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# i-Ready, Are You?

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**ABSTRACT**

This study explores how my first-grade students interact with the newly implemented educational program, i-Ready. Students use this program weekly for both math and reading. Observations were made over the course of 5 weeks while students were using i-Ready. A double-entry journal was used to document data regarding the lessons students were working on, things that were said, facial expressions, and body language. Data excerpts will be used to illustrate key findings. There is very little research in the field that directly studies this program, which is what makes this study significant.

## INTRODUCTION

In the past twenty years, there has been a massive rise in the use of technology in our day to day lives. Computers first became common in households in the 1980's (Computers from the 1980's, 2004). They were difficult to operate and were used primarily for work related tasks. Today, everyone has a handheld computer glued to their palms with internet access at their fingertips. Internet and technology are not only used by working adults; they are used by people of all ages, including children. In schools, computers and educational programs are being introduced to children as young as pre-kindergarten. These educational programs can be used to assess students, differentiate their work, and provide data for teachers. It seems that teachers are always looking for new ways to differentiate instruction for students. Differentiation is all about making sure that students have what they need to be successful. It is important because development and learning are primarily considered individual activities, which is why individual children's needs must be recognized in the classroom (Vehkakoski, 2012). Differentiation looks different for every student, which is why it can be so difficult for teachers to do.

I am a new teacher, teaching first grade and I am required to use an educational program called i-Ready (i-Ready Proven to Predict, 2012-2013) with my students. i-Ready is a program being used in my school district as well as many other districts around the world. The only research available regarding i-Ready has been done by the company that developed and sells it (i-Ready Proven to Predict, 2012-2013). The information that they provide is solely about the product, its features, and what it can be used for. i-Ready is a computer program built to align with the Common Core State Standards (CCSS) that is being used in classrooms with children as young as kindergarten. It measures individualized growth and provides ongoing progress monitoring in math and ELA (i-Ready Proven to Predict, 2012-2013). It provides instruction and

practice differentiated to fit the needs of each student based on their ability and progress, as well as how they perform on their diagnostic tests. i-Ready provides reports for teachers that are ongoing, easy to use and easy to read. The company made the claim that "i-Ready successfully predicted proficiency on the assessment for 85% of students. Plus, i-Ready also accurately identified individual student needs on the CCSS to drive targeted instruction—both student and teacher-led" (i-Ready Proven to Predict, 2015). According to the company, teachers enjoy the benefits of easy data collection and the fact that students can learn from a computer.

When these programs are piloted by teachers, teacher opinions are included, but why aren't the students'? After all, they are the ones primarily using it. The i-Ready website doesn't say anything about how students interact with it or their opinions of it. There is a huge gap in the research that I hope to begin to fill by conducting this study.

Administrators learn about the benefits and assume that's all that matters. I didn't have a choice on whether or not I wanted to use this program and my students certainly didn't either. I understand the high demand for the use of technology in classrooms, but what about the students? How do they interact with these new computer programs?

i-Ready seems like a great idea for teachers and administrators, but how do the students feel about it? Do they enjoy using it? How do they interact with it? Would they rather use pencil and paper, or learn from their teacher? It seems that student choice is not always taken into consideration when it comes to new technology being introduced in education. My purpose for this project is to look at how students interact with i-Ready. I made observations as my students were using i-Ready in order to learn how they are using it, what they are learning, and what their facial expressions, body language and things that they say tell about their interactions with it.

**Research Question:**

- How do students interact with the educational program i-Ready?

**LITERATURE REVIEW**

Encouraging students to practice and develop 21st century skills at a very young age is made easier with the huge range of technology that is currently available in schools. Teachers are being asked to teach these skills as early as kindergarten. "21st century skills are the skills, knowledge and expertise students should master to succeed in work and life in the 21st century" (Framework for 21st century learning, 2002). 21st century student outcomes are made up of various areas of content knowledge, such as English, arts, mathematics, social studies and science. Educators are being asked by administrators to promote understanding in these academic areas at much higher levels. These outcomes also include information, media and technology skills, learning and innovation skills, and life and career skills (Framework for 21st century learning, 2002). Living in a world that is so rich with technology makes it crucial for adults and young adults to be able to access information, be flexible to changes in technology tools, and be able to create, evaluate and effectively use technology, media, and information. 21st century skills encompass a lot more than just being able to use a computer.

Scientists suggest that teachers do 9 things when teaching 21st century skills; make it relevant, teach through the disciplines, develop thinking skills, encourage learning transfer, teach students how to learn, address misunderstandings directly, treat teamwork like an outcome, exploit technology to promote learning, and foster creativity(Saavedra & Opfer, 2012). In order for students to develop learning and innovation skills, there is a huge focus on creativity, critical thinking, communication and collaboration. One might question a kindergartener's maturity or

ability to interact with technology in such a way that encourages these 21st century skills, but the types of technology available make it all possible. The amount of technology and programs available to schools is overwhelming. School districts frequently make difficult decisions regarding programs they would like to use in their schools. When looking at these programs, it seems that some are more structured and rigid whereas others allow for creativity and collaboration.

The educational program, i-Ready is a perfect example of structured technology (i-Ready Proven to Predict, 2012-2013) The only research that I could find on i-Ready was done by the company that produced it (i-Ready Proven to Predict, 2012-2013). This study will help to address a large gap in research regarding i-Ready by seeing how students are interacting with it. What is the true purpose of both interactive technology and technology that is more structured and rigid? What do students use each of them for?

**Interactive Educational Technologies**

Interacting with technology that allows collaboration and creativity seem to match the outcomes included with 21st century skills more than structured programs do. Educators continue to incorporate technology into daily curriculum in order to make students more comfortable with using it to enhance their learning. When students are able to access a variety of open-ended technology, they are taking their learning into their own hands. There are more choices available for students which makes them more likely to be motivated and engaged in their work. When students engage in learning that is open-ended and less structured, they are able to explore their resources, interact with technology in a positive way and take charge of their education. Taking a more constructivist route allows learning to be an active process. Research shows that

introducing technology to preschoolers in a "very open-ended and playful way" can be "expanded to allow for more advanced academic work as children develop proficiency" (Murphy, DePasquale, & McNamara, 2003, p. 2). Using technology to support learning starting at a young age will help prepare students for the future and improve their interactions with technology.

Digital imagery and storytelling is an exciting technological application that can be used with very young children to construct and document their learning. Through the use of digital imagery, students learn to write differently and more effectively, new visual literacy skills, new software skills and they learn to develop a voice (Telling stories with technology, 2008). The images and videos can be uploaded onto computers for students to view, share and reflect on. Images can also lead to discussions among students and promote deep conversation. Teachers can also model and teach students how to use email and word processing programs to communicate information to others. Students can send emails to their peers where they share information on certain research topics, personal opinions, and to ask questions. Students can use word processors to publish work they have done, share work with others through email, create newsletters, information pamphlets, etc. (Murphy, DePasquale, & McNamara, 2003). Using word processors allow creativity in how to choose to format the work as well as the font, colors, and whether or not the student wants to incorporate pictures or graphs. Giving students a choice when it comes to their education can motivate them to be successful as well as promote creativity. The information shared would vary by the grade, subject, and circumstances, but nonetheless, students are communicating and expressing themselves through the use of technology.

Problem-Based Learning is a self-directed learning style that can increase motivation, cognitive and metacognitive outcomes (Zumbach, Kumpf, & Koch, 2004). Students can engage in Problem-Based Learning while using technology as a support. Various search engines can support learning by providing students with countless resources to access while working together in small groups to solve the problem at hand. Students are then able to analyze their findings and come to some type of conclusion. Problem-Based Learning is designed as a curriculum instead of just an approach for a single lesson (Zumbach, Kumpf, & Koch, 2004). By using technology often to solve a problem, students are able to interact with it in a very open-ended way that promotes learning and motivation. This type of collaboration and creativity while using technology is what leads to the development of 21$^{st}$ century skills.

As writing is developed and changed every day, using blogs in educational settings has been a new approach to teaching. A study was done to explore how blogging influences writing development in elementary students who were used to very structured and rigid work (Davis, & McGrail, 2014). The study showed that at first, they had a hard time with it because they were unsure of what to do. Once they realized that they had an audience besides their teachers, they were able to build a relationship with the audience and become actively engaged in the writing process. As students continued to blog, they were not only enhancing their writing craft, they were meeting fellow bloggers all around the world. Using technology to enhance academics as well as social interactions is key. Blogging made students feel "empowered" and motivated" (Davis, & McGrail, 2014, p. 427). Blogging can also lead to more independent and confident writers. They were exposed to so much simply through writing using technology. When students interact with blogging programs, they are able to be creative by using dialogue, storytelling, sharing interests, news, and various personal information. Blogging also allows for direct

feedback from peers and other people who have access to the blog. Getting continuous feedback allows writers to refine their ideas.

The use of interactive whiteboards has become widespread in most educational settings. When students interact with these whiteboards, they are able to manipulate objects and gain a better understanding as a result. A commonly used interactive whiteboard is the SMART board by SMART education (Smart for education, 2015). Some of the company's core principals include building skills and knowledge to develop both the processes and outcomes of learning (Smart for education, 2015). Students are able to work collaboratively to develop necessary skills and be involved in powerful learning experiences. A study was done that looked into the use of interactive whiteboards regarding motivation in mathematics with elementary students. For teachers, it can be challenging to get their students excited about certain subjects, math being one of them. Through the use of interactive whiteboards, student learning can be enhanced in a variety of ways. This study was done using qualitative methods such as student self-reported procedure with interviews (Torff, & Tirotta, 2010). Students reported that using interactive whiteboards for lessons made learning more interesting, exciting and motivating.

Another way to use technology in classrooms is through educational games. Two quantitative studies were done using a technology-based game as well as a paper-based game. Both games had the same learning goals and outcomes (Shin et al., 2012). Educational games should allow students to be in control and have learning activities be regulated based on their learning style. If students have control when playing an educational game, it facilitates an interaction between the technology and the student, providing a more individualized learning environment. Games should be used repetitively and allow students to use them in a trial and error way so that they can continue to learn and develop skills. The results of this study showed

that educational games that contain clear and specific goals and rules lead to enhanced performance and learning outcomes.

**Structured Educational Technologies**

With so many open-ended, interactive technological resources that students are interested in, some may wonder why so many schools are using more structured and rigid technology to drive instruction. An example of a more structured educational program is IXL (IXL analytics, 2015). IXL is aligned to the New York State Common Core Learning Standards and provides students with the technology to practice math, language arts, science and social studies. Students answer questions that get progressively more advanced and complex. Students are able to see milestones in their progress when they reach certain points and there are various visuals that are easy for students to understand. Students have very little choice when it comes to structured technologies. They are not able to make decisions regarding their education and as a result, may lack motivation or engagement.

Another structured educational programs is i-Ready (i-Ready Proven to Predict, 2012-2013). K-12 Students interact with i-Ready through the use of a computer. i-Ready instructs students in math as well as and reading. They first take a diagnostic assessment and are automatically given customized instruction, all of which is done online. Throughout the year, students take a total of three benchmark assessments using i-Ready. In the district in which I work, these i-Ready benchmark assessments have begun to take the place of other traditional benchmark assessments that have been used in the past. There are some aspects of i-Ready that allow the manipulation of objects along with multiple choice questions. During diagnostic assessments, students are given a short break to play a game and then directed back to the

questions. "Differentiated instruction is a philosophy about teaching and learning that focuses on designing instruction in ways that enable all students to be successful"(Edyburn, 2004, p. 61). Designing instruction for students is what i-Ready does and is one of the reasons that so many school districts decide to implement this program. Another reason is that i-Ready is aligned with Common Core State Standards. There is very little research surrounding i-Ready and students' opinions of it as well as how they interact with it, besides articles produced by the company (i-Ready Proven to Predict, 2012-2013). Based on the information provided by the company, any administrator would see it and think that i-Ready would be perfect for their school. When administrators only see that information, they are not necessarily seeing all of the perspectives and opinions that they may need to in order to make an educated decision.

Edgenuity (Edgenuity, 2016) is another structured educational technology used in schools. Edgenuity is for students in grades 6-12. It teaches mathematics, science, ELA, social studies, advanced placement, general electives, world languages, career and technical education and test preparation. This program provides standards-based online instruction that builds on current and confirmed research, scaffolds learning and supports the transfer of skills to real-world applications (Edgenuity, 2016). Through the use of evidence-based instruction, engaging course content and real results, the program is making "the Edgenuity difference by redefining student engagement and achievement" (Edgenuity, 2016). The program also makes the claim that Edgenuity "empowers teachers to motivate students and ensure success" (Edgenuity, 2016). Educators receive data that allows them to monitor student engagement, progress, and achievement. Educators can then take that data and use it to differentiate instruction, address any misconceptions and answer individual questions. Since 2011, this program has won seventeen awards and appears to have been very successful. Similar to i-Ready (i-Ready Proven to Predict,

2012-2013), Edgenuity (Edgenuity, 2016) is another structured educational technology program

that has little to no research surrounding it besides what has been provided from the company.

From a personal standpoint, I had the opportunity to experience this educational program first

hand while completing an internship in an all-male, public charter high school. The students

went on Edgenuity for half of the day and learned from teachers from the other half. I did not

meet one student that liked using this program. They thought it was boring and were not engaged

in it at all. One of the students that I worked closely with would not even attempt to answer

questions thoughtfully. He would simply guess every answer and take lessons over and over

again until he passed. He expressed that he wanted to learn from real teachers all day. This is

only one scenario and set of opinions regarding the program.

Another structured educational technology, K12 International Academy (K12, 2016),

provides online education options for students in grades K-12. This program is able to help a

variety of students including; advanced learners looking for an academic challenge, students who

are college and career-minded, students who are homeschooled, children of families in the

military, elite athletes and performers, students who are homebound for various reasons and

students who are struggling learners. K12 has three educational options that students and parents

can choose from. There is Free Online Public Schools, Online Private Schools, and Individual

and Supplemental Courses. The company states that K12 curriculum consistently gets 95% or

higher satisfaction ratings from parents and teachers (K12, 2016). The company provides a

variety of success stories shared by parents as well as special recognition it has received over the

years.

Another source, (K12 Virtual Academy Online Homeschool Reviews, 2008-2016),

provides homeschooling program reviews. The first handful of reviews that were posted are

titled; "Do not use K12", "Too Much Even if Some Work Can be Skipped", "Don't use K12", and "K12: Worst school ever >:(." These reviews were posted by real students who have had real experiences with K12. The majority of these reviews ended up being negative. The themes that were found in the student reviews were that the program doesn't do what it says it will, there is way too much work and they do not like learning from K12. If students were always given opportunities to provide reviews of educational technology programs, administrators and educators may think twice before implementing it in their school. Another source, Arizona State University, stated that if a student misses 20% of a lesson they have to redo it. If they redo it and miss another 20%, they have to redo it again. Susan Ohanian responds to this by saying "The so-called "needs of each student" is an endless loop of repetition of the same material" (Ohanian, 2004, p. 5).

Also, there are no resources available for parents to use to help their child with difficult material. Companies can very easily fool people by making promises of student achievement and student-centered learning. They also state that K12 seeks public reimbursement which affects people's willingness to get involved with the company. It also helps to prove that the company does not have the best interest of students in mind, rather the money they can make.

Many structured educational programs such as IXL, i-Ready, Edgenuity and Connections Academy appear to be very successful programs in the eyes of administrators and educators. One may think that student opinions and experiences would be advertised on these websites in order to sway buyers; I did not find any student commentary of testimonials on these sites. The lack of student opinion involved makes me wonder if students actually enjoy using them or not.

## LITERATURE REVIEW: SUMMARY

It is clear that students of all ages enjoy interacting with technology. No matter what it is, students want to have a choice. When using interactive technology, students are able to customize their work whereas structured technology does not allow for that type of creativity. When I first introduced i-Ready to my students, they were thrilled to have the opportunity to get on the computers. As we began using it more and more it seemed that their motivation toward it decreased. I started to notice some students staring off into space while using the program instead of interacting with it and learning. I don't know if they were distracted, bored, or just uninterested with i-Ready. It could also be due to the fact that they are stuck in the same routine every time they log on. They are doing math or reading, depending on what I tell them, and their lessons are given to them by the computer. There is absolutely no choice available in this program. I hope to learn more about how my students interact with i-Ready though the data that I collected through observations. Allowing students to feel empowered and take charge of their learning is great for motivation and interest. Open-ended technology as well as structured technology are both being used in schools around the world. While many programs seem great from the perspective of an administrator, we need to stop and think about the student. Even with promises from the companies of progress and alignment to standards, if students aren't having positive interactions with it, administrators may not be getting desirable outcomes. Student interest and choice should play a role in decisions being made regarding their education.

## METHODOLOGY

My research was conducted in a town with a population of approximately 3,600. The community has SES levels that range very widely. The unemployment rate is 4.2% and the poverty rate is

5%. This town has a lot of large and expensive houses, as well as trailers and trailer parks  (New York State Education at a Glance, 2015).

The school that my research was conducted in is a public school in which I am employed. The school is one of four elementary schools in the district. It is a K-5 school with an enrollment of 333 students. There are 177 males and 156 female students.

**STUDENTS BY ETHNICITY**

|  | Total Number | Percentage |
|---|---|---|
| **Black or African American** | 26 | 8% |
| **Hispanic or Latino** | 21 | 6% |
| **Asian or Native Hawaiian/ Other Pacific Islander** | 3 | 1% |
| **White** | 265 | 80% |
| **Multiracial** | 18 | 5% |

**OTHER GROUPS**

|  | Total Number | Percentage |
|---|---|---|
| **Limited English Proficient** | - | - |
| **Students with Disabilities** | 28 | 8% |
| **Economically Disadvantaged** | 131 | 39% |

 (New York State Education at a Glance, 2015)

The SES levels in our school mimic those in the town. There are some students who have everything they need and more. They have had many positive experiences in their lives and have

been exposed to a lot of positive things. The same cannot be said for all students. Some students'

families do not have the money for new clothes, toys, and food. They have also not been exposed

to the world as much and aren't as knowledgeable about certain things.

My classroom is neat and organized appropriately. The walls are covered with various

visuals and bulletin boards. We have a SMART board, a document camera (Elmo), one desktop

computer, and 5 classroom laptops for the students to use. We have also have access to the school

computer lab and to a shared laptop cart of 25. Students' ages in the study range from 5-6 years

old. The number of participants for the study is 9. Students were selected to participate in this

study because they are in my class. My class is made up 10 boys and 9 girls. Demographics and

SES levels vary in my classroom. There are 17 Caucasian students and 2 African American

students. Academic levels in my class also vary. I have 6 students reading below grade level, 8

reading on grade level, and 5 reading far above grade level. The majority of my students are

working at or above grade level expectations for math.

My role in this study is the teacher of a first grade class of students who were studied. I

am also the researcher. I am a 24 year old, white, middle class female pursuing my Master's

Degree in Literacy Education. I am not a parent, nor am I married. This is also my first year

teaching, although I have worked in this specific school for 2 years. I feel that I am fully

equipped to use the technologies that are available in my school. I use many of these

technologies on a daily basis. I also learn and adapt quickly when it comes to new technologies. I

have been trained on using i-Ready and have taught my students how to use it as well. I have no

personal connection or negativity towards the program i-Ready. This has allowed me to look at

the study with an open mind without bias.

I collected data for five weeks through observations. By conducting this study, I worked to answer one research question. How do students interact with the educational program i-Ready? In order to answer this question I made observations while students were using i-Ready two times a week for approximately 30 minutes each time. I documented my observations in a double entry journal. By taking observations while students were actually using the program I was able to notice their body language, facial expressions and overall interaction with it. On the left side of my double journal entry journal I wrote the date and notes. On the right side I wrote observations. This data collection method has helped me to answer my research question regarding how students interact with the program.

My design meets criteria for trustworthiness. I observed multiple students over an extended period of time at different times of day. The students were focused on their work and typically did not realize that I was observing them. When they did not realize, they were truly acting as themselves instead of acting in ways that they felt would be pleasing to me.

## DATA ANALYSIS

### Introduction

Data were collected in this study in order to answer the research question; how do students interact with the educational program, i-Ready? Data were collected on 9 students in my first grade class, but not all students were observed for the same length of time, as informed consent was given at different times. Student 2, student 3, student 4, student 7, student 8 and student 9 are males. Student 1, student, 5 and student 6 are females. Observations were recorded using a double journal entry, 2-3 times a week for approximately 35 minutes each time.

When teaching reading, I have four differentiated groups. Green group is above level, blue group is on level and high, light blue group is on level and low, and orange group is approaching grade level. Out of the 9 students in the study, 6 students (student 1, student 2, student 3, student 5, student, 6, student 8 and student 9) are in the green (above level) group and 3 students (student 5, student 7 and student 8) are in the blue (on level but high) group. Students go on i-Ready reading in the morning during the time when they work independently on centers. During this time, students are using touch screen laptops at their seats. We have access to 7 touch screen laptops that students use. Students take turns on the laptops completing 1-2 lessons each day, which takes approximately 20 minutes. Once a student finishes their lesson(s), they will give it to the next student. These laptop times have been planned accordingly as this is also the time I meet with my differentiated guided reading groups. Students are expected to complete 2 center assignments each day, but that varies depending on how much time they spend on i-Ready.

When teaching math, I have three differentiated groups. Square group is high, triangle group is average and circle group is low. Out of the 9 students in the study, 6 students (student 2, student 3, student 4, student 6, student 8 and student 9) are in the square (high) group and 3 students (student 1, student 5 and student 7) are in the triangle (average) group. Students go on i-Ready math in the afternoon during our math workshop rotations. We have access to the same 7 touch screen laptops. In math workshop, there are three 15 minute rotations, one of the rotations being i-Ready math. Once every six days, we have access to the computer lab in the afternoon. Students go on i-Ready math during this time and stay on for 45 uninterrupted minutes.

There were two different environments in which data collection took place. One environment was our classroom, where students used touch screen laptops, and the other was the computer lab, where students used desktop computers. In our classroom, there are 4 groups of

desks that have 4-5 students. There are two students in the class who have their own tables to work at. During centers and math rotations, students are at their desks using the laptops. Also, not all students are using i-Ready at the same time as we only have 7 laptops to share among 19 students. On the laptops, students use the touch screen feature to do their work as well as the touch pad and keyboard. The computer lab is a completely different environment than our classroom. It has three rows and two columns of tables with desktop computers on them. There is a fairly wide walkway down the middle of them. Each row has eight computers. There are more than enough computers for all students to be on one at the same time. The computer lab is a quiet room with little to no distractions. All computers and seats are facing the same direction in the room. The desktop computers are not touch screen like the laptops are. Students use a mouse and keyboard to do their work when using the desktops computers.

Data were analyzed by positive/negative experiences and on/off task behaviors in order to answer my research question; how do students interact with the educational program, i-Ready? Looking at the experiences students had when using i-Ready allowed me to see how they were interacting with and responding to the program, whether it be positive or negative. Making observations regarding on task and off task behavior was useful in gaining an understanding of student engagement and interest in the program. When coding the data, PE refers to positive experience and NE to negative experience. ON refers to on task behavior and OFF to off task behavior. Once data were coded, I looked at the interactions between on and off task behaviors and positive and negative experiences.

**Positive and Negative Experiences**

| Student | Number of PE | Number of NE | % PE | % NE |
|---|---|---|---|---|
| Student 1 | 2 | 2 | 50% | 50% |
| Student 2 | 5 | 0 | 100% | 0% |
| Student 3 | 5 | 2 | 71% | 29% |
| Student 4 | 3 | 1 | 75% | 25% |
| Student 5 | 1 | 5 | 17% | 83% |
| Student 6 | 4 | 8 | 33% | 67% |
| Student 7 | 4 | 9 | 31% | 69% |
| Student 8 | 1 | 5 | 17% | 83% |
| Student 9 | 0 | 3 | 0% | 100% |

(*Figure 1*. Positive and negative experiences while using i-Ready.)

**Positive Experiences and Negative Experiences**

The data that I collected were analyzed by positive and negative experiences as well as on task behaviors and off task behaviors. Overall, 44% of experiences using i-Ready were positive and 46% of experiences were negative.

**Student 1**

Student 1 is a female who is reading above grade level and is in the high math workshop group. She is very academic and does well in all areas. She is intrinsically motivated in school. She was absent from school for one week while data were being collected. She had 2 positive experiences and 2 negative experiences using i-Ready. Student 1's positive experiences included completing a lesson that wasn't challenging for her and becoming very excited when a game popped up for her to play. Student 1 had a negative experience using i-Ready when she was

working on a lesson that was way too easy for her. She was bored and it was a waste of her time.

Another negative experience was when she was asked to do multiplication. As stated previously,

she is in first grade and multiplication is not taught in first grade.

### Student 2

Student 2 is a male who is reading above grade level and is in the high math workshop

group. He had 5 positive experiences and 0 negative experiences using i-Ready. He had positive

experiences working on lessons that were at an appropriate level for him. Throughout the year,

student 2 has verbally expressed how much he likes to use the computers and laptops in school.

He also really enjoys math and using i-Ready to practice and learn more about math.

### Student 3

Student 3 is a male who is reading above grade level and is in the high math workshop

group. He is intrinsically motivated and loves to learn new things. He never tries to avoid work

or complains about what he has to do in school. He had 5 positive experiences and 2 negative

experiences using i-Ready. Student 3 had positive experiences using the touch screen feature on

the laptop, working on lessons that were appropriate for him, and providing correct answers. He

also had positive experiences with passing his lessons. A behavior that I observed and considered

to be a negative experience was when he was completing a lesson, he put his head back and let

out a big sigh. In my opinion, and being able to see his lessons, it was not a sigh of relief, it was

a sigh of frustration. As mentioned previously, we use i-Ready in two different environments

with two different types of technology; the classroom with touchscreen laptops and the computer

lab with desktop computers. Student 3 had a negative experience going back and forth with the

different types of technology when he tried to use the desktop screen as a touch screen and it

obviously didn't work.

**Student 4**

Student 4 is a male who is reading above grade level and is in the high math workshop group. Similar to student 3, he is also intrinsically motivated and is interested in new learning experiences. He is a hard worker who completes tasks quickly and correctly. He had 3 positive experiences and 1 negative experience using i-Ready. Student 4 had positive experiences on i-Ready completing and passing lessons in a timely manner. He was completing a lesson on vowels and excitedly told me "it just said when two vowels go walking, the first one does the talking!" He was making a connection to a previous lesson I had taught. Student 4 also had a positive experience when he completed his math test, letting out a huge sigh of relief. As mentioned previously, students go on i-Ready reading during ELA centers. Students are required to complete 2 centers, meet with me for guided reading and complete an i-Ready lesson. A negative experience that was observed was when another student was handing her laptop to student 4 and he said "no, don't give me a laptop! My work isn't done!" It was clear that he was stressed out and feeling overwhelmed about having to go on i-Ready.

**Student 5**

Student 5 is a female who is reading at grade level and is in the average math workshop group. She is typically very shy and quiet, and doesn't always ask for help when she needs it. Despite her shyness, she raises her hand frequently to contribute to class discussion and gives answers when called on. She had 1 positive experience and 5 negative experiences using i-Ready. Her one positive experience throughout the study was working on a lesson that practiced work recognition which was at an appropriate level for her. The majority of student 5's negative experiences were a result of working on lessons that were not academically appropriate for her. She was given a lesson on identifying beginning consonants on words, which was far too easy.

She was also given one that was on measuring time, which had not been taught yet and was too difficult.

**Student 6**

Student 6 is a female who is reading above grade level and is in the high math workshop group. She is intrinsically motivated and is an extremely hard worker. She enjoys learning new things and is typically very engaged in everyday instruction. She had 4 positive experiences and 8 negative experiences using i-Ready. Her positive experiences included; completing lessons at her level, enjoying lessons she was working on, and being excited to use a math strategy her dad taught her to add two two-digit numbers. Student 6 also enjoyed playing the games between lessons. The majority of her negative experiences were a result of working on lessons that were far too challenging for her. During one of her lessons, she was asked me to read the word "punishment". She asked me what the word meant, and I told her that I couldn't help her and that she had to do her best. This was frustrating for her as she responded with "ugh!" While student 6 was working on another lesson she said "this has times, do I just guess? I don't know how to do times. What are vertices? I'm doing like 4th grade stuff. Why? Can I get off?" She was being asked to do multiplication, which is not even taught in 1st grade. Student 6 also had a negative experience working on a lesson that was far too easy for her. It was not a good use of time and she was not being challenged at all. Student 6 is typically very eager to get off i-Ready and often asks me multiple times a day when she can pass her laptop to someone else. She also had negative experiences with the technology. She said her headphones weren't working, she got directed to another page while trying to complete her lesson and her headphones continued to get unplugged.

**Student 7**

Student 7 is a male who is reading at grade level and is in the average math workshop group. Student 7 is someone who is very easily distracted and is often off task during everyday instruction and independent work. He requires extrinsic motivation most of the time to complete a task. He had 4 positive experiences and 9 negative experiences using i-Ready. Some positive experiences that student 7 had were completing and passing some of his lessons. He is very excited and proud of himself when this happens. Along with positive experiences, he also had a significant amount of negative experiences. Redoing the same lesson becomes very tedious and frustrating for him, especially if he doesn't understand what is being asked of him. There were many instances where he didn't pass his lesson and had to redo it. When he doesn't pass his lesson, he often cries and tells me that it is too hard. When he is nervous or overwhelmed, he plays with and tugs on the back of his hair. He exhibited this behavior every time he used i-Ready, which leads me to believe that this program causes him a lot of stress and anxiety.

**Student 8**

Student 8 is a male who is reading at grade level and is in the high math workshop group. Student 8 occasionally needs extra reminders to stay focused and on task while working independently. This student was only observed for 3 weeks because he did not yet have consent. He had only one positive experience when using i-Ready which was when he became very excited to have completed both his reading and math tests. Student 8 had 15 profound negative experiences. He had a negative experiences with failing a lesson. The computer displayed "Good Try. Try Again." He began crying and slid out of his chair under his desk because he did not want to redo the lesson. Another day, he completed a lesson and I told him to do one more, he put his face in his hands. Toward the end of the study, we completed our second diagnostic assessment. The program flagged his score because he went too fast which tends to lead to inaccurate scores.

I gave him a laptop and asked him to redo his test because he went too fast (students were warned of this beforehand). He looked at me like he was going to cry. He was pouting and walking around the room to avoid beginning his test. He said he didn't want to do it and that it was too hard. He also said that he didn't know "times". He also often asks "when can I get off?"

**Student 9**

Student 9 is a male who is reading above grade level and is in the high math workshop group. Despite his outstanding academic abilities, student 9 often needs extra reminders and motivation to work hard and try his best. Similar to student 8, student 9 was only observed for 3 weeks because he did not have consent. He had zero positive experiences and 3 negative experiences using i-Ready. He had a negative experience with technology in the computer lab when he was trying to use the desktop computer as a touch screen. Another negative experience he had because of the technology was when he asked me to adjust the volume on his laptop 8+ times during one lesson. He was also asked to add on a number line, which we have not used before.

**On Task and Off Task Behaviors**

The data that were collected and analyzed showed that students displayed on task behaviors 45% of the time and off task behaviors 55% of the time. Students often stressed over going on i-Ready during centers in fear that they will not get their center assignments completed. This caused many students to rush through their reading lessons because they just wanted to finish and get off.

| Student | Number of ON | Number of OFF | % ON | % OFF |
|---|---|---|---|---|
| Student 1 | 3 | 7 | 30% | 70% |
| Student 2 | 10 | 1 | 91% | 9% |
| Student 3 | 11 | 1 | 92% | 8% |
| Student 4 | 9 | 9 | 50% | 50% |
| Student 5 | 5 | 13 | 28% | 72% |
| Student 6 | 8 | 6 | 57% | 43% |
| Student 7 | 4 | 18 | 18% | 82% |
| Student 8 | 2 | 5 | 29% | 71% |
| Student 9 | 3 | 7 | 30% | 70% |

(*Figure 2*. On task and off task behaviors while using i-Ready.)

**Student 1**

Student 1 had 3 on task behaviors and 7 off task behaviors. Despite her high academic abilities, she portrayed few on task behaviors throughout the study but she always displayed a positive attitude toward i-Ready and never once complained about having to use it. Some of her off task behaviors included dancing around in her seat, stopping her work to help others with their work, looking at other students' computer screens, and getting out of her seat to talk to our classroom aide. She also played with her headphones, kicked the back of the desk, and mimicked the voices of the characters in her lessons. Many of her behaviors proved that she was clearly disengaged and unfocused while on i-Ready.

**Student 2**

Student 2 had 10 on task behaviors and 1 off task behavior. Student 2 is typically very distracted and unfocused, but is engaged and attentive when completing his lessons on i-Ready. Student 2 displayed on task behaviors such as sitting up in his seat, looking at his screen, and not being distracted by what is going on around him. He takes his time and does not rush through the work. When it comes to reading and writing, he often gets distracted and is unable to complete his work on paper, but never seems to have that problem when on i-Ready. Based on the data and background of the student, the probable reason he was so engaged and motivated while using i-Ready was because he was using technology, which he loves. His one off task behavior was losing focus and playing with his headphones.

**Student 3**

Student 3 had 11 on task behaviors and 1 off task behavior. Student 3 never complains about using i-Ready and really seems to enjoy it. Student 3 displayed a high number of on task behaviors such as keeping his eyes on his screen, focusing, engaged in the lesson, whisper reading to himself, and counting on his fingers. Not only was he on task, he was enjoying what he was learning. His one off task behavior was staring out the window while on i-Ready in the classroom.

**Student 4**

Student 4 had 9 on task behaviors and 9 off task behaviors. His on task behaviors included being focused with his eyes on the screen, sitting up straight, and usually remaining engaged in the lessons without being distracted by his surroundings. Student 4 listened carefully to the lesson tutorials while instructions are being given. Despite his outstanding academic abilities and on task behaviors, he also displayed many off task behaviors both using i-Ready and in everyday classroom instruction. As off task as student 4 can be, he always makes sure he gets

his work done and does it correctly. Some of his off task behaviors included dancing in his chair, looking around the room at posters, playing with his headphones, becoming unfocused and easily distracted. Student 4 asked to go to the bathroom, I asked him if it was an emergency and he said no. This led me to believe that he was using the bathroom as a way to avoid i-Ready. He also logged on to i-Ready math on accident because he was not listening to directions.

**Student 5**

Student 5 had 5 on task behaviors and 13 off task behaviors. Her on task behaviors included being engaged, focused, and looking at the computer screen. She exhibited a large amount of off task behaviors. She clapped her hands, tapped her hands on her desk, kicked her feet, played with her headphones, fidgeted, stared off, and looked at other students' computer screens. Despite her high amount of off task behaviors, she seemed to pass the majority of her i-Ready lessons that I observed.

**Student 6**

Student 6 had 8 on task behaviors and 6 off task behaviors. As mentioned previously, student 6 is very high academically which led to more complex i-Ready lessons. The on task behaviors she exhibited included staying engaged throughout her lessons, not allowing distractions to break her focus, and whisper reading to herself. Student 6 was also very engaged during a lesson that had calendars. She was talking to herself about the lesson and her birthday because she saw it on the calendar. Student 6 had multiple off task behaviors as well. When she became nervous or uncomfortable, she told me that she has a stomach ache, as she often did while using i-Ready. There was one day where she got up to blow her nose multiple times and then came to tell me that her dad told her she could go to the nurse if she didn't feel well because she woke up coughing a lot. Another day, she got out of her seat to tell me that the computer

game gave her the answer. Student 6 displayed other off task behaviors when she helped another student with their work, asked to go to the bathroom, slouched in her chair and squirmed around in her chair.

**Student 7**

Student 7 had 4 on task behaviors and 18 off task behaviors. His on task behaviors included finishing lessons in a timely manner, being engaged, and paying attention throughout a reading test.  As mentioned previously, student 7 is often very distracted and struggles to stay focused. He was especially unfocused when he was asked to do work that he didn't like or was challenging for him. Verbal instructions were given for each lesson. With his difficulty to pay attention, I wondered if he was able to fully understand what the lesson was actually asking him to do. Generally, he took a very long time to complete a lesson, and often failed. On any given day, he took up to 10 minutes to get logged onto i-Ready. I began logging into i-Ready for him in an effort to reduce the amount of time wasted. On multiple occasions, it took him up to an hour to complete a 10 minute lesson. Other off task behaviors included; rubbing his head, looking away from his screen, playing with his headphones, and frequently asking to go to the bathroom. I was fully aware that student 6 struggled on i-Ready, but I had no choice or say in whether or not he went on i-Ready, as it is mandated by the district.

**Student 8**

Student 8 had 2 on task behaviors and 5 off task behaviors. As mentioned previously, this student was not in the study for the full 5 weeks. His on task behaviors included looking at his screen and focusing on his work. His off task behaviors included pointing at his neighbors screen, whispering answers to other students, slouching in his chair, and repeatedly taking his headphones off and putting them back on.

**Student 9**

Student 9 had 3 on task behaviors and 7 off task behaviors. As mentioned previously, student 9 entered the study at week 3 when I received informed consent. His on task behaviors included being engaged, counting on his fingers, and paying attention to his computer screen and lesson. His off task behaviors included becoming distracted during a lesson, opening 20+ internet tabs on his computer, looking at his neighbor's screen, and having his body turned away from his computer.

**Summary**

| Student | % PE | % NE | % ON | % OFF |
|---------|------|------|------|-------|
| Student 1 | 50% | 50% | 30% | 70% |
| Student 2 | 100% | 0% | 91% | 9% |
| Student 3 | 71% | 29% | 92% | 8% |
| Student 4 | 75% | 25% | 50% | 50% |
| Student 5 | 17% | 83% | 28% | 72% |
| Student 6 | 33% | 67% | 57% | 43% |
| Student 7 | 31% | 69% | 18% | 82% |
| Student 8 | 17% | 83% | 29% | 71% |
| Student 9 | 0% | 100% | 30% | 70% |

(*Figure 3*. Summary of percentages of experiences and behaviors.)

On average, 44% of experiences were positive and 56% of experiences were negative. Successfully completing lessons, working at an appropriate level, and working on lessons of interest are examples of positive experiences that I observed. Failing lessons, working on lessons

that are too difficult and working on lessons that aren't engaging are examples of negative experiences that I observed. I found it interesting that the percentages of positive and negative experiences were fairly close to being equal.

On average, 45% of behaviors were on task and 55% of behaviors were off task. Sitting up, looking at the computer screen, whisper reading and counting on fingers are examples of on task behaviors that I observed while collecting data. Playing with headphones, asking to use the bathroom frequently, and looking away from the computer screen are examples of off task behaviors that I observed. Similar to positive and negative experiences, I found it interesting that the percentages for on and off task behaviors were close to equal as well.

Based on the data that were collected, students displayed on task behaviors 45% of the time. There was no relationship between the quality of the experiences and whether or not the students were on task. In order for students to be on task, they had to be focused, engaged and somewhat interested in the content. The amount of on task behaviors (45%) and positive experiences (44%) were almost exactly the same.

## DISCUSSION

### Summary of Findings

Data were collected through observations over the course of 5 weeks to answer my research question; how do students interact with the educational program, i-Ready? The purpose of my study was to analyze how students interact with the educational program, i-Ready. Students had no choice or say in whether or not they wanted to use the program, which is why I wanted to observe behaviors and experiences.

During this study, I had several findings. They are that a) students had more negative experiences and off task behaviors than positive experiences and on task behaviors when using i–Ready, b) positive experiences do not lead to on task behaviors, c) i-Ready does not provide opportunities for student choice, and d) i-Ready does not support the development of 21st century skills.

**Students had more negative experiences and off task behaviors than positive experiences and on task behaviors when using i–Ready.** Forty-four percent of student experiences were positive and 56% were negative. These experiences varied by student. Some of the most common negative experiences occurred when students were working on lessons that were not appropriate for the student, failing lessons, and crying because they did not want to be on i-Ready. Forty-five percent of student behaviors were on task and 55% were off task. Common off task behaviors included playing with headphone cords, using the bathroom frequently to avoid work, and focusing attention on outside stimuli. As a teacher, it was alarming to learn that over 50% of the time my students were on i-Ready, they were having negative experiences and were off task. This does not support learning for students as they had few positive experiences and low engagement. A recent study examined the attitudes of students toward the use of computers before and after taking a class that required students to use technology to complete tasks and assignments. The results suggested that the "increases in positive attitudes toward computers may have resulted from instructional approaches, meaningful assignments requiring technology, and supportive faculty" (Abbott, & Faris, 2014, p. 149). Students having low engagement and low interest in i-Ready could be linked to the fact that it is difficult to be engaged in drill-like learning where there is no authentic purpose for what

they are doing. Most students seem to have no intrinsic or extrinsic motivation to do well academically when using i-Ready.

      **Positive experiences do not lead to on task behaviors.** The similarity in overall percentages between experiences and behaviors might make one assume that in order for students to be on task, they must be having positive experiences with using the program. That seems like a legitimate conclusion to make regarding the data, but when looking across these data, positive experiences do not tend to the ones with the most on task behavior. For example, 50% of student 1's experiences were positive and 50% were negative. Without looking at each student's data individually, one may look at the overall percentages and assume that on task and off task behaviors are the same. Thirty percent of student 1's behaviors were on task and 70% were off task, which are significantly different from her experiences. On the other hand, student 2 had positive experiences 100% of the time and 0% of her experiences were negative. Similar to her experiences, student 2's behaviors were on task 91% of the time and off task 9% of the time. When looking at the overall percentages of experiences and behaviors, there seems to be a similar relationship between the two. Although, when looking at each student's percentages individually, there is not a significant relationship.

      "When you hear the next pitch about cyber-enriching your child's education, keep one thing in mind: so far, there is no good evidence that most uses of computers significantly improve learning" (Bennett, 2000, p.3). This quote clearly states what all educational programs won't. Companies of these educational programs will lead you to believe that your child will have great experiences with them and be excited and engaged while learning. Even if a student has positive experiences using it, that doesn't mean it's going to significantly improve learning as many companies state and many consumers believe.

**i-Ready does not provide opportunities for student choice.** i-Ready is an extremely

structured and rigid educational technology. The company makes claims to successfully predict

each students' proficiencies on state assessments as well as show student growth in math and

ELA (i-Ready Proven to Predict, 2012-2013), which administrators find appealing.

Administrators may make decisions based on promises from the program without considering

how students will interact with it. When students use educational programs with few choices,

they are more likely to be less engaged and motivated to do well. Teachers and students in my

study did not have a choice or say in whether or not they wanted to use i-Ready as it is required

by administrators. The district that this study was conducted in also has a 40 minute time

requirement per week for each subject, math and ELA, which teachers did not have a say in

either. The program uses assessments to pinpoint "student needs down to the sub-skill level, and

ongoing progress monitoring shows whether students are on track to achieve end-of-year targets"

(i-Ready Proven to Predict, 2012-2013). The result of these assessments determine which lessons

the student will be working on and if they are going to be successful by the end of the year. Since

this program is structured so rigidly, students are told exactly what lessons and skills they will be

working on. The most interactive piece of this program seems to be when students are given

games to play as a quick brain break between lessons. At the end of each lesson, students are

required to take a quiz in order to prove that they had mastered the content. If a lesson is not

mastered, students will have to redo the same exact one. Perhaps the lack of student choice in i-

Ready has something to do with such a high amount of negative experiences and off task

behaviors

**i-Ready does not support the development of 21$^{st}$ century skills.** As mentioned

previously, "21$^{st}$ century skills are the skills, knowledge and expertise students should master to

succeed in work and life in the 21st century" (Framework for 21st century learning, 2002). Twenty-first century skills are typically promoted through the use of critical thinking, communication, creativity, and collaboration. If "learning 21st century skills requires 21st century teaching" (Framework for 21st century learning, 2002), using i-Ready is essentially useless in developing these skills in students. Twenty-first century skills cannot be developed by simply using technology; it is how the technology is used. i-Ready does not support the development of 21st century skills as students are not asked to think critically, communicate, collaborate or show any creativity when using the program. i-Ready has students doing a variety of drills in order to learn and practice skills. Open ended technologies are more closely related with 21st century skills than structured technologies. With open ended technologies, students are able to take responsibility for their learning and become more engaged as a result. When students are learning with little structure, their learning becomes an active process.

**Implications**

Through this study, I have found several implications that may benefit my students while using i-Ready. These implications may increase positive experiences and on task behaviors. The amount of time spent using i-Ready each week is not the teacher's decision and cannot be altered. What the teacher can do though, is closely monitor students' behaviors and experiences to see when they are becoming negative and/or off task. If a teacher does notice these behaviors and experiences occurring, they can give the student a quick brain break from i-Ready. Depending on the severity of the situation, the teacher could have the student log off i-Ready completely and finish their required time a different day. Although teachers cannot help students while they are on i-Ready, they can encourage positive experiences and on task behaviors to help each student interact with it in a more positive way. Strategies to do this will vary by student.

When adopting educational programs, schools should not only pilot them, but also conduct their own research to see exactly how students are using it and responding to it. Another suggestion to districts when choosing an educational program would be to learn about the difference between open ended and interactive technologies and decide which would be best for students. Districts who have goals of developing 21$^{st}$ century skills in students should consider choosing programs that are engaging and interactive. Students will benefit from having learned 21$^{st}$ century skills at such a young age. They then will be able to use their expertise and knowledge of the skills and apply them to their lives in order to be successful in their futures (Framework for 21st century learning, 2002). In addition, the program should support the development of creativity, communication, and collaboration in students.

**Limitations**

There were several factors that caused limitations in this study. Data were only collected for 40 minutes each week in math and ELA. Data were collected over the course of 5 weeks. The data were collected solely on observations and no interviews. Making observations allowed for me to see how students interacted with the program. Without conducting interviews, I was unable to get students' true opinions and insights regarding i-Ready. The study also included only 9 first grade students, although 19 students were invited to participate. A study where data were collected for a longer period of time on a larger amount of students would help to increase the validity of the study.

**Recommendations**

A suggestion for future researchers would be to next answer the research question, does how students interact with i-Ready affect their test and lesson scores? In order to do this, they would need to look at the relationship between how students interact with i-Ready and their

scores on diagnostic tests and lessons. This extension to my study could prove or disprove that student engagement and effort does lead to high scores. I would also suggest that the researcher conduct interviews with teachers and students to obtain more information and data. The researcher should also consider using more students in the study as well as a variety of grades, schools and districts.

**Closing**

This study has helped me understand how my very young students have responded to this highly structured software. I found that students had more negative experiences than positive and more off task behaviors than on. Using educational programs and technologies that do not provide opportunities for student choice along with engaging and meaningful learning experiences is likely to put students in situations where they will be having a large amount of negative experiences and off task behaviors. Based on the data collected in my study, I found that there is no true purpose in using this program if over 50% of the time is spent off task. With such a high percentage of off task behaviors presented in this study, districts should put into consideration the amount of time that students are spending on i-Ready; specifically how much of that time is spent off task. They should also consider engaging students in alternative learning experiences involving technology that are more meaningful and engaging.

REFERENCES

Abbott, J. A., & Faris, S. E (2014). Integrating technology into preservice literacy instructions a survey of elementary education students' attitudes toward computers. *Journal of Research on Computing in Education, 33*(2)149-161.

Anonymous. (2008). Telling stories with technology. *Leader of the Year*, *28*(11), 62.

Bennett, W. (2000). *The Educated Child*. New York. Free Press.

*Computers from the 1980's*. (2004). Retrieved from The People History: http://www.thepeoplehistory.com/80scomputers.html

*Connections Academy*. (2016). Retrieved from Connections Academy: http://www.connectionsacademy.com/

Davis, A., & McGrail, E. (2014). The influence of classroom blogging on elementary student writing. *Journal of Research in Childhood Education*, *25*(4), 415-437.

Earhart, B., Rooy, D., Brubacher, S., Lamb, M., (2014). An examination of "don't know" responses in forensic interviews with children. *Behavioral Sciences and the Law*, *32*(6), 746–761.

*Edgenuity*. (2016). Retrieved from edgenuity: http://www.edgenuity.com/

Edyburn, D. (2004). Technology supports for differentiated instruction. *Journal of Special Education*, *19*(2), 60-63.

*Framework for 21st century learning*. (2002). Retrieved from partnership for 21st century learning: http://www.p21.org/our-work/p21-framework

i-Ready Diagnostic New York State Validity Study. (2012-2013). *Curriculum Associates*. http://www.scotiaglenvilleschools.org/emailforms/i_ReadyNY_validitystudy.pdf

*i-Ready Proven to Predict*. (2012-2013). Retrieved from Curriculum Associates: http://www.curriculumassociates.com/products/iready/i-ready-predicts.aspx

*IXL analytics*. (2015). Retrieved from IXL: https://www.ixl.com/analytics/

*k12*. (2016). Retrieved from k12: http://www.k12.com/

*K12 Virtual Academy Online Homeschool Reviews*. (2008-2016). Retrieved from homeschool-curriculum: http://homeschool-curriculum.org/k12-virtual-academy/

Murphy, K., DePasquale, R., & McNamara, E. (2003). Meaningful connections using technology in primary classrooms. *Beyond the Journal Young Children on the Web*, 1-9.

*New York State Education at a Glance*. (2015). Retrieved from data. nysed.gov:
    http://data.nysed.gov/

Ohanian, S. (2004). The K12 virtual primary school history curriculum. A Participant's-eye
    View . *Arizona State University*, 1-34.

Saavedra, A. R. (2012). Learning 21st-century skills requires 21st-century teaching. *GALE,*
    *94*(2), 8.

Shagoury, R. & Power, B.M. (2012). *Living the Questions: A Guide for Teacher Researchers*
    (2nd ed.). Portland, Maine: Stenhouse.

Shin, N., Sutherland, M., Norris, C., Soloway, E. (2012). Effects of game technology on
    elementary student learning. *British Journal of Educational Technology*, *43*(4), 540-560.

Torff, B., Tirotta, R. (2010). Interactive whiteboards produce small gains in elementary students'
    self-reported motivation in mathematics. *Computers & Education*, *54*(2), 379–383.

Vehkakoski, T. (2012). 'More homework for me, too'. Meanings of differentiation constructed by
    elementary-aged students in classroom interaction. *European Journal of Special Needs*
    *Education*, *27*(2), 157-170.

Zumbach, J., Kumpf, D., & Koch, S. (2004). Using multimedia to enhance problem-based
    learning in elementary school. *Information Technology in Childhood Education Annual*,
    *2004*(1) , 25-37.