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Computer Science in the Elementary Classroom: The Basics

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Computer Science in the Elementary Classroom: The Basics

Computer Science is often ranked with Nuclear Physics or Biochemical Engineering; people understand it is an academic discipline, but have no desire to study or learn anything about it. With the introduction of Arkansas Computer Science Standards in the elementary classroom, many teachers wonder how to satisfy these and to do so without full knowledge of computer science and alongside all the other demands they must meet in the classroom. This paper covers my interest in computer science and why it is needed in elementary schools, specifically in Arkansas. It also incorporates the standards, including a chart of all the standards with suggestions about how they can be taught, followed by some full lesson plans written during my research.

My Background/Interest

I have heard about computer science throughout my life. I was born into a house filled with technology and conversations about current advancements in technology. We had a household computer when I was born in 1996; it was a dinosaur Gateway computer that took up most of the office space. I would play games on it like minesweeper and pinball, although I didn't really know what to do other than push buttons. When I was two, my dad accepted a new job at Ouachita Baptist University as a computer programmer, a job that I never fully understood beyond the fact that his computer screen was always very confusing with lots of number, letters, and symbols. It was always a plain looking screen which did not seem like much fun. My parents were never overly concerned with the amount of time we spent on the computer, so I spent hours at a time playing games and typing on Microsoft® Word. I experimented with fonts and WordArt. My favorite game was Math Blaster for First Grade, which I played long before meeting the minimum age requirement. I have always understood the basics of operating

computers and troubleshooting basic problems. When I did not know what to do, I knew where to find information to help me solve the problem.

Why Introduce Computer Science in Elementary Schools?

Computers are a major part of the real world. They should be an important part of life within a classroom, but must be used effectively to be beneficial. Technology exists in every field, from computer programmers and engineers to teachers and doctors. Students should be introduced to technology early in order to help them develop skills easier and be more inclined to pursue a job in a STEM field.

Technology has many benefits to student learning and engagement. Students learn more than just programming or computer science skills when technology is effectively incorporated into classroom lessons, in conjunction with differentiated instruction and collaborative learning. By incorporating technology into lessons, teachers can prepare their students for and spark an interest in STEM fields.

Students learning technology and programming skills, learn many other life skills, including critical thinking skills, collaborative skills, and creative thinking skills. Resnick (2003) compared the teaching of coding to writing because teachers do not, avoid teaching writing because only a few students will become journalist, novelist, and writers. The same is true for coding. Students benefit by learning skills that reach far beyond the field of computer science. Students learn critical thinking skills by solving problems. According to Resnick (2003), coding is "an extension of writing. The ability to code allows you to 'write' new types of things – interactive stories, games, animations, and simulations" (para. 3). In addition to critical thinking skills, students also learn collaborative skills, by working together on projects. Through languages such as Scratch (a block based, android app creator software), students can join

collaborative projects with others around the globe. Resnick (2003) explained how one young girl got involved with other students and collaborated by making animated animals in Scratch, "[She] worked with four other young people from three different countries to produce an elaborate adventure game. [She] created animated characters while other members of the collab (collaboration team) developed game scenarios, created music and sound effects, and drew backgrounds" (para. 11). In this scenario, the increase in student creativity is self-evident. In Scratch, students design animated objects to follow commands, so they must have a vision for what they want their application to accomplish. Computer science can extend art, writing, mathematics, or science. Students can use programs to make their artistic creations come to life, to retell or create a story, solve a math problem, or create a scientific interactive diagram. When I was in high school, I completed a project on a scientific topic of my choice to teach it to others. I created a PowerPoint that illustrating how cells divide; it would run automatically and was like a digital version of the flip books we used to make on notebooks where the animations would appear to be moving when they were flipped quickly.

Technology can provide extra assistance to English Language Learning (ELL) students in a classroom by providing more ways to communicate and help with writing essays. In addition to helping with individual work, computer technology helps students with cooperative learning by connecting them with other students. There is a major trend among young students in fan communities, or fan-fiction. This does not require a student to be tech-savvy, only to have a passion for a subject and write about it and post in a forum. Students receive feedback from other people interested in their same topic (Black, 2009). Students are building community with others outside of the classroom and receiving acceptance which can boost the morale of an ELL student (Black, 2009). Students learn technological skills from other fan community users and

receive peer scaffolding from the other users (Black, 2009). According to Black (2009), these "skills also are related to effective instructional approaches for ELLs that involve peer-to-peer cooperative learning as well as teacher, parent, and community scaffolding" (p. 694).

Technology Today

Arkansas Computer Science Standards

Current Arkansas Governor, Asa Hutchinson, began Arkansas' computer science initiative during his campaign in 2014. Beginning in March of 2015, legislators passed a law that all public schools in the state must offer computer science education for high school students (Lapowsky, 2015). In response to the law and computer science initiative, Hutchinson is quoted in *So, Arkansas Is Leading the Learn to Code Movement,* an article in *Wired,* as saying "Whether you're looking at manufacturing and the use of robotics or the knowledge industries, they need computer programmers. If we can't produce those workers, we're not going to be able to attract and keep the industry we want" (Lapowsky, 2015).

Limitations

While teaching computer science standards sounds like it could cost a lot of money, there are ways to teach technology concepts with limited resources. Many computer science standards involve working collaboratively and problem solving. In the most basic form, writing computer programs takes the limited commands you can tell the computer and finding ways to make solve a problem or perform a necessary task. By providing students with a limited number of commands and trying to get them to accomplish a task, students practice the skills needed to write computer programs without ever getting on a computer. Block based-programming, which is required up through 3rd grade, is just takes command blocks and strings them together to accomplish a task. For the lower grades, this can be done by taping off blocks on the floor and

having students tell each other how to get from one place to another. A lack of technology does not mean we cannot prepare students for a future in computer science. It just means that we need to find more creative ways to accomplish the goal.

How to Incorporate the Standards

According to Drake and Burns (2004) curriculum integration "is about making connections". This integration can be slight mentions of a connection, or they can be fusion between two subjects, or total integration of all learning. Computer science standards easily integrate into other curricula, because every subject area can benefit from the use of technology. Many of the standards below deal with critical thinking, problem solving, and data. These standards fit well in math or science curriculum. Some of the other standards such as the proper use of technology and the positive and negatives of technology can be integrated into a writing assignment. Deciding how to teach computer science standards can be overwhelming for a teacher who himself/herself may not understand computer science.

Standards Broken Down

The following is a list of all the standards for kindergarten through 6th grade. I will provide a table that presents the standards for each grade level and then, in the box under it, provide ideas for incorporating the computer science standard with other content area standards. These are simple ideas to get teachers started teaching each standard. Some of them take a little time, others may need to be incorporated in larger math or science unit projects.

Kindergarten	**1st Grade**	**2nd Grade**	**3rd Grade**	**4th Grade**	**5th Grade**	**6th Grade**
CT.1.K.1 Discuss the following basic steps when problem solving: •understanding the problem • considering various strategies	CT.1.1.1 Demonstrate the following basic steps when problem solving: •understanding the problem • considering various strategies	CT.1.2.1 Demonstrate the following basic steps when problem solving: •understanding the problem • considering and examining the efficiency of various strategies	CT.1.3.1 Solve problems using a defined process	CT.1.4.1 Examine the process of problem solving and how it applies to algorithmic problem solving	CT.1.5.1 Demonstrate basic steps of algorithmic problem solving with or without a computer	CT.1.6.1 Select basic steps to solve algorithmic problems
Standard 1.1 focuses on problem solving. It can be used with any problem from a global problem, school wide problem, to a personal problem with individual students. In kindergarten students begin with discussing how to solve problems and then in 1st and 2nd grade the demonstrate problem solving. In third grade, students start using a specific process which can be linked into math problems and in 4th grade it is specific to algorithmic problems in math. This would be fun if it was taught using a Rubik's cube and doing a unit on the algorithms of a Rubik's cube that can be looked up online.						
CT.2.K.1 Discuss the relative positions of objects within a program (e.g., up, down, left, right, over, under, on top of, behind, in front of, to the left, to the right)	CT.2.1.1 Demonstrate understanding of the relative positions of objects within a program (e.g., up, down, left, right, over, under, on top of, behind, in front of, to the left, to the right)	CT.2.2.1 Demonstrate understanding of the relative positions of objects within a program (e.g., up, down, left, right, diagonal)	CT.2.3.1 Apply fractional rotations within a program (e.g., quarter turns and half turns)	CT.2.4.1 Examine the relative position of objects using angles within a program (e.g., 30 degree turn)	CT.2.5.1 Compare and contrast the relative positions of objects using ordered pairs within a program (e.g., battleships, block-based programming, treasure maps)	CT.2.6.1 Ends in Grade 5
This standard wants students to use relative positions to move things around in a program. Many block based programs use this type of movement. Code.org has students move things around in relative positions and the harder levels use angles. For 5th grade, students can use battleship and play against each other. This can been done on paper and does not require the students to each have a game.						

https://www.printablepaper.net/preview/battleship has a free version of the game that can be printed. It doesn't require anything but a pencil to play.						
CT.2.K.2 Begins in Grade 6	CT.2.1.2 Begins in Grade 6	CT.2.2.2 Begins in Grade 6	CT.2.3.2 Begins in Grade 6	CT.2.4.2 Begins in Grade 6	CT.2.5.2 Begins in Grade 6	CT.2.6.2 Discuss binary numbers, logic, sets, and functions and their application to computer science
Understand binary numbers can be complicated, because it requires using a system other than our standard base 10 system. NASA has a great kid's site that helps explain binary and teaches how to convert binary into base 10 numbers: https://spaceplace.nasa.gov/binary-code2/en/# The other part of this standard is understanding logic such as sequence and if/then statements, set of numbers like matrices and functions in terms of computer science. There are websites like the NASA site that students can explore and then have them get together with a group and explain the different concepts.						
CT.2.K.3 Begins in Grade 6	CT.2.1.3 Begins in Grade 6	CT.2.2.3 Begins in Grade 6	CT.2.3.3 Begins in Grade 6	CT.2.4.3 Begins in Grade 6	CT.2.5.3 Begins in Grade 6	CT.2.6.3 Describe events as subsets of a sample set identifying unions, intersections, and complements (e.g., describing information sorted with a Venn diagram)
This can be taught using a worksheet and direct instruction on subsets and defining unions, intersections, and complements using real life examples. This can be taught using geographic shapes of attributes of people.						
CT.2.K.4 Begins in Grade 6	CT.2.1.4 Begins in Grade 6	CT.2.2.4 Begins in Grade 6	CT.2.3.4 Begins in Grade 6	CT.2.4.4 Begins in Grade 6	CT.2.5.4 Begins in Grade 6	CT.2.6.4 Select variables that appropriately represent data

This should be done with data in science or math class. I would provide students with a scientific question and ask them what variables would need to be tested to solve the problem and how ask why they represent data.						
CT.3.K.1 Solve problems cooperatively	CT.3.1.1 Solve problems of increasing complexity cooperatively	CT.3.2.1 Solve problems of increasing complexity collaboratively	CT.3.3.1 Construct innovative solutions to problems collaboratively	CT.3.4.1 Construct innovative solutions to problems of increasing complexity collaboratively	CT.3.5.1 Evaluate effective ways that collaboration can support problem solving and innovation	CT.3.6.1 Analyze appropriate collaborative behaviors (e.g., providing useful feedback, integrating feedback, understanding and accepting multiple perspectives, using socialization) to solve problems
There are so many activities that can be done to help students work together and solve problems together. The sixth grade lesson provided in the thesis is a fun way to get students to solve problems in a group. It was an interactive lesson that fully engaged the students. It is a lock box and the students have to solve different worksheets and problems in order to find out the combination and gain access to the locks on a box. This can be done without the use of technology.						
D.4.K.1 Define data and provide examples	D.4.1.1 Describe how and why data is used	D.4.2.1 Compare types of data and how it is used	D.4.3.1 Describe how representation of data can exist in multiple formats	D.4.4.1 Compare the representation of existing data in multiple formats	D.4.5.1 Illustrate how different kinds of data can be represented	D.4.6.1 Represent a variety of data in multiple formats
I would teach this with math or science standards and just use data from different problems throughout the year. Discuss what data is and have the students explain it to the extent of the grade level standard. By sixth grade, students should be able to create their own data and represent it in multiple formats. This can be done through graphs and chart in Microsoft Excel, or by hand making charts to represent data that they collected.						
D.4.K.2 Recognize ways that people	D.4.1.2 Describe how numbers can be used to	D.4.2.2 Use numbers to represent data	D.4.3.2 Describe how 0's and 1's	D.4.4.2 Use 0's and 1's to represent data	D.4.5.2 Recognize that binary is a way of	D.4.6.2 Discuss how and why binary is used to

represent data differently (e.g., thumbs up for yes; thumbs down for no)	represent data (e.g., color by number, secret codes)	(e.g., encode and decode a word with numbers)	can be used to represent data	(e.g., encode and decode a word with 0's and 1's)	representing data using only two options (e.g., on/off)	represent data in a computer
This standard varies a lot. Kindergarten is fairly simple; this can be taught using thumbs up/down in a variety of different ways, or by subitizing numbers and representing them in different ways such as tally marks, dice, and fingers. For k1-4th grade, it would be fun to do some coded worksheets with a secret message that the students must decode and then encode the answer. For fifth and sixth grade, focus on binary numbers. Have the students research binary and present it to the class.						
D.5.K.1 Identify the purpose for data collection	D.5.1.1 Recognize various tools for data collection as a class	D.5.2.1 Select and use various tools to collect data as a class and in teams	D.5.3.1 Select and use appropriate tools to collect data in teams and individually	D.5.4.1 Compare and use appropriate tools to collect data	D.5.5.1 Evaluate, select, and use appropriate tools to collect data	D.5.6.1 Collect data using a variety of tools (e.g., analog, digital)
D.5.K.2 Collect and arrange data based on a characteristic (e.g., size, color, shape, alphabetic) as a class	D.5.1.2 Collect and arrange data based on a characteristic (e.g., size, color, shape, alphabetic) in teams	D.5.2.2 Collect and arrange data based on multiple characteristics (e.g., both size & color, alphabetic & phonemic patterns) as a class and in teams	D.5.3.2 Collect and arrange data logically based on multiple characteristics as a class and in teams	D.5.4.2 Collect and arrange data logically based on multiple characteristics in teams and individually	D.5.5.2 Identify the characteristics (e.g., collection environment, units of measure, input method) of the collected data	D.5.6.2 Describe the characteristics (e.g., collection environment, units of measure, input method) of the collected data
D.5.K.3 Represent data visually as a whole class	D.5.1.3 Organize and visually represent data as a whole class and in teams	D.5.2.3 Organize and visually represent data with pictographs and bar graphs	D.5.3.3 Organize and draw visual representations of data with pictographs and bar graphs	D.5.4.3 Compare different ways to visually represent data with pictographs, bar graphs, and line plots	D.5.5.3 Evaluate the most effective ways to collect, arrange, and visually represent data	D.5.6.3 Evaluate the most effective ways to collect, arrange, and visually represent data

Standards 5.1, 5.2, and 5.3 all have to do with understanding data, collecting data, and representing data. These standards could be taught in a long term science unit where students are expected to collect data over a period of time and then represent that data. The students could collect data on a science project such as growing a plant or the weather over a period of time. The project could also be short term such as which side a penny lands on when tossed 100 times, or how far a car rolls depending on the angle of the ramp. The students should represent the data in multiple ways, depending on the age group and by 5th and 6th grade they should be choosing their own method for collecting and representing data.						
D.6.K.1 Interpret and analyze concrete and pictorial graphs as a whole class	D.6.1.1 Interpret and analyze concrete and pictorial graphs as a class and in teams	D.6.2.1 Interpret and analyze graphs in teams and individually	D.6.3.1 Interpret and analyze graphs individually	D.6.4.1 Explore graphs as models for data analysis	D.6.5.1 Explore various models and simulations (e.g., ecosystems, epidemics, molecular dynamics) to support learning and research	D.6.6.1 Compare various problems that can be solved using modeling and simulation
This standard also deals with reading graphs which should be done with math and science lessons. This standard can also be grouped with standards 5.1, 5.2, and 5.3 as direct instruction on graphs during the project.						
A.7.K.1 Identify and follow an algorithm to accomplish a simple task	A.7.1.1 Choose an algorithm to accomplish a specific task	A.7.2.1 Determine which steps will complete an algorithm to accomplish a task	A.7.3.1 Create and follow algorithms to accomplish a simple task or solve a simple problem	A.7.4.1 Create and follow algorithms to accomplish a task or solve a problem	A.7.5.1 Create algorithms to solve a problem	A.7.6.1 Create algorithms to solve problems and evaluate their effectiveness
This should be fulfilled with a math class; students should be able to determine what algorithm should be used to solve and problem and use the steps to solve the problems. A lot of this can be done by doing math talks in the classroom. Starting in third grade students should be able to create algorithms, this is done when introducing a new math concept and the students can try to find their own way to solve the problem.						
A.7.K.2 Compare and contrast algorithms of appropriate	A.7.1.2 Compare and contrast algorithms of	A.7.2.2 Compare and contrast algorithms of	A.7.3.2 Compare and contrast algorithms of	A.7.4.2 Compare and contrast algorithms of	A.7.5.2 Compare and contrast algorithms of	A.7.6.2 Compare and contrast algorithms of

complexity as a class	appropriate complexity	appropriate complexity	appropriate complexity	appropriate complexity	appropriate complexity	appropriate complexity
This standard should also be done in math class; it is the idea of looking at different methods of solving and problem and deciding which method is the best. Students should be presented with multiple methods for solving a problem and be able to pick the best method for them.						
A.7.K.3 Demonstrate how to correct errors within an algorithm that accomplishes a simple task	A.7.1.3 Identify and correct errors within an algorithm that accomplishes a specific task	A.7.2.3 Identify and correct errors within an algorithm that accomplishes a task	A.7.3.3 Identify and correct multiple errors within an algorithm that accomplishes a simple task or solves a simple problem	A.7.4.3 Identify and correct multiple errors within an algorithm that accomplishes a task or solves a problem	A.7.5.3 Identify and correct multiple errors within an algorithm that solves a problem	A.7.6.3 Identify and correct errors within multiple algorithms
I would teach this standard by looking at other student's open-response questions that were done incorrectly and identify where the student messed up and how it could be fixed.						
A.7.K.4 Design algorithms of appropriate complexity as a group to show a simple process	A.7.1.4 Design and test algorithms of appropriate complexity collaboratively	A.7.2.4 Design and test algorithms of appropriate complexity collaboratively	A.7.3.4 Design and test algorithms of appropriate complexity collaboratively using technology	A.7.4.4 Design and test algorithms of appropriate complexity collaboratively using technology	A.7.5.4 Design and test algorithms of appropriate complexity collaboratively	A.7.6.4 Design and test algorithms of appropriate complexity collaboratively
Standard 7.1. also deals with creating algorithms; these two standards could be done together throughout the year within math talks. The students will create different methods for solving math problems than what they already know.						
A.8.K.1 Use a visual block-based programming language individually and collaboratively to solve problems	A.8.1.1 Use a visual block-based programming language individually and collaboratively to solve problems of	A.8.2.1 Use a visual block-based programming language individually and collaboratively to solve problems of	A.8.3.1 Use a visual block-based programming language individually and collaboratively to solve problems of	A.8.4.1 Use a visual block-based programming language individually and collaboratively to solve problems of	A.8.5.1 Use a visual block-based and/or text-based programming language programming language	A.8.6.1 Use a visual block-based and/or text-based programming language individually and collaboratively to

	increasing complexity	increasing complexity	increasing complexity	increasing complexity	individually and collaboratively to solve problems of increasing complexity	solve problems of increasing complexity
This standard can be the most overwhelming standard for teachers because it seem like they have to know computer programming, but in reality they do not have to know any computer programming languages to teach this standard. My best recommendation for starting this standard is to have students complete code.org Hour of Code. This can be done during the computer science week in December or any other time throughout the year. This will introduce students to block-based programming, which is simply taking block commands and stringing them together to accomplish a goal. If technology is not available for students to do this, there are board-games that teach block-based programming that could be done during recess or any other time when they students can interact with each other. https://leftbraincraftbrain.com/if-then-backyard-coding-game-for-kids/ This link provides a fun game that could be used during free time in the classroom, such as at the end of the day when the students are finished early, rather than playing the quiet game, or heads-down, thumbs-up, try play if/then at varying difficulties.						
CC.9.K.1 Explore uses of computing and technology	CC.9.1.1 Identify uses of computing and technology	CC.9.2.1 Examine uses of computing and technology	CC.9.3.1 Discuss a variety of careers that require computing and technology	CC.9.4.1 Identify a variety of careers that require computing and technology	CC.9.5.1 Examine the range and types of careers that require computing and technology	CC.9.6.1 Investigate a career that requires computing and technology
This standard could be met by inviting a parent or other community member in to speak during computer science week in December. For 3-6 grade, the students could research different jobs relating to computer science.						
CC.9.K.2 Begins in Grade 3	CC.9.1.2 Begins in Grade 3	CC.9.2.2 Begins in Grade 3	CC.9.3.2 Discuss as a class that computers perform actions or outputs based on inputs by humans (e.g., using a video game controller, typing and using	CC.9.4.2 Recognize that computers perform actions or outputs based on input by humans (e.g., using a video game controller, typing and using	CC.9.5.2 Discuss ways that a human creates input for a desired output through a device (e.g., texting, changing device settings)	CC.9.6.2 Identify what distinguishes humans from machines focusing on human intelligence versus machine intelligence (e.g.,

			a mouse)	a mouse)		robot motion, speech and language understanding, and computer vision)
This standard provide students with the basic information for using a computer and how it works. It teaches them that computers are not living things; they are a machine that only does what them information it is given tells it to do. The sixth grade standard would be a fun conversation to compare the difference in machine intelligence and human intelligence. This could be a fun research project for students to research the different types of machine intelligence and the history of artificial intelligence (AI).						
CC.10.K.1 Use various input/output devices	CC.10.1.1 Demonstrate an appropriate level of proficiency with various input/output devices	CC.10.2.1 Demonstrate an appropriate level of proficiency with various input/output devices including keyboarding - can be a touchscreen keyboard.	CC.10.3.1 Demonstrate an appropriate level of proficiency with keyboards and other input/output devices.	CC.10.4.1 Demonstrate an appropriate level of proficiency with keyboards and other input/output devices	CC.10.5.1 Demonstrate an appropriate level of proficiency with keyboards and other input/output devices (e.g., printer, student response systems, texting/instant messaging, voice assist)	CC.10.6.1 Demonstrate an appropriate level of proficiency with keyboards and other input/output devices. (e.g., printer, student response systems, texting/instant messaging, voice assist)
This standard will be met if the students are just interacting with technology on a daily basis. This comes from doing a variety of different activities with different types of technology.						
CC.10.K.2 Demonstrate proper care of computer equipment	CC.10.1.2 Demonstrate proper care of computer equipment	CC.10.2.2 Recognize the expense of the equipment and how care and protection of the computers can prolong use and	CC.10.3.2 Recognize the expense of the equipment and how care and protection of the computers can prolong use and	CC.10.4.2 Recognize the expense of the equipment and how care and protection of the computers can prolong use and	CC.10.5.2 Recognize the expense of the equipment, how care and protection of the computers can prolong use and	CC.10.6.2 Recognize the expense of the equipment, how care and protection of the computers can prolong use and

		save the cost of purchasing new equipment, therefore benefiting all students	save the cost of purchasing new equipment, therefore benefiting all students	save the cost of purchasing new equipment, therefore benefiting all students	save the cost of purchasing new equipment, therefore benefiting all students	save the cost of purchasing new equipment, therefore benefiting all students
This standard should be taught and assessed prior to students using the technology extensively. The teacher should have procedures in place for how to use technology and when. These procedures should be taught in the first two weeks of school and reinforced as needed. If they are taught well in the first two weeks of school, the classroom behavior problems will be kept to a minimum throughout the year. These procedures should also be assessed in a written form. For the upper grades, the students could even write why it is important and make a contract for how they will treat the technology.						
CC.10.K.3 Practice locating: • letter and number keys • enter key • space bar with thumb Using visual representation of keyboard when physical keyboard is not available	CC.10.1.3 Practice locating: • letter and number keys • enter key • space bar with thumb Using visual representation of keyboard when physical keyboard is not available	CC.10.2.3 Introduce proper keyboard positions including: • fingers on home row keys • space bar with thumb • use enter key	CC.10.3.3 Use correctly on the keyboard: • fingers on home row keys • thumb on space bar • enter key • shift key for capital letters • punctuation appropriate to writing level	CC.10.4.3 Demonstrate touch typing techniques, not looking at fingers, while increasing speed and maintaining accuracy	CC.10.5.3 Demonstrate touch typing techniques, not looking at keyboard, while increasing speed and maintaining accuracy	CC.10.6.3 Demonstrate touch typing techniques while increasing speed and maintaining accuracy
There are many resources that can teach this standard to students of all ages. One that I have seen students use and love is TypeTastic which has different levels and walks students through the levels. There is a free version for schools that allows teacher to monitor students' progress.						
CC.10.K.4 Learn proper seat posture	CC.10.1.4 Demonstrate proper seat posture	CC.10.2.4 Recognize proper keyboarding technique: • posture	CC.10.3.4 Demonstrate proper keyboarding technique:	CC.10.4.4 Practice proper keyboarding technique: • posture	CC.10.5.4 Practice proper keyboarding technique: • posture	CC.10.6.4 Practice proper keyboarding technique • posture

		• elbows down • body centered in front of keyboard	• posture • elbows down • body centered in front of keyboard	• elbows down • body centered in front of keyboard	• elbows down • body centered in front of keyboard	• elbows down • body centered in front of keyboard
This standard can be taught in conjunction with standard 10.4 or taught separately. It should be taught in the first two weeks of school as an expectation for students in the classroom. It should be included in the proper technology procedures and reinforced throughout the year as needed. If this is made as an expectation for students it will become a habit rather than just knowledge that students will carry with them.						
CC.11.K.1 Discuss as a class how information can be communicated electronically	CC.11.1.1 Discuss as a class how information can be communicated electronically	CC.11.2.1 Discuss as a class how information can be communicated electronically.	CC.11.3.1 Identify and use productivity technology tools for writing, communicating, and publishing activities	CC.11.4.1 Use productivity technology tools for writing, communicating, and publishing activities	CC.11.5.1 Use and evaluate productivity technology tools (e.g., word processing, spreadsheet, presentation software) for effectiveness in writing, communication, and publishing activities	CC.11.6.1 Apply productivity/multimedia tools to support communication throughout the curriculum
For K-2nd Grade this standard can be met by having a discussion about communication on electronic devices. This can be in the form of email, text message, or IM message. Starting in 3rd grade, students should be introduced to different types of tools that are used frequently in a variety of jobs. By 6th grade, students are going to need to be using technology regularly in order to use multiple different tools throughout other parts of the curriculum. This can include making charts in Excel, creating PowerPoints to display information and writing papers in Microsoft Word.						
CC.11.K.2 Begins in Grade 3	CC.11.1.2 Begins in Grade 3	CC.11.2.2 Begins in Grade 3	CC.11.3.2 Identify as a class that information can be transmitted using	CC.11.4.2 Identify that information can be transmitted using computing	CC.11.5.2 Identify that information can be transmitted using many	CC.11.6.2 Describe how information can be transmitted by many computing

			computing devices via a network	devices via a network	computing devices via a network	devices via a network
Because networks are a confusing concept, this standard maybe best taught by someone who knows more about them! This would be a great opportunity to bring in the technology coordinator/network administrator for the school district to explain how networks work specifically the school network if applicable.						
CC.11.K.3 Recognize that computing devices execute programs	CC.11.1.3 Identify a variety of computing devices	CC.11.2.3 Describe the unique features of a variety of computing devices (e.g., processors, displays, storage types, input formats)	CC.11.3.3 Recognize that computing devices execute programs using processors	CC.11.4.3 Identify a variety of computing devices that execute programs using processors (e.g., digital watch, home appliances, vehicles)	CC.11.5.3 Describe the unique features of a variety of computing devices that execute programs using processors (e.g., mobile devices, automobiles, airplanes)	CC.11.6.3 Ends in Grade 5
This standard will be met if students are using technology for a variety of different activities because they will just a variety of different programs that all have a different function. Teachers should make sure they are using computer science content specific language when giving directions (ex. Rather than saying "click on the 'Blue square with a W'" to open Microsoft Word, teachers should say "Click on the Microsoft Word icon, it is Blue with a W and open the Microsoft Word program".						
CC.11.K.4 Identify simple hardware and software problems that may occur during use	CC.11.1.4 Identify simple hardware and software problems that may occur during use	CC.11.2.4 Identify simple hardware and software problems that may occur during use	CC.11.3.4 Apply strategies for solving simple hardware and software problems that may occur during use	CC.11.4.4 Apply strategies for solving simple hardware and software problems that may occur during use	CC.11.5.4 Apply strategies for solving simple hardware and software problems that may occur during use. (e.g., refresh the webpage, restart the device)	CC.11.6.4 Apply strategies for solving simple hardware and software problems that may occur during use

This comes from using computers regularly and encountering problems. In the beginning students will freeze when the computer does not do exactly what they think it should, but rather than just fixing the technology and handing it back, we should walk students through how to fix the problem and troubleshoot so that they know what to do on their own the next time.						
CGE.12.K.1 Begins in Grade 3	CGE.12.1.1 Begins in Grade 3	CGE.12.2.1 Begins in Grade 3	CGE.12.3.1 Identify and discuss positive and negative impacts of technology on the daily life of individuals and society	CGE.12.4.1 Identify and discuss positive and negative impacts of technology on the daily life of individuals and society	CGE.12.5.1 Explain positive and negative impact of technology (e.g., mobile computing and communication, web technologies, digital security, virtualization) on the daily life of individuals and society	CGE.12.6.1 Demonstrate an understanding of positive and negative impact of technology (e.g., mobile computing and communication, web technologies, digital security, virtualization) on the daily life of individuals and society
This standard could be taught using a research/persuasive paper, students research the positive and negative side of technology and decide if technology is good or bad from children to use.						
CGE.12.K.2 Recognize positive and negative behaviors for using computing devices	CGE.12.1.2 Recognize positive and negative behaviors for using computing devices	CGE.12.2.2 Identify positive and negative behaviors for using computing devices	CGE.12.3.2 Identify and discuss positive and negative uses of technology and information and their impact	CGE.12.4.2 Discuss basic issues related to the appropriate use of technology and information, and the consequences of inappropriate use	CGE.12.5.2 Demonstrate an understanding of the appropriate use of technology and information and the consequences of inappropriate use	CGE.12.6.2 Discuss the difference between appropriate, legal, and ethical uses of technology
Standard 12.2 is all about teaching kids how to be safe using technology; this should come in the form of direct instructions. It should be taught in the beginning of the year as a procedures and reinforced throughout the year as need. It would be an awesome idea to implement a safe technology week to emphasis age appropriate use of technology at school and at home.						

CGE.12.K.3 Recognize various electronic information sources	CGE.12.1.3 Recognize various electronic information sources	CGE.12.2.3 Recognize various electronic information sources	CGE.12.3.3 Identify attributes of credible electronic information sources	CGE.12.4.3 Identify and discuss attributes of credible, unbiased, electronic information sources	CGE.12.5.3 Compare the credibility, bias, accuracy, and relevance of electronic information sources	CGE.12.6.3 Demonstrate an understanding of the credibility, bias, accuracy, relevance, age appropriateness, and comprehensiveness of electronic information sources
This standard is preparing students for research project later in their education. It should be taught using research as the basis. In K-3 grades, students should just be able to find sources of information, but then they should be able to identify credible sources and think critically about the sources. By having students look up information or questions they have, students will develop these research skills and open the conversation to talk about the sources. By having a procedure for researching questions that come up in the class, teachers can ensure that students are able to develop research skills in a variety of content areas.						
CGE.12.K.4 Recognize copyright, in various media	CGE.12.1.4 Discuss copyright, in various media	CGE.12.2.4 Identify and name resources used in the process of gathering information.	CGE.12.3.4 Identify and name resources used in the process of gathering information.	CGE.12.4.4 Demonstrate an understanding of ethical issues in copyright, fair use, and intellectual property in various media	GCE.12.5.4 Demonstrate an understanding of ethical issues in copyright, fair use, and intellectual property in various media (e.g., music, graphics, video, etc.)	GCE.12.6.4 Demonstrate ethical uses in copyright, fair use, and intellectual property in various media (e.g., music, graphics, video, etc.)
Standard 12.4 teaches students ethical and fair use of materials and information. This begins in Kindergarten where students should recognize when material is under copyright based on the symbols. Then the conversation should continue through 1st grade were students discuss copyright. By 2nd grade, students should give credit to their source when they use information for projects. This should continue up						

and be reinforced and different age levels. Because copyright is a difficult topic, students are more likely to pick up on it and understand the importance if start talking about it early on and reinforce it throughout school.						
CGE.12.K.5 Begins in Grade 5	CGE.12.1.5 Begins in Grade 5	CGE.12.2.5 Begins in Grade 5	CGE.12.3.5 Begins in Grade 5	CGE.12.4.5 Begins in Grade 5	GCE.12.5.5 Discuss the impact of access to computing resources	GCE.12.6.5 Demonstrate an understanding of the impact of access to computing resources
This standard could be a writing prompt in a social studies class. Students can analyze the impact of technology resources and how it can affect a community of group of people.						

Lesson Plans

The following pages are a culmination of lesson plans that I have written that incorporate computer science standards in with other content areas. Some of them require specific technology, but some of them can be used without any technology.

Planting the Seeds of Computer Science

First Grade

Objective:

- TSW: Individually identify different plant parts by moving a textbox to the appropriate place in a word document and be able to label the 4 parts correctly and properly use the computer.

Framework or Common Core Standard:

CC.11.1.1 Discuss as a class how information can be communicated electronically
CC.10.1.1 Demonstrate an appropriate level of proficiency with various input/output devices
LS.2.1.4 Locate plant parts: • leaves • stems • flowers • roots

Teaching Standard:

- **Standard #1: Learner Development**. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.
- **Standard #4: Content Knowledge**. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.
- **Standard #5: Application of Content**. The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.
- **Standard #6: Assessment**. The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making.

Materials/Technology:

- Professional Resource: http://marinmg.ucanr.edu/files/187894.pdf
- Computer
- Projector
- YouTube video: https://www.youtube.com/watch?v=ql6OL7_qFgU
- Class laptops
- Word Document
- A way to get a copy of the file to all the students (google drive, email, flash drives, network drive).
- A way to get the students' finished copy for grading (printer, email, flash drive, Google drive, network drive)

- A poster of a plant to point to the parts, or a picture displayed on the projector
- One set of index cards that say: Flower, Stem, Leaves, Roots
- Written directions for finding the file and saving the file (With screen shots)

Introduction:

- "I know how you like to use computers and have been learning many skills on them, today we are going to move to a new science concept. We have been talking about the parts of a human body, and just like there are parts to us, a plant has parts that all have a different job in order to help them get the nutrients they need. So, today we are going to learn how to identify the parts of the plant. First we will learn a song from a video, then we will talk about the parts as a class, and last I will have you use the computer to move words around and label the parts of a plant"

Procedures:

- "First, I have a video to introduce our unit on the part of plant, we will watch this several times and hopefully you will learn these four basic parts and what their jobs are. There are some motions I want you to do with the song, when it gets to the chorus, it will say 'flower, stem, leaves, and roots' we are going to pretend we are each part when we that part comes up. So here is how to act out the four motions:
    - Flower – Put your arms in a circle above your head
    - Stem – Stand up tall with your arms at your side
    - Leaves – Hold your hands out flat
    - Root – Spread your fingers out down toward the ground"
    - Play the video for the students after practicing the movements fast: https://www.youtube.com/watch?v=ql6OL7_qFgU
- After the video, pull out the poster of the plant and show it to the students. Point to the parts and ask them to come up and identify the different parts. The student will draw a card and point to that part and then have another student come and do a different part. Continue this until the topic has been covered and the students are understanding
- "Now I want you to log on to the computer and pull up the Word document file (Explain the method of opening the document. Written steps for all of it would be ideal). Now once you have the document open, you will click and drag the word to the part of the plant it identifies." Show the students how to click and drag a box (make sure that the word wrap is set to in front of text and fixed position on the page.)
- "After you are finished, be sure to resave the document using file save as, and type your name in the file name box so I know who the paper belongs to. Then you will turn it in by (explain how to get the file back to you)"

Culmination:

- "Alright, I hope you all got your paper turned back into me. Be sure you turn your computer off by going to the start button and shutting it down so that the battery stays charged. Now we learned the different parts of the plant today by watching a video, picking it out on the poster and labeling on the computer. Does anyone have any question

about what we learned? Thank you for being awesome students today, and we will continue looking at the parts of a plant and their function through this unit."

Assessment:

- Look over the papers and make sure the students labeled them correctly and that the degree was met.

Extension:

- Art: The students will correctly create their own model to use and teach the class the different part of the plant using various supplies at home or in the classroom.
- Reading: The students will locate a book in the library that tells them more about plants and read it with a partner.
- Math: The students will identify how many leaves or flower are on different plant and add the number together to find a total in a given area such as the playground or a limb.

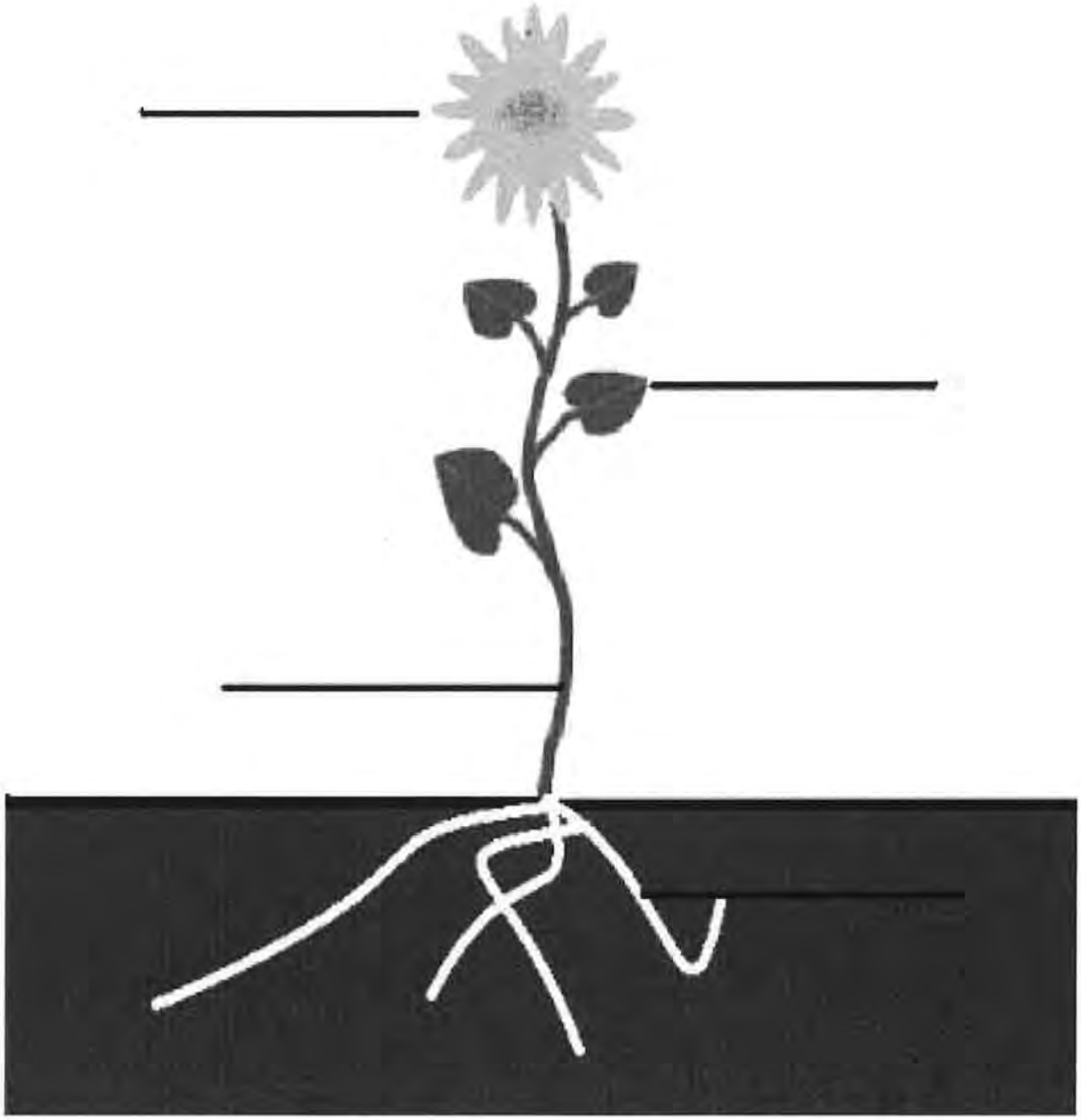
Accommodations:

□Gifted: Let the student help other students but do not let them do things for the students. Using technology can spark students' interest in computer science especially if they are gifted. If they finish early have a game or site they can go to on the computer to learn more or play educational games.
□ADHD/ADD: Moving around and acting out the parts in the video allows the student to let out some energy and move, also allowing the student to get up and point to the part of the plant helps the student be a part of the lesson.

Alternate Suggestions:

- For a later lesson, after talking about the jobs, you could have a card with the job and they have to identify the parts that way.
- The cards and board could also have Velcro or a magnet so the card sticks to the board.
- You could also have blank lines and the student type to words which would also meet Computer Science Standard CC.10.1.3
    - Practice locating: • letter and number keys • enter key • space bar with thumb
- You may want to lock the word document so that the students can only type their name and move the boxes so they don't delete the picture or get everything messed up (This requires using the developer on the ribbon)

Type Your Name: Click here to enter text.



Flower Stem Root Leaves

Programming Penguins

Third Grade

Objective:

- The students will recreate the story of Penguin Pete and Pat by Marcus Pfister by using ScratchJr to animate the story in a small group and be able to accurately retell their part of the story with detail and how it fits into the context of the book.

Framework or Common Core Standard:

- RL.3.2 Recount stories, including fables, folktales, and myths from diverse cultures; determine the central message, lesson, or moral and explain how it is conveyed through key details in the text.
- A.8.3.1 Use a visual block-based programming language individually and collaboratively to solve problems of increasing complexity.

Teaching Standard:

- **Standard #1: Learner Development**. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.
- **Standard #4: Content Knowledge**. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.
- **Standard #5: Application of Content**. The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.

Materials and Preparation:

- Professional Resource: http://news.mit.edu/2014/scratchjr-coding-kindergarten
- Be familiar with the app ScratchJr and prepare an example to use to introduce the app to your students using the rainbow fish (which the students have heard recently) or another book read in the previous few days
- Book: Penguin Pete and Pat
- Groups assigned ahead of time
- Class Tablets with ScratchJr downloaded
- Interactive white board

Introduction:

- "I have made a cool animation of the story the rainbow fish that we read yesterday." Show the student the example.

- "Today I am going to ask you to help me make a similar animation with a different book."
- Agenda
    - "First, we will read the story together.
    - Next, we will design the first page of the story together and I will show you how to use the features of ScratchJr.
    - In a group of 4-5 students you will create a part of the story on your own.
    - The last few minutes of the lesson, we will come together and show the animation we have made to the whole class"

Procedures:

- Do a read aloud with the book "Penguin Pete and Pat" by Marcus Pfister. Have the student use the emoji flip-cards to explain the characters feelings throughout the story.
    - First page: Startled
    - Octopus: Scared
    - After washing off: happy
    - When he went to sleep thinking about the girl: sad
    - When he found the girl: in love
- At the conclusion of the story, bring ScratchJr on the screen for the students to use using the interactive board.
    - "As a class we are going to make the first page of the story. What is the setting on the first page? (Call on a student to select a background). Now what character do we need? (Choose a student to select a character). Now we need to animate the character. First we put a block with the green flag in the build area. This tells the program that when I press the green flag I want the program to do… and this is where we put in what we want it to do.
    - So where do we want the character to move? Toward the water to get on the whales back? Should we put a whale there? I think so! (Have a student put a whale on the screen), now select the penguin character at the side so we can have him move. How should we get him over to the side? Walk up and the over? Well let's put the block to move up on there? (Have a student come up) we can change how far it moves up by changing the number here. Now let's make it move over.
    - Lastly we need to add words so that our story has words. Click on the letters at the top and write the words. Also once you create two pages, you can have the end of the line of code for one page automatically move to the next page by adding the block that has the second page."
    - Show the students different features.
- Have the student groups already set so they can move quickly into the groups. Post them on the board or have their desks already in groups.
- Break the students into groups and have the work on one part of the story each. Put them in groups of 4-5. Start simple with just a one page animation until the students are familiar with the program and then challenge them to do more advanced programs.
    - Roles in the group
        - Student 1: Chooses the background and explains to the class when the time comes

- Student 2: Ensures it follows the story
- Student 3: Puts the characters in place
- Student 4: Animates the characters
- Student 5: Writes the words

Culmination:

- Okay, as a class let's come together and show what we did with our part of the story. We will go in order of the story and see if we can follow. I want Student 1 in each group to explain what the group did in their animation and how it fits into the story.

Assessment:

- The assessment is the students' final project presented to the class. Save the projects to show later. You may want to email the individual pages to one device and put them all together to create the story.

Extension:

- **Math:** The students will solve math problems in Scratch and when the student clicks on a character it reveals the answer.
- **Writing:** The students will develop their own story using the words and the animations to make it come to life.
- **Art:** The student will create a penguin and then give directions for moving it around the classroom as they would give the instructions to the computer.

Accommodations:

□Gifted:

- Have the students create a more complex program on their own. If they are advanced in programming allow them to use a text-based programming language

□Visual/Hearing Impaired

- Have a copy of the book the student can read and see the picture in order to create their own from.

Designing Our Future

Fourth Grade

Objective:

- TSW: Individually create a flyer for an event that is taking place or one they would like to design themselves and answer who, what, when, where, and why within the flyer.

Framework or Common Core Standard:

R.7.4.2 Analyze the manner in which a message is communicate by a visual image (e.g., advertising, brochures, pamphlets, maps)
CC.11.4.1 Use productivity technology tools for writing, communicating, and publishing activities

Teaching Standard:

- **Standard #1: Learner Development**. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.
- **Standard #4: Content Knowledge**. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.
- **Standard #5: Application of Content**. The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.
- **Standard #6: Assessment**. The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making.

Materials/Technology:

- Professional Resource:
- Computer, Projector
- Class laptops
- Sample Flyers
- Flash Drive, Email, or Printer to save the file for grading

Introduction:

- Show examples on the screen of flyers and advertisements and have examples around the room.
- "Have you ever received a flyer or an invitation for an event that made you want to go? Why did it make you want to go? Why did you look at the flyer in the first place?"

- "We have been looking at different types of art that is useful in the real world for things other than just being art to look at. Today we are going to look at paper advertisements such as flyers and you will create your own that will answer five questions about the event."

Procedures:

- "Advertising flyers work first because they make you want to read them and because they make an event sound worthwhile, or like something you need or want to go to. What is something that makes you want to read a piece of paper?"
    - Colors, Pictures, Bright Paper, Cool Font etc.
- "What kind of information do you need to know when finding out about an event from a flyer?"
    - Who is putting on the event?
    - What the event is?
    - When it is taking place?
    - Where it is?
    - How much or how it will work?
- Show the students how to enter Word art, clipart and borders on a Word document.
- "I want you to create your own holiday event flyer to advertise any event. It can be an event you come up with on your own, or an upcoming event you know about. I want you to answer the question Who, What, When, Where, and How when you create the flyer. It should be creative with colors and pictures."
- "After you are finished, be sure to resave the document using file save as, and type your name in the file name box so I know who the paper belongs to. Then you will turn it in by (explain how to get the file back to you)."

Culmination:

- "Alright that is all the time we have, be sure to save your file and if you need time we can work on them later, otherwise email them to me. I am proud of all the work you have done. You are learning skills you will use in making school project and in the business world. Continue to work on these skills whenever you get the chance."

Assessment:

- Look over the flyers, offer written feedback and make sure the students knew how to use Microsoft Word to create a flyer.
- To receive full credit the students should have a colorful and creative flyer that answers the 5 questions about the event.

Extension:

- Math: The students will use Microsoft word to create a visual representation of a math problem
- Reading: The students will locate some advertisements and read and answer questions about what they are for.

- History: The students will analyze advertisements from the great depression to see how they appealed to their audience.

Accommodations:

- Gifted: Let the student help other students but do not let them do things for the students. Using technology can spark students' interest in computer science especially if they are gifted. If they finish early, have a game or site they can go to on the computer to learn more or play educational games.
- Learning/Developmental Disabilities: Provide students with written directions with pictures of how to use Microsoft Word. Students can use this as a reference because some will not know how after watching one time.

What's Your Angle on Block-Based Programming?

Fourth Grade

Objective:

- TSW: Create a block program to draw lines and angles in order to complete to puzzle individually and successfully complete code.org's hour of code.

Framework or Common Core Standard:

- AR.Math.Content.4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines.
- AR.Math.Content.4.MD.C.6 Sketch angles of specified measure
- CT.2.4.1 Examine the relative position of objects using angles within a program (e.g., 30 degree turn)

Teaching Standard:

- **Standard #1: Learner Development**. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.
- **Standard #4: Content Knowledge**. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.
- **Standard #5: Application of Content**. The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.
- **Standard #6: Assessment**. The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making.

Materials/Technology:

- Professional Resource: https://www.khanacademy.org/computing/computer-programming/programming-natural-simulations/programming-angular-movement/a/angles-and-units
- Class laptops
- Projector and computer
- Internet access
- Code.org https://studio.code.org/s/frozen/stage/1/puzzle/1 or https://studio.code.org/s/artist/stage/1/puzzle/1

- Worksheet: http://www.commoncoresheets.com/Math/Angles/Angle%20Estimation%20(MC)/English/1.pdf
- Checklist

Introduction:

- "We have been studying angles on shapes, today we are going to look more about angles in shapes and how to estimate an angle. After we practice as a class, I will show you how to do block-based programming online and how to use the program, then I will give you time to get as far as you can on the program in the time we have today and then we will come back together and I will give you

Procedures:

- Begin with some angles on the screen and talk about how we can estimate the angle based on the angles that are already known such as 90, 45, 180, and 360.
- "I want to show you how angle can relate to programming" pull up code.org on the screen and work through some of the problems to show the students were to find the directions and how to link the programming blocks together.
- "Now I want you to go to www.code.org on your laptop. And choose the Frozen puzzle or the Artist puzzle in the list of Hour of Code games. Work through the problems. If you get stuck or have a question, ask one 2 people around you and then raise your hand and ask for help. Try the problem first on your own. When you work together, make sure you aren't just giving each other the answer but you are actually solving the problems individually."
- Give the students as much time as possible to work 30-45 minutes is ideal or the full hour if time allows, otherwise just have them save their work and come back later.

Culmination:

- "We are running out of time today, I hope we can finish the Hour of Code in the future if you did not get to finish it today, and there are more puzzles like this on the website if you have free time with a computer or want to explore block-based programming more at home."
- Just a quick look at what we talked about today, we looked at the different angles and how we estimate an angle based on the angles we know. We used the knowledge in order to move a character on the screen and turn them at the correct angle to draw a design.
- Does anyone have any questions about what we learned?
- We will continue to practice this in the future."

Assessment:

- Have a class check list and check off when they complete the Hour of Code. Have a practice worksheet of estimating angles based on multiple choice options.

Extension:

- Art: the students will create a simple drawing with shapes and write in the angles used for that shape.
- Science: The students will find occurrence of angles in nature and estimate them

Accommodations:

- Gifted: Encourage them to explore more with programming provide Khan Academy workshops for them to use once they have completed the Hour of Code. Allow them to help other students in the class but make sure they are not giving them the answers.
- Developmental Disabilities: Go to their table first and make sure you help them get started and make accommodations according to their individual needs. Pair them with a gifted student who can help them and show them what to do.
- Learning Disabilities: Provide written directions and some angles as a base to figure out the angles in the coding.

Benefits of Disasters

Fifth Grade

Objective:

- TSW: Individually analyze the cooperation within communities following a disaster by using productivity tool to create a presentation to explain different historical disasters to the class following a rubric.

Framework or Common Core Standard:

- G.11.5.2 Analyze cooperation within communities during and after natural and human-made disasters (e.g., disease, famine, weather phenomena, war)
- CC.11.5.1 Use and evaluate productivity technology tools (e.g., word processing, spreadsheet, presentation software) for effectiveness in writing, communication, and publishing activities

Teaching Standard:

- **Standard #1: Learner Development**. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.
- **Standard #4: Content Knowledge**. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.
- **Standard #5: Application of Content**. The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.
- **Standard #6: Assessment**. The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making.

Materials/Technology:

- Class set of laptops
- Sample presentation
- Rubric
- Class set of laptops
- Projector and computer

Introduction:

- "Have you ever experienced a disaster in a community that you lived in? Maybe a tornado, hurricane, wildfire or anything else?

- I have not experienced anything extreme myself, but I have seen firsthand the impact that natural disasters can create, but it isn't all negative. Disaster, whether natural or man-made, can bring a community together like no other.
- We have been looking at different types of natural disasters and man-made disasters, today we are going to start a research project where you will look at the impacts they have on the community and how a disaster can bring a community together."

Procedures:

- First give an example presentation for the student to model. Give statistics of the disaster, the town and how it brought the town together. Share a story from the event.
- Give the students a rubric of what information expected in the presentation
    - Slide 1: Title Slide
    - Slide 2: Statistics of the Community
    - Slide 3: Cause of the Disaster
    - Slide 4: Cost of the Disaster
    - Slide 5: How the Community Came Together
    - Slide 6: Individuals Story
    - Slide 7: Sources
- Allow student time to work on their projects, this could be an afternoon and present to the next day or something they work on little by little throughout the week and at home.
- Have each student present their information to the class.

Culmination:

- "All of your presentations were wonderful, and I hope you learned from your research and the information your peers presented. We have looked at the impact disaster can have on communities and how they can bring them together to help each other."

Assessment:

- See attached rubric

Extension:

- Art: The students will create a piece of artwork that symbolizes the disaster they researched. Something that could be placed in the community to remember the disaster and how it brought the community together.
- Reading: The students will locate a book about a firsthand account of a natural disaster and do a book report on the book.
- Math: The students will calculate the total damage cost of the disaster they researched.

Accommodations:

□Gifted: The student is able to be creative and go above and beyond with the presentation. Encourage them to find a video or other media that can help add in their project.

□ADHD/ADD: The student is engaged in the lesson with creating and researching a disaster they care about. They are using a computer and able to explore on their own. Monitor to make sure they stay on task.

Alternate Suggestions:

- Provide a listening guide to make sure they students listen to others' presentations.
- Have them write a paper to accompany the presentation.

Score	Content	Conventions	Organization	Presentation
4	• Content has statistics of the town (at least 3) • Information regarding the cause of the disaster • The impact of the disaster (deaths, cost, damage) • Example of how the community came together • At least one individual's story	• No mechanical errors • High-level use of vocabulary and word choice	• Information is clearly focused in an organized and thoughtful manner • Information is constructed in a logical pattern	• 7-8 slides • Multimedia is used to clarify and illustrate the main points • Professional look • The slides have minimal words • Information is not read directly from the slides
3	• Contains at least 4 of the above pieces of information	• Few (1 to 3) mechanical errors • Good use of vocabulary and word choice	• Information is adequate but not presented in a logical, thoughtful pattern	• 5-6 slides • Multimedia is used to illustrate the main points • Professional look • The slides have lots of words • Information is not read directly from the slides
2	• Contains at least 3 of the above pieces of information	• Minimal (3 to 5) mechanical errors. • Low-level use of vocabulary and word choice	• Information is unclear	• 3-4 slides • Multimedia is used • Professional look • The slides have lots of words • Information is read directly from the slides
1	• Contains 2 or less of the above pieces of information •	• More than 5 mechanical errors • Poor use of vocabulary and word choice	• Information is off topic or not present	• 1-2 slides • Unprofessional and/or multimedia is not used effectively

Breaking through Figurative Language

6th Grade

Framework or Common Core Standard:

- **L.6.5** Demonstrate understanding of figurative language, word relationships, and nuances in word meanings, as appropriate for the grade level.
- **CT.3.6.1** Analyze appropriate collaborative behaviors (e.g., providing useful feedback, integrating feedback, understanding and accepting multiple perspectives, using socialization) to solve problems

Objective:

- The students will demonstrate an understanding of figurative language in a small groups and individually with at least 95% accuracy.

Arkansas Teaching Standards:

- **Standard #1: Learner Development**. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.
- **Standard #4: Content Knowledge**. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.
- **Standard #5: Application of Content**. The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.

Materials/Technology:

- 6 Break out boxes
- 6 Sets of 6 Locks
- Break out Package
- Class Chromebooks
- Google Classroom

Introduction:

- Have the break out boxes set out for the students to see when they walk in the classroom.
- "We have been reviewing concepts that you already know for your upcoming test. Today we are going to review figurative language and you will have to identify and use figurative language in order to break into these boxes and find a sweet prize inside."
- "Let's go over the figures of speech you will need to be successful today:
    - What are some different types of figurative language?"

- Write the following examples on the board as they are listed and talk about the definitions.
  - Simile – Compares two things using 'like' or 'as'
  - Metaphor – comparison without using 'like' or 'as'
  - Idiom – An expression that means something different from what it actually says
  - Onomatopoeia – words taken from the sounds they make
  - Personification – Giving human qualities to ideas or things
  - Hyperbole – An extravagant exaggeration
  - Alliteration – Repeated beginning sound.

Procedures:

- "You will break up into the teams that I put on the board for you, and move to a box around the room. I will then pass out the packets for you to get started. Each page will tell you the information that you need to know for each of the locks on the box. You should all work together and no one should be left out of working."
- Show the students their groups and let them get started with their packets.
- Walk around and monitor the students.
- Attached is the full activity that the students will complete. It includes group work, as well as individual assessments.

Culmination:

- "We only have about 5 minutes left in the class, so I need you to reset your box for the next class and put all of your papers back in your envelope so you can restart tomorrow.
- Today we reviewed figurative language, does anyone have any questions about figurative language?
- Tomorrow if you did not finish, we will continue to work on the boxes."

Assessment:

- The assessment will be based on the individual student's responses to the assessment. As the teacher I can see individually what the students scored each time they took the assessment. The test is varied for students with intellectual disabilities to have fewer answer choices. The students should be able to take the assessment until they make a 100% but I expect all students to have at least a score of 95%.

Extension:

- **Writing:** The students will create their own passage containing every piece of figurative language covered.
- **Science:** The students will write similes to explain scientific discoveries under a microscope.
- **Math:** The students will design a math worksheet containing figurative language that describes how to solve a multistep math problem.

Accommodations:

ADHD/ADD

- I will walk around during their work time and make sure they stay on task.

Physical Impairment

- Working together the students can help with manipulating the boxes.

Behavior Issues

- I will monitor behavior while the students are working to ensure they are working with their teams and not being disruptive.

Intellectual Disabilities

- These students will have a different individual assessment with fewer answers choices.

Figurative Language Break out Boxes

Designed for use with 6th grade standards

Includes the following elements of figurative language:

SIMILE

METAPHOR

HYPERBOLE

PERSONIFICATION

IDIOM

ALLITERATION

By: Mary Grace Hill

Instructions:

1. **The pages with "Hyperbole, onomatopoeia, personification, and alliteration" and directions should be placed around the room on two walls, the floor and the ceiling.**
2. **Set all the locks to the following combinations:**

   Word lock : snuon
   Directional: left up left right down
   Key – have the key ready to give them
   3 digit grey – 645
   4 digit – 3948
   Other 3 digit – 732
   Lock box - 438

3. **Each group of students needs a packet with a number on it, so if they do not finish the first day, they can put all the work they have done in the envelope and get it out the next day.**

Hyperbole

Up

Onomatopoeia

Down

Personification

Left

Alliteration

Right

1. **The wind whistled through the trees.**
2. **I have told you a million times.**
3. **The stars looked down from the sky.**
4. **Peter Piper picked a peck of pickled peppers.**
5. **The cars crashed together on the highway.**

The sentence "She was as quiet as a mouse" is an example of a _____.

The sentence "Her face was an open book" is an example of a _____.

?tahw erapmoc hceeps fo serugif owt esehT

Below is a passage about Princess Penelope that contains figures of speech find the line that contains the figure of speech listed.

Once upon a time, Prince Paul went on a search for a princess. He held a royal ball for all eligible young ladies. Princess Pearl wanted so badly to attend the ball, but her father told her should could not date until she had finished her degree. Pearl cried like a baby, distraught over not being able to go to the ball. When Pearl's mother heard, she banged on the princess's door bringing her a dress that said "I am here to dance with the prince". Pearl's mother helped her get ready and sneak out the window into a waiting carriage that became a train speeding away to the ball. When Pearl arrived at the ball, she was the most stunning girl there and immediately caught the eye of the Prince. They danced until Pearl's legs could no longer keep up in her high heeled shoes. Slam! Prince Paul had stepped on the princess's dress, and Pearl fell to the ground like an apple falling from a tree. Pearl was so embarrassed she ran home and agreed to never date again, but the next day the Prince searched high and low for Pearl until he found her, studying in her home! He persuaded her father to allow him to date her until she was finished with school.

The numbers for one of the four digit locks are

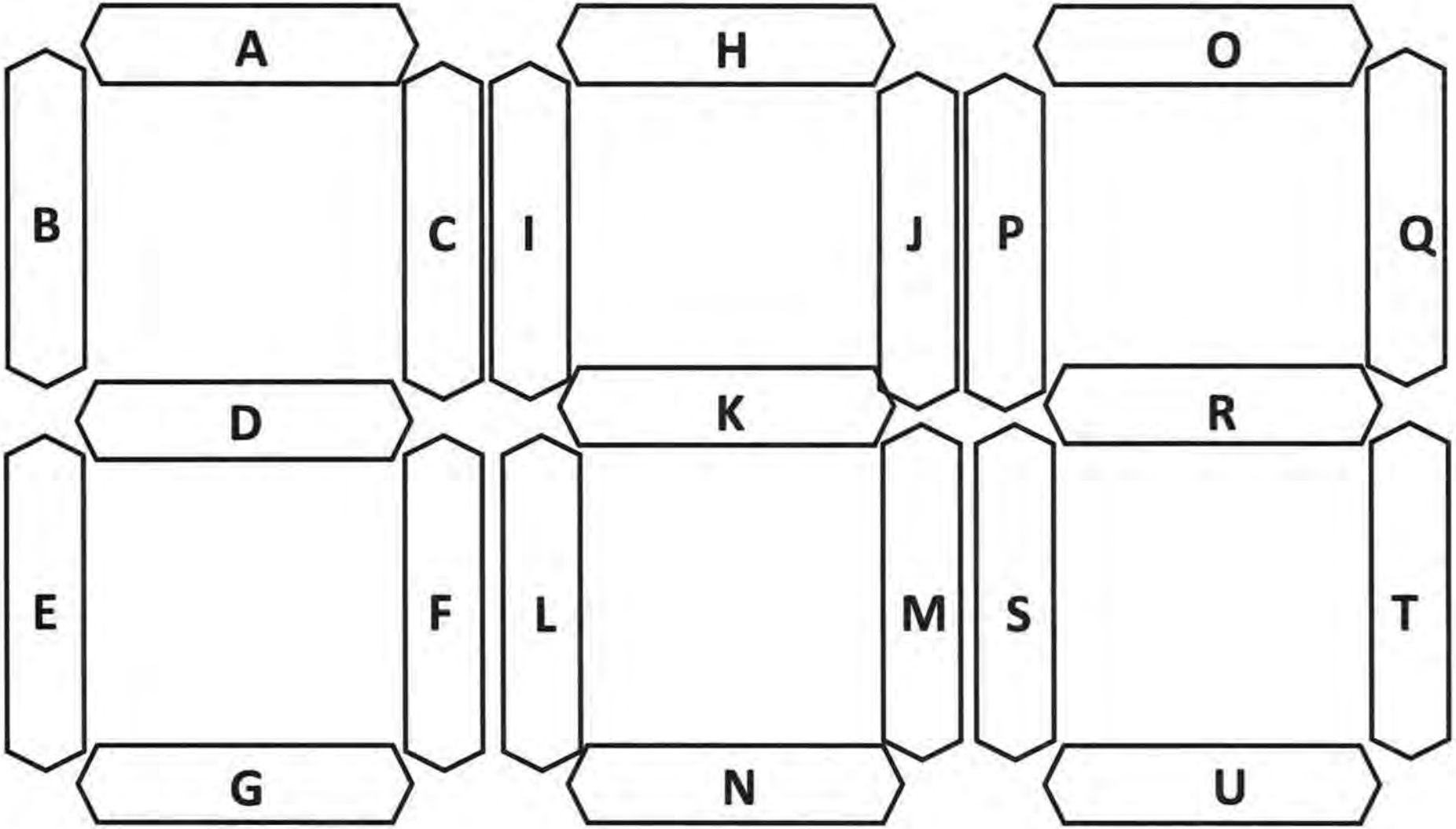
There are similes on lines _____ and _____ and there are onomatopoeias on lines _____ and _____.
1st one 2nd one 1st one 2nd one

The numbers for the grey 3 digit lock are:

There is a metaphor on line _____ and there is an example of personification between lines ____ and ____.

To get the key for the key lock you must complete the figurative language assignment in Google Classroom. This is to be done individually. If you do not score 15/15, you must redo the assignment until you get 15/15. Bring me your Chromebook to show me your score. Once the last person has finished, I will give your group their key.

Use the true and false page to figure out the number. If the statement matching the box is true leave the box blank. If the statement matching the box is false, shade the box in.



Figurative Language True/False

A. _____"He was a cheetah running down the hall" is a simile.
B. _____Hyperbole is a type of Figurative Language.
C. _____ "My file cabinets are made of metal" is a metaphor.
D. _____ "Time is a marching army" is an example of a metaphor.
E. _____You can personify animals.
F. _____ "We had to wait forever" is a metaphor.
G. _____"I was as sick as a dog" is an example of a simile.
H. _____ "My love is like a red rose" is an example of a metaphor.
I. _____Metaphor, similes, alliterations, and personification are all types of figurative language.
J. _____ "His eyes were a blue sky" is an example of alliteration.
K. _____ "The camera loves me" is an example of an onomatopoeia.
L. _____ "My computer hates me" is an example of personification.
M. _____ "Sally sells sea shells by the seashore" is a hyperbole.
N. _____A hyperbole is the repeated beginning sounds.
O. _____A metaphor contains 'like' or 'as'.
P. _____A simile always contains 'like' or 'as'.
Q. _____ "We had a ton of work to do on Monday" is an idiom.
R. _____ "She can't even remember her own name" is an example of personification.
S. _____ "The sunflowers nodded their yellow heads" is an example of an onomatopoeia
T. _____ "The mind is a spring" is a metaphor.
U. _____Similes always compare verbs.

Use the passage from earlier to answer the following questions and get the final numbers needed to break into the boxes.

1. In line 1, the prince's name contains alliteration. Which of the following last names for the prince would be consistent with this alliteration?

    2. Jones

    4. Patrick

    6. Hill

    8. Queen

2. Read the simile in line 9. How did the princess fall?

    5. softly

    1. lightly

    3. hard

    9. loud

3. In line 3, which of the following words could best be substituted for the word "train" without changing the meaning of the simile or the sentence?

    8. cheetah

    4. quickly

    2. puppy

    7. lightning

Conclusion

While at Ouachita Baptist University, I had to opportunity to learn from experienced teachers, observe education first hand, and Begin my experience toward becoming a highly effective teacher. Through this, along with my background in technology, I fell in love with the idea of teaching my future students my love of technology. Technology is a great resource, and when future generations learn how to effectively use technology, there is no limit to where they can go. Interest in technology needs to start early with students learning to use technology for learning. It is often been said that in Kindergarten and 1st grade, students learn to read, and in 2nd grade and beyond they read to learn. The same can be true of technology. If we teach students how to research using technology, they can learn anything. The effects of technology have been seen when kids learn skills by watching YouTube videos. It is the responsibility of the school to teach students the proper way to learn from technology and provide them with ways to share their knowledge with the world.

References

Arkansas Department of Education (2016). Arkansas computer science curriculum standards for grades K-8. Retrieved from http://www.arkansased.gov/public/userfiles/Learning_Services/Curriculum%20and%20Instruction/Frameworks/Computer%20Science/Grades_K_4_Computer_Science_01152016.pdf

Black, R. W. (2009). English-language learners, fan communities, and 21st-century skills. *Journal of Adolescent & Adult Literacy, 52*(8), 688–697.

Drake, S. M. & Burns, R. C. (2004). Meeting standards through integrated curriculum: What is integrated curriculum? Retrieved from http://www.ascd.org/publications/books/103011/chapters/What-Is-Integrated-Curriculum%C2%A2.aspx

Lapowsky, I. (2017, June 03). So, Arkansas is leading the learn to code movement. Retrieved from https://www.wired.com/2015/03/arkansas-computer-science/

Resnick, M (2013, May 8). Learn to code, code to learn. *EdSurge,* Retrieved from https://cedsurge.herokuapp.com/news/2013-05-08-learn-to-code-code-to-learn