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INSTRUCTIONAL TECHNOLOGY IN ELEMENTARY EDUCATION

By

Rachel Allen

Project submitted in partial fulfillment of the  
requirements for the  
Bachelor of Integrated Studies Degree

Murray State University

December 2, 2019

FIELD OF STUDY  
PROJECT APPROVAL

I hereby recommend that the project prepared under my supervision by  
Tricia Jordan,  
entitled Instructional Technology in Elementary Education,  
be accepted in partial fulfillment of the requirements for the degree of  
Bachelor of Integrated Studies.

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BIS 437 Senior Project Faculty Adviser Signature

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Abstract

Technology has grown at a rapid rate and its usefulness in everyday life is astonishing. Including technology in elementary education provides students with unlimited resources to better their education and skills that will lead them in life. Research has been done on how useful implementing technology is when students are learning. Including how instructional technology helps students with special needs or learning disabilities, because these students shouldn't be left behind or feel left out. Teacher attitudes of how they are shaped to teach with technology is an important factor. Ages of elementary students has shown how effective instructional technology can be and the implications it can have if used correctly. Educators have been surveyed as to technology use and what it can do for them to make instruction more affective.

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The technology in our society is growing rapidly as well as many changes in the way we approach education in elementary schools, students now are continuously surrounded by some form of technology. It is beneficial for students in elementary schools to start using technology at a younger age. Technology in elementary schools is on the rise because of students that have learning difficulties and different learning styles, the technology that is put in place to help them has shown very positive results.

Technology in the classroom can offer more resources for teachers to be more involved in students' unique learning styles along with providing students learning equipment. The instructional technology used in schools has to follow particular policies and procedures that are put in place to protect students and the equipment that is being provided. The technology that students in elementary schools are using is allowing students to work at a pace with other students to where everyone feels equal. The new ways instructional technology is used makes learning more creative and fun which benefits the teachers as well as the students. With the use of technology, problems may occur which is why limiting screen time to particular age groups is important.

### **Defining Instructional Technology**

Instructional technology is used in most, if not all of educational systems now. Understanding what technology is and what it can do for individuals is important because of the impact it has on not only adults with careers but also with students that are elementary school age. The last 30 years of technology has allowed us to witness the drastic change it has made in our lives, relationships, and careers. The rapid growth of technology has flowed over into the schools and has changed the way teachers educate the youth. Instructional or educational technology has made advancements in how students are learning as well. In order to properly



educate students in elementary schools and to use instructional technology to the highest benefit they first must learn what instructional technology means.

What is instructional or educational technology? Defining instructional or educational technology as described by Wright (1999), is a system set up to help teachers in creating a capable and understanding program to construct models for education while supplying students with information and showing them techniques while making sure that all the materials are effective. Those systems being taught should be assessed to make sure that the appropriate measures and actions were/ are being used in order for the student and the educators to be successful. This concept will lead students to be effective members of society in the future. Instructional technology is a definition that has changed over the years to accommodate the continuous evolution of technology. Seals and Richey (2012), stated that, “Instructional technology is the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning (p. 14).” Seals and Richey’s instructional technology definition defines what all instructional technology can do to benefit teachers and students professionally and academically.

Gaynes (2013), talks about instructional technology being used by involving useful skills for all age groups of students that will impact the way they learn. The instructional technology allows students the freedom to create their own versions of lessons like when reading a story or when understanding math and teachers and students can draw out objects to represent numbers. Technology can help students with learning collaboratively by working with the teacher using technology or with other students. Instructional technology should be an aid to both teachers and students to be at its most affectively.

According to Kurt, (2017), instructional technology teaches students a logical approach of educational growth and strategy. The educational systems are trying to incorporate new, inventive ways for students to learn that allows them to be creative and involved which can make students want to learn. In order for this to be successful, educators have to figure out what technology will work best for the class while being easy enough that the teacher can learn it quickly. After the teacher has learned it, making sure the technology is easy to understand and can be used by everyone, regardless of age or if there could potential be learning struggles or curves.

The definition that the author of this paper has created for instructional technology or educational technology is broken down for students in elementary schools to better suit this paper. Instructional is based off the word instruction which simply put means to teach or educate. Educators will still be instructing students on their normal academic curriculum using books, papers, and pencils while including the use of technological devices to aid with instruction.

Why is instructional technology so important? The technology that is included can be used to create fun new ways to help educate the students while providing students with a more creative learning environment. It is important for educators to learn, practice, and be able to teach past technology and devices along with modern technology, and proper training and assistance should be provided. This will help educators prepare better for future technological devices that will appear. The importance of relaying this information to students at a young age is to give examples of how technology has transformed and to better prepare those students for the future technology that will no doubt be thrust on him in the upcoming years.

The main focus of applying technology to schools is to enhance student performance. While technology use relies heavily on educators and how they use it, the positive impact it has on student learning is the ultimate outcome. Most students have access to technology at home because it is becoming more affordable, because of this, students want to use it at school as well. It is important for students to keep up with the world around them as well, meaning technology may have started with most businesses but has made its way down to students of all ages so that they are better prepared for the impacts of technology once they move on in school and out of school.

Instructional technology helps teachers keep track of student assignments and progress they are making. The Alliance for Excellent Education (All4ed) and Stanford Center for Opportunity Policy in Education (SCOPE) conducted a study about the proper use of technology in classrooms and how it can positively affect student outcome by enhancing engagement, and specifically with students who don't generally have access to technology even at home. SCOPE along with All4ed reported that technology won't take the role of a teacher; teachers using technology has showed to be the most beneficial to student learning (2014).

### **Timeline and Evolution of Technology**

The historical evolution of technology in school and how it drastically changed the way educators taught and how students learned. The school systems had radios and televisions but the one piece of technology that changed it all was the computer. The time the computers were invented to the time that educators and students used them are two different times as Reiser (2001) discussed. Tooms, Acomb, and McGlothlin (2004), tell that the first mainframe computer was developed in the 1960's, these computers solved different equations at a fast rate. The

mainframe computer made administrative work a bit easier. The computers were accessible by the students but not very much.

The computer and internet were major components to the emergence of technology in schools, thus leading to instructional technology. The internet created places for multiple people to gather and figure out new ideas that would transform classrooms. The rapid growth of technology has shown itself through many assistive devices for students who are impaired. Instructional technology demonstrates that learning is possible even when students have completely different learning styles. Students don't have to fear being left behind, technology support classrooms learning together and creates new ways for them to interact. Garrison and Akyol (2009). Instructional technology should be used as a tool to help guide students into being adaptable individuals who are preparing themselves for the future.

When computers were starting to be more known in educational settings, computer-assisted instruction (CAI) would be some of the first used in public schools. Even though the CAI was created it wasn't mixed with classroom education at this time. The CAI technology was developed by IBM and Gordon Pask who both created their own, (Reiser, 2001). To better understand CAI's Michael Haran (2015) wrote that, "CAI was intended to teach students a specific content area." The CAI gave options during learning like short answer, fill in the blank, or multiple choice. The programs used would either let the student move on if answered correctly or give them another problem or equation similar to the one that was missed. These first programs introduced were not as effective as they were projected to be and were very costly, however, this didn't stop manufacturers from creating a larger variety of programs that could be more beneficial.

The 1970's and the 1980's gave way to smaller computers that people could maintain and use on their own; because of this office or school administrators had access to these along with teachers (Tooms, et. al 2004). These microcomputers were now affordable to most people, thus leading to educators believing that the microcomputers would be good for education as well. Reiser (2001), talked about how computers came into the educational picture in 1983 hitting public schools hard by assisting classrooms with instruction. There was a lot of attention in computers being used in the educational setting because of what they were able to do plus they now could fit on a desk. The involvement that computers actually had on instruction was fairly small; meaning that although students had some access to computers, most teachers were only using them for practice on certain lessons to help them understand more and to better their skill that the specific lesson was teaching them.

The development of the internet in the 1990's as explained by A. Tooms et. al (2004), gave schools a completely different approach that would provide instruction for students. Instead of searching through different books to find new material or ideas, the internet could be used. The internet is a mass of computers that create a network. The computer network that give its users access to a diverse range of information. The internet also gives its users access to the World Wide Web (www) which is a compilation of many different websites which are retrieved through the use of the internet (Fleisch, 2010).

The internet keeps changing which makes its use broader which leads schools and the population into the era of wireless technology. Reiser (2001) explains the growth of technology at this time would change how we perceived and used technology. Computers were being modified to be better and the Internet was had advanced as well. The Internet was a big attention getter and had many wanting it to be used in instruction, not just in education but other places as

well. It should also be understood that although the schools now had access to computer and internet, it doesn't mean that they were used for instructional purposes in the classrooms. With computers and the internet, educators and students were still limited to what they had access to. Computers did not have the capability for a bunch of different software and the internet was very limited Resier (2001) writes which meant students rarely got any use.

The rise of technology use has become much more affordable and more accessible. The technology being used also gave students interactive equipment. The equipment gave students the right to interact with their instructors and a way for students to interact with the material and subject the instructor is covering. According to Reiser (2001), another important interactive approach technology also brought into education was allowing students to network with other students in the class. Allowing students to network in their education can create a bond between them and their instructors. This could allow students to feel more comfortable with their peers and teachers, thus leading to ask more questions leading to more understanding which could lead them to have higher success rates.

In order for technology to be a successful tool for education, the school's administrators must decide how technology can benefit the teachers and students. They must also establish what it can do for learning and how it can make it more successful for students. The success of the students has to be measured as well to show that the schools are improving due to blending technology in with instruction and learning. Tooms et. al (2004) write that principals of these schools have to take on the obstacles that new technology can bring and figure out if it will be beneficial to incorporate it into the schools. Those same school leaders are responsible for figuring out how to use the technology as well, because there are already tools that are being used for those specific purposes. Since this is a real problem that many school officials face

regardless of if the educators find it useful, it will not be approved for instruction. The inclusion of technology can also be a challenging task for many; it is introduced to the public at rapid rates which makes it difficult to keep up with. The school administrators don't have enough time to do all of their tasks plus shopping for new instructional technology.

Schools are implementing new instructional ways for students like the 1:1 approach and bring your own device to give a few examples. The 1:1 and bring your own device approaches both give students one to one learning instead of having to share devices. These approaches along with social media can be difficult, however, many schools have now started using some forms of social media such as Facebook. Technology has evolved exponentially, the fact that there are some institutions that acknowledge forms of social media. With the internet teachers are able to blog, communicate in teacher forums, interact through social media pages, share ideas on Pinterest.

### **Policies and Procedures for Using Technology**

The one on one (1:1) approach to education is of major focus presently due to technology being so universal. The idea of the 1:1 approach is to give each student independence when using their own calculating and interaction devices; meaning that this method requires some sort of technology that can gain internet access like laptops, tablets, or smart phones to be in possession of each student. The pedagogical learning style intertwines with the 1:1, teachers allow students wants and needs to shape the way they educate them. School systems and teachers must give students an atmosphere that gives them a place to grow intellectually, creatively, and individually. Since technology became more affordable and well known it appealed to the education systems because of the ways it could benefit students and bring them into a more contemporary instructional setting (Andersson & Islam, 2016).

Evans and Annan (2018) conducted an educational study was done in 2017 researching the active consumption of technology and the impact it has had on schools in districts all over the country called the Speak Up Project. The 1:1 approach was assessed to make sure assistive devices were available to all students regardless of ethics and culture. By schools implementing the 1:1 method it resulted in an increased use of technology that is giving students an advantage to new knowledgeable experiences that will prepare them for a successful future. Funding for technology for the 1:1 style and keeping it current is important for schools and students to succeed.

Students having the option to bring their own device incorporating fun, interesting instructional technology can be familiar with students which can lead to high participation in the classroom (Bruder, 2014). With students bringing their own devices, funding from the state that goes into purchasing and taking care of the technology could be used for something else that schools need. The downside to students bringing their own devices into the schools is the potential for students to become easily occupied with their device. The KDE placed restrictions on school funded technology along with gaining internet access, with students bringing home devices they could bypass the network connections needed thus avoiding any restrictions that have been placed. Without those precautions being used the student(s) would have access to look and share whatever they wanted. Students with the option to bring a device could very well create more diversity between students since some will not have the option.

Schools that decide to allow students to bring their own devices must inform parents and students beforehand of the rules and procedures associated with bringing technology inside the school. Parents must sign these forms to represent that they understand the responsibility that comes with it and to make sure they understand if something were to happen to say technology



that they will not be held accountable for it. Not all students will be able to bring smart technology from home and educators need to check which students can and cannot bring them, that way everyone will have access to something.

Bringing student devices from home can include cell phones, laptops, PDA's or personal data assistants, electronic music players, electronic handheld games, digital cameras, and watches that can connect to cell phones or other devices. The variety of these is large and most, if not all, can access internet, because of this they come with their own set of rules set by the Cyberbullying Research Center. (Bruder, 2014). During instructional hours any device brought from home should be turned off and put away or it will be taken by school officials, unless teachers have said otherwise. In most situations, if a device is taken away there will also be consequences for the student such as detention. Because the technology is on school grounds and the device was for some reason taken away, there is a chance that it could be searched by parents of the student or by the local law. Although a device was taken away from a student there is no guarantee that it will be searched but the rules are in place if it is necessary. A very important measure to remember when bringing your own device is that it should not under any circumstances be used on other students or educators unless permission has been granted.

### **Creating Policies**

The Kentucky Department of Education (KDE) created guidelines and procedures for employees and students to have access to the latest technology. The rules that were created followed the KDE's Master Plan for Education Technology. This plan was put in place to help the schools in Kentucky become more contemporary and one way to do that is by incorporating the latest technology in all publicly funded schools. The plan is carried out by a group of LEA's or local education agencies such as school districts, that go along with existing procedures and

creating new ones that still follow the directives set by the KDE Master Plan for Education Technology. For technology to be permitted in Kentucky schools that is funded by the state of Kentucky, it has to be used successfully in state required curriculum classes. In order for KDE to see results of successful and responsible use, students are tested in each required curriculum.

The inclusion of technology for the Master Plan is a way for schools to prepare themselves and students for the present world they live in and for the future. The Master Plan is not something that will fade out but will continue to grow. The growth of technology for schools to keep up with is challenging therefore, the state has set a specification of what technology will be purchased in used for district schools. The Kentucky Department of Education will monetarily deliver the technology for the school systems to have and use, along with giving the necessary guidance that the school educators will need to successfully teach students.

“The Master Plan for Education Technology calls for Internet access, electronic mail, and other instructional services to be available through the Kentucky Education Technology System (KETS), which includes voice, video, and data access,” (Kentucky Department of Education, 2019). In 1998 a bill was approved which gave schools permission to screen software that linked to the internet that ran through the local schools. This bill was called the Senate Bill 230. The purpose of screening the software isn’t completely thorough, which is why the guidelines for internet and technology use are to be read through and signed by the students of the school as well as the parents. The Senate Bill 230 created a pathway for the Kentucky Department of Education to create the Acceptable Use Policies or the AUP’s. These rules are put in place to assist administrators in monitoring student use and make sure that the technology is used in an educational way that will benefit the students along with keeping them innocuous from material that is inappropriate.

The Kentucky Department of Education (2019), created guidelines that must be signed by employees, students, parents and/or guardians. According to the Kentucky Department of Education these policies are made up of the 1998 Senate Bill 230 and the Kentucky Administration Regulation 5: 120 (701 KAR 5: 120) along with federal guidelines that meet CIPA specifications. CIPA represents the Children's Internet Protection Act which is an important aspect that is used when developing guidelines and procedures for technology use in schools.

When using CIPA to create the procedures they have to include a way to filter the internet that is being used by the students and staff members. In order to use the internet at the school systems each student and staff will have a username and password. When connecting to the Wi-Fi internet service that is provided by the schools that login information is required. Once internet access is granted blocks are put in place for certain websites, chatrooms, and email that could potentially show inappropriate or harmful material. The use of CIPA was declared to not take away any freedoms from individuals. Although CIPA is a filtering system that affects all students to keep them safe and on topic. According to Greenberg, (2018), it can be temporarily removed by administrators for teachers who need to access certain websites or pages that need to be used to create an instructional lesson for class. The downside to this is the fact that many students now have some form of a communication device and with certain data packages from their mobile home providers, Wi-Fi connection is not a requirement in order to have internet access. The internet is accessible using only the data package that was purchased (Kentucky Department of Education, 2019).

### **Best Practices for Appropriate Use of Technology**

The Kentucky Department of Education has implemented a digital citizenship model for individuals associated with the schools that follow guidelines and procedures of the state along with funding. This model adapted by the state is to assist teachers, parents or guardians of students and potential students, along with community members who are skilled at using technology and understand how it works. The purpose of the model is to help the individuals who are using the technology funded by the schools understand how to use it to where it will benefit them the most while also teaching responsibility. Student use of technology in the school keeps them up to date with technology in our every-changing society, this gives students an advantage who may not have access to this at home (Kentucky Department of Education, 2018).

Although the digital citizenship is seen to be a separate model from the Acceptable Use Policies or AUP's, they are seen the acceptable use policies and considerations that are listed on the KDE webpage (Kentucky Department of Education, 2018). The best practices extension from those pages give detail in to how to properly care for and work the equipment not just while using the devices in school but also while at home when trying to access material for classes. The digital citizenship covers much of the internal parts of technology that can be overlooked or ignored. The parts that the AUP's include are hardware, network access, how to properly store and remove devices, the files that are on the devices, etc.

The digital citizenship model on the KDE webpage informs community members, staff members, and students about what is allowed and what is not allowed while using electronic mail or emails. Emails should be used in a responsible manner; it is easy to attach inappropriate pictures and files to these, but it is strictly prohibited. The use of emails should be professional and not used for personal emails. The interaction between students and educators should only

about school related activities or assignments. The emails should be used for educational purpose to best benefit the students and educators; junk or spam should immediately be deleted not be passed on. The AUP's inform employees, parents, and students that any technology used to access emails is recorded using usernames, some schools also include written sign out logs that contain student signature whenever technology is taken out to be used and signed back in whenever it is returned.

The state of Kentucky has learned and prepared for internet and network security. The KDE developed an alert system that notifies administrators of security breaches thus, keeping public school workers and students safe. In order to keep the network secure, students should not give out any personal information or information like usernames and passwords for school use. Consent forms are signed by parents of students to give schools permission of whether they can or cannot give out student information to a third-party requesting information.

The use of the internet provided by the schools is strict. Employees of KDE along with students should only be using the internet for educational purposes. Websites that contain inappropriate material are banned, however, some websites and such can go unnoticed which can lead to inappropriate material being viewed. The material that is banned covers anything that could be observed as pornographic, gossip or chat rooms, social media, etc. Any website that could potentially contain personally information is banned also; this includes banks, shopping websites, or auction websites (Kentucky Department of Education, 2018).

The use of technology in public schools should be used for educational purposes or work-related purposes only. Regardless of the device, nothing is to be downloaded or uploaded whether that be pictures, music, or files. Saving information such as a paper on Microsoft word is allowed. Games are also banned. Many handheld devices have an app store where things can

be downloaded, this is prohibited, along with students or employees searching games to play while using the internet. The KDE lays out what will not be tolerated while using the devices the state of Kentucky and school are providing.

### **Acceptable Use Policies**

In Kentucky the AUP's are mandatory written agreements to let students and parents know what students are allowed to do with the equipment and technology during instructional hours or while on school grounds (Kentucky Department of Education, 2019). The use of the internet, as signed in the AUP's, allows educators and/or administrators to manage what devices are used and to view material that students are looking at in order to monitor that the use of these devices is being done so in an educational and appropriate manner. Students and staff members of the school district are required to have a username and password when on school property that gives them internet access while on school grounds, unless that person has a handheld device that uses data. This procedure screens a lot of what can be viewed while on the internet. It should be known that each student and staff members under the local school board districts has their own username and password to access the internet; with this approach and the understanding of the AUP's, no one has full privacy. The school administrators will have full access to check anything that any student looks at or saved on their account. It should be understood that this is not done to each student or staff member every time technology is used, it is only done occasionally or when questionable acts have been accused.

Technology use has developed and made itself easy to use which has allowed children of all ages more accessible to technology and them having some form of it. Because of this, technology will be brought to school with these students which is allowed by the school systems but is harder to monitor. When this occurs, it can cause issues with what material is being shown

or looked up on these devices. Students along with parents or guardians of the students are supposed to read through and discuss the rules and repercussions if caught by the school for looking up, viewing, or showing unfit websites, chats, pictures, etc. (Kentucky Department of Education, 2019).

The whereabouts of technology and who it belongs to is a reason why Kentucky created the AUP's, that way it covers all technology brought and used on school ground. The AUP's have to meet federal and state requirements that allow student use of technology in schools. The procedures will also be placed to where they are easily accessible to students, parents, and staff to view at any time so that it is made clear who is responsible for said technology and how it used with information about why these are important and what safety it is providing for their children. The information on the devices will be available to anyone who wants to see what that specific device has been used for and by whom it was used by (Kentucky Department of Education, 2019).

The developed AUP's and whenever they are revised to better fit students and technology, the input of people that are involved with the schools like the students and parents, staff members of schools, and the public is wanted. This approach helps make sure that all input received is heard and nothing could be left out that will benefit the students in the best educational way possible while making sure that nothing bad comes in via technology. This could include printed copies of a picture, magazines or journals that could show unacceptable things, these also include hand-written or technology typed messaged meant to hurt or pressure someone (Kentucky Department of Education, 2019).

The rules that have been put in place have made their way into the Student Code of Conduct in Kentucky, for easy reminders of what is expected. The policies can change quite

often and to make sure that they are adhered to, discussing the procedures with the educators is required. The educators will then discuss the rules that include examples while giving the printed-out information to the students and parents to make sure all information is discussed and understood. Parents will need to sign these forms. The AUP's are discussed with the parents in hopes of getting their full support and cooperation, with parents or caregivers on their side there is a better change of technology use being integrated successfully. Compliance with the rules and procedures will give them web access which is important to understand for the reason that the use of the web is a revocable freedom (Kentucky Department of Education, 2019).

### **Instructional Technology for Teachers**

Dias (1999) described technology as being an achievement by the type of environment it is in. The importance of the integration of technology starts at a basic level of understanding and support. Instructional technology has shown to have benefits that weren't expected. Clements and Sarama (2002) researched four and five-year-olds using computers while in class. The students came from lower financial backgrounds; the students were able to create friendships while working at the computer. In order for the technology integration to be successful proper training should be held. The school districts and school administrators should allow plenty of training on how to use the computer's hardware and software not just so the teachers understand it but also so that it is easier for them to explain it for student use. The availability for support should be implemented as well. Being able to call the computer hardware/software companies is an option but having someone available for any difficulties or problems would be easier and faster, which is why most local school districts have an information technology (IT) person.

The incorporation of technology should be valuable and to make to ensure that teachers should be appropriate planning periods to learn and prepare to teach students should be given.



This would give teachers time to create lesson plans using technology and make sure the technology devices will work. The lesson plans could include instructional technology in which the teacher would pick out what device would be used, how easy it would be or if training was needed for the students, if it's appropriate for the lesson, and what lesson(s) the students will get out of it. Allowing teachers to work together will also help them understand how to best fit technology into their classes. Educators have different styles and viewpoints on technology devices and uses, therefore, them getting together to create new ideas and share their previous success or failure stories will help create success with fewer drawbacks.

The educational systems are used to teaching using a constructive type learning method, which blends children activities that can be done independently or as a group with each child's own personal developments and experiences. This type of education allowed student to gather information and based on the information at hand come to their own conclusions and mix it with knowledge that they had learned on their own. Rakes, Fields, and Cox (2006) concluded that both types of constructive learning contribute to greater cognitive functions in students. The researchers made this conclusion not the journal. Understanding the constructive learning method paves the way for how technology is a useful instrument.

The importance of instructional technology is based on the teachers themselves. Miranda and Russell (2012) relay information about those who do believe that technology will make a difference are more prone to using it in their classrooms. The inclusion of technology in a constructive classroom increases the way teachers can help students. The constructive learning environment creates new ways to understand cognitively while explaining the challenges that can occur. To utilize technology properly for students it should be taught with academic curriculum courses and not just as a tool to be used to take a test or do research. Educators should want an

environment that assist each other and works together for everyone to be successful; technology can make that a goal for each classroom (Rakes et. al 2006).

The use of technology is not limited to just instruction; but creating a fun place where students want to come. There are different websites or apps that teachers can use to bring music into class or games. These ideas can be used along with the lesson the teacher is on but puts a spin on traditional classroom learning. The music can be about learning phrases or vocab words that is paired with a catchy beat, games can be created like puzzles or trivia to help students as well. These although may take extra time can be fun for the teacher as well because they can play along with the students.

The ideas of instructional technology can be limitless when it comes to improving classroom learning environments. Technology can increase learning by providing hands on equipment, assistive devices, studying, recording data information, etc. The rapid growth of technology has also raised questions about how technology would be best used to be functional and successful for everyone. There are many different forms of instructional technology that teachers can apply. With the purpose of stimulating students and use technology successfully, educators need access to the handheld devices to understand and learn them.

Teachers have had to modify their way of teaching due to the use of current technology. Therefore, teachers should be implementing it as much as they can so students can see how it is used for instruction and learning from it. A study on elementary school teachers and how they used instructional technology based on information about teacher and what tools were available to them. The results showed that elementary school age teachers were more likely to do more student-based learning, which involves instructional technology because the classroom sizes were smaller and it made using the equipment easier (Bektas, 2013).

A study on what 488 teachers had access to instructional technology since some schools have more funding thus more equipment than other schools. The study was done with teachers who taught students up to age 8 which would be students between the grade of kindergarten and 4<sup>th</sup> grade. The writers work with the National Association for the Education of Young Children (NAEYC) and the Fred Rogers Center. The two groups studied what technical devices were available to teachers and what percentage used them. As a result, fewer educators have access to electronic books (e-readers) and interactive whiteboards, (Pila, Blackwell, Lauricella & Wartella 2019).

The survey done by Pila et.al (2019) included a total of 488 teachers. The teachers were asked what technology sources were provided for them by the schools. The survey was done using percentages and the highest percentage at 89% was recorded for teachers having access to the internet. The results for the digital camera and computer came in just above 80% for each. The survey showed that teachers had more access to tablets at 71% versus televisions which only came in at 63%. It is not surprising that smartphone was pretty popular and came in at 61%. Interactive Whiteboards or Smartboards haven't made their way into as many classrooms reporting in with only 30%. Electronic readers resulted in 24% of teachers having contact with them.

Instructional technology can read students in different ways. The National Association for the Education of Young Children (NAEYC) and the Fred Rogers Center furthered their research with teachers to discover the possibilities of how technology is used. The same 488 teachers were asked about their classrooms with school age children up to 8 years old. The study was done to show what technology is being used for and what teachers agree that it is doing something positive. The results of the study showed a significant percentage difference when it

came to students using technology to increase social interaction and if technology should be used daily in the classroom (Pila et. al 2019).

Pila et al. (2019) conducted another survey asking the same 488 teachers how they valued technology and what it can do for education. The study was conducted using percentages as well, but the teachers were asked if they agreed, were neutral about how it affected technology, or if they disagreed with it altogether. When it came to technology helping children with disabilities 83% agree that technology use was successful, while 15% were neutral, which left 2% disagreeing that technology affected these students. When asked about if technology improved communication 89% agreed that it helped, 7% were neutral, and 4% disagreed. Teachers were asked if technology improved documentation and 88% agreed that it did, 8% were neutral, and 4% disagreed. Using technology to communicate with parents was measured with 78% agreeing that it helped, 15% were neutral, and 7% disagreed. 64% of teachers think technology helps students that have a language barrier while 24% are neutral, and 12% disagree. 14% disagree that the inclusion of technology helps student to curriculum and help individualized learning, while 28% are neutral, and 58% agree on both of those studies. When it comes to assisting students develop a higher order 26% don't think technology helps at all, while 35% are neutral, and 39% agree that it helps. Critical thinking development measure that 26% don't think technology helps, 33% are neutral, and 41% agree that technology helps. This is where information changes most; 33% of teachers don't think technology should be used every day with 38% agree that it should, leaving 29% neutral on the subject. When it comes to increasing social interaction, 52% of teachers disagree that technology helps, 26% are neutral about it, and 22% agree that technology supports social interaction Pila et. al (2019).

Technology inclusion gives teachers ways to build relationships with parents to alert them of that student's progress or concerns and extends a bridge between the two to communicate what methods work best for that individual student. Wireless technology with internet capabilities give access to professional development places where different educators can learn and exchange instructional procedures. (Andersson & Islam, 2016). It is important to understand that the hardware and software listed isn't going to be in every school in every state, it will vary from school to school.

### **Teacher Hardware**

One of the most important instructional technology tools a teacher can have is a computer. Teachers use computers to help with their administrative duties. One example of the administrative work teachers do is done in the morning before lessons actually start and that is taking attendance. The computer makes it easier by clicking the mouse with the names of students who are absent. This process is faster because it is immediately sent to the administrators of the school (Njiku, Maniraho, & Mutarutinya, 2019). The computer keeps teachers up to date on school activities and what is going on in the school by email. lessons and lesson plans, they are able to save and look up material. The desktop computer is bigger than laptops which gives it more room for storage which is important for educators. The laptop computers don't have the space capacity for storage that the desktops do. Teachers may have laptops as their primary computer, which gives them more freedom in the classroom to walk around and for their job by making it easy to carry home. Teachers use computers to research what practices would be best for certain models for instruction (Franklin, 2007).

The computer tower that is attached to desktop computers plays an important role for teachers as well. The tower stores all of the computers components that make it function but

holds a certain area available for software storage. The tower also has many components such as USB ports and VGA plugs, along with a drive for CD, DVD or Blu-Ray discs. The USB ports can be used for flash drive to store information or assistive devices like a mouse. Technology based equipment that has a cord has two ends of the cord, one end is for what it connects to, while the other end could have a USB, HDMI, or VGA plug, is plugged in to the tower to give it power. The tower disc compartment is where software is downloaded to the computer where it is stored and used. The disc compartment can also play movies and music. The CD can also be used as storage, documents or pictures can be downloaded on a CD to save for later use. The laptops don't have an external tower but do have different plug in places around it, just not as many as the tower. There are laptops that have the CD compartments available for playing movies or music, saving information, or downloading software.

Classrooms now have access to laptops and/or tablets which are put into a cart that can be rolled and plugged in to charge devices. For instance, the Chromebook is essentially both; the keyboard that make it a laptop can be positioned as a stand with the screen up to use as a tablet. Teachers have to make sure all laptops or tablets are in working order and that students sign the devices in and out while using them respectively. The schools provide training so that teachers can integrate technology into instructional and learning practices (Russell, Bebell, & Higgins 2004). Training includes how to handle malfunctions that the laptop and/or tablet could display, there are issues that teachers cannot fix, and that device is put back on the cart and an email or phone call is made. The teachers also have to look after the cart and make sure all cords are secure and not damaged. The cart is on wheels requiring regular maintenance checks to make sure it is in proper working order.

The printer is also an important component for teachers. Even with all the technology that is available it is important for students to write while in school. Teachers still print out a lot of worksheets and test for students, especially in elementary school when students are learning how to write. In addition, teachers print out a lot of information to send home to parents as well. Access to printers is important for teachers. Most printers also scan, teachers can find a lesson or worksheet from any book scan it which will send a document to the camera and are able to immediately print out a copy of that worksheet. The printers located in classrooms can make multiple copies but using a copying machine is easier and more efficient.

The copier or copying/fax machine also has the ability to scan documents even documents with more than one side. Copying machines give users the option to create a document with more than one page. The copying machine has a drawer for regular sized paper and a drawer for longer sheets of paper which allows teachers to make small work packets for students.

Televisions are still used in many aspects of the classroom. Although most computers now have the availability to play DVDs or Blu-Ray Disc, the televisions offer the use of VHS tapes. Schools around the nation have student news channels which are aired on the television for the classes to see, however, not all elementary schools will have these programs. Teachers who have the tapes of a specific movie or video will use the television for educational purposes versus going out and buying new equipment. There are older teachers to be considered as well, school systems require a certain amount of technology to be used in the classrooms to educate the students but there are some who prefer the use of the television over using the computer, projector, and board. Televisions have advanced from being analog, using cable lines, to being digital where they have the ability to connect to the internet and stream things from it. The

digital television gives teachers another tool where useful videos and movies can be played for educational purposes (Dos Santos Junior, Braga, Lopes, & Lime 2012).

Overhead projectors are being replaced by the LCD projectors and document cameras. In order for overhead projectors to be used, the document that was being magnified on a whiteboard or screen that document had to be copied onto a see-through plastic. The document camera can be connected to the computer and the LCD projector. When the document camera is connected it will display anything that the teacher wishes to show the students without special copies having to be made. The document camera also allows the teacher to zoom in or zoom out as needed. Anything can be placed on the base of the document camera and it will project it to the screen allowing students to see images in 3D. Esposito, Spicer, Tilghman, and Weeg (2008), have described multiple uses of the document camera in the classroom. Document camera can be used in teaching students how to properly take notes.

The use of interactive equipment has become very popular with elementary age classrooms, it creates a fun learning environment. Interactive Smart Boards connect to computers and LCD projectors and require a downloadable software. The LCD projectors portray videos and images on the interactive board that is connected to the computer, teachers or students can touch the board, which is the equivalent of a mouse click. This device gives teachers a freedom of being able to continue a lesson using one board. The interactive Smart Boards give teachers access to their computer and all that they may need to open or use on it all while using a Smart Pen designed for the board, a finger, or a clicker remote that can be used while walking around the room (Starkman, 2006).

The interactive Smartboard is a good source for teachers when creating lesson plans for classes that have students with disabilities. Using the Smartboard gives teachers the ability to



add in sounds and pictures that correspond with each other, allowing students to visualize what they are learning or learning the sounds of objects, animals, etc. For example, if classroom instruction starts at 7:55 in elementary school, teachers can present a book and a bell on the Smartboard while the sound of a bell plays. This allows students with visual or hearing impairments to know that instruction time is about to begin. The Smartboard gives teachers access to online tools that can be presented on the board for students to relate lessons in class with real life situations (Whitby, Leininger, & Grillo, 2012).

Cell phones can be by teachers and students in schools and have taken the place of numerous expensive devices. Smart phones aren't just cellular phones anymore, they include cameras (which replaces the need for digital cameras), with video recording available, internet access, music, access to email accounts with different domains, and the option to download educational material that can be used for instruction (Manzo, 2008). Cell phones can increase communication between parents and students where learning disabilities or a language barrier is present. Teachers can use certain apps to help students practice skills on their own time, not a mandatory thing, which they can send to the parents as well, so they know what to look for and how it is used for education.

### **Teacher Software**

Educators use different software that helps create lessons, increase student engagement, and providing access to tools to use in the classroom. The computer has them click on whether the student is present in the class or not, and it is immediately sent to administrators.

Information for assignments or lessons can be shared between teachers, along with information about staff meetings, IEP meetings, technology support, and keeping students and parents up to

date on student progress or concerns. The use of emails has become an important role in education and being a successful one.

The search engines are used by many teachers as well; these include Google, Yahoo, Bing, etc. The convenience of search engines and how quickly they work makes instructing with technology quick and easy. The search engines pull information at fast rates and teachers can use it immediately. YouTube has become a big one teacher turn to give student examples. GoNoodle can be searched using any of the search engines and is a great way to get students up and moving while learning, plus it has catchy, feel good songs that students can learn that are fun for them to watch.

A type of software many teachers are having to adjust to is distance learning. Distance learning is using devices that can access the internet for teacher instruction because the student and teacher are not in the same room or area. Teachers can implement this type of learning when far away because it still requires students to attend and the teacher is able to see who is online and who isn't. Distance learning is not the same thing as mobile learning or online learning, (Burdina, Krapotkina, & Nasyrova 2019). The digital television also gives students and parents access to a channel where they can link up with the school to access student information, connect with the teacher, and see daily or weekly activities (Dos Santos Junior et. al 2012). Distance learning can be extremely beneficial for teachers and students. When school is cancelled teachers have the option to come into work or stay home, they are available to students or parents that need them. Teachers can upload assignments and important lesson information to send to students and parents virtually at any time.

Mobile learning gives teachers and students the option of being mobile with learning. Teachers can use mobile learning by having students use handheld devices that access course

work. Mobile learning is often used with learning apps that can be downloaded and used virtually anywhere. This type of learning is convenient because most adults have some form of handheld device which makes it easy for elementary school aged students to have access to them, (Hockly 2013).

If there is approval by school administration and parents, teachers can have students use their phones for classroom interaction, like Kahoot. This app allows the teacher to create trivia questions for practice, quiz, or a test. The app can be downloaded on any carrier phone. The teacher is given a code upon creating the questions and the students enter that code in the app, this links up the phones to what the teacher has created, and the students can answer questions from their seats. Kahoot can enhance the interaction experience because of the apps game being competitive, for elementary students a reward of candy or bonus points on who won the round on Kahoot could increase the interactive experience. There are many more apps that can be used by cell phones to create interaction, Kahoot is familiar with the author of the paper.

Online learning in instructional settings is when teachers bring devices into the classrooms for students to use while instruction is occurring. The technology that is brought into the classroom is there to assist students in their academics while the teacher still does in-person instruction. Using online learning in the classroom also gives students in elementary school the interaction with the teacher they need to fully learn and comprehend the lesson; interaction is increasingly important with proper development which distant and mobile learning don't provide (Layton, 2017). Another option that online learning provides is by allowing classes to connect with other classes that could be in a different school, state, or country.

Online learning is when teachers integrate instructional technology into the classroom, physical interaction is still present. Online learning and mobile learning work together helping

teachers find creative ways to get to students to learn. Teach Your Monster to Read helps students sound out letters and words in order to read sentence. Study Island is another example, this website assists teachers by helping students learn math, English, and reading. Teachers can find fun educational apps or games that students can play during free time at school and they can play at home. Teach Your Monster to Read and Study Island have both been used by the author.

Teachers can use computer networking to show students how to work certain websites. Computer networking works together with online learning, especially in elementary school ages students who are learning a lot of the technology. Computer networking allows all the computers to be linked up to one to demonstrate how to work a computer, show students how to search information, or show them how to use productivity and application software like Microsoft office, which is important for both teachers and students.

Teachers have access to different types of educational systems through technology that all assist teacher. Software types specifically for teachers are classroom management systems, classroom performance systems, and learning management systems. The classroom management system manages students' behaviors by keeping track of their progress. Google classroom would be an example of a learning management system because it is designed to help students learn.

A classroom management tool teacher use is Class Dojo used for tracking student behaviors in the classroom. Students can create a cartoon of themselves, teachers use the cartoon to make positive or negative marks that add or take away points regarding their behaviors. The behavior marks can be made on the entire class, a group of students, or just one student (Krach, McCreery, & Rimel 2017). Class Dojo also provides a messaging box where teachers can communicate with parents about class or concerns about the reports. This software keeps up with student behaviors over the course of the year and averages the point value to show parents

the students overall good or bad behavior. This app also can be a guide for parents; parents can operate the app from a parental point of view and add positive and negative points into it as well. The combination of home and school can give teachers and parents an overall behavioral assessment of the student.

Classroom performance systems allow interaction between teacher and students. A type of interaction teachers could use would be clickers Martyn (2007), concludes that this approach to learning could let the teacher know who is contributing to answering questions versus asking one student who answered which doesn't tell the teachers if the other students know the information or not.

Termos (2013) discusses classroom performance systems as being inexpensive wireless devices for teachers. Class performance systems can give immediate feedback to the teachers when used during class time. Teachers can use this to take attendance, test or quiz students and get immediate grades, or use it as a drill and practice skill by creating a game and allowing students to play against each other. Class performance technology can make lessons more creative and fun while creating a bond with students that will open communication. Teachers can get student files created in a Google Classroom system where the student's picture is on display in the morning before class starts. Students can come into class, put their things away and immediately use their figure to click their picture to represent they are in school for the day. This task would help students learn responsibility along with saving the teacher time in the mornings for having to take roll (Jonson 2019).

Teachers who use laptops and tablets, especially ones under the name Google, have been noticed for their hard work. Google for Education team has developed educational programs that associate with Chromebooks and Android systems. The Google teams have created an online

cloud drive that has unlimited storage which is excellent for teachers. The programs provide educational apps and games, a Vault program that can be used for storing and as a tool for discovering new things. Last but not least is Google Classroom (Using Tablets and Google, 2015).

Teachers use learning management systems such as Google Classroom. Learning management systems assist teachers in keeping up with their administrative duties like taking attendance, documents that have been downloaded or saved, tracking student work and progress. Google Classroom is a tool for educators that saves important instruction time students may need, helps manage the numerous classes that teachers teach in a day describes Iftakhar (2016). The uses of Google Classroom include any type of google document. The use of Google Classroom also gives teachers an advantage when creating assignments, it keeps past assignments or saved assignments for present or future use in class categories which allows the teachers to have more instructional time with students. Classroom lessons can include multiple approaches which can include spreadsheets or slides that are included in this system.

Instructional technology has crossed over into social media. In fact, De La Rosa (2018), believes schools using social media specifically Facebook because it is a good way to keep in touch with parents because most of them have a Facebook account. There are forms of social media that are more popular with students and can increase positive results for classmates when an individual has excelled in something academically. Some forms of social media are quite private which increases confidentiality when discussing lesson information with a parent or student.

### **Instructional Technology for Students**

Technology is important to increase student participation. Instructional education can increase inspiration in wanting to learn more at a faster rate. Students in elementary schools

have short attention spans which makes it more difficult for them to learn. Instructional technology should be used as an important learning tool for students. The technology shouldn't be making the classroom environment more difficult even if that means having to search for new programs. The inclusion of technology has put a spin on regular assignments and projects by giving students access to more information and tools to make the assignment in their own creative way (Smaldino, Lowther, Russell, & Mims 2008).

The use of technology for students at the elementary age can improve by showing them things they may never see in person, such as a rainforest and the animals within. According to Radich (2013), there is proof that technology helps the social and intellectual parts of a child brain grow and develop. This is not saying children should not go outside and explore and see new things, but simply that technology can broaden their horizon and open them up to more of the world.

Elementary school age students using instructional technology have shown researchers pride and confidence in themselves. They are able to participate in fun learning by just typing on a computer keyboard. Students who feel good about themselves create positive atmospheres around them thus creating a very positive learning environment for everyone else. With the growth of small devices, it has given students who need help communicating, reading, or writing a way to fit in with the class while bonding with them instead of feeling different or left out (Clements & Sarama 2002).

According to Means and Coleman (2000), students can use technology created by The Global Learning and Observations to Benefit the Environment or GLOBE. The technology created allows students to take soil and water measurements following GLOBE etiquette which

can be entered into an archive. The archive can then show a detailed map of different geographical places that are available on the internet.

Lou, Abrami, and D'Apollonia (2001), discuss categories of computer technology that is helpful for students, like tutoring, experimental technology, tools, and communication technology. The tutoring programs help students by offering information and explaining ideas that can be better understood by younger students while giving students a place to practice lessons. Tutoring technology in schools such as CAI (computer-assisted instruction), can help elementary school students with reading. The CAI programs can form to create a specific guide for what that student needs (Chambers, Slavin, Madden, Abrami, Logan, & Gifford, 2011). The experimental technology includes simulation type experiences. Technology tools is where students will enter their data for assignments. The GLOBE information above gives an idea of the experimental technology and the tool technology because the information had to be logged and entered. The communication category would be where students' places based off the computer that allow students to interact with each other exchanging information such as emails.

Project Computers Helping Instruction and Learning Development or Project CHILD was a study done on two elementary schools with comparable access to technology. One school used the Project CHILD structure which included computers in everyday instruction and learning, while the other school did not. The research was conducted to see if technology equipment such as computers would show positive results in student educational uses in grades K-5. The study was also known as a transformed approach, which means that it is designed to look specifically at subject-specialty teaming, action centered education stations, and done with multi-grades along with following students through years (Butzin, 2001).



There were three teachers associated with the study who worked with students from three different grades and followed them for three years. The students were tested in second grade started initially in kindergarten while the students tested in fifth grade started Project CHILD in third grade. Each of the classrooms that were used were provided with a computer station that held up to at least three computers, a book, and a sport for written assignments. The teachers taught one of the three fundamental subjects reading, writing, or math. They had their own individual stations where they could either work with one student at a time or help small groups of students (Butzin, 2001).

The students, during the study, spent one hour each class day in each of the cluster classrooms. This exercise created just one hour for the student to focus on one subject which allowed teachers to combine effective technology equipment to students who were comfortable in a certain while which allowed them to work at their own pace. Project CHILD have students contact with computers along with providing learning stations and a coordinated class management system.

The schools used in the study conducted using Project CHILD were similar in student body numbers along with technology available to the students. The numbers were slightly different, the school following the Project CHILD studied 110 second grades and 94 fifth grades, while the school who did not follow Project CHILD procedures studied 188 second grades and 188 fifth graders. According to Butzin (2001), the third-year students who were studied using the computer equipment that followed Project CHILD scored higher on all the test compared to the school who didn't.

## **Student Hardware**

Students are limited to the technical hardware they can use compared to teachers. The technology available to students can also depend on the needs of the students. Students have access to computers; there used to be computer labs in school, however, since any schools have purchased classroom laptops there isn't much of a need for a computer class, (not all schools have access to full class computers, they could still have a computer lab). Some schools may not be able to afford classroom sets of computers for each class, meaning that the teacher has to schedule times for that class to have them. Students are given a username and password at the beginning of the year, that easy to remember, to log in and out of the computers. Teachers help students sign computers in and out of the computer cart.

The use of the computer also includes the computer tower. The computer tower as stated above has particular places for certain plugs go. The plugs could be external storage devices like a USB drive or flash drive that will save documents on it. The drive can be taken from the school and used at home creating a bridge between school and home research. The plugs on the tower can be used for assistive devices as well for students with special needs such as a computer mouse for the USB port and headphones for the auxiliary port.

The use of the printer is only for research purposes only, students are not to be printing anything unless it has been approved by the teacher in the room. Students only have access to the printer while they are in the computer lab of the schools. Students in lower grades in elementary school may not use the printer but students in upper grades will be researching information for projects and assignments that will have to be finished at home.

Instructional technology has introduced students to a different type such as interactive technology. Most students have easy access to cell phones or even tablets at home that are all

touch screen, those devices are not very big. Interactive equipment such as the Smartboard has brought interactive technology that is displayed on a big screen for students to see. The students can touch the board make an action occur.

The television has been in classroom for a long time, that doesn't mean they aren't beneficial in education when used properly. There are many passages that can be read about creating a bill when educating students on laws. Schoolhouse Rock is a small cartoon for students to learn about how a bill and law is made. The TV has spots for a VHS tape, DVD, or Blu-Ray disc that can be played on the TV in a fun cartoon. Televisions have advanced in the classrooms as well; students are now able to watch digital television which provides a better quality because they use digital signals instead of analog. Digital televisions give students access to video-on-demand, educational games or activities, and access to the internet. If the students have a digital television at home, parents can pull up information and activities that occurred at school for their student and do them from home (Dos Santos Junior et al., 2012).

The use of interactive technology for students creates a wide spectrum with how they learn. When touch interaction is implemented for students at young ages in elementary school, it is a fun and different approach that can create a positive stimulation. The way students interact with technology can very much so depend on the conditions surrounding that. The lesson and time of the experiences they have with the interactive technology will determine how effective it suits students' educational needs (Beeland, 2002).

Beeland (2002) conducted a study on students between the class grades of 4<sup>th</sup> and 8<sup>th</sup> grade in three different schools. After the study, it was clear that the use of interactive Smartboards created more interaction between the students and teachers, it encourages students

to be creative, and is effective in closing the gap for students who learn differently. Overall, students had optimistic when it came to use interactive Smartboards or whiteboards.

Interactive technology that falls under classroom performance technology, allows students freedom at their seats by using clickers or remote controls. The clicker is connected to the Smartboard through software. Each student will have a clicker to use while in class. The clickers create an active learning environment that allows students to answer questions namelessly, taking away the feeling of isolation and embarrassment that can be associated with missing a question when asked by a teacher.

Laptops and tablets have come to be extremely popular in schools, even elementary schools. Google helped design instructional technology precisely for teachers and students to use. Tablets come in different sizes and some come with keyboards that can be detached from the tablet, while others have keyboards that can rotate down to create a tablet setting. The laptops that come with the Google educational setting are only Chromebook and Android. The management is easy as well, students will get educational access as soon as the teacher adds the students in the Google drive that is managed by the teachers (Using Tablets and Google, 2015).

### **Student Software**

Elementary school age students also have access to distant learning. Distant learning means that the student and teacher are not in the same room as each other for instruction. The computer, tablet, or smartphone can bridge between teacher and student to reach the educational needs that the student needs. The digital television can also help create a bridge for students who do experience distant learning.

Technology has created ways for students to learn about more than what is just physically around them. Johnson (2019) suggests online and mobile learning can be used between

classrooms in two totally different parts of the world. Learning from phones or at home can be beneficial to students because it means they are wanting to learn while outside of school which is a good thing. Different apps and websites can keep them learning while not at school like Teach Your Monster to Read, which has come from personal experience with the author. With the help of the teacher students create their monster to represent them in the game. This game teaches students how to sound out words by asking what word which is presented on a cookie is being repeated, once the word is selected the monster advances forward in the game. This website helps students organize sentences by selecting certain area of the sentence and taking the word out making the student listen to the sentence and the words separately then having the student select which word is correct for that sentence.

The students who have cell phones in elementary school also have mobile learning, if the teacher allows them to use their phones during school. There are a lot of rules and policies concerning the use of private cell phones in schools. Students can use their cell phone to communicate with other students via messaging or email if they use that, calling, and access the internet. Teachers can give students ideas of apps they could use to practice curriculum at home. The smart phones can be used for classroom interaction as well. The author has had personal experience with Kahoot, which is a game where the teacher can create questions to prepare for a test or just for practice and the cell phone is used as a tool to answer questions. The app shows will show the number of participants for that question along with the number of students in the classroom, so the teacher is aware of how many are participating. Kahoot creates student interaction while learning and remembering information.

Mobile technology also gets students at this age up and going and moving outside. Boyce, Mishra, Halverson, and Thomas (2014), discuss that informal learning environments

create a new curiosity for Science, Technology, Engineering, and Math also known as the STEM fields. Boyce et al. developed the informal learning environments that include getting students to go on hikes using mobile technology. This approach allows students to actively experiment with new things while learning through new experiences outside of the classroom and textbook.

Students don't exactly use Class Dojo themselves, but it pertains to their character, manners, and actions in class. Points are recorded by the teacher and put into this downloadable app for parents to see and communicated with the teachers on. Depending on the number of positive and negative points, especially in elementary school where they are still learning to listen to the teacher, positive points can be turned into an award on Friday for the students. The calculation of the negative and positive points can be averaged by the app for teachers and parents to see student behavioral progress or regression.

Online learning Google classroom also impacts students. This software is learning management for students. Teachers create classes with student names in each one, that way if there are class changes at certain hours of the day teachers only have to click that time of class for all students to show up in that particular hour. The use of Google Classroom gives students access to class announcements that teachers can post. Assignments can be easily turned in through Google which alerts teachers who has completed the assignment to be graded. Google also makes it more difficult for students to cheat, privacy folders are used specifically for one student and the teacher. Google also organizes assignments by their due dates for students to easily access and know about deadlines (Keeler, 2014).

Students can learn responsibility with interactive equipment in the classroom, as long as the teacher has given a clear system of the classroom. A classroom performance system for teachers can also teach students how to be accountable and responsible by giving them tools to

come into the classroom every day and signing themselves in to account for their attendance in class. This saves time on the teacher as well as increasing learning time during the day (Jonson, 2019).

### **Instructional Technology for learning disabilities**

The inclusion of assistive technology has made a big impact on students with learning disabilities. With these devices' students are able to feel more equal to their classmates, that feeling can help create bonds. Students with learning disabilities that have the correct devices that will help them have also been researched, the participation level has increased (Quenneville, 2001).

According to White and Robertson (2015), "The two aspects of importance in these reading difficulties: problems decoding and interpreting the actual print; and problems accessing the vocabulary, learning materials, and ideas appropriate for the students' grade and cognitive level" (p. 1268). Technology software such as text to speech which convert books to speech. This software is beneficial when it is provided for students before large amounts of reading are given. Kurzweil 3000 and Dragon Naturally Speaking are also beneficial software to help students get more access to books, support the writing process for students, and increase independence so the student doesn't have to rely on the teacher for as much help.

A study was conducted on five students, two teachers, and an educational assistant that was also the researcher. There were 8 meetings total one before the trial started, 6 every week to see progress the teachers and students were making, and one after the trial was over. The goals for the participating students are set and agree upon by the teacher and student. All the students participating with the assistive technology had also used different previous methods to help them succeed with reading and comprehension problems. When the study was completed, the results

showed that the students between the ages of 8 and 10 years old could work very well with the technology. The students learned how to operate the programs that taught how to copy and paste, use email, use text notes, keyboarding speed improved, reading improved, students learned how to scan books into the system which made things more time efficient for the teachers as well, and writing skills improved. Research concluded that students gained skills in vocabulary use, recognizing important ideas in literature sections, and their self-confidence went up (White & Robertson 2015).

Students with learning disabilities have supportive technology now that if used correctly can be able to replace what is missing if only during the school day. Computer writing programs assist students in communicating with others and relaying feelings or thoughts they may be having. There are talking word software systems, these give hearing responses so they can distinguish between sounds to create words and then create sentences and so on until they are able to write a whole document. The software can be adjusted to fit the dialect. Another type of useful software is word prediction. Word Prediction can create a sort of guessing game for students to choose the right word in order to complete the sentence or phrase, however, if the students don't choose the correct word the system moves on (Quenneville, 2001).

There are quite a few different options for students who need assistance with writing. One option is for students who need help taking notes in class have device like the Alpha Smart 3000. This device makes taking notes easy which is important for elementary school aged children, the device turns on and they are able to immediately start writing. All information that is typed is automatically saved and gives the operator the power to copy and paste information if they need to. The Alpha Smart 3000 will connect to PC computers which makes access from



teachers easy as well. Another tool listed a prewriting multimedia software which helps students organize their thoughts and create ideas for things they would want to write about.

Instructional technology will definitely not solve the disabilities that students have but it is a tool that can help. The development of smart technology like phones and tablets, these portable devices have created new ways that technology can be included in assisting students with special needs. According to Qahmash (2018), the technology tools accessible for students with special needs are called assistive technology or AT. There are three ideals that are looked upon when analyzing what technology could be useful for special needs student; is the hardware or software of AT beneficial for these students, if the AT is designed with special needs students in mind or if it is not, and how AT can help special needs students. There are also different levels of AT such as super affordable devices that include pencil grips, the second level of AT would be devices such as calculators that are digital and can be costly but don't have the advancement as some of the other tech, the last level is more expensive AT like tablets which can access the internet and download different content.

As AT devices go, the tablet has become a favorite due to its affordability and multi-function abilities. The fact that tablets are light and mobile is extremely for some students with special needs. AT can increase special needs students in reading, building math skills, and interacting with other students/individuals. The potential uses for AT devices is a wonderful aspect of learning if it is used; it is important that educators want to do the most they can for all of the students to be successful, with extra emphasis on those individuals who may really need it. Using tablets can increase special needs student's classroom attention because of the fun interactive programs that fit the curriculum (Qahmash, 2018).

### **Age Requirements for Screen/Technology Time**

With technology taking up large amounts of time in people's lives everyday it is no wonder that limiting child use has become something that is needed. The American Psychological Association and Alvord (2019), suggest limiting primary school age children screen/technology time is an extremely difficult feat with many falling short of what they think is an appropriate time. It isn't just screen time that causes concerns either; social media has led to many parents being against any form of it due to the effects it can have on a child mentally and emotionally. The use of technology for primary school age children is much easier to keep check on, especially the younger ones. Monitoring child use and being open about how technology works and the dangers of it is important.

Research and studies have been done by the American Psychological Association (2019), to help guide not only parents but school guidelines as well. For elementary age students, they recommend setting limits together on the media that is being used and how it is being used. An example would be the downloadable app Teach Your Monster to Read, which assist students in creative and fun ways to help them learn to read words and sentences. Learning the proper amount of time that students should spend reading each day and discussing how that works on a screen, as in if a child should read for an hour each day do thirty minutes of screen and thirty with an actual book.

According to Young (2017), students between the ages of 3 and 6 years should be limited to one hour per day. The reason for the small amount of technological activity is because this age group of children and their brain development is particularly critical. This age of children should be learning socializing behaviors that is a healthy and important part of psychological development. Young discusses that outdoor activities will help this age of children socially

develop in ways that technology whether it is a reward or an activity they do daily never will.

There are some exceptions to technology use which includes learning the alphabet and its sounds, numbers, and puzzles, however, outside activity and physically working puzzles, and using flash cards is recommended.

Students/children between the ages of 6 and 9 years old should use technology with guidance from adults, whether that is parents, guardians, or teachers says Young (2017). Most children around this age have reached all the physically demanding milestones. Children in this age group are still growing and should still be playing or doing activities that are physically demanding as well as mentally. Young suggest having screen time together as a family using an interactive game system like the Wii. This game console allows you to wear a wristband that is attached to the controller of the game which has a sensor that can be sensed by a sensor bar by the console of the game a few feet away. This particular game system promotes activity while still having screen time, and playing it with family promotes family bonding, physical activity as a family, along with supervision of screen time. Since this age group has many life milestones met, Young (2017) suggest these children be allotted up to two hours of technology time.

The age group of 9 to 12-year old should still be following a 2-hour screen time policy (Young, 2017). This is a very active age for kids; thus, they should be encouraged to do new healthy actions that use the energy and release anxiety or frustration. Some ideas would be playing sports along with hiking or riding bikes which are all fundamental techniques that can help later in life. This is also a time when strict rules should be set where technology is concerned, and if said rules are broken consequences will follow. Monitoring all technology or screen time use is important at this time when children are nearing ages of puberty, wanting access to social media, or asking for their own smart devices.

**Concerns with Technology Time**

Elementary school students start school around 5 years of age, up until that point their brains are like sponges absorbing everything around them. Those first few years are extremely important for brain development. Children run the risk of becoming obese, developing behavior issues, not developing good social skills, a decreased amount of active playing, and developing bad sleep schedules (Mayo Clinic, 2019). Children of the age 5 getting screen time for an hour a day, however, parents know their children and what they are capable of so it could vary from child to child (Mayo Clinic, 2019). This is not an attack on schools or parents; the availability of technology for students at school and at home can exceed an hour a day very quickly.

The American Heart Association (2018) issued that children are becoming more inactive due to technology media which is increasing the rates of children being overweight or obese. Studies have shown that students between the age of 5 and 8 spend up to 3 hours using some sort of technology, while showing a big number of kids around the age of 10 having a personal cellphone. This age group of students make up most students in elementary school. Screen time use has also been linked to affecting students reading and social skills. More studies are being done to show that too much screen time can be linked to other health related problems (American Heart Association, 2018).

There is also concern for violence and harmful commercials when it comes to screen time and adds to the list of why it should be limited at these young ages. Ernest, Causey, Newton, Sharkins, Summerlin, and Albaiz (2014), discuss how violence portrayed on televisions is connected with the increased aggressive behaviors that are being accepted and used in society today. The commercials are also a problem, creating issues in the youth like body image, sexualization, and family stress. The students of elementary age are at risk for brain

development issues because of increased screen time, this age requires positive interactions between people not screens (Ernest et al. 2014).

## **Conclusion**

Instructional technology development has impacted teacher instruction and student learning in elementary schools. The technology can engage students in classroom instruction and keep them wanting to learn and try new things that the traditional classrooms with textbooks cannot provide. The use of technology in elementary schools comes with concerns which is why the Kentucky Department of Education has created policies to make sure students are safe while using technology while also keeping the technology safe, too. Student learning has showed positive impacts as well and has made leaps in assisting students with learning disabilities. White and Robertson (2015) concluded research that students gained skills in vocabulary use, recognizing important ideas in literature sections, and their self-confidence went up.

Although there has been research showing that technology has positively impacted teacher and student learning environments, it doesn't come without some issues. The main issues that were discussed in research was that teachers didn't always receive the proper training for technology which made using it and teaching students to use it difficult. Another problem that occurs is that not all schools have the resources to provide the proper instructional technology equipment that could benefit the teachers and students. Clements and Sarama (2002), discusses how the inclusion of technology can create bonding between classmates and keep students from feeling left out; but because of lack of resources to schools this is a real problem that they can face.

Instructional technology has impacted teacher and student environments by creating a fun, experimental learning environment. The integration of technology in schools comes with

particular guidelines for students and staff members that are important to follow. Teachers can use multiple types of technology devices to assist instruction while students can use it for effective learning as well as studying. The increase in technology use has created issues with some which is why limiting technology and screen time by age is important, health issues have been linked to too much technology time.

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