Using Technology to Provide Students with Authentic Learning Opportunities in the Elementary Classroom

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USING TECHNOLOGY TO PROVIDE STUDENTS WITH AUTHENTIC LEARNING OPPORTUNITIES IN THE ELEMENTARY CLASSROOM

by

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To my husband who has continuously supported me and encouraged me to move on through this difficult path. I am grateful for your, always hopeful, perspective and for keeping a sense of humor, even when the kids were “all yours” night after night, weekend after weekend.

Para mis hijos que me extrañaron cuando podríamos haber estado juntos. Espero que juntos disfrutemos de los frutos de tanto esfuerzo y sacrificio.

Para mis padres que siempre me inspiraron a ser mejor y a alcanzar grandes metas.
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CHAPTER ONE

Introduction

In the modern world, the use of digital technology has become an essential necessity. There are no activities that do not have an application of technology. Our lives are supported by multiple applications that help us to be more efficient and effective. Information and Communication Technologies (ICTs) have modified the way we communicate and consequently many other aspects of our lives.

It is obvious that ICTs must work in tandem with the needs and development of people and society, and as a result they will change constantly. Looking at the evolution of technology, we can examine a few of the advances that have occurred in recent memory. We can start by mentioning the progression from large-sized televisions to the current flat-screen TVs or the ubiquity of mobile telephones that have essentially replaced landlines. Wireless systems and virtual libraries that allow access to immeasurable amounts of information of all kinds, anywhere and at all times, have revolutionized how we learn.

Education cannot be left out of that digital world, as such, there are many applications that facilitate the development of classroom activities for teachers and students. These two factors, technology and education, have an inseparable bond where they are wholly dependent on one another, with a projection of only increasing interconnectedness for the future. Education should accompany this process of global technological evolution in its various aspects with the development of teaching materials, sources of information, apps to facilitate practice and increased creativity, critical thinking,
communication and collaboration. In addition to the factors mentioned, the use of technologies in education should contribute to improving the relationship with families and facilitate the process of sharing classroom products with a larger audience. Through my years of teaching, I have found that meeting each student where they are and expanding their learning from there has been one of the most challenging things to do, besides sitting in long staff meetings. Every time a student develops an affinity to something that they are particularly attracted to, something that has a relation to what they have experienced outside of school or an application to their daily lives, their attitude changes and the engagement grows.

Ultimately, I want my students to be that excited most of the time and not for just one fun project or a moment in their day. I want them to always be interested or at least curious to see if there is anything in there for them.

Technology is not the only way to accomplish that, but it has provided me with a set of tools to facilitate engagement and create a classroom atmosphere of continuous learning. It is for these reasons that my research question for this capstone is How can technology be used as a tool for providing students with authentic learning opportunities in the elementary classroom setting?

In this first chapter, I will share how technology and education came together for me, even though I was not actually searching for the connection, and how I found joy in merging two passions so that I can better serve my students and fellow teachers.
Personal Background

As the daughter of a social worker and an engineer, I was raised in a marriage of mathematical facts and caring for others. Both my parents have instilled in me that what we do matters and that we do have an obligation to give our best and always regard others with compassion and understanding.

When I was in high school, computers were just beginning to become more common in households and I remember well the day my dad brought home our first PC (personal computer). It was Apple. I fell in love with being able to erase without using the white strips previously used in typewriters. Yes, I did use typewriters for some projects. Also in high school, we had the chance to participate in some “clubs” and I chose computer programming. I found it fascinating that I could write a few lines in Basic and let the computer know what I wanted. It really was a simple “Hello world” in green fonts with a black background.

Later on, it was time to choose my college career. I had many ideas and could not decide until the very last minute where I wanted to focus. I am originally from Argentina and went to college in Paraguay. There, you have to decide from enrollment what you want to do for your major in studies. There are not as many choices as there are in the US. I knew I wanted to do something technical and engineering seemed the route to take. I have always liked technology so the possibility to join a new program from the University of Milan coming to Paraguay sounded exciting. That is how I signed up for Informatics Engineering and spent many, many years studying every day of the week, including weekends, nights and holidays.
During those years I had also volunteered some Saturday mornings to teach younger kids on the outskirts of Asunción, Paraguay’s capital city. I would help them with their school assignments and mostly provide guidance and support. At that time, I was a student aid of a professor I really admired. I did not write lesson plans or curriculum then, but I would be the one actually teaching the class.

Later, as I was reaching the end of my college years, I was asked to take a long-term subbing position at the high school I attended. It was a private high school and due to my engineering background, I qualified to teach math to 4th, 5th and 6th grade students in elementary and also middle and high school students.

Even though teaching has been in my life in many ways since I was young, I consider this my first teaching job. In spite of my pursuit of computer technology, it was teaching that found me and I had found a new passion and career path. It gave me the motivation (and some money) to finish my last few university classes. It was while I was in that teaching position that someone told me about the opportunity to come to the US and help in some schools that needed Spanish teachers.

Education brought me to Minnesota and I have worked in the Twin Cities area since 2005. I was a teaching assistant, a paraprofessional, a sub, a long-term sub, a part-time Spanish teacher and finally working as a full-time teacher in a Spanish Immersion school. I participated in curriculum writing committees for Language Arts and Math. In 2017, I presented at the Ignite Conference, where I talked about the tools I used in my classroom to make writing more enjoyable for first graders. At the time we used ChatterPix, BookCreator, PicKids, Legos and iMovies to create our final products. We
have also been using Seesaw as an application to connect with parents, assign work and provide feedback.

As a teacher, I want my students to want to learn. I want them to enjoy learning and I want them to keep growing no matter where they start. I have found joy in their achievements and have seen parents smile when they know that their children are being considered as a whole person with their very personal set of interests, preferences, skills and learning styles. Finding a balance between what needs to be taught and how to reach each student in particular has been and is a never ending, always growing challenge.

**My Present Workplace and Its Characteristics**

The school where I am teaching is one of six elementary schools in a suburban city. The school is a choice school for the district because it is a Spanish Immersion school. As a language immersion option, this K-6th grade school combines strict academics with the opportunity to learn in Spanish. The same standards, outcomes, curriculum and assessments applied at the district’s other elementary schools are the basis for immersion education. In grades K-6, all core subjects are taught, and all interactions between students and teachers are done in Spanish. Beginning in grade 3, students experience a dual literacy program; with language arts instruction in both English and Spanish, resulting in students who can learn, read, write, and speak in both languages by the time they enter middle school.

There are many teachers in the school who are from various Spanish speaking countries. Every year the school also welcomes interns to assist in the classroom. They come through an International Intern Program and their native language is also Spanish.
This provides staff and students with a unique opportunity to interact with people from another culture. All teachers meet weekly as a PLC (Professional Learning Community) to discuss student progress and adjust lessons and schedules determined by students’ needs. Collaboration between teams also occurs during monthly staff meetings and committees.

It is highly encouraged that all teachers in the same grade level follow the same pace and share strategies and resources. The first-grade team meets not only as a PLC but also as a team to work on planning, assessments and resource sharing. The Language curriculum has been designed by the district following the Academic Standards for English Language Arts, however in our school, those have been adapted to teach in Spanish. The math curriculum uses Math Expressions as the base resource. The standards are followed in the same way, but the resources differ from the other schools in the district.

Students are assessed three times a year, in the Fall to get a baseline and then again in January and May. In first grade students are assessed by the teachers individually using the Fountas and Pinnell system (2007) for assessing reading levels and also using the early Reading and early Math tests from the FASTBridge Learning™ (version 2019) test set. Depending on the results, some students may participate in progress monitoring using FastBridge. All tests for literacy are done in Spanish in first grade, Fast tests are done in English for math.

Each classroom has an electronic interactive whiteboard, a grade-level library and leveled reader books. We also have a 1:1 tablet class. The school provides iPads and students have access to resources in Spanish for the classroom and English and Spanish if
they want to access from home using a device of their own. Tablets also have digital tools for writing, practice, recording and sharing work with a bigger audience, mainly parents.

Due to the nature of teaching in another language, the number of books and resources can be limited for certain topics and especially when trying to find them for each reading level. The selection is not as vast as it would be if the class was in English. Teachers create most of the materials for extra practice, group work and differentiating skills.

For all these reasons I decided to embark on a project that will provide teachers with another set of tools in the target language, in this case, Spanish. Having resources that have not been translated and that are created for the specific needs of our students makes them authentic. Using technology assures that students can access the resources when needed and teachers have flexibility to assign activities that respond to individual necessities. These led me to investigate How can technology be used as a tool for providing students with authentic learning opportunities in the elementary classroom setting?

**Authentic Learning and Technology**

For the last few years, our district has been revising our mission and implementing systems that will guide us all to achieve that mission. One of the aspects of that mission is to “inspire each student to contribute purposefully to our ever-changing world.” This is where the authenticity part of my research question will provide some guidance and the project will offer teachers some tools for using technology in order to reach each student. I see my teammates and myself making a great effort to rise up to the challenge and yet still
feeling that we are not reaching the mark. There is always a feeling that we could be doing more or that we could do it differently in order to better fulfill students’ needs. These feelings may be coming from some results we analyzed during professional development. After two years of looking at data from learning walks (where coaches observe various teachers, at all grade levels, different times of the year), we have learned that most of our lessons keep students at low levels of rigor or that only some students participate in higher thinking questioning. The same was happening when authenticity was analyzed. I am hoping to make a small contribution, and with this research and project, develop some strategies with the use of technology that will permit us to adapt to individual styles and extend the lessons beyond the classroom.

Authentic learning is defined by learning experiences that center on the learner’s construction of meaning (Newmann, Marks, & Gamoran, 1996). It reflects what is done outside of a school, produces work that holds a place beyond the school setting and has value to an audience beyond the classroom. The purpose of authentic learning is to create experiences that involve real-world problems and that mimic the work of professionals. Hallmarks of authentic learning include the use of open-ended inquiry, student engagement in discourse, social learning, and self-directed learning in projects (Newmann, Marks, & Gamoran, 1996). The goal of authentic learning is to provide students with the means to read broadly, think deeply, and respond actively through continuous learning in response to the complexities of our world. Authentic activities in the classroom are those that replicate or reflect activities that occur in the lives of people outside of a learning context and purpose (Rules, 2016).
Following the work of Daggett (2018), the district has developed a Rigor and Authenticity matrix. Dagget created the Application Model, where he described how to put knowledge to use. The four quadrants of his representation are Acquisition, Assimilation, Application and Adaptation. As teachers, we have always been working to make learning accessible to all students. Now we are faced with the challenge to go beyond the applications in the classroom, and even though I am teaching first grade, I want my students to be critical thinkers that can work with others to solve real-world problems and communicate their findings.

Why am I interested in developing a project on these topics? Simply put, in my first university academic endeavor, I obtained a Bachelor of Science degree with a Major in Computer Science. I worked with computers and developed software after graduating. Computer sciences and technology were my first love. However, on the other hand, my job for many years now has been teaching in schools. The research question and the project will involve the two major roles that I have played in my professional life.

The role played by the teacher in this process is of the utmost importance, so the institutions must provide all the means for its training. Given the academic training that I have, I find myself in a very good position to incorporate technological tools to make classes more interactive and efficient in hopes to achieve these goals. Not that it is easy, and I have mentioned before how much I struggle to make this a reality on a day to day basis.
Conclusion

Technology and education have been intertwined throughout my life. At times, the connections occurred naturally by fate, and at other times, I made the effort to connect them. I feel that in the world that we are living, technology will continue to be embedded in our interactions in myriad ways. I want to use what is already there to empower my students to learn the way that best suits them. To equip them with the tools that they will now need to succeed as students and later in life as human beings that contribute to the world. With my research and my project, I want more teachers to be able to make that happen in their classrooms too. I understand that there are countless strategies and theories on how to achieve such an intimidating goal. My hope is to present one alternative, authentic learning through the use of technology, for those who feel it suits their learning and teaching style.

Chapter one laid out an overview of my personal experiences and how my interest in technology has shaped my practice and guided me to this research question: How can technology be used as a tool for providing students with authentic learning opportunities in the elementary classroom setting? Chapter two will look at the use of technology in the classroom by revising the available literature and recent research. Chapter three will describe the project created to increase authenticity during math lessons in a first-grade Spanish Immersion classroom. And Chapter four summarizes the findings and experiences.
CHAPTER TWO

Literature Review

Introduction

Education and technology have merged in my life even without me trying to look for the connection, I want my students to experience that connection and use technology to their advantage. I understand the advantages and challenges that the integration of technology can bring into the classroom and our lives. We cannot dive into new technologies without being purposeful about their use and how they will affect student achievement and interactions.

Chapter one of this capstone was a recount of my personal and professional ventures in regards to my teaching experiences and how technology has been a part of this journey. I shared my background as an engineer in informatics and my many years of teaching various grade levels. My current job in a district with 1:1 devices and a focus on personalized instruction have led me to eagerly investigate, How can technology be used as a tool for providing students with authentic learning opportunities in the elementary classroom setting?

Chapter two will include the subtopics of personalized learning, authenticity, differentiation, the use of devices in the classroom and the challenges these concepts face.

The first section of this chapter defines personalized learning and describes the misconceptions that have surfaced. The next section explains authenticity and its main elements. After that differentiation is examined. The fourth section delves into the use of
technological devices in the classroom, more specifically iPads. The final section takes into consideration the challenges and contradicting points of view.

**Personalized Learning**

The U.S. Department of Education defined the term personalization in its 2010 Education Technology Plan as schooling that is regulated to learning needs, “tailored to learning preferences, and tailored to the specific interests of different learners. In an environment that is fully personalized, the learning objectives and content as well as the method and pace may all vary” (p. 12). In that sense, personalization comprises differentiation.

Similarly, in the Spanish speaking world, Victor Garcia Hoz is a leader in the philosophy of personalized learning. His work affirmed that the idea behind personalized instruction is not just a philosophy or a pedagogical method but more importantly a compound of strategies that will aid in the learning of the person as a whole without any reductionisms (as cited in Carrasco, 2011).

Moreover, studies performed in the United Kingdom concluded that personalized instruction builds upon cognitive and constructivist theories (Sampson, Karagiannidis, & Kinshuk as cited in FitzGerald et al., 2018). In Australia, Herrington (2000) agreed by saying that education is making a change from a behaviorist based education to a constructivist structure. Going further Campbell, Robinson, Neelands, Hewston, and Mazzoli (2007, as cited in FitzGerald et al., 2018) highlighted the need to foster student decision making about their learning, not only of content but also in manner. It is important to highlight that such an approach is not exactly new and it lays on the
foundations of constructivist learning grounded on the social theory of Vygotsky (1978, as cited in FitzGerald et al., 2018).

Personalized learning involves providing different tasks for each student and offering support at the individual level. It is based on the idea that all students have different needs, and therefore require an individualized or customized instructional approach, particularly in relation to the tasks and activities that students undertake and the pace at which they progress along the curriculum. Various models of personalized learning have been tested throughout the years in education, especially in areas such as mathematics and literacy where students can have sets of individual activities that they must complete, often and largely independently. Recently, digital technologies and environments have been used to facilitate individual activities and feedback (SUMMA, 2019).

There are many aspects of personalized learning that should be considered as well as be aware of the misconceptions that we have been falling into when discussing personalized learning in the classroom. In the next paragraphs, we will dive into those categories.

The term personalized learning has become popular (FitzGerald et al., 2017; Miller, 2019; Molnar & Herold, 2019). It is important to know that research conducted by GovWin by Deltek found that the term “personalized learning” showed up in their database in 2012, by then only four districts were looking for services in that field (and those were not technology related). One year later the number rose to 59 and 16 of them involved educational technology (Molnar & Herold, 2019).
All things considered, personalized learning is a tendency that will continue to shape how we teach in this ever changing educational system.

**Myths about personalized learning.** One of the biggest myths is that technology is the main component of personalization (Miller, 2019). It is true that the first consideration should be about the resources that students will employ, but content can be personalized by choice (FitzGerald et al., 2017). Both previously cited authors coincide that it is the teacher who plays a major role, as well as, Bray and McClaskey who claimed that “teachers develop capacity to create independent learners who set goals, monitor progress, and reflect on learning and summative assessments based on student mastery” (Bray & McClaskey, 2012, p. 3).

The second myth is in relation to student work. Even though students should be guiding the learning based on their individual knowledge, it does not mean always doing independent work (Miller, 2019). This means that the learner chooses suitable resources that may include technology, to achieve their learning goals and build a network of people (peers, experts, teachers, and paraprofessionals) to monitor and their education (Bray & Mc Claskey, 2012). Multiple intelligences specialist Thomas Armstrong stated, “Giving students choices is as much a fundamental principle of good teaching as it is a specific intrapersonal teaching strategy” (Armstrong as cited in Smith & Throne, 2007, p. 83).

The third myth involves the idea that students follow their own rhythm and pacing to achieve the required learning. This is just another factor and while personalized learning includes self-pacing (Miller, 2019), personalized learning relates to the personal characteristics of the learner (Carrasco, 2011; FitzGerald et al., 2017). The main idea is
that learners dynamically participate by having a voice in what they are learning based on their personal learning styles. Teachers provide choice in how to show proficiency and students have ownership (Bray & McClaskey, 2012).

Personalized education addresses what students have in common, and their individualities; it should combine the needs of individuals as well as the socialization component. It should aim to be in line with the deep human needs and conditions of students in the technological society in which we live (Carrasco, 2011).

At the same time, it is known that in many parts of the world, the educational process, from preschool to universities, is carried out in a conventional way. In this format, the lessons are expository; this is by a teacher delivering content equally to all the members of the class, with standardized programs, and the same allocation of space and time. The irruption of technology allows modifying this scheme and introducing personalized education systems adapted to the needs and strengths of each student. This capstone wishes to investigate how to better serve students providing authentic and constructive learning.

One of the factors that contribute to cognitive development is the personalization of education, and in this sense, technology is a very important ally. Understanding what personalization is has provided the parameters for the capstone project. In the next section, authenticity and differentiation are defined as ways to personalize learning and its applications in the classroom.
**Authenticity**

In this section, authenticity and its beginnings will be explored. The definition, its components and what makes a lesson authentic will be presented to later link the use of technology as a way to provide authentic experiences for students.

Authentic work is defined as learning that replicates or reflects activities that occur in the lives of people outside of an artificial learning context (Rule, 2006). It produces work that holds a place in the real world. According to Herrington (2006) and Duke, Purcell-Gates, Hall, and Tower (2006), authentic learning has its origins in the theoretical constructs of what was called situated learning and cognitive apprenticeships.

The concept of apprenticeships and what influences its success has been investigated by many (Herrington, 2006). Lave and Wenger (1989) wrote a report on the subject. Brown, Collins, Duguid and Newmann have published papers about the concept (as cited in Herrington, 2006).

In 1989, Brown et al. presented their model of situated cognition in which they stated that relevant learning happens only when the social and physical context of the instruction resembles the context of its application. Moreover, Collins (1988) defined situated learning as “the notion of learning knowledge and skills in contexts that reflect the way the knowledge will be useful in real life” (Collins as cited in Herrington, 2006, p. 2).

Consequently, these definitions and theories were further investigated during the 1990s. Cognitive apprenticeships and situated learning encountered a world of multimedia evolution and the development of internet based education (Herrington, 2006).
Rule’s (2016) study analyzed 45 journal articles of faculty members in the School of Education at SUNY-Oswego. In these articles, teachers submitted examples of authentic learning. It was found that there are four themes supporting authentic learning: posing and solving problems that can be found in the real world, inquiry through investigation and question asking to develop thinking skills, discourse in a community of learners including communication and collaboration and student-directed learning, where students take agency of their own learning paths.

Another list of authentic qualities was recompiled by Niehoff (2018). He answered the question, What are the ways to make student work more authentic? In pursuing an answer, he listed authentic problems and challenges, authentic audiences, authentic partners, authentic clients, authentic skills, authentic gear, authentic outcomes, authentic competition and authentic time. For Pahomov (2014), the characteristics of authentic inquiry-based instruction are choice, personalization, relevance, empowerment and care. Thinking of these characteristics we will explain a few that will be fundamental for the purpose of this capstone.

**Components of authentic learning.** The literature defines four components of authentic learning; audience, purpose, resources and task. This section will explain what they signify and how they are used in education.

**Audience.** One of the components of authentic learning is an audience beyond the classroom, this changes the task from just a practice to something more important, which allows students to engage emotionally in the activity (Newmann, Marks, & Gamoran, 1996; Rules 2006). Boss (2018) called this, “Presentations of learning” that provide
students with a framework to have their work shared beyond the classroom in a way that it is not just a process in which the teacher is the only audience and after a grade, nothing happens. The paper goes further to say that “If we want students to be ready for their future, they need opportunities for communication, collaboration, and all the things that presentations of learning allow students to do” (p. 1).

**Purpose.** Purcell-Gates, Duke and Martineau (2007) established that an authentic activity is that which is realized for a purpose that is beyond the “learning-to-read-and-write context and purpose” (p. 14). They go further to say that authentic function or purpose means that the activity functions as a communicative purpose.

In their study (Purcell-Gates, Duke & Martineau, 2007), they defined a continuum of authenticity, where activities can be highly authentic, somehow authentic or just have some components of authenticity. For example, students can be reading a highly authentic book but only using it for a school-related activity, making the whole task less authentic. It is clear that the benefits of integrating technology are significant when there is a clear and specific purpose for doing it (Brooks & Lasser, 2018).

**Tasks.** The studies by Herrington and Oliver (2000) suggested that what we teach in schools does not transpire into real-life, problem-solving contexts. Separating learning and context prevents students from seeing their education as a tool to be used in their future as problem solvers. Pahomov (2014) followed the same idea when explaining relevance. In her book, she wrote that inquiry makes learning relevant because students
are asked about their interests and become the leaders of their own discoveries. The personal views of the students are valued in this model.

**Impact on student learning.** One of the foundations for relevance and authenticity in the classrooms is the work of Daggett and Nussbaum (2006). They created the Rigor/Relevance Framework©. Their research is based on the work of Bloom’s Taxonomy and studies on brain activity. The premise of their studies is that students who are engaged will learn more than students that are not. Basically, those engaged students will not only improve their learning conditions but also achieve higher on tasks and tests (Daggett & Nussbaum, 2006).

Willoughby (2003) conducted a study based on the premise that: Hundreds of schools across the nation have used this model for instructing teachers during professional development and have found it to be successful in improving their school culture and their students’ interest in learning. However, a link has never been established between the use of this framework and student achievement (p. 5).

The researcher investigated, amongst other questions, the relationship between the use of the Framework and score results on standardized tests. The findings suggested that because of the nature of the framework, which recommends that teachers create rigorous and authentic learning in order to succeed in the real world, the ability of students to respond to drill questions out of context was not significantly improved.

Application of knowledge is a way for students to remember it in context and the researcher thought that it may help them better remember basic knowledge, but
teaching in context does not always translate into better scores on paper and pencil tests. (Daggett as cited in Willoughby, 2013, p. 79)

However, Johnson and LaBelle (2017) concluded that higher levels of learning were found when students described their learning experiences as authentic. Their investigations even found that students were positively affected in their interaction by educators they view as genuine. They referred to the fact that teachers need to not only show care and concern but engage with students in ways that go beyond the responsibilities in the classroom. On the same line Duke, Purcell-Gates, Hall, and Tower (2006) found several studies to support their own research that authentic literacy activities promote “higher growth in both comprehension and writing” (p. 345).

The work led by Newmann (1996) has found positive effects when measuring student achievement after compiling information on authentic classroom practices. Besides, another study by Newmann, Bryk and Nagaoka (2001) found “comparable positive effects of Authentic Pedagogy on student outcomes when measured on a conventional standardised test of basic skills” (as cited in Amosa, Ladwig, Griffiths & Gore, 2007, p. 3).

When thinking of reaching all learners, there is an equity component that needs to be considered. The studies of Amosa, Ladwig, Griffiths and Gore (2007) found that by augmenting the rigor of cognitive tasks in assignments, then student authentic performance significantly improves and even has the ability to close the achievement gap between students of different socio-economic groups. Likewise, having “high expectations about the quality of student work has a positive and significant effect on student authentic
achievement” (Amosa, Ladwig, Griffiths & Gore, 2007, p. 12). The researchers concluded paraphrasing the findings of Griffith et al. (2007) that, in order to sustain results towards equity goals that will close the achievement gap, it is necessary to present all students even more, those who are considered at greater risk, with evaluations that motivate elevated authentic performance. In addition, if only students who are already privileged in education are presented with quality assessment tasks, it is thought that the achievement gap will grow wider.

I truly believe that, “...all children can learn. We have countless opportunities each day to invite kids to do the work and build understanding. Leveraging technology is one way to make that happen” (Muhtaris & Ziemke, 2015, p. 49). My research question is founded on the belief that, with the appropriate tools and by making instruction relevant, each of the students in the classroom can attain proficiency and feel valued. There is abundant literature to support the notion that students learn better when learning is meaningful to their lives and the activities are rigorous and authentic. By investigating How can technology be used as a tool for providing students with authentic learning opportunities in the elementary classroom setting? I aspire to contribute a little to that goal.

In the upcoming sections, I will discuss how the integration of technology can make learning authentic for each student in the classroom and how teachers can differentiate and personalize learning with the aid of technology.
Differentiation

Differentiation involves a variety of techniques and resources teachers use in the classroom to instruct a diverse group of students (The Glossary of Education Reform, 2013). It signifies instruction that is designed to the learning preferences of singular learners, where learning goals are equal for the whole class even though the methodology of instruction changes taking into account the preferences and research-based strategies for students (US Department of Education, Office of Educational Technology, 2017). Following that same line of thought, Tucker explained that teachers who use differentiated instruction design their curriculum to match the learning styles of their students. Furthermore, the writer adds that all students have the same learning goal, but the way of teaching varies according to how the student learns best. Instead of using a single teaching method for all students, teachers use a variety of methods (Tucker, n.d.).

According to Tomlinson (2008), one of main researchers of differentiation, there are five main components that can be differentiated in the classroom. The first component is content, it refers to what is needed for a student to know or how will the student acquire access to that knowledge. The second one is process, the way in which lessons are designed. The third is product, these are the final projects students will complete. The fourth is affect and environment, defined as the set of classroom interactions and conditions. It is the learning environment which includes the personal, social and physical organization of the classroom (Tomlinson & Moon, 2014). The Glossary of Education Reform follows the work of Tomlinson saying that differentiation techniques can also be
guided by the specific interests of students and their learning styles (The Glossary of Education Reform, 2013).

Classrooms are diverse not only in relation to the interests, readiness and learning styles but also when it comes to cultural backgrounds (Smith & Throne, 2007; Tomlinson, 2017). Differentiated instruction aims to recognize those differences and adjust instruction to meet the learning targets (Smith & Throne, 2007).

Differentiation is also built upon the constructivist approach to learning, which establishes that students create or construct their own knowledge and understanding by building on previous knowledge (Smith & Throne, 2007). This coincides with the foundations of personalized learning that have its beginning under the same principles (FitzGerald et al., 2018). Smith and Throne (2007) emphasized that teachers in this model are the facilitators of experiences and opportunities not the keepers of knowledge.

Even with all the positives and assuming that teachers are keeping their students best interest there is one major criticism for the approach when it can lead to tracking (grouping students by their abilities in a non-flexible way) and it also requires adequate teacher training (The Glossary of Education Reform, 2013).

We should also consider that to achieve a personalized education it is necessary to have resources, time availability and teachers with the right knowledge. All these elements that are not always available together (Harper & Milman, 2016).

At the core of differentiation is the belief that teachers can offer a variety of approaches to meet a diverse group of learners who take responsibility for their learning (Pahomov, 2014; Smith & Throne, 2007). In this sense differentiation is “an approach to
teaching that promotes equitable learning experiences for all students. It is teaching with planned responsiveness to the inherent diversity present in the population of a classroom” (Millman et al., 2014, p. 124).

Considering that differentiation happens when:

...a teacher proactively plans varied approaches to what students need to learn, how they will learn it, and/or how they can express what they have learned in order to increase the likelihood that each student will learn as much as he or she can as efficiently as possible. (Tomlinson, 2003 as cited in Milman et al., 2014, p. 151)

I will investigate how to use iPads in order to facilitate differentiation in those three areas: content, process, and product.

By incorporating technology in the classroom teachers can design “anytime-anywhere” learning. The educator intentionally and thoughtfully integrates all essential course content into a digital platform so students participate in learning within and outside of regular class periods.

During this section, I have learned that an effective use of technology will provide adequate differentiation of education. Technology may also allow teachers to develop their classes to reach students personally. Technological devices are a very important factor in adapting the learning mode to each student in order to obtain the best performance in their educational process.

**Devices in the classroom**

The number of schools investing in technology in the United States has been increasing since the first laptops. Many districts are participating in one-to-one (1:1)
initiatives in order to offer environments for students and teachers that include technology (Harper & Milman, 2016; Milman et al., 2014).

For Smith and Thorne (2007), the utilization of technology in education seems to vary. Although different educational organizations over the United States have gathered information, there is little consistency on what ought to be gathered and how. Therefore it is complicated to decide, standing from a worldwide point of view, how much innovation is utilized in grade schools today. It does not mean that it is not feasible (Smith & Thorne, 2007).

Milman, Carlson-Bancroft and Boogart (2014) conducted a study to examine the use of iPads in elementary schools. In their research, they mention the previous works of Banister (2010, as cited in Milman et al., 2014) on how technology is being used to “increase student learning and achievement” (p. 120). As they research the impact of technology on learning they start by mentioning a study by Stanford Research Institute (SRI) in which 93% of teachers stated that devices in the classroom had a “positive impact on students’ learning” (Joyner, 2003, as cited in Milman et al., 2014).

On the other side, there are factors that have been brought up regarding the use of screens in younger learners. Most people are familiar with the recommendations from the American Academy of Pediatrics to avoid television viewing for children under two but we do not have research base information on what exactly would be healthy for each age group and how to qualify each device children are using (Kamenetz, 2018). Besides, when companies market a technological product they advertise the opportunities it provides to personalize learning. Teachers and districts should inquire about the actual personalization
that it can provide; the flexibility to adapt it to a variety of learners and the research base efficacy of the product (Molnar & Herold, 2019).

Another area to keep in mind is how technology can serve all groups of students and contribute to equity goals. Warschauer found that "overall, students who are black, Hispanic, or low-income are more likely to use computers for drill-and-practice, whereas students who are white or high-income are more likely to use computers for simulations or authentic applications” (as cited in Zielezinski, 2016, p.148). It is important to understand that just having devices in the classroom is not enough to increase performance levels for all students.

The “Technology Counts” report is prepared by Education Week. In the 2019 edition, the report highlighted that K-12 teachers do not trust that the growing insertion of technology into U.S. schools is changing education. Indeed, another national study of 700 educators led by the Education Week Research Center shows that less than 33% of America's instructors said ed-tech advancements have changed their convictions about what schools should be (Herold, 2019).

However, authors agree that research still needs to continue to substantiate or disprove these statements, or at least analyze how educators can incorporate and use technology in different grade levels and subjects in order to improve student performance considering personal needs (Clement & Miles, 2018; Kamenetz, 2018; Milman et al. 2014; Smith & Thorne, 2007).
**Recommendations for the effective use of technology in the classroom.** The use of technology in the classroom must serve the purpose of improving instruction. The tools alone do not make better teaching (Clement & Miles, 2018). Smith and Throne (2007) listed in their book the recommendations from the Center for Applied Research in Educational Technology (CARET). There are six ways to use technology effectively:

- Technology improves student performance when the application directly supports the curriculum objectives being assessed.
- Technology improves performance when the application provides opportunities for student collaboration.
- Technology improves performance when the application adjusts for student ability and prior experience and provides feedback to the student and teacher about student performance or progress with the application.
- Technology improves performance when the application is integrated into the typical instructional day.
- Technology improves performance when the application provides opportunities for students to design and implement projects that extend the curriculum content being assessed by a particular standardized test.
- Technology improves performance when used in environments where teachers, the school community, and school and district administrators support the use of technology. (pp. 7-8)

Our classrooms should facilitate the creation of innovators that can follow their own inquiries and turn them into a valuable experience (Wagner, 2012). In order to do
that, Hattie (2012) suggested having classroom centered in students, knowledge, assessment and community (as cited in Tomlinson & Moon, 2013). Students that are met where they are in their learning journey and are guided to proficiency. Knowledge that fosters connection of ideas. Assessment to support students and guide teacher decisions. Community in which to share experiences and learn from each other.

Zielezinski (2016) advocated for the use of digital tools that integrate communication, collaboration, creativity and critical thinking with problem-solving and higher-level thinking skills. Activities that will “help students engage in authentic tasks” (p. 1).

Ultimately, the purpose of this capstone is to provide teachers and students with activities that will serve that relevant task.

**Conclusion**

After delving into the investigations of various researchers, I have learned a plethora of information around the ins and outs of personalized learning. My research included delving deeper into personalized learning, including the subtopics of authenticity, differentiation, the use of devices in the classroom and the challenges educators may come across as they integrate technology into their practices. The chapter defined personalized learning and how authentic learning and differentiation are pieces to the bigger puzzle. It also made clear that technology is only a tool and the main goal should always be to reach all students and guide them towards achievement of their educational goals.

As I move forward in Chapter 3, I will explain the differentiated learning activities library that I will be creating through this work in order to supplement the current and
available math instructional resources available to our team. Additionally, I will include
an overview of the educational setting, the student demographic group, and a detailed
project description.
CHAPTER THREE

Project Description

Introduction

Digital tools have become part of our teaching practices. As educators, we want to root our work in pedagogical research as we use technology to support learning (Muhtaris & Ziemke, 2015; Richmond & Troisi, 2018). Technology is integrated in schools as a way to personalize learning and provide authentic opportunities to all students.

In chapter two, I described the main topics that relate to technology and education when it comes to creating an authentic learning environment. The chapter explained personalized learning and then differentiation, authenticity and devices in the classroom as pieces that integrate the bigger picture of personalization. I also presented some misconceptions and concerns to be considered when making decisions about student learning. The literature review allowed me to set the groundwork in my research question, *How can technology be used as a tool for providing students with authentic learning opportunities in the elementary classroom setting?*

This chapter presents an overview of the project and the theories that support that choice. It also includes the school setting and the characteristics of the environment in which the project was developed and applied, as well as the participants and tools utilized. I later provide a description of the project including the timeline and the steps required to complete it.
Description of the Project

The project consists of an activity library to supplement our current math resources. An activity library is a collection of resources organized by grade level and subject area. The resources are created by teachers and assigned to students for extra practice or to address a specific need. Following the district Math Proficiency Scales, I designed an activity library that teachers can share with students using Seesaw. This educational app allows students to share their work with not only the teacher but parents and classmates too, Seesaw was chosen for its capabilities to amplify audiences. The app facilitates assigning work to specific students or the entire classroom, it also gives a platform for feedback. Students can show their work in a variety of ways, be it drawing, writing, recording their voice or a combination of them. Even though the activities compiled in this library were presented to students and shared amongst teachers using Seesaw, they can be copied into other platforms for student use.

The project intends to supplement the math curriculum design process that has been happening in the district for the last few years. The math proficiency scales include more than one unit of study and span to the entire year. They establish where students should be in their understanding of math standards in three areas: conceptual, procedural and contextual. For this addition to the curriculum, I carefully selected the activities and provided a platform for implementation in the classroom at the discretion of the teacher.

The activities align with the learning targets and provide authentic learning to students. As a Professional Learning Community of teachers, coaches and administration, we have noticed, by reviewing test results and analyzing data trends, that students reach
proficiency in their procedural work but are lacking a deep understanding of the concepts and how to apply them in context. This set of activities is aimed to fill that gap, offering more opportunities to practice that skill.

After learning about the importance of making work relevant and authentic for all students (Amosa, Ladwig, Griffiths & Gore, 2007; Daggett, 2008; Newmann, Marks & Gamoran, 1996), I considered that providing teachers with a set of activities specifically designed to the needs of the group of students that we have is one way to reach each of the learners. The activities for this project were designed not only considering the learning objectives, the existing curriculum and resources but also the personal characteristics of this group of first graders and their current achievement levels. The focus of the activities is to improve their proficiency in the understanding of the mathematical concept of place value, this is taught through two units in our current resource, however, it is a concept that extends throughout the year and into second grade. Students worked on the activities independently, with partners or in small groups with teacher guidance depending on the type of activity and needs of the students. The activities are divided into three strands, procedural fluency, conceptual thinking and contextual application (Kilpatrick, Swafford, & Findell, 2009). The first area, procedural fluency measures the ability of students to accurately complete an algorithm; the second one conceptual thinking requires students to show their work and explain their thinking; the third area refers to the application of the concepts in a word problem or real life scenario.

In order to make the activities authentic, I thought about the four components of authentic learning as described in Chapter 2, purpose, task, resources and audience
(Rules, 2016). For example, the pictures used in the activities were taken in the classroom using materials relevant to the students. I used some of the toys, or other tokens they brought in to share with the class and turn them into a math problem.

Given that we have a 1:1 iPad classroom setting, each student can have their own portfolio and individualized resources. I chose an app that makes assigning activities to students and sharing with parents an easy task. I believe that Seesaw is a user-friendly app for younger learners that supports authentic learning. Students may use other apps to show their understanding, but Seesaw was used to distribute activities, provide feedback and share work.

**Research Supporting the Approach**

Following the work of Daggett (2008), the district has developed a Rigor and Authenticity matrix (see Table 1). Daggett created the Application Model, where he described how to put knowledge to use. The four quadrants of his representation are Acquisition, Assimilation, Application and Adaptation. Oftentimes we have realized that our instruction falls under the first quadrant, Acquisition.
Table 1

Rigor and Authenticity Matrix.

Adapted from the Rigor and Relevance Framework by Daggett (2008). (Reprinted with permission- Creative Commons NonCommercial license)

I would like to create a set of activities that will move that learning to the other quadrants, presenting students with problems that, as defined by Rules (2006), replicate real-world problems, inquiry and thinking skills, discourse in a community of learners and student-directed learnings.

The concepts of Authentic learning, defined as learning that replicates or reflects activities that occur in the lives of people outside of an artificial learning context (Duke, Purcell-Gates, Hall, & Tower, 2006; Herrington, 2006; Rule, 2006) and will be the foundation for the activities in the contextual area. It produces work that holds a place in the real world.
I will use a technological tool, Seesaw, as the platform to integrate the four components of authenticity that our district is working on including throughout lessons. The first component of authenticity is purpose. We want learning to have a purpose in the world beyond school. Using technology would allow students to become technologically literate, something important for 21st century learners. The second component is the use of resources found in a context beyond school. Students use devices and apps found outside the classroom, as well. The third component involves a task that exists outside of a school context. Using technology, creating with technology, learning with technology, collaborating with technology are all tasks found outside the classroom. The fourth component is a genuine audience who values the work. Seesaw gives students a way to share with parents, community members, and classrooms around the world. It gives students an audience outside of the classroom.

Seesaw gave me a platform to scaffold opportunities for reflection, provide feedback for students to revise their work. These capacities align to research in the field of e-portfolios, that suggests that advising students on their work is critical to their capacity to reflect and considers the belief that a life-long learning experience is grounded in the ability of students to reflect and be aware of how they learn (Yancey, 2009).

Christodoulakis, Kotseva and Yoshinov (2016) studied technological infrastructures based on specific information systems that permit the development and management of instruction anytime, anywhere. They also investigated libraries like a source of learning resources. The researchers advocate for a digital library, as a method to provide content in a variety of sizes and formats. In their study, the authors define a digital
library as an “information system targeted towards a specific community, where content from different sources is collected and managed” (Christodoulakis, Kotseva & Yoshinov, 2016, p. 152). This type of activity library is the kind that facilitates personalized and authentic learning opportunities for this project.

In a study about the use of iPad in math classes, Al-Mashaqbeh (2016) found that incorporating technology has a positive effect on student achievement when compared to classrooms with no integration. Furthermore, the Consortium for School Networking identified the top five technologies to be used in order to enhance opportunities in education. Blended learning is one of them (Friedman, 2016). This project proposed using technology in that way. The teacher is still using other resources that do not involve technology but adding the digital activity library to support instruction and foster student success. It is well known that even Gates said “Technology is just a tool. In terms of getting the kids [students] working together and motivating them, the teacher is the most important” (as cited in Richmond & Troisi, 2018, para 24).

Setting

The school where the project was implemented is one of six elementary schools in a suburban city. The school is a choice school for the district because it is a Spanish Immersion school. There are 830 students in the school. The school demographics are 74% White students, 13.7% Latino or Hispanic, 6% one or more races, 3.4% Asian and 2% Black or African American.

As a language immersion option, this K-6th grade school combines strict academics with the opportunity to learn in Spanish. The same standards, outcomes, curriculum and
assessments applied at the district’s other elementary schools are the basis for immersion education. In grades K-6, all core subjects are taught, and all interactions between students and teachers are done in Spanish. Beginning in grade 3, students experience a dual literacy program; with language arts instruction in both English and Spanish, resulting in students who can learn, read, write, and speak in both languages by the time they enter middle school.

The project will be implemented in six first-grade classrooms with a total of 132 students. The school provides 1:1 iPad devices from Kindergarten through 6th grade.

**Participants**

The intended audience for the project is the first-grade cohort. This includes 6 teachers and 132 students. One interventionist and two instructional coaches may use the library as needed. Teachers in the cohort have been in the profession for more than 5 years at least and have been in the school since the implementation of the 1:1 initiative in 2016. Teachers have MacBooks and iPads for their use in the classroom, as well as an interactive board. Continuous professional development including the integration of technology in the classroom is offered. At the moment, all six grade teachers use Seesaw as a tool to assign activities, provide feedback and share with families. All teachers and coaches are bilingual although their interactions with students are completely in Spanish.

**Timeline**

Before deciding on the project, I consulted with my PLC (Professional Learning Communities) team and coaches in October 2019. Looking at our current curriculum,
resources and thinking of the proficiency scales, we saw the need to add resources that will assist us in facilitating the achievement of learning targets for each student.

Since then we have been tracking students in the mathematical areas of contextual, procedural and contextual learning; both in formative and summative assessments.

During the months of December 2019 and January, February 2020, I designed the activity library that teachers implemented from April to June. The library will be added to the various resources for first grade to be used in the coming years.

Assessment

The library was created and developed taking input from student performance and teacher input regarding areas of need. As a team we will evaluate how the activities are received by the students and how the assignments allow students to increase their levels of understanding. Weekly meetings with the first grade team will give me information regarding the effectiveness or improvements needed for future activities. Once the library is completed

In addition, each math unit has a set of formative and summative assessments. The summative assessments are part of the resource that the district has chosen. On the other hand, the formative assessments have been designed to help teachers measure the progress of students towards proficiency in the areas of knowledge: conceptual, contextual and procedural. Those assessments will be used not only to guide the decisions a teacher makes when it comes to the assignments for each student but also as a post-assessment. The post assessments are to be administered to students after they have worked on the assigned activities from the library and, preferably, before the summative test. By
measuring student’s levels before and after the use of the activities from the digital library, I obtained information to measure if, by using authentic resources and tasks students improve achievement. The first grade team analyzed the data during weekly meetings and discussed how the use of activities for each math area was supporting student learning which in the end showed in their proficiency on the summative assessments. Students enjoy having their own set of assignments and especially seeing that the problems were created using images from their own school or objects that are familiar to them. This directly relates to my research question of *How can technology be used as a tool for providing students with authentic learning opportunities in the elementary classroom setting?*

**Conclusion**

Chapter 3 describes the project I designed for use in first grade classrooms at my school. It also gives an overview of the main ideas and the reasoning behind the choices. The school setting and special characteristics of the teachers and students involved were presented, and how all these pieces informed the decisions that were made.

In chapter 4, I will reflect on my major learnings and offer a review of the literature that was impactful in the project; as well as some considerations for future research and its implications.
CHAPTER FOUR

Reflection

Introduction

This research project started as a way to help me better understand the importance of authentic learning in today’s classrooms. As I deepened my learning around authenticity, my curiosity grew and led me to discover approaches to incorporate authentic elements in my daily lessons. During this process, the inclusion of technology became evident as a tool that would increase authentic learning and provide students and families with meaningful communication. This was the path that guided me to my research question: How can technology be used as a tool for providing students with authentic learning opportunities in the elementary classroom setting?

My goal with this capstone was to find research that supported the requirements that the district where I am employed was asking teachers to follow and to provide my first grade team with supplemental activities, ready to go so that everyone could use them to fulfill those requirements for the benefit of our students.

The importance of the use of technology in education has been demonstrated throughout these various chapters, and the project created allowed me the satisfaction of curating a tool that impacts my current position and professional experience as a teacher.

In this chapter, I share the major learnings during this past year as a researcher, something I have never done before to the extent that I did for this capstone. In addition, I review the main ideas from my literature review as well as the application of this type of tool in the classroom. I later discuss the limitations, some recommendations for future
implementations and further research. At the end of the chapter the results are posed and a hopeful narration of the contributions is presented.

**Major Learnings**

As previously described in this capstone, technology and education have merged in my professional career, providing me with a unique perspective. From having studied software and computers during my college years, to teaching math and later immersion education in the elementary setting, all my interactions with technology had a positive impact on the way I have learned and approached teaching.

As a foreigner growing up and living in the US for many years now, I have also experienced the necessity to feel included, validated and recognized. When I first heard about authenticity in the classroom, there was a spark that made me want to know more, it felt like this was something that could also help my students feel included, validated and recognized. This spark contributed to my desire to investigate, find ways to incorporate more authentic learning opportunities into my practice, and to share these strategies with others as we collaboratively work to reach the needs of all students in our classrooms.

During the 2017-2018 school year professional development was centered around increasing authenticity. This is when I first heard about the concept and started my initial investigation. At the end of the school year, I presented my experience with authentic writing at a local teaching conference. In years that followed, the district combined authenticity with rigor to create a Rigor and Authenticity matrix. During that time, I served as a member of the district’s math curriculum writing team. As a team, it was our goal to make sure the new math resource fulfilled the mission of guiding students to reach
high levels of understanding in mathematical thinking by increasing the rigor and authenticity; we used the newly developed Rigor and Authenticity matrix as a tool to guide our work. As I continued to grow in my personal knowledge of authentic learning, I started adding my personal experiences and strengths to the learning opportunities I provided in the classroom. I found that technology was pushing me to reach deeper and further in my practice.

Teaching in a classroom with access to 1:1 iPads provided my students and I access to a variety of applications and high levels for connectivity. During these past few years, I have used many applications in the classroom not only to present my lessons but to also empower students to foster and share their creativity and knowledge. For my capstone project, I chose Seesaw as the platform to create an activity library because it has become near seamless for students and teachers to interact with this specific application.

Once my research question was decided upon, my next step was to pinpoint an area in which I wanted to concentrate my efforts for the project. Considering that math was an area of focus within the district, paired with the lack of supplemental resources in Spanish, I decided to design activities that would be authentic to first graders using a familiar application in which I could infuse the elements of authenticity (resources, task, purpose, and audience) into the given activities (Duke, Purcell-Gates, Hall &Tower, 2006; Rules, 2016).

In the process, I learned that authentic learning is not an isolated concept nor an additional requisite in a lesson plan. Authenticity is a continuum, and it requires the right mindset and thoughtful preparation to successfully implement. The more I understood
what was needed, the more I thought about equitable learning opportunities and the practices from culturally relevant pedagogy. It is imperative that we allow ourselves to think of authenticity as a transversal practice that extends through the curriculum.

It is well noted that in order to make resources authentic, teachers need to know not only the academic level of their students but also know their interests, backgrounds and preferences. As I was researching and later developing the project, I found that the investment of time is a necessary one, but oftentimes one of the biggest obstacles in the life of a teacher.

Another positive finding is related to how students interacted with the final product. When students are presented with resources that come from their personal experiences they seem more engaged. It is not the same to solve a math problem about animals than to solve one where your own dinosaurs are portrayed. On the same line of thought, using the names of the students that will be working with the problem, adding pictures of the actual school playground and creating problems with the toys students have shared during morning meetings are examples of mechanisms employed in the project.

As with many theories in education, putting something into practice requires commitment and persistence from the educator. As I started to develop my project I realized that I needed time to get to know my students and invest in moments throughout the day that would help me in making learning authentic to each student in the classroom. I also discovered that even though it is my goal to share my library and the curated resources, each teacher will have to adapt the activities in order to make them authentic to the students in their classroom, year after year.
I was also lucky enough to be able to implement some of the activities with the students in my classroom this year. Before all the activities were compiled I had the opportunity to share activities and observe my students' interactions with them. I will share that it is always a joy to see their excitement when the math problem they are solving is about the Pokemon cards they brought from home to play with during recess.

Many activities were also readily accessible when our school transitioned to Distance Learning due to the COVID-19 global pandemic. During this uncertain time, I was able to lean on the resources I created and share them with my first grade colleagues, as well. Also, unlike other times, we were all able to experience how technology has helped us to stay connected and has provided our students with quality, authentic and rigorous instruction in the digital setting.

**Connections to the literature**

Throughout my research, the literature review was by far the most difficult piece of the process. It was daunting at the beginning, but I found joy finding that so much of the new learnings were related to theories that have been researched for years. Herrington (2006) gave me a whole picture of the beginnings of authentic learning based on situated learning and cognitive apprenticeship (Brown, 1989; Collins, 1988).

Herrington (2006) also mentioned that these definitions and theories were further investigated during the 1990s, to later merge with the new technologies of the time when multimedia was starting to make its appearance in the world.

The work of Dagget was instrumental in supporting the applications being implemented in the district and my classroom. One of the foundations for relevance and
authenticity in the classroom is derived from Daggett and Nussbaum (2008). They created The Rigor/Relevance Framework©. Their research is based on the work of Bloom’s Taxonomy and studies on brain activity. The premise of their studies is that students who are engaged will learn more than students who are not.

As previously mentioned, student engagement was one of the main goals for my project. I tried to increase that engagement by incorporating as many components of authenticity as possible. Purpose- so that students see that the work they are doing can also be applied to their daily lives; task- by giving them problems in context; resources- by incorporating technology tools that they will use beyond the classroom; and, finally audience- sharing work with classmates, teachers and parents.

An additional, major takeaway for me was the relation between authenticity and culturally responsive teaching. Reading the studies of Amosa, Ladwig, Griffiths and Gore (2007), I learned that by augmenting the rigor of cognitive tasks in assignments, student authentic performance significantly improves and even has the ability to close the achievement gap between students of different socio-economic groups. It was important to me that, in order to sustain results towards equity goals that will close the achievement gap, it is necessary to present all students, and even more for those who are considered at greater risk, with instruction that elevates their performance (Griffith et al., 2007).

**Project Implications and Limitations**

Parts of the project have already been implemented and used not only by students in my classroom but also with the entire first-grade cohort, which comprises six teachers and approximately 130 students and their connected families. I will definitely use the
Activity Library next year, making sure to edit some of the images in order to make them relevant and authentic to each group of students. I am hoping that the format and all the thought dedicated to these resources will be taken advantage of and used for many years to come by the whole first grade team.

Considering that Seesaw is only one platform and that technology rapidly changes, I have all the activities for the project stored in Google Slides so that they can be edited and applied within other applications, or if appropriate, on paper. As mentioned many times in this research, technology is a tool that has allowed my students and I to amplify our learning and our audiences but is not an end in itself.

The project developed is only the beginning of what can be a growing library of resources to cover the span of the entire math curriculum. For the project, I chose one mathematical basic skill, but it would be a future goal of mine to expand the library and continue creating activities that will support students when learning within other mathematical areas such as algebra, data, measurement and geometry. Because the activities are based on a skill and not a specific resource, they can be utilized even if there are changes in the curriculum and units.

Another limitation would be that the activities were designed for one specific grade level. Some activities may be used for Kindergarten students that have shown proficiency in their grade level expectations for place value or on the other hand for second graders that have not yet reached the expected level of understanding for the previous grade level. But for the most part, the activities were designed with first grade standards in mind. Other grade levels can definitely use the research behind these
activities and adapt them to their specific needs which brings us to some ideas for future research.

**Considerations for Future Research**

After completing my capstone project I would like to expand the activities to other mathematical areas such as algebra, data analysis or geometry. Personally, I would choose geometry as my next step.

There is also a whole lot more to investigate in order to increase not only the authenticity of the activities but also the level of rigor and the depth of thinking for each activity. Going even further in the research it would be ideal to have a set of activities that can serve as a tool to progress monitor students with efficiency and valuable data.

These past few weeks, have shown the world that technology has given us an opportunity to stay connected while learning continuously. Teachers and students everywhere have changed the way they receive instruction and how to show their knowledge. I would love to see more research highlighting the positive impact that these types of tools can have on education, particularly with distance learning efficiencies.

**Results and Contributions**

My project has already been shared with my first grade PLC, and we will continue to use it and possibly start contributing to expand the library. I have also shared my findings regarding authenticity through presentations inside and outside of the district.

Furthermore, I will continue to analyze students' engagement levels during our team meetings and analyze achievement data to inform future adaptations.
This project has provided a set of ready-to-use activities for my entire first grade team during Distance Learning. The research behind it has led my team and I to explore changes in our lessons that will increase the authenticity of learning opportunities to best benefit our students and their families. The technology behind the project has proven to be user friendly, not only for students but for parents that are now actively involved in the lessons.

**Conclusion**

This chapter gave me the opportunity to reflect on my learnings, highlight the authors that shaped my research and share some contributions and limitations of the project developed.

Today more than ever, I feel validated for highlighting the positive impact that the thoughtful use of technology can have in the classroom, even with younger students. It was never the thought behind this capstone to idolize the use of devices as a replacement for comprehensive and impactful learning. My research question *How can technology be used as a tool for providing students with authentic learning opportunities in the elementary classroom setting?* was written with the purpose to integrate technology into the classroom as a tool, that can make the creation and utilization of authentic activities useful for teachers and meaningful to students.

I hope that as educators we continue to grow in our understanding of what increasing the level of authenticity can do for students, not only in their academic performance but also in how they see themselves in our multicultural world. If technology can improve how we reach our students in a way that makes them feel included, valued
and deserving of all our efforts then why not take advantage of the possibilities it can offer for us all.
REFERENCES


technology overuse is making our kids dumber. Chicago, IL: Chicago Review Press.


Kamenetz, A. (2018). The art of screen time: how your family can balance digital media


APPENDIX A

Math Proficiency Scales: This proficiency scales were used to design the activities for the digital library.

Level I: Does not meet proficiency
Level II: Partially meets proficiency
Level III: Meets proficiency
Level IV: Exceeds proficiency
Math Proficiency Scale
Course: **1st Grade Math**
Essential Concept: **Place Value**

<table>
<thead>
<tr>
<th>Level</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>Student can extend, transfer and adapt understanding of <em>place value</em> to complex tasks in a new, authentic context that is co-created with the student. <em>[Contact your building IE Coordinator or Instructional Coach for support]</em></td>
</tr>
<tr>
<td>III</td>
<td><strong>Essential Learning Target</strong></td>
</tr>
<tr>
<td></td>
<td>Student understands and uses <em>place value</em> at the 1st grade level, consistently demonstrating conceptual thinking, procedural fluency, and contextual application of:</td>
</tr>
<tr>
<td></td>
<td>• The ability to recognize, represent, identify, and compare 2-digit numbers as tens and ones</td>
</tr>
<tr>
<td></td>
<td>• The ability to count and write numbers to 120</td>
</tr>
<tr>
<td>II</td>
<td><strong>Supporting Targets</strong></td>
</tr>
<tr>
<td></td>
<td>A. Student can recognize, represent, identify, and compare 2-digit numbers as tens and ones</td>
</tr>
<tr>
<td></td>
<td>• Break apart 2-digit numbers into tens and ones</td>
</tr>
<tr>
<td></td>
<td>• Represent 2-digit numbers using tens sticks and circles</td>
</tr>
<tr>
<td></td>
<td>• Compare 2-digit numbers using tens and ones (&gt;, &lt;, =)</td>
</tr>
<tr>
<td></td>
<td>B. Student can count and write numbers to 120</td>
</tr>
<tr>
<td></td>
<td>• Count on or back from any given number up to 120</td>
</tr>
<tr>
<td></td>
<td>• Write any given number up to 120</td>
</tr>
<tr>
<td>I</td>
<td>Student's demonstration of learning shows minimal success of Supporting Targets</td>
</tr>
</tbody>
</table>
Math Proficiency Scale
Course: **1st Grade Math**
Essential Concept: **Algebraic Thinking (Addition & Subtraction)**

<table>
<thead>
<tr>
<th>Level</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>Student can extend, transfer and adapt understanding of <em>algebraic thinking within addition &amp; subtraction</em> to complex tasks in a new, authentic context that is co-created with the student. <em>Contact your building IE Coordinator or Instructional Coach for support!</em></td>
</tr>
</tbody>
</table>

**Essential Learning Target**

Student understands and uses *algebraic thinking within addition and subtraction* at the 1st grade level, consistently demonstrating conceptual thinking, procedural fluency, and contextual application of:

- The ability to write, represent, and solve addition and subtraction story problems with various unknowns for solutions up to 10 using multiple strategies and models.
- The ability to write equations for addition and subtraction story problems.
- The ability to identify and extend repeating, growing, and shrinking patterns.

**Supporting Targets**

A. Student can write, represent, and solve addition and subtraction story problems with various unknowns using multiple strategies and models.
   - Find Number partners and totals
     - Use break-aparts
     - Draw Math Mountains
     - Organize Stair Steps
     - Count on and Counting Back
     - Organize 5-Groups
     - Make a Ten
     - Draw and use Comparison Bars
     - Draw and use Ten Sticks and Circles

B. Student can write equations for addition and subtraction story problems.
   - Write an equation that represents the story problem
   - Understand what the symbols represent (+, -, =)

C. Student can identify and extend repeating, growing, and shrinking patterns.
   - Find the pattern
   - Name the pattern
     - Adding and subtracting 0, 1, and 2
     - Using doubles to add and subtract
     - Using decade numbers to add and subtract
   - Continue the pattern

I  Student's demonstration of learning shows minimal success of Supporting Targets