Curriculum Map Project

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The following curriculum map will be created for an 6th grade Introduction to Computers class and is aimed at exploring the world of computers and their related technologies.

Learner Characteristics

The 6th grade students enrolled in this class are expected that they have fulfilled the 5th Grades Arkansas Computer Science Standards (Arkansas Department of Education, 2016). Most of their educational careers have consisted of using Google Classroom or the occasional educational application or website. According to Grapevine-Colleyville ISD (2007), 11 and 12-year-old 6th graders learn best when activities are active, hands-on and related to personal experiences.

Subject Overview

In this class, students will begin by discussing computer hardware and advance through the year by discussing topics such as security, ecommerce, data science, being a global citizen and artificial intelligence. The theme for the class is Computers Make the World Go Around! This insinuates that computers are used as the basis for many of the programs, processes and technology that powers the world today. This theme is an exploration of all things computer related that a member of the 21st century society must understand to be a productive, responsible member. The 8-week segment (2 units) described in this assignment will focus on Computer Hardware and Computer Software.

Curriculum Model

The model selected for the development of this curriculum is the Understanding by Design model (Wiggins & McTighe, 2005) as developed by Grant Wiggins and Jay McTighe. The reason for selecting this model is the backwards design philosophy employed by the model.

Starting from the desired results of the standards identified and working backwards to determine the assessments need to achieve the desired results and then finally the activities that need to occur to drive to those assessments. The WHERETO acronym is also helpful in determining what to include in the curriculum development.

Curriculum 21 & 21st Century Learning

These 2 units invoke the 4 C's of 21st Century Learning Skills: Critical Thinking, Creativity, Collaboration, and Communication (Applied Education Systems, n.d.). Some of the most fun lessons are called The IT Crowd where the students have to a) work collaboratively to diagnose hardware or software problems. They then have to b) communicate effectively their solutions that were ascertained by c) critical thinking exercises. And all of this is communicated through a d) creative interaction with multiple individuals role-playing.

These units also promote information, media and technology skills. Instead of just top down lecture/note taking, the students are required to jump into technology by using blogs, vlogs, live streams, web sites, YouTube videos, etc. Several of these lessons focus on life & career skills that an individual in the 21st century will need to be an active contributor to a connected society.

Curriculum Map

Unit 1, Week 1 – There's a Snake (of wires) in my Boot (-able computer)!

Stage 1 – Desired Results

Established Goals:
ISTE – 1d – Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies
ISTE – 7b - Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.
CC. 11.7.2 - Describe major components and functions of computer systems and networks

Students will understand that …	Essential Questions:
Computers are made of several internal components. Each computer part plays a vital role in the computer being able to function.	What is a computer? Why is computer hardware important? What is a computer without hardware?
Students will know… The names of all the internal components. The function of all the internal components.	Students will be able to… Identify each internal component of a desktop computer
Lesson Objectives The 6th grade student will be able to identify each internal component of a desktop computer by describing the function of each component with competency.	Lesson Learning Targets I will watch a video about the internal parts of a computer and discuss computer parts in a "de-construction" lab. I will also have to create a vlog where I describe computer components and their functions to a younger sibling.

Stage 2 – Assessment Evidence

Assessment:
Assessment #1: Students will be assessed (formative) according to their contributions during Dr. Frankenstein's Lab activity
Assessment #2: Students will be assessed (formative) through their vlog assignment wherein they record themselves describing the internal components of a computer and their function to a younger sibling.

Stage 3 – Learning Plan

Resources & Activities:
Activity #1: In this lesson students will watch the *What does what in your computer? Computer parts explained* video.
Activity #2: Students will then take part in a collaborative discussion during Dr. Frankenstein's lab. "Dr. Frankenstein" will disassemble a computer and discussing each part as it is removed from the computer. Students must contribute to the discussion.
Activity #3: Students must complete a vlog assignment in which they attempt to describe the internal components of a computer to a 5-year-old.

Timeline:
This is lesson 1 of 4 in this unit and will occur over the course of a 5-learning session week.

Unit 1, Week 2 – Computers, Assemble!

Stage 1 – Desired Results

Established Goals:
CT.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.
ISTE - 1d - Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
ISTE - 3d - Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
ISTE - 7c - Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

Students will understand that … Each computer component has a specific job. Purchasing and changing out computer part can extend the life of your computer purchase.	Essential Questions: How are all the internal parts of a computer related? Why is it a good idea to know how to buy computer components?
Students will know… Why each computer component is necessary. Which computer components to purchase to build a computer. The proper placement of each computer component inside the case of a computer.	Students will be able to… Shop for PC components on an online store. Assist in assembling a computer from its component parts.
Lesson Objectives The 6th grade student will select and help assemble all the parts necessary to build a functioning computer by utilizing a PC Parts website with competency.	Lesson Learning Targets I will help write and act in a skit pretending to be a computer component and why I'm important. I will build a list of computer components needed to build a computer on the PC Parts Picker website. I will also take part in a lab project where I help our teacher rebuild a computer from its parts.

Stage 2 – Assessment Evidence

Assessment:
Assessment #1: Students will be assessed (formative) based on their participation and contributions to the computer component skit.
Assessment #2: Students will be assessed (formative) on their ability to collect the correct and appropriate amount of parts necessary to build a computer. Students will add components to their shopping cart on PC Parts Picker and share that list with the instructor.
Assessment #3: Students will be assessed (summative) on their participation and contributions to the computer assembly activity during Dr. Frankenstein's lab.

Stage 3 – Learning Plan

Activities and Resources:

Activity #1: Students will split up into groups to develop a skit where each student is a component and what each component is responsible for in a computer. The skit must focus on how all components are necessary and what would happen if each part were left out of the build.

Activity #2: The class will visit the PC Parts Picker website to choose the components necessary to build their own computer. This will help the students recognize the expense of the equipment.

Activity #3: Back to Dr. Frankenstein's Lab. In the previous week, the students dissected a computer. This week, we will construct a computer from its core components. Students will also draw on their experience from the skit activity to determine what happens if a component is left out of the build.

Timeline:

This is lesson 2 of 4 in this unit and will occur over the course of a 5-learning session week.

Unit 1, Week 3 – Hello, IT. Have You Tried Turning It Off and On Again?

Stage 1 – Desired Results

Established Goals:
CT.3.8.1 - Demonstrate appropriate collaborative behaviors (e.g., providing useful feedback, integrating feedback, understanding and accepting multiple perspectives, using socialization) to solve problems of increasing complexity.
CC.11.6.4 - Apply strategies for solving simple hardware and software problems that may occur during use.
ISTE - 1d - Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
ISTE - 3d - Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
ISTE - 7c - Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

Students will understand that …	Essential Questions:
Sometimes hardware issues can cause the computer to not function correctly. Fixing computer hardware problems can sometimes be a quick fix.	Is it better to get a new computer or repair the one you have? How can diagnosing hardware problems help you to understand more about computers?
Students will know… The proper steps to determine hardware problems.	Students will be able to… Locate the root cause of hardware failure issues. Explain and demonstrate why their solution is correct.
Lesson Objectives The 6th grade student will deduce the cause of common hardware problems by collaborating with a group of peers with proficiency.	Lesson Learning Targets I will read and discuss an article about computer hardware problems. I will help figure out why a computer isn't working. I will work with classmates to develop a presentation about how we figured out computer problems.

Stage 2 – Assessment Evidence

Assessment:
Assessment #1: Students will be assessed (formative) on their contributions and participation in the *Common PC Hardware Problems* article discussion.
Assessment #2: Students will be assessed (summative) on their contributions to their group projects. This will include making sure each student is responsible for delivers a specific portion of the presentation. This way students will be assessed individually and as part of the group.

Stage 3 – Learning Plan

Resources & Activities:
Activity #1: Students will read and discuss the *Common PC Hardware Problems* article.

Activity #2: Students will diagnose component failure issues based on poorly assembled computers or faulty components. The instructor will present a team of students with a computer, a list of symptoms, and the students will act together as an IT Team to diagnose and solve the computer hardware issues.
Activity #3: The IT Crowd. Students will take the results of their troubleshooting exercise and develop a group presentation wherein they describe their recommendations for correcting the assigned issues and how they reached those recommendations. This presentation will be conducted in the form of an IT Help Line. Each team member will be responsible for answering a random "call" from a frustrated customer. The "customer" will present the symptoms of the issue and the student on the call will have to present the solution to correct the issue based on the group research. The student will also be responsible for detailing why the solution was determined.

Timeline:
This is lesson 3 of 4 in this unit and will occur over the course of a 5-learning session week.

Unit 1, Week 4 – Sweet Raspberry Pi

Stage 1 – Desired Results

Established Goals:
ISTE – 4a – Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
ISTE – 4c – Students develop, test and refine prototypes as part of a cyclical design process.
ISTE – 6d – Students publish or present content that customizes the message and medium for their intended audiences.
A.8.6.1 - Use a visual block-based and/or text-based programming language individually and collaboratively to solve problems of increasing complexity.

Students will understand that …	Essential Questions:
Computers come in all sizes. Microcomputers can handle a lot of day-to-day tasks without the need for robust components.	Does the size of a computer affect its processing ability? Can a microcomputer of today replace a desktop computer?
Students will know…	Students will be able to…
That you don't have to be a programmer to be able to use microcomputers. The difference between a microcomputer and a desktop computer.	Use a microcomputer to develop a small DIY project.
Lesson Objectives	Lesson Learning Targets
The 6th grade student will be able to create a functioning Raspberry Pi project by following a project plan with competency.	I will read and discuss an article about Raspberry Pi computers. I will attend a discussion from a local microcomputer expert to talk about creating projects with a Raspberry Pi. I will work with a classmate to build a project using a Raspberry Pi and present it to the class.

Stage 2 – Assessment Evidence

Assessment:
Assessment #1: Students will be assessed (summative) on successful operation of their Raspberry Pi project.
Assessment #2: Students will be assessed (formative) on their contributions and participation in their team's Raspberry Pi presentation.
Assessment #3: Students will be assessed (formative) on their blog entry on 2 things they liked about this week's lesson and one thing they still have a hard time understanding.

Stage 3 – Learning Plan

Resources & Activities:
Activity #1: Read and discuss the *Can a Raspberry Pi 4 Really Replace Your PC?* article.
Activity #2: Have a local Maker come and show the class all the different uses of a Raspberry Pi microcomputer. Discuss different projects the students can work on during the week for their "Pi Baking Contest."

Activity #3: Students will work with a teammate using a Raspberry Pi to create something of their own for the "Pi Baking Contest," and present their Pi projects to the class by demonstrating its capabilities. The presentation should include components used and any programs or processes used to generate the desired outcome.
Activity #4: Students will create a blog entry on 2 things they liked about this week's lesson and one thing they still have a hard time understanding.

Timeline:
This is lesson 4 of 4 in this unit and will occur over the course of a 5-learning session week.

Unit 2, Week 1 – Why is it Called Software?

Stage 1 – Desired Results

Established Goals:
ISTE – 1d Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies
CC. 11.8.2 - Describe major components and functions of computer systems and networks

Students will understand that … Computers are just really expensive paperweights without software.	Essential Questions: Will software ever replace the human brain? Can we create a program for every human skill?
Students will know… The difference between hardware and software.	Students will be able to… Describe different types of software.
Lesson Objectives The 6th grade student will be able to differentiate between hardware and software by evaluating favorite software programs with competency.	Lesson Learning Targets I will watch a video explaining how software works with hardware in computers. I will learn more about how software is made by going on a field trip to a local college. I will create a wiki entry and vlog about my favorite software/apps.

Stage 2 – Assessment Evidence

Assessment:
Assessment #1: Students will be assessed (formative) on if they completed the required viewing of the Khan Academy video series.
Assessment #2: Students will be assessed (formative) on their contributions to the class wiki and the content of their favorite software/app vlog.

Stage 3 – Learning Plan

Resources & Activities:
Activity #1: In this lesson students will watch the *How Computers Work* video series on Khan Academy.
Activity #2: Students will take a field trip to the local university to explore the software engineering department and discover what the software engineers do.
Activity #3: Students will contribute to a class wiki on their 3-favorite software/apps and develop a short vlog on why they selected the software/apps that they did.

Timeline:
This is lesson 1 of 4 in this unit and will occur over the course of a 5-learning session week.

Unit 2, Week 2 – Let's Go to Work!

Stage 1 – Desired Results

Established Goals:
ISTE – 1d Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies
CC. 9.6.1 - Investigate a career that requires computing and technology.

Students will understand that … Software powers today's workforce. Many companies, even non-tech related companies, utilize custom software for business.	Essential Questions: Why would a company create new software instead of buying something that already exists?
Students will know… The difference between Waterfall and Agile software development. The different roles represented on a software development team.	Students will be able to… Describe the software development process
Lesson Objectives The 6th grade student will be able to demonstrate the software development life cycle by conducting a mock requirements meeting with competency.	Lesson Learning Targets I will create a Google Slideshow on the different phases of software development. I will attend a web conference with a software developer to learn more about the software development process. I will work with teammates to conduct a mock software development requirements meeting.

Stage 2 – Assessment Evidence

Assessment:
Assessment #1: Students will be assessed (summative) on creating a Google Slide deck describing each of the 7 stages of the software development life cycle.
Assessment #2: Students will be assessed (formative) on their contributions and participation during the custom software development webcast.
Assessment #3: Students will be assessed (formative) on their role, contributions and participation during the software development team mock exercise.

Stage 3 – Learning Plan

Resources & Activities:
Activity #1: Read the articles and discuss *What Is Custom Software Development* and *Software Development Process: How to Pick the Process that's Right for You*.
Activity #2: Engage in a webcast with a local company that has had custom software developed for day-to-day business purposes. Students will be expected to ask questions regarding the development of custom software.
Activity #3: Students will work together as a mock software development team. Each member will have a specific role. Their task will be to interview the instructor about his/her software needs based off a predetermined scenario/industry.

Timeline:
This is lesson 2 of 4 in this unit and will occur over the course of a 5-learning session week.

Unit 2, Week 3 – Software Showcase

Stage 1 – Desired Results

Established Goals:
ISTE – 4b – Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
CC. 11.8.2 – Describe major components and functions of computer systems and networks

Students will understand that …	Essential Questions:
Software programs/app can be used for a wide variety of purposes. Everyone can become an expert in some form of program.	What are we limited by when it comes to using software? Can you think of something that software can't do?
Students will know…	**Students will be able to…**
That software is just a tool to create original works with. That practicing software skills help create proficiency in software use.	Demonstrate their knowledge of a particular software program/app.
Lesson Objectives	**Lesson Learning Targets**
The 6th grade student will be able to create an original work by using a select software with proficiency.	I will select one of my favorite software programs or apps and create an original piece of content.

Stage 2 – Assessment Evidence

Assessment:
Assessment #1: Students will be assessed (summative) on their content creation according to a predefined rubric.
Assessment #2: Students will be assessed (summative) on their presentation and Q&A session.
Assessment #3: Non-presenting students will be assessed (formative) on their participation and feedback given during the presentations.

Stage 3 – Learning Plan

Resources & Activities:
Activity #1: Will spend the week working on their Software Showcase projects. In a previous unit, students were asked to submit their favorite software programs/apps. The student will then select one of their favorites and create some kind of content that demonstrates the capabilities of the software/app. There are no boundaries for this project other than it must be appropriate to be viewed/used in a school setting. It could be a document, spreadsheet, image creation, video creation, etc.
Activity #2: Students will take part in a 2-day showcase wherein they are given the opportunity to showcase their creation. Each student will present their creation before the class and describe the process of creating it. Students will answer questions from the rest of the class.

Timeline:
This is lesson 3 of 4 in this unit and will occur over the course of a 5-learning session week.

Unit 2, Week 4 – What Happens When I Click This Button?

Stage 1 – Desired Results

Established Goals:
CT.3.8.1 - Demonstrate appropriate collaborative behaviors (e.g., providing useful feedback, integrating feedback, understanding and accepting multiple perspectives, using socialization) to solve problems of increasing complexity.
CC.11.6.4 - Apply strategies for solving simple hardware and software problems that may occur during use.
ISTE - 1d - Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
ISTE - 3d - Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
ISTE - 7c - Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

Students will understand that … Just like in hardware, sometimes software can prevent computers from functioning properly. Sometimes it takes a team to fix a software problem.	Essential Questions: What do you do if you don't know how to fix something? If you're computer stopped working, what would you do?
Students will know… How to diagnose a software problem. How to work as a team to solve software issues.	Students will be able to… Locate the root cause of software failure issues. Explain and demonstrate why their solution is correct.
Lesson Objectives The 6th grade student will deduce the cause of common software problems by collaborating with a group of peers with proficiency.	Lesson Learning Targets I will work with a team to help figure out why a computer isn't working.

Stage 2 – Assessment Evidence

Assessment:
Assessment #1: Students will be assessed (formative) on their contributions and participation in the *A Common Computer Problems List* article discussion.
Assessment #2: Students will be assessed (summative) on their contributions to their group projects. This will include making sure each student is responsible for delivers a specific portion of the presentation. This way students will be assessed individually and as part of the group.

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References

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