On Level	On Level	+2
ES3	-5	-5	+2
ES4	+2	+3	+3
ES5	-4	-4	0
ES6	-1	-2	+1
ES7	-2	-2	+2
ES8	-6	-6	+2
ES9	+2	+2	+2
ES10	On Level	On Level	+2
ES11	+2	+2	+2
ES12	-2	-2	+2
ES13	-5	-5	+2
ES14	+1	+1	+2
ES15	-2	-2	+2
ES16	-2	-2	+2
ES17	+2	+2	+2
ES18	-6	-5	+3
ES19	-5	-5	+2

The experiential group grew a total of 36 levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post-badge assessment. This calculated a mean growth of 1.8947 levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post-badge assessment. The experiential group had two participants (11%) reading below proficiency level J on the mCLASS 3D pre-badge assessment, a total of 41 deficiency levels below the proficiency level J. The mCLASS 3D pre-badge assessment also indicated that two participants (11%) were reading on proficiency level J, and three participants (26%) were reading above proficiency level J, a total of 9 levels above proficiency level J. On the mCLASS 3D post-badge assessment, the experiential group had 12 participants (63%) reading below proficiency level J, a total of 42 levels behind proficiency level L. The mCLASS 3D post-badge assessment indicated two participants (11%) were reading on proficiency level L, and five participants (26%) were reading above proficiency level J, a total of 10 levels above proficiency level L. The reading level achievement from the mCLASS 3D pre-badge assessment to the mCLASS 3D post-badge assessment was averaged for the experiential group. Eighteen students (95%) made reading level growth from the mCLASS 3D pre-badge assessment to the mCLASS 3D post-badge assessment. One student (5%) made no reading level growth.



Experiential Group's mCLASS 3D Pre-Badge Assessment



Experiential Group's mCLASS 3D Post-Badge Assessment

Figure 2. Comparison of Experiential Group's Reading Levels from the mCLASS 3D Pre-Badge Assessment to the mCLASS 3D Post-Badge Assessment 2017–2018

A two-way contingency table analysis (Chi square cross-tabulation) was conducted to evaluate whether academic growth in reading was greater in classrooms using digital badges as a reward or in classrooms, which were using traditional rewards in the form of stars. The two variables were classroom reward type (digital badges and typical stars) and growth in reading (growth in two or more levels of reading and less than 2 levels of growth in reading). Reward and reading were found to be significantly related, Pearson χ^2 (1, N= 38) = 8.92, p = .003. Cramer's ν = .49. The proportion of students who were progressing at 2 levels of growth or more in reading in the experiential and comparative groups were .84 and .37, respectively. The probability of a student growing at 2 levels of growth or more in reading was about 2.27 times (.84/.37) more likely in the experiential class than the comparative class. See Table 3 and Figure 3. This analysis supported rejecting the null hypothesis that the acquisition of digital badges does not sustain the motivation of second graders to improve their reading performance.

Table 3

Prevalence of Growth in Reading in the Experiential and Comparative Groups 2017–2018

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.922[a]	1	.003		
Continuity Correction[b]	7.049	1	.008		
Likelihood Ratio	9.400	1	.002		
Fisher's Exact Test				.007	.003
N of Valid Cases	38				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.50.

b. Computed only for a 2x2 table

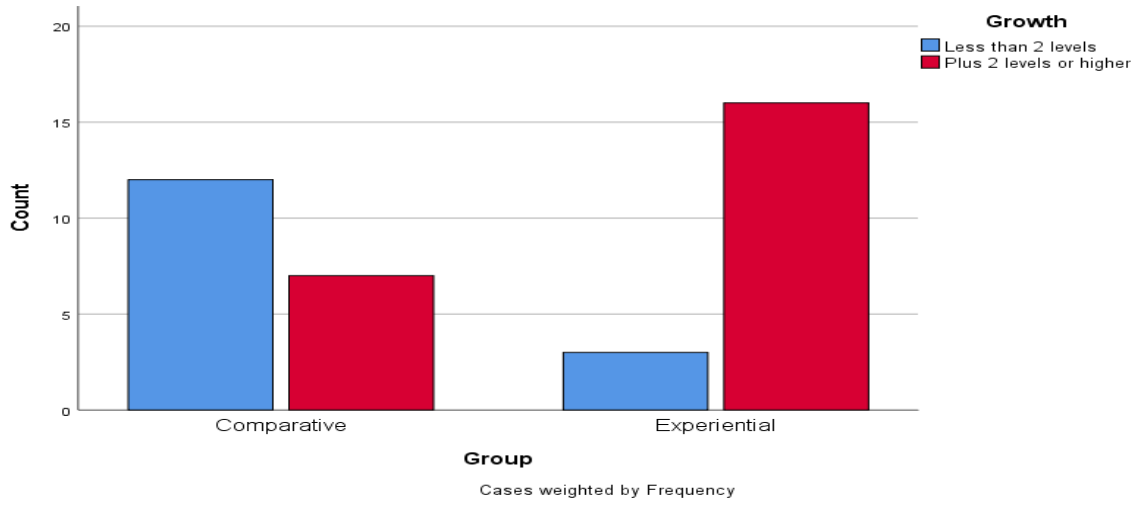


Figure 3. Type of growth in reading in the Comparative and Experiential classrooms 2017–2018

Summary

Collected data indicated that the comparative group that did not receive digital badges grew a total of 16 reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment, while the experiential group that did receive digital badges grew a total of 36 reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment. When only the number of reading levels increased from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment was analyzed, there appeared to be a significant difference between the reading level achievement of the comparative group that did not receive digital badges versus the experiential group that did receive digital badges. However, when statistically analyzed in relation to how many students met the proficiency level L for the mCLASS 3D post badge assessment, the data was more skewed. The comparative group that did not receive digital badges had 5% more students reading below proficiency reading level L, the same percentage (10%) reading on grade level, and 5% less reading above grade level from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment. The experiential group that did receive digital badges had the same number of students reading below grade level (63%), on grade level (11%), and above grade level (26%) from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment. Even though students in the comparative group that did not receive digital badges and the experiential group that did receive digital badges increased their reading level from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment, the proficiency level goal increased, making these percentages stagnant for both groups. A scatterplot revealed that the reading level achievement from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment made by the experiential group that did receive digital badges was not correlated to the number of digital badges acquired. However, when the data was analyzed according to number of positive reading levels grown for both groups

with the proficiency level not considered, the calculations revealed the experiential group statistically and significantly outperformed the comparative group. Results supported rejecting the null hypothesis and accepting the alternate hypothesis that there is a difference between second grade students' reading achievement and the acquisition of digital badges.

Chapter 5: Discussion and Conclusion

Introduction

The purpose of chapter 5 is to discuss and draw conclusions from the collected data from the study "The Effects of the Acquisition of Digital Badges on Second Grade Literacy." This chapter will include a summary of the results, a discussion of the results, a discussion of the results in relation to the literature, limitations, the implication of the results for practice, policy, and theory, recommendations for further research, and a conclusion. The study analyzed the reading level achievement of second grade students as impacted by the implementation of a digital badge initiative. According to Abramovich et al. (2013), more research is needed to fully comprehend the impact of badges on learners of different ages and in various environments. The study responded to this gap in the literature by examining the difference between reading level achievement and digital badge acquisition in second grade students in a K–2, Title I, rural, public elementary school in the southeastern United States.

Thirty-nine second grade students were the research participants for this study. Twenty students were in the comparative group, and 19 students were in the experiential group. The comparative and experiential groups were given the mCLASS 3D pre-badge assessment to determine beginning reading levels From September 11, 2017 to October 9, 2017. Pre-badge reading levels were recorded by the researcher. The comparative and experiential groups participated in RAZ-Kids, a comprehensive online reading program from October 23, 2017 to January 7, 2018. The experiential group received digital badges for every 500 stars accrued with the RAZ-Kids' program. The comparative group did not receive digital badges. The comparative and experiential groups were given the mCLASS 3D post badge assessment to determine ending reading levels from January 10, 2018 to February 5, 2018.

The researcher collected data during the study which lasted from September 11, 2017

through February 5, 2018. This data included mCLASS 3D pre-badge assessment reading levels for the comparative and experiential groups, the number of digital badges acquired by the experiential group, and mCLASS 3D post badge assessment reading levels for the comparative and experiential groups. Data for each group were recorded in a multiple of ways. First, each comparative and experiential group's participant's score were written in comparison to second grade reading proficiency levels. The increase in reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment was recorded for the comparative and experiential group's participants. The comparative and experiential group's percentages of students reading below proficiency level, on level, and above proficiency level were recorded for the mCLASS 3D pre-badge assessment and the mCLASS 3D post badge assessment. Chapter 5 will discuss results and draw conclusions from the data.

Research Question and Hypotheses

Research Question. How does the acquisition of digital badges sustain the motivation of second graders to improve their reading performance?

Null Hypothesis. The acquisition of digital badges does not sustain the motivation of second graders to improve their reading performance.

Alternative Hypothesis. The acquisition of digital badges sustains the motivation of second graders to improve their reading performance.

Summary of the Results

Digital badges are network-based symbols of learning achievements that, unlike traditional credentialing systems, recognize learning in formal as well as informal settings (Anzalone, 2015). There is a minimal amount of research on the impact of badges on student motivation, and the research available is complex. As evidenced by Abramovich, Schunn, and Higashi (2013), the design of digital badges and the students for which they are created are critical indicators of

learning motivation. Even though digital badges are becoming more prevalent, there remains uncertainty regarding their use in education. Traditional credentialing systems are deeply rooted in the foundations of the educational system as networks of trust, making standardized assessment measures such as degrees and diplomas valued at institutions of learning (Hickey & Willis, 2015). However, according to Rediehs (2009), human learning is extremely complex, and traditional grading fails to appropriately measure and signify the authenticity associated with a learning achievement. As districts and schools face the challenges of documenting student learning, they should build internal capacity and consider new learning opportunities (Mozilla, 2013). One avenue for achieving this mission is the use of digital badges. Digital badges possess the potential to create a disruption to the traditional credentialing system as there is an increase in digital badge usage in diverse settings (MacArthur Foundation, 2017).

Digital badges are gaining widespread interest as a multi-faceted means of assessing learners (Carey, 2012). However, badges are not widely valued by admissions or hiring officials (Hickey et al., 2015). Badges possess the potential to communicate an expansive amount of achievements and serve as an alternative to traditional credentialing systems. As studies continue to explore comparisons between badges and learning outcomes, the likelihood of integration into traditional credentialing systems will increase and a standardization of badges will emerge (Hickey & Willis, 2015). Digital badge research will also serve to improve the learning ecosystems established through badge accumulation. The study sought to add to the existing literature on differences between digital badge acquisition and reading level achievement in second grade students.

While promising positive disruptions to the available credentialing system, digital badges are not widely recognized by academic institutions and employers (Hurst, 2015). Digital badges tend to lack trusted traditions of existing credentialing systems such as numerical grades, diplomas,

and degrees (Priest, 2015). As stated by Ford, Izumi, Lottes and Richardson (2014), "Scholarly research on using badges for competency-based education is incipient and little has been published on the matter" (p. 34). There is also the issue of organizations with diverse expressions of outcomes, making standardization of badges difficult to manage (Casilli & Hickey, 2016). However, as education moves more toward open learning formats, badges continue to become significant. According to Schwarz (2016), the achievement of digital badges is highly probable due to the far-reaching benefits to a growing number of learners who seek recognition and validation for achievements.

Digital badges support a more personalized learning environment that fosters collaboration and relevant learning practices (Bowen & Thomas, 2016). Specific design structures of badges maximize learner benefits. This requires continued research exploring the learning potential of badges (Rughinis & Matei, 2011). As stated by Hickey et al. (2014), the way in which badges are used in education should be weighed responsibly against the backdrop of assessment practices. According to Strunk and Willis (2017), "In terms of assessment alone, badges offer granular evidence of skills acquisition and demonstration, a specific pathway to learning complex concepts, and a clear picture of how far the learner has progressed" (para. 4). The research study analyzed the difference between the acquisition of digital badges and reading level achievement to add to the existing literature regarding the impact of digital badges on learning outcomes.

Discussion of the Results

The comparative group that did not acquire digital badges improved 16 reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment. A statistical analysis revealed 75% of the comparative group participants were reading below proficiency level J on the mCLASS 3D pre-badge assessment, 10% of the comparative group participants were reading on level on the mCLASS 3D pre-badge assessment, and 15% of the comparative group

participants were reading below proficiency level J on the mCLASS 3D pre-badge assessment. On the mCLASS 3D post badge assessment, 80% of the comparative group participants were reading below proficiency level L, 10% of the comparative group participants were reading on level, and 10% of the comparative group participants were reading below proficiency level L. The comparative group that did not receive digital badges had an average growth of 1.35 reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment.

The experiential group that did acquire digital badges improved 36 reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment, with an average growth of 1.8947 reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment. A statistical analysis revealed 63% of the experiential group participants were reading below proficiency level J on the mCLASS 3D pre-badge assessment, 11% of the experiential group participants were reading on level on the mCLASS 3D pre-badge assessment, and 26% of the experiential group participants were reading above proficiency level J on the mCLASS 3D pre-badge assessment. The mCLASS 3D post badge assessment showed the same percentages with no changes for the experiential group participants. Sixty-three percent of the experiential group participants were reading below proficiency level L on the mCLASS 3D post badge assessment, 11% of the experiential group participants were reading on level on the mCLASS 3D post badge assessment, and 26% of the experiential group participants were reading above proficiency level L on the mCLASS 3D post badge assessment

The difference between the average reading level growth of the comparative group that did not receive digital badges compared to the experiential group that did receive digital badges was .5447. This number revealed a greater average growth rate for the experiential group that did receive digital badges. A two-way contingency table analysis (Chi square cross-tabulation) was conducted

to evaluate whether academic growth in reading was greater in classrooms using digital badges as a reward or in classrooms, which were using traditional rewards such as stars. The two variables were classroom reward type (digital badges and typical stars) and growth in reading (growth in two or more levels of reading and less than 2 levels of growth in reading). Reward and reading were found to be significantly related, Pearson χ^2 (1, N= 38) = 8.92, p = .003. Cramer's ν = .49. The proportion of students who were progressing at 2 levels of growth or more in reading in the experiential and comparative groups were .84 and .37, respectively. The probability of a student growing at 2 levels of growth or more in reading was about 2.27 times (.84/.37) more likely in the experiential class than the comparative class. The calculation was statistically significant. The experiential group that acquired digital badges did statistically and significantly outperform the comparative group that did not receive digital badges. Based on the calculations, it was determined that the acquisition of digital badges translated to more reading level achievement for the experiential group because badges encourage student independence in learning, allow students to track their progress, eliminate questions about missed work, and garner individual feedback and improvement (Browne, 2014).

The implications of this research on the field of education include connecting badges to specific curriculum objectives in a motivational fashion. Since the digital badges in this study were tied to RAZ-Kids, a research-based, comprehensive online reading program that nurtured students' increase in fluency and comprehension, the effort put forth to attain badges, even if not acquired, led to more reading practice for students in the experiential group that did receive digital badges, and higher reading level achievement than the comparative group that did not receive digital badges. More practice on reading fundamentals likely led to greater reading level achievement for the experiential group that did receive digital badges. This implies the need for careful

construction of digital badge requirements to mimic the learning needs of students. Connecting the digital badges to the greater educational ecosystem is also an implication of this research. By making sure the experiential group knew that the digital badges would be copied and placed in student portfolios, the range of stakeholders was expanded, and the digital badges were connected to traditional grading systems. This made the acquisition of digital badges relevant and placed traditional value on the acquisition.

Discussion of the Results in Relation to the Literature

Few students attain the necessary tools to benefit from the rigors of a balanced literacy approach (Nazaryan, 2014). This is evident as according to The Literacy Project Foundation (2017), "Illiteracy has become such a serious problem in our country that 44 million adults are now unable to read a simple story to their children" (para. 2). To combat illiteracy, innovative instructional and assessment practices such as the use of digital badges are adopted. Badges are complex representations of student learning that create cohesive learning pathways (Davis & Singh, 2015). The digital badges acquired in this study represent formal as well as informal learning achievements. Students read stories, took online quizzes, wrote about and discussed texts, and recorded themselves reading stories to earn badges. By using digital badges, students receive an added layer of instructional support that encourages reading achievement.

Digital badge ecosystems provide a platform for learners from all cultural, economic, and social settings to market themselves to educational organizations as well as future employers (Gibson et al., 2015). According to Seitzinger (2015), ecosystems are a way to mimic lifelong learning developed in work each day. Additionally, "it's when a badge is shared and recognized that its 'mint' value hits reality and becomes exchangeable currency" (Presant, 2016, para. 16). This study developed an ecosystem for the digital badges created by copying and placing acquired badges in student portfolios. Students were able to connect relevancy to traditional grading

practices, making their acquisition more meaningful and motivational.

Digital badges create an integrative learning experience, allowing learning pathways to develop. These pathways produce accumulative learning achievements that personalize learning and show a logical progression in understanding across a hybrid of learning environments (Ahn et al., 2014). Unlike traditional credentialing systems, badges move away from skill-based, isolated assessments to more global measures that include the recognition of micro-credentialing and macro-credentialing (Knight, 2015). This was evident in the research study as students read diverse texts and completed miscellaneous activities to demonstrate their understanding of stories. The research-based, multi-faceted, comprehensive program, RAZ-Kids, allowed students to develop learning pathways which led to higher reading level achievement in the experiential group that received digital badges than in the comparative group that did not receive digital badges.

Scholars view digital badges as a gamification tool, using a strategic game framework for learning and teaching, which is highly motivating (Hall, 2014). There is a minimal amount of research on the impact of badges on student motivation, and the research available is complex. As evidenced by Abramovich, Schunn, and Higashi (2013), the design of digital badges and the students for which they are created are critical indicators of learning motivation. Even though this study did not statistically calculate motivation for the experiential group, the researcher did observe students' excitement over the acquisition of digital badges. Students were visibly excited to check their classbadges.com website to count the number of badges attained and often compared this number with classmates. The anticipation of earning digital badges led to a higher number of logins and minutes worked on RAZ-Kids in the experiential group versus the comparative group.

According to Casilli and Hickey (2016), badges offer a functional and meaningful alternative to current grading. Massive potential may exist for badges to widen the educational landscape in teaching, learning, and assessing because "the power of the digital badge is that it

provides assessment for what normally goes ignored" (Abramovich, 2015, para. 18). The digital badges used in this study replicate traditional learning objectives as well as offer a more diversified means of learning how to read for students in second grade. Instead of using only traditional methods of instruction, students were given the opportunity to participate in a research-based, innovative online reading program and earn badges for their work on this program. This progressive means of instruction allowed students to learn how to read more fluently and comprehensively and provided a powerful means of assessment in an unconventional form.

As stated by Ford, Izumi, Lottes, and Richardson (2014), "Scholarly research on using badges for competency-based education is incipient and little has been published on the matter" (p. 34). This study sought to add to the existing literature on the acquisition of digital badges and their impact on learning outcomes. Since digital badges were first introduced to the educational infrastructure, few studies examined digital badge efficacy in relation to learning outcomes (Anzalone, 2015). Even so, digital badges are emerging as a continuing trend in education (Career and Technical Education Consortium of States, 2017). This study expanded upon the existing research on digital badges to determine if the acquisition of digital badges impacted higher reading achievement. The experiential group did show more reading achievement than the comparative group. This advanced the use of digital badges as an innovative instructional tool that impacts learning outcomes.

Limitations and Delimitations

According to Simon (2011), "Limitations are potential weaknesses in your study and are out of your control" (p. 2). One limitation of the study included comparing heterogeneous groups of students. Administrators at the research site placed students in heterogeneous groups without the input of the researcher. This was recognized when describing the target population. It was also recognized when interpreting results. The comparative group that did not receive digital badges

did not score as high on the pretest as the experiential group of students that did receive digital badges. This may have impacted the outcome of the study as the experiential group may have included students with more academic potential, motivation, or support.

Another limitation included acknowledging immeasurable, external factors that may have contributed to academic achievement. These external factors included the use of tutors with at-risk students, differences in levels of parental support, and the inclusion of exceptional education students in the study. Tutors were equally distributed for both classes, and parental support is difficult to calculate objectively. However, the comparative group that did not receive digital badges had four more students that had been previously retained than the experiential group that did receive digital badges. The comparative group also had three students identified exceptional education students, whereas the experiential group had no exceptional education students. The higher number of labeled at-risk students in the comparative group was unanticipated and unavoidable at the onset of the research study, but it may have impacted the outcome.

The abstractness of digital badges to young research participants was another limitation to the study. "Badges will not unlock tangible opportunities for students until they hold value for key stakeholders, and these stakeholders must be convinced of their worth" (Davis & Singh, 2015, p. 78). In response, students were given usernames and passwords for classbadges.com to view acquired badges. Additionally, documentation of acquired badges was placed in students' portfolios. This enhanced the traditional credentialing system because digital badges communicate the standards used to decide a grade (Bull, 2014). This also contributed to more interest and participation from students in the experiential group because digital badge research generally finds a positive correlation between learning and academic performance and a negative relationship between performance avoidance and learning outcomes (Elliott et al., 2006).

According to Creswell (2008), delimitations are choices made by the researcher

that describe the boundaries that you have set for the study. A delimitation associated with this study was using one research site, two classrooms that accurately represent the broader population of second grade students at the research site, and two homeroom teachers. This allowed for continuity in data collection and reduced the number of variables in the study. Another delimitation included not issuing grades and not leveling badges. Issuing grades and leveling badges would have been counterproductive because the program was based upon earning incentives. Adding grades to the research would have compromised the conclusions formulated about the results. According to Bowen (2017), "Critical thinking, oral communication, intercultural awareness, and teamwork are desirable skills students may develop through coursework, co-curricular and extracurricular activities, or from work experience; however, such skills are difficult to measure with grades" (p. 6). This study involved issuing digital badges based upon the completion of reading activities, not assigning grades. The researcher observed the experiential participants working towards completing the activities to earn the badges. Since grades were not an issue, this group was able to gain daily practice with reading fundamentals through the RAZ-Kids' program, without the concern of earning a grade. This may have contributed to increased fluency and comprehension for the experiential group.

Implication of the Results for Practice, Policy, and Theory

There were four themes guiding this research study: 1) Digital badges as an alternative and innovative solution to traditional credentialing systems, 2) The future implications of digital badges as related to badge ecosystems, 3) The credibility of digital badging programs, and 4) The future implications of digital badges as related to motivation and behavior. This section will address each of these themes' implications for practice, policy, and theory as evidenced by the research study.

Theme One: Digital Badges as an Alternative and Innovative Solution to Traditional Credentialing Systems. There are few empirical studies on the correlation between digital

badges and learning outcomes. As stated by Hickey and Willis (2015), "Many of the most important ideas that might be tested in experimental research are unlikely to be discovered with experimental studies, which seems certain to be the case with digital badges in education" (p. 1). However, digital badges explain the context, meaning, process, and result of an activity through detailed-rich metadata. Badges also may be tied to standardized objectives for higher quality evaluative purposes but can also be used to measure soft-skills and community engagement (Pagowsky, 2017). Digital badges represent and highlight learning achievements, but there remains little research on utilizing digital badges in competency-based education (Hickey et al., 2015). This study adds to the existing literature surrounding the difference between digital badges and learning outcomes.

The study sought to mimic the traditional credentialing system and connect to the existing curriculum standards. All participants were expected to work towards standardized reading level goals for the mCLASS 3D Reading Assessment, practicing essential standards through the RAZ-Kids' program. The acquisition of digital badges for the experiential group was tied to the accruement of stars with the RAZ-Kids' program. These activities were directly tied to standardized curriculum standards. By making digital badges a part of the traditional credentialing system and tying them to existing academic standards, the research study established the utilization of badges for competency-based standards in direct response to a gap in the existing literature.

Research conducted on digital badges occurring in informal settings reveals the more badges are used, the more they mimic the established credentialing systems. As stated by Priest (2015), "In this sense, badges can be data-rich in a way that traditional transcripts, resumes, degrees, and certificates, even electronic ones, typically are not" (p. 8). The study proved that digital badges can successfully be integrated into an elementary setting and have a positive impact on learning outcomes. The digital badge initiative contributed to an overall higher reading level

achievement of the experiential group compared to the comparative group. This was most likely due to the motivational aspect of earning badges as tied to the fundamental reading practice the experiential group received. By spending more time on the RAZ-Kids' program to attain digital badges, even if the time spent did not result in accrued badges, the experiential group was able to improve their reading achievement significantly more than the comparative group.

Theme Two: The Future Implications of Digital Badges as Related to Badge Ecosystems. One aspect of digital badges that makes them marketable to the educational system is that they contain rich metadata about a learner (Devedzic et al., 2015). This metadata includes information such as the issuer's name, the earner's identity, the badge's description, the criteria set forth to earn the badge, the date of acquisition, and the learner-specific evidence for the attainment of the badge. However, there are challenges associated with these ecosystems. One challenge is the inconsistency of standards for the information contained in the metadata (BadgeCraft, 2017). This challenge can be eliminated through collaboration among institutions in defining requirements for badge acquisition (Finkelstein, Knight, & Manning, 2013). Another challenge is the nonexistence of badge recognition outside of closed learning communities (Jovanovic & Devedzic, 2014). Digital badge credibility is a recurring issue in the literature. This study eradicated this challenge by copying and placing acquired digital badges into students' portfolios. This linked the digital badge initiative to the traditional credentialing system, making it more relevant to students and more connected to the existing curriculum. Since the traditional credentialing system of grades is so ingratiated into the educational system, it is imperative that future digital badge initiatives also are embedded into the existing infrastructure. This will allow badges to be more accepted and eventually implemented more readily in classroom settings. This transition requires careful construction of digital badges to mimic the curriculum standards. The

research study used the standardized academic objectives to guide the acquisition of badges, making the transition to badging more reading acceptable by students, parents, and homeroom teachers.

The validity of digital badges mandates evidence of achievements through valid organizations, providing a cohesive picture of the knowledge, skills, and abilities achieved (Jovanovic & Devedzic, 2014). Badges can be accumulated and grouped together to create a diversified portrait of a learner. According to Priest (2015), digital badges "provide a methodology for mapping out a more flexible array of learning pathways and trajectories, including pathways that cut across traditional courses and educational settings" (p. 6). These ecosystems deliver equitable learning environments when awareness exists about the uses and benefits of badge acquisition to students and educational leaders (Reynolds, 2016). The research study developed badge ecosystems for the experimental participants on classbadges.com. This password-protected program allows students and parents to view the digital badges accrued during the research study and is a home for future badges to be stored. This badge ecosystem can also be used to highlight accomplishments of the experimental participants to future teachers and employers. Future digital badge initiatives at the elementary level should also develop simplified badge ecosystems for students to add credibility to the acquisition of digital badges and organize the learning accomplishments of students.

Theme Three: The Credibility of Digital Badging Programs. A recurring recognition in the literature is that badges do not hold the inherent value represented by traditional credentials (Casilli & Hickey, 2016). According to Casilli and Hickey (2016), "The correlation between educational and professional credentials and employment suggests an unspoken assumption about credential value" (p. 1). The literature states digital badges should coexist with the traditional credentialing system in education. This dual existence allows for alignment with existing learning

standards, adding reliability and credibility to digital badges. The research study aligned the acquisition of digital badges with standardized learning objectives in second grade reading. This was done by connecting the digital badge program with RAZ-Kids, an online, research-based, comprehensive reading program that hones the skills and strategies taught in the second grade curriculum. Furthermore, the participants were assessed using a standardized, research-based testing program, mCLASS 3D, to determine if the digital badge initiative had an impact on reading level achievement. Future studies should also connect digital badge initiatives to existing standards and assessment programs to add validity to such programs.

Since there is a lack of existing research studies to support the effectiveness of digital badges, it is imperative that a slow process be employed when introducing badges into existing assessment systems (Merisotis, 2016). An increasing number of businesses and educational institutions are seeking avenues to validate learning that reflects skills that cannot be measured on a traditional grading scale. Furthermore, designing digital badges to complement existing content and related skills works better than measuring isolated skills (Fontichiaro & Elkordy, 2015). This allows for the development of a cohesive badge ecosystem that "reduces the historic disconnect between institutions" (Fontichiaro & Elkordy, 2015, p. 1). The research study's primary purpose was to determine if the acquisition of digital badges impacted reading achievement in second grade students. It was evident that inserting a digital badge initiative into the existing educational infrastructure did have positive influences on learning outcomes. This was evidenced by data that supported the greater reading achievement growth of the experiential group versus the comparative group. Future digital badge initiatives should utilize academic objectives and skills already in place in educational settings to validate learning reflected on a traditional grading scale. The study proved that this practice is effective in measuring isolated reading skills and reduces disconnect between learning objectives.

Theme Four: The Future Implications of Digital Badges as Related to Motivation and Behavior. Digital badges have the potential to transform diversified learning experiences. More organizations are beginning to employ badges, emphasizing the importance of understanding the varied roles badges play in the promotion and interaction of knowledge (MacArthur Foundation, 2017). However, even with the expanded use of digital badges, an essential question in many research studies involves the role of badging as a motivator for behavior (Abramovich, et al., 2013). As stated by Ahn et al. (2014), studies normally link badges and other incentives to increased user participation. Research also claims connections between learners, motivation, and knowledge against the backdrop of the types of badges sought (Ahn et al., 2014). This study sought to determine the most effective badge designs to best fit the motivational needs of learners. The researcher created appropriate designs for second grade participants in the experimental group. Badges were colorful, and large fonts were used. Students were eager to unlock the upcoming badges to see the illustrations and read accomplishments. Future studies should consider the age group of the students and design badges to most effectively gain the interest of the students.

If structured properly, badges are a visible representation of learning pathways and serve as guideposts for learning (Ahn et al., 2014). This increases the interconnection of learning and eliminates learning skills in isolation. Linking learning pathways to traditional credentialing systems is essential, giving badges meaning and value. By strengthening trust networks during the badge design process, the inherent value increases (Grant, 2014). This may lead to a clear application for learning initiatives. The researcher designed the badges in the study to be a representation of the learning pathways students in the experimental group were using to increase fluency and comprehension. Students had to read texts, answer questions, write responses, and even record themselves responding to texts to accrue stars in the RAZ-Kids' program and earn digital badges. The progressive learning sequence was designed to add meaning and value to the

study and led to a clear application of learning objectives. Future digital badge initiatives should consider designing badges to mimic the practical learning sequence of students and represent pathways of learning.

Recommendations for Further Research

There are several recommendations for further research based upon the implementation of the study. It was anticipated that class sizes would be larger. However, the class sizes were less than 25 students at the beginning of the study, and several students transferred to other schools, making the number of overall participants smaller. According to Zamboni (2017), "Larger sample sizes allow researchers to better determine the average values of their data and avoid errors from testing a small number of possibly atypical samples" (para. 1). The results may have been more representative of the population being studied if the sample sizes were larger. The data from the study should be used to design larger confirmatory studies (Hackshaw, 2008).

The length of the study is a recommendation for further research. The study began September 11, 2017 and ended February 5, 2018, lasting approximately 5 months. The length of the study resulted in sufficient data to formulate conclusions about the correlation between the acquisition of digital badges and learning outcomes. Data calculating student growth from the beginning of the school year to the end of the school year would improve the validity of the study. According to The North Carolina Department of Public Instruction (2018), "Student growth is the amount of academic progress that students make over the course of a grade or class" (para. 2). Growth for school performance data are calculated based upon a year's worth of student growth, so mimicking this practice may have been more congruent with traditional credentialing systems.

The mCLASS 3D Reading Assessment is the standardized tool used to measure reading achievement in the primary grades (Amplify, 2017). This tool is objective and research-based, but further research should evaluate student learning in multiple ways. This may allow for a

generalized and broadened perspective of student achievement. One assessment can result in misinformed results. Allowing for a variety of assessment measures would develop a conceptualized picture of reading achievement for participants. According to Heibutzi (2018), "No achievement test, no matter how unbiased it seems, can equally measure what children learn" (para. 6). Using a variety of assessment sources may depict a comprehensive picture of student learning.

Another recommendation for further research involves the addition of physical badges to compliment the digital badges acquired by students. A limitation for the study involved the abstractness of digital badges to young research participants. "Badges will not unlock tangible opportunities for students until they hold value for key stakeholders, and these stakeholders must be convinced of their worth" (Davis & Singh, 2015, p. 78). Documentation of digital badges was placed in student portfolios. This connected the study to the traditional credentialing system to which students relate. Creating physical badges to complement the acquired digital badges may lead to increased motivation and a tangible means of rewarding academic achievement.

Lastly, the study did not employ surveys to gauge the participants' perceptions regarding the digital badge initiative. According to Teachnology, Inc. (2018), "A survey is one way of getting the opinion of a group of people or members of a group about a particular topic" (para. 3). Surveys were not chosen for the study because of the small number of participants, but further studies may benefit from a survey to determine student perceptions of digital badges. According to The National Center for Children in Poverty (2016), "One of the primary strengths of sampling is that accurate estimates of a population's characteristics can be obtained by surveying a small proportion of the population" (para. 6). Using surveys may create valid generalizations of the larger population.

Conclusion

What difference does the acquisition of digital badges for reading growth on second grade

have on improvement in reading performance? The experiential group that did receive digital badges improved 36 reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment, whereas the comparative group that did not receive digital badges improved 16 reading levels from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment. The research study indicated the experiential group, receiving digital badges, showed more reading achievement from the mCLASS 3D pre-badge assessment to the mCLASS 3D post badge assessment than the comparative group that did not receive digital badges. The researcher considered extraneous, immeasurable factors such as the use of tutors with at-risk students, differences in levels of parental support, and the inclusion of exceptional education students in the study. The differences in the comparative group participants and the experiential group participants were a possible causation of the higher reading achievement of the experiential group.

It was predicted that the number of digital badges would impact the number of reading levels improved by the experiential group, so results of the study revealed several key points. First, digital badges are an alternative and innovative solution to traditional credentialing systems. According to Ahn et al. (2014), if digital badges continue to be broadly used, there is a greater potential they will be examined and developed as a more established credential. "Technology is a critical tool to propel the vast increases in educational access and quality that this nation must achieve in the next decade" (Duncan, 2011, para. 29). The study added to the existing literature base regarding the use of digital badges in education. Since research studies have focused on secondary education, the study examined the use of badging in an elementary setting. Badges positively impact learning outcomes.

A second key point from the study involved digital badges as an interconnected ecosystem. According to the Mozilla Foundation (2017), badges play a pivotal role in connecting knowledge,

acting as a bridge between contexts and impactful learning experiences. The students who worked toward receiving digital badges spent more time working on RAZ-Kids. This led to comprehensive understanding of texts. Badges are developed to function within larger learning ecosystems, making the value contingent upon participants within an established system of organizations. This allows for the translation of skills into needed workplace and professional settings. The integrated process drives the success of badges in the educational realm. The badges attained in the study were copied and placed in student portfolios. This developed a broader pool of stakeholders and increased the relevancy of the acquired badges.

The third key point from the study involved the credibility of digital badges. There is little evidence regarding levels of competency, experience, or quality that corresponds with a paper degree (Merisotis, 2016). Digital badges represent the soft skills that degrees traditionally overlook, making badges compatible with the educational and professional demands of society. The literature claimed digital badges should coexist with the traditional credentialing system in education. Merisotis (2016) found that digital badges were closely linked to standardized curriculum objectives and measured against a research-based assessment. This assured the legitimacy of the digital badges and advanced the mission of the school system.

The study revealed new knowledge regarding the implementation of a digital badge initiative with primary-aged students. A Chi-Square analysis did reveal the overall reading achievement of the experiential group statistically and significantly outperformed the comparative group. It is likely the extra time spent on RAZ-Kids to acquire digital badges by the experiential group contributed to higher reading achievement. The researcher determined the insertion of a digital badge initiative is beneficial to learning outcomes, regardless if the actual badges are not acquired. The actions taken by students towards earning the badges most impacts learning outcomes.

The study sought to answer the question if a difference exists between digital badge acquisition and learning outcomes to add to the existing literature on the comparison between the acquisition of digital badges and academic growth. It is important to determine the difference because of decreased learning outcomes and an educational system less able to meet rising academic expectations (Jones, 2012). Failures are represented by declining test scores, uncomplimentary international achievement comparisons, an increase in high school dropout rates, and the failure of extra funding to create positive learning outcomes (Jones, 2012; Levin, 1998). The null hypothesis that the acquisition of digital badges does not sustain the motivation of second graders to improve their reading performance was rejected. The acquirement of digital badges strongly impacted second grade reading achievement.

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Appendix A: IRB Approval

DATE: October 9, 2017

TO: Mindi Outlaw Collins, MEd

FROM: Concordia University - Portland IRB (CU IRB)

PROJECT TITLE: [1074208-1] The Effects of the Acquisition of Digital Badges on Second Grade Literacy

REFERENCE #: EDD-20170721-Mathur-Collins

SUBMISSION TYPE: New Project

ACTION: APPROVED

APPROVAL DATE: October 3, 2017

EXPIRATION DATE: October 3, 2018

REVIEW TYPE: Expedited Review

Thank you for your submission of New Project materials for this project. The Concordia University - Portland IRB (CU IRB) has APPROVED your submission. This approval is based

on an appropriate risk/ benefit ratio. All research must be conducted in accordance with this approved submission. This submission has received an Expedited Review based on the applicable federal regulations.

You are responsible for contacting and following the procedures and policies of Concordia University and any other institution where you conduct research. Attached is a stamped copy of the approved consent/assent form(s). You must use this stamped form(s). Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. The form needed to request a revision is called a Modification Request Form, which is available at www.cu-portland.edu/IRB/Forms. All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please email the CU IRB Director directly, at obranch@cu-portland.edu, if you have an unanticipated problem or other such urgent question or report. All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of October 3, 2018. You must submit a close-out report at the expiration of your project or upon

completion of your project. The Close-out Report Form is available at www.cu-portland.edu/IRB/Forms. Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Dr. OraLee Branch at 503-493-6390 or irb@cu-portland.edu. Please include your project title and reference number in all correspondence with this committee. This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Concordia University - Portland IRB (CU IRB)'s records. October 9, 2017

Appendix B: Student Assent Form

Dear Student:

I am doing a research study about how digital badge acquisition affects reading level growth. If you decide you want to be part of this study, you will be asked to participate in RAZ-Kids at school during guided reading time. You may or may not receive digital badges for your work, depending upon the group you are assigned. You will be assessed using mCLASS 3D. There are some things you should know about this study. Your name will not be revealed in the study, but I will be using your reading level growth and number of digital badges acquired to try to determine if a relationship exist. I will write a report about what was learned. This report will not include your name or that you were in the study. The information may be used to help our school do a better job in the future of educating students like you. You do not have to participate in this study and not participating will not affect your grade, your relationship with me as a teacher at this school, or anything else about what you do at school. If you decide to stop after we begin, that is okay, too. If you decide you want to be in this study, please sign your name. I, _____, want to be in this research study.

_____ _____

(Sign your name here.) (Date)

Thank you for your attention in reading this form and your consideration for this study.

Primary Investigator: Mindi Outlaw Collins [Researcher email redacted]
c/o: Dr. Neil Mathur
Concordia University – Portland
2811 NE Holman Street
Portland, Oregon 97221

Appendix C: Consent Form for Minimal Risk Study

Research Study Title: "The Effects of the Acquisition of Digital Badges on Second Grade Literacy"

Principal Investigator: Mindi Outlaw Collins

Research Institution: Concordia University - Portland

Faculty Advisor: Dr. Neil Mathur

Purpose and what you will be doing:

The purpose of this study will be to examine the relationship between reading level growth and digital badge acquisition of second grade students in a K–2, Title I, rural, public elementary school in a state in the southeastern United States. Two self-contained, regular education second grade classes will participate in a comprehensive leveled reading program for three months. One group will earn digital badges to mirror progress with the program, while the other group will only participate in the program with no added incentive. Students in both classes will be assessed to determine a beginning reading level. Students will be assessed again to determine an ending reading level. The number of reading growth levels will be documented and analyzed to determine if the acquisition of digital badges impacts learning outcomes.

Risks:

There are no risks to participating in this study other than providing your information. However, I will protect your information. Any personal information you provide will be coded so it cannot be linked to you. When I look at the data, none of the data will have your child's name, your name, or any other identifying information. I will refer to your data with a code that

only I know links to you. This way, your identifiable information will not be stored with the data. I will not identify you in any publication or report. Your information will be kept private and then all study documents will be destroyed 3 years after I conclude this study.

Benefits:

The study seeks to find if a correlation exists between digital badge acquisition and reading level growth in second grade students. Student participants will be exposed to literacy activities that will serve to improve reading and comprehension.

Confidentiality:

This information will not be distributed to any other agency and will be kept private and confidential.

Right to Withdraw:

Your participation is greatly appreciated, but entirely optional. Student participants will not receive grades based upon completion of the program.

Contact Information:

You will receive a copy of this consent form. If you have questions, you can talk to or write the principal investigator, Mindi Outlaw Collins [Researcher email redacted]. If you want to talk with a participant advocate other than the investigator, you can write or call the director of our institutional review board, Dr. OraLee Branch (email obranch@cu-portland.edu or call 503-493-6390).

Your Statement of Consent:

I have read the above information. I asked questions if I had them, and my questions were answered. I volunteer my consent for this study.

_____ _____

Participant Name Date

_____ _____

Participant Signature Date

_____ _____

Investigator Name Date

_____ _____

Investigator Signature Date

Investigator: Mindi Outlaw Collins [Researcher email redacted]
c/o: Dr. Neil Mathur
Concordia University – Portland
2811 NE Holman Street
Portland, Oregon 97221

Appendix D: Institutional Permission Letter

REOUEST FOR PERMISSION TO CONDUCT RESEARCH IN SCHOOLS

Mindi Outlaw Collins, Primary Investigator
Study: "The Effects of the Acquisition of Digital Badges on Second Grade Literacy"
Concordia University — Portland
Committee Chair: Dr. Neil Mathur
Committee Members: Dr. Janice Powell and Dr. Kallen Dace

Dear [Research site administrator name redacted],

My name is Mindi Outlaw Collins, and I am a second grade teacher in [Research site name redacted]. As a doctoral candidate at Concordia University—Portland, I wish to conduct a multi-month study during the fall term of 2017 at [Research site name redacted] for my dissertation. I am seeking to conduct a quantitative quasi-experimental study to analyze a real-life learning situation over time through statistical data collection, including mCLASS 3D Reading scores and digital badge acquisition documentation. The study involves two self-contained, regular education second grade classes participating in a comprehensive leveled reading program for three months. The comparative group will earn digital badges to mirror progress with the program, while the experiential group will only participate in the program with no added incentive. Students in both classes will be assessed using the mCLASS 3D Reading Tool. The number of reading growth levels will be documented and analyzed to determine if the acquisition of digital badges impacts learning outcomes. Participants will receive verbal as well as written instructions on the reading

program and the digital badge initiative from homeroom teachers. Consent forms with instructions will be sent home to participants' parents. The reading program, RAZ-Kids, is a research-based,online reading program to enhance fluency andcomprehension. All students on the roster of both second grade classrooms at the beginning of the 2017—2018 school year will be included in the study. Students registering after the initial ten-day attendance frame for the 2017—2018 school year will be excluded from the study. Data will be stored on www.mclasshome.com, a a secure and standardized software program. Students will be identified such as "Comparative Group, Student A in 2017—2018." Student participants will gain literacy knowledge through this program that improves fluency and comprehension. The difference identified between digital badge acquisition and learning outcomes will guide instructional practices. I am hereby seeking your consent to conduct "The Effects of the Acquisition of Digital Badges on Second Grade Literacy" with two second grade classes at [Research site name redacted] during the fall term of 2017. Upon completion of the study, I plan to provide [Research site name redacted] with a bound copy of the full dissertation. If you require any further information, please do not hesitate to contact me. Thank you.

Respectfully,

Mindi Outlaw Collins

Approved by:

[Signature Redacted]

Date: 7-20-17

Appendix E: Parental Permission Letter and Assent Form

Dear Parents and Guardians,

My name is Mindi Outlaw Collins, and I am a second grade teacher. As a part of my dissertation as a doctoral candidate at Concordia University - Portland, I am completing a research study titled "Developing Literacy Data through the Acquisition of Digital Badges." This involves working with two second grade classrooms. Both classes will participate in an online reading program called RAZ-Kids, but only one group will receive digital badges for their participation. Reading assessment data will be collected by your child's teacher. All data collected will be anonymous. I will analyze the assessment data and compare it to the number of digital badges acquired. I am seeking to find if a relationship exists between these two variables. The study will be done during guided reading time in school and serve as an enrichment activity. If you child does not want to do this, or you do not want your child to do this, then your child can do other literacy activities as an alternative during this time that are specified by the teacher.

Your child does not have to do this. It is optional. There will be no penalty for not participating. In the same way, there is no advantage or favoritism for your child participating. If your child wants to stop participating, he/she can stop even if this is in the middle of the activity. The activity for this study is scheduled for September, 2017 through February, 2018. We expect approximately 50 students to participate. The results will be collected in a way that protects the student's identity. The name and other identifying characteristics of your child will not be stored with the answers/observations specific to you or your child. To do this, we will

give your child a code that only I will know. The code, and not the name or other identifying characteristic, will be stored with this private information. Reports will be made in group aggregate form; such as, the average and general group findings, with no individual identifying information linked to the information. Information will be stored on a password protected computer. The paper documents, such as this form, will be kept in a locked file cabinet. Three years after the study is completed, the study documents will all be deleted and destroyed. The results of the study could benefit children and the school systems by finding out effective tools teachers can use in the classroom to best accommodate learning needs and improve reading comprehension and fluency.

I will ask your child if they want to participate. For me to ask your child, I need your permission, or consent. Please read the parental consent form on the next page. If you agree, please fill out the form below and return this page before _____.

As the parent or guardian of the child _____, I consent.

Parent/Guardian Name: _____

Parent/Guardian signature: _____

If you have any questions or concerns, you can call me or send me an email. You can also let your child's teacher know if you have questions. I have also attached a second copy of this page for you to keep for your records. This study was approved by the Concordia University – Portland IRB. If you want to talk with a participant advocate, you can contact Dr. OraLee Branch . (email obranch@cu-portland.edu or call 503-493-6390).

Appendix G: Digital Badge Template

This is an example of a digital badge students in the experiential group earned for successfully completing activities with RAZ-Kids. The digital badges were acquired for every 500 stars accrued.