Millcreek Township School District

Part III: Computer Science Grade 8 Curriculum Map

Course Title: Computer Science Grade 8

The goal of this course is to provide students with continued opportunities to develop their computational thinking and digital literacy skills in a variety of experiences. Throughout this course, the students will work to develop and hone their skills in the areas of problem-solving, persistence, creativity, collaboration, and communication. All of these naturally occur during the design process used by computer scientists. In Grade 8, students will begin by examining the design process and focus on user-centered design. The design process is an approach used in many career tracks (e.g., architects, engineers) to solve a variety of problems. The students have a background in the design process; however, this particular unit will have them identify empathy for the user as an important component of the design process. Students will brainstorm ways to make improvements to a product based on a user profile, select the most appropriate strategies, and collect and analyze feedback from peers to finalize the prototype. The second unit will focus on utilizing the computer skills they were introduced to in Grade 7 (e.g., digital literacy, programming, debugging) with the addition of a focus on creativity and collaboration. One additional unit in this course is Touch Typing. The goal of this ongoing unit is to provide students with frequent practice time to develop their keyboarding skills. It will be individualized and supported by an online program. Students will set short-term individual goals and work at their own pace to develop their skills. All aspects of this course provide our students with foundational learning that will transfer and prepare them for success in Middle School and their future High School coursework.

Time Frame: 22 class periods

Power Standards for Course:

- 2-IC-20 Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- 2-IC-21 Discuss issues of bias and accessibility in the design of existing technologies. 3.4.8.C1. Evaluate the criteria and constraints of a design.
- 2-IC-22 Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact.
- 2-IC-23 Describe tradeoffs between allowing information to be public and keeping information private and secure.
- 2-CS-01 Recommend improvements to the design of computing devices, based on an analysis of how users interact with the devices.
- 2-DA-08 Collect data using computational tools and transform the data to make it more useful and reliable.

- 3.4.8.C2. Explore the design process as a collaborative endeavor in which each person in the group presents his or her ideas in an open forum.
- 3.4.8.D1. Test and evaluate the solutions for a design problem.
- ISTE 1. Creativity and innovation: Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.
    - Apply existing knowledge to generate new ideas, products, or processes.
    - Create original works as a means of personal or group expression.
- ISTE 2. Communication and collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
    - Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media
    - Contribute to project teams to produce original works or solve problems
- ISTE 3. Research and information fluency Students apply digital tools to gather, evaluate, and use information.
    - Plan strategies to guide inquiry
    - Process data and report results
- ISTE 4. Critical thinking, problem-solving, and decision-making Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
    - Plan and manage activities to develop a solution or complete a project
    - Collect and analyze data to identify solutions and/or make informed decisions
    - Use multiple processes and diverse perspectives to explore alternative solutions
- ISTE 6. Technology operations and concepts: Students demonstrate a sound understanding of technology concepts, systems, and operations.
    - Transfer current knowledge to learning of new technologies.
- CC.1.4.6.U Use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of three pages in a single sitting.
- CC.1.4.7.U Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and citing sources.

Enduring Understandings:

- In the content area of computer science, they will build knowledge and experience learning, which allows them to develop new and creative approaches to problem-solving.
- The engineering design process represents a systematic series of steps that helps you define, plan, and produce a product or solve a problem.
- The end user is a critical component of the user-centered design process.

- Receiving and providing feedback, a component of the design process, is imperative for growth.
- Technology provides ways to collect, organize, and analyze data which is a set of skills that can transfer across content areas and career pathways.
- Having a sufficient command of keyboarding skills and utilizing proper ergonomics will lead to a more efficient work session.

Essential Questions:

- How can experiences in computer science help you develop new and creative approaches to problem-solving?
- How can we use the engineering design process for problem-solving and developing products?
- To what extent is the end user a critical component to the user-centered design process? How can the user-center design process differ from the common engineering design process?
- How can receiving and providing feedback be instrumental for growth?
- To what extent can the skill sets applied when using Google Platform be transferred across content areas and career pathways?
- To what extent does the level of keyboard skills and use of proper ergonomics impact digital content creation efficiency?

List of Unit Titles:

1. The Design Process: User-Centered Design
2. Current Technology Topics
3. Keyboarding

Unit 1: The Design Process: User-Centered Design

Unit 1 Summary:

The goal of this unit is to provide students with additional opportunities to apply and improve their problem-solving skills and strategies using the engineering design process. This unit is unique in that it asks students to consider making different design choices. Students will engage in activities that will focus on building empathy for others. This, in turn, will help them to consider developing an innovative creation for various users. Students will use a deliberate design process to develop, test, and refine prototypes as part of the engineering design process. Skills and strategies from this unit will transfer across the remaining units in this course.

Power Standards:

- 2-CS-01 Recommend improvements to the design of computing devices, based on an analysis of how users interact with the devices.

- 2-IC-21 Discuss issues of bias and accessibility in the design of existing technologies. 3.4.8.C1. Evaluate the criteria and constraints of a design.
- 3.4.8.C2. Explore the design process as a collaborative endeavor in which each person in the group presents his or her ideas in an open forum.
- 3.4.8.D1. Test and evaluate the solutions for a design problem.
- ISTE 1. Creativity and innovation Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.
    - Apply existing knowledge to generate new ideas, products, or processes.
    - Create original works as a means of personal or group expression.
- ISTE 2. Communication and collaboration Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
    - Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.
    - Contribute to project teams to produce original works or solve problems.
- ISTE 4. Critical thinking, problem-solving, and decision-making Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
    - Plan and manage activities to develop a solution or complete a project.
    - Collect and analyze data to identify solutions and/or make informed decisions.
    - Use multiple processes and diverse perspectives to explore alternative solutions.
- ISTE 6. Technology operations and concepts Students demonstrate a sound understanding of technology concepts, systems, and operations.
    - Transfer current knowledge to learning of new technologies.

Enduring Understandings:

- In the content area of computer science, they will build knowledge and experience learning, which allows them to develop new and creative approaches to problem-solving.
- The engineering design process represents a systematic series of steps that helps you define, plan, and produce a product or solve a problem.
- The end user is a critical component of the user-centered design process.
- Receiving and providing feedback, a component of the design process, is imperative for growth.

Essential Questions:

- How can experiences in computer science help you develop new and creative approaches to problem-solving?
- How can we use the engineering design process for problem-solving and developing products?
- To what extent is the end user a critical component to the user-centered design process?
- How can the user-center design process differ from the common engineering design process?
- How can receiving and providing feedback be instrumental for growth?

Declarative Knowledge:

1. Engineering Design Process
    a. Identify the Problem
    b. Brainstorm
    c. Design
    d. Build – evaluate – redesign cycle
    e. Share solution
2. User
3. Critique
4. Empathy

Procedural Knowledge:

1. Identify, describe, and apply the engineering design process.
2. Develop a product based on the relationships between users and their needs.

Unit 2: Current Technology Topics

Unit 2 Summary:

This unit will help students understand how technology in the news affects our everyday lives.

Power Standards:

- 2.IC.20 - Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- 2.IC.23 - Describe tradeoffs between allowing information to be public and keeping information private and secure.

Enduring Understandings:

- Students will explore various current technology topics.

Essential Questions:

- How is technology in the news affecting our everyday lives?

Declarative Knowledge:

1. How technology is affecting us every day.

Procedural Knowledge:

1. Internet research guidelines

Unit 3: Keyboarding

Unit 3 Summary:

The goal of this ongoing unit is to provide students with frequent practice time to develop their keyboarding skills.

Power Standards:

- CC.1.4.6.U Use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of three pages in a single sitting.
- CC.1.4.7.U Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and citing sources.

Enduring Understandings:

1. Having a sufficient command of keyboarding skills and utilizing proper ergonomics will lead to a more efficient work session.

Essential Questions:

1. To what extent does the level of keyboard skills and use of proper ergonomics impact digital content creation efficiency?

Declarative Knowledge:

1. Posture
2. Home row
3. Keystrokes
4. Key by touch-type

Procedural Knowledge:

1. Type using the correct posture and position
2. Type using the correct keystrokes.
3. Type using the key by touch-type method

Unit 4: Google Platform

Unit 4 Summary:

The goal of this ongoing unit is to provide students with direct and explicit opportunities to develop their skills and usage of Google Suite.

Power Standards:

- 15.3.8.A Selecting the appropriate writing type to produce a work product.
- 15.3.8.B. Produce a variety of business documents and reports; focus on content, style, and format.
- 15.3.8.E Choose appropriate print and electronic resources to meet project needs.
- 15.3.8.G Develop appropriate information and content for presentations, meetings, discussions, and group assignments.

Enduring Understandings:

- Google Platform is a tool that can be used to meet the needs of students in all content areas for a variety of educational assignments.

Essential Questions:

- How can Google Platforms meet the needs of students across all content areas and be applied to a variety of educational assignments?

Declarative Knowledge:

1. Tabs
    a. File
    b. Edit
    c. Insert
    d. Format
2. File
    a. New
    b. Make a copy
    c. Move
    d. Page setup
3. Edit

    a. Redo
    b. Undo
    c. Cut
    d. Copy
    e. Paste
4. Insert
    a. Image

Procedural Knowledge:

1. Create, make a copy, and share a Google Doc, Slide, or Sheet
2. Use the tools within the tabs: File, Edit, and Insert (listed above) to create a product that will serve as a review or an extension to their classroom learning.