Branchburg Township Public Schools

Office of Curriculum and Instruction

Grade 4 Technology Curriculum

Adopted by the Board of Education October 2022

This curriculum is aligned with the 2020 New Jersey Student Learning Standards – Computer Science and Design Thinking

Curriculum Scope and Sequence			
Content Area	**TECHNOLOGY**	**Course Title/Grade Level:**	**4TH GRADE**

Topic/Unit Name		Suggested Pacing (Days/Weeks)
Topic/Unit #1	Digital Citizenship, Online Safety, and Email	5 cycles
Topic/Unit #2	How Computers Works, Computer Shortcuts, and Google Sheets	10 cycles
Topic/Unit #3	Innovation Lab/Robotics/Intro to Coding	5 cycles
Topic/Unit #4	Coding/Programming with Tynker	10 cycles

Topic/Unit 1 Title	Digital Citizenship, Online Safety, and Email	Approximate Pacing	5 cycles

STANDARDS

NJSLS Technology

8.1.5.NI.1: Develop models that successfully transmit and receive information using both wired and wireless methods.

8.1.5.NI.2: Describe physical and digital security measures for protecting sensitive personal information.

8.1.5.IC.1: Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.

8.1.5.DA.2: Compare the amount of storage space required for different types of data.

8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system.

8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have.

Interdisciplinary Connections:	21st Century Skills:
NJSLSA.R4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. **Example-students will understand the power of words and meanings when interacting with others online and in person.** **RI.4.4. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.**	**9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).** **Example-students will be introduced to their classmates ideas and perspectives via Google Classroom discussion questions.** **9.4.5.IML.4: Determine the impact of implicit and explicit media messages on individuals, groups, and society as a whole.** **Example-students will learn that the words from others have an impact on their lives.**

Example-students will use domain specific language when discussing online safety/digital citizenship.

NJSLSA.W6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Example-students will learn how to interact appropriately with classmates online via Google Classroom in a community.

Technology Standards:	Career Ready Practices:

2020 Standard Disciplinary Concepts (See Standards Above):

Computing Systems (CS)	**Engineering Design (ED)**
Networks & the Internet (NI)	**Interaction of Technology and Humans (ITH)**
Impacts of Computing (IC)	**Nature of Technology (NT)**
Data & Analysis (DA)	**Effects of Tech on the Natural World (ETW)**
Algorithm & Programming (AP)	**Ethics & Culture (EC)**

9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2).

Example-students will understand consequences for behavior that is not safe, legal, or ethical utilizing both online and offline technology.

9.4.5.DC.6: Compare and contrast how digital tools have changed social interactions (e.g., 8.1.5.IC.1).

Example-students will consider how technology has changed and will continue to evolve in the future.

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

ENDURING OBJECTIVES/UNDERSTANDINGS

1. **Uses and treats equipment with respect**
2. **Acts appropriately and respectfully in the real and digital world**
3. **Uses appropriate technology/digital citizenship vocabulary**
4. **Can access and use a variety of digital applications including the Google Suite**

5. **Uses the internet to explore and investigate safely**
   Use email to communicate effectively and efficiently
6. **Uses research skills to solve problems or further understanding**
7. **Creates and shares original work**
8. **Credits resources appropriately**

ESSENTIAL QUESTIONS

1. **How does a computer/application work to connect to school community?**
2. **How am I being a productive and respectful member of the online community while practicing online safety?**
3. **Can this program/application help me accomplish my learning goal?**
4. **Can I use digital applications to demonstrate my learning?**
5. **Can I use my research skills to bring awareness to a topic?**
6. **How does sharing resources online create a community of learners?**
7. **Why is it important to understand ownership rights in a digital environment?**
8. **How can I use a variety of digital tools to find accurate information/communicate with others safely online?**
9. **Did I learn from my mistakes and keep persevering?**

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge

Students will know:
● **The difference between personal and private information**
● **What to do if they encounter someone online who might make them feel uncomfortable**
● **Components of digital citizenship**
● **What information can be shared safely online and what information cannot be shared online.**
● **The parts of an email**
● **BASK in a Digital World (Be BRAVE, ALERT, SMART, KIND)**
● **5 Rules to stay safe online:**
  ○ **Online life is real life**
  ○ **Keep your identity a secret**
  ○ **Careful with any stranger**
	Students will be able to:
	● **List examples of personal and private information**
	● **Seek help from an adult if they encounter something online that makes them feel unsafe, uncomfortable, or is inappropriate.**
	● **Identify what makes a good community member online/offline.**
	● **Understand that private information should never be shared online.**
	● **Create a memorable and secure password.**

○ **Tell Somebody>TRUST YOUR GUT** ○ **Protect your passwords**	
ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	**Portfolios** **Rubrics/Checklists** **Notes** **Culminating Activity-students will act out a skit/role play about things they might encounter that are safe or unsafe online. Students will practice key internet safety skills utilizing Google's Be Internet Awesome Be Kind Online**
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	**Discussion questions via Google Classroom, teacher observation and notes**
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	**Student research or an individual assignment based on student needs**
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	**Students will discuss their knowledge of online safety first through discussion questions and class discussion. Then, might also take an online safety quiz at BrainPop.**
RESOURCES	
Core instructional materials: ● **Unit 1 Student Presentation/Passport** ● **Common Sense Education** ● **Code.org Digital Citizenship Unplugged** ● **BrainPop Online Safety**	

• **Google's Be Internet Awesome**
Supplemental materials: **Edutopia Digital Citizenship Website** **Screenager Website**
Modifications for Learners
See appendix

Topic/Unit 2 Title	How Computers Works, Computer Shortcuts, and Google Sheets	Approximate Pacing	10 cycles

STANDARDS

NJSLS Technology

8.1.5.CS.1: Model how computing devices connect to other components to form a system.

8.1.5.CS.2: Model how computer software and hardware work together as a system to accomplish tasks.

8.1.5.IC.1: Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.

8.1.5.IC.2: Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.

8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

8.2.5.ED.1: Explain the functions of a system and its subsystems.

8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.

8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).

8.2.5.ITH.4: Describe a technology/tool that has made the way people live easier or has led to a new business or career.

8.2.5.ETW.1: Describe how resources such as material, energy, information, time, tools, people, and capital are used in products or systems.

Interdisciplinary Connections:	21st Century Skills:
NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.	**9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).**

Example-students will understand that data can be graphed and displayed to have specific meaning such as a class poll.	**Example-Create a graph or chart to showcase data collected.** **9.4.5.TL.3: Format a document using a word processing application to enhance text, change page formatting, and include appropriate images, graphics, or symbols.** **Example-students might make an infographic about an important technological invention or review jobs and technology requirements.**
Technology Standards:	**Career Ready Practices:**
2020 Standard Disciplinary Concepts (See Standards Above): **Computing Systems (CS)** / **Engineering Design (ED)** **Networks & the Internet (NI)** / **Interaction of Technology and Humans (ITH)** **Impacts of Computing (IC)** / **Nature of Technology (NT)** **Data & Analysis (DA)** / **Effects of Tech on the Natural World (ETW)** **Algorithm & Programming (AP)** / **Ethics & Culture (EC)**	**9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.** **Example-technology jobs require specific requirements and training and students should consider those in jobs they are interested in that can influence them.** **9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.** **Example-students will consider important technology careers to learn more about potential future careers.**
UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS	
ENDURING OBJECTIVES/UNDERSTANDINGS **1.) Identify the use for each Google application utilized in school, introducing spreadsheets.** **2.) Important computers/inventions play a major role in advancing society**	

3.) How does a computer use input and output to store and share information, while interacting with individuals
4.) Introduce students to spreadsheets, Google Sheets, and collecting/graphing data visually.
5.) Data can be represented/organized with combinations of words and visuals. It is more than numbers.
6.) Memorize and utilize important computer shortcuts to gain computer efficiency and increase navigation skills.

ESSENTIAL QUESTIONS

1.) What is an actual computer?
2.) How do we utilize Google Sheets to organize data to accomplish tasks?
3.) What are some of the most important technological inventions of all time?
4.) What training and skills are required in specific technology fields/jobs?
5.) How do we share information with a computer device to create an output?
6.) How can we use computer shortcuts for efficiency on our computers?
7.) What is a poll and how can we use the data to learn about something such as favorites?
8.) How can we use an application like Google Sheets to display information visually?

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
Students will know: ● The applications available in the Google Suite can be used for various purposes. ● Some of the most important technological inventions. ● How a computer works through input and we, as the user, interact with the output: ○ Input: Information in such as keyboard, mouse, microphone, temperature reading, movements, camera, heart monitor, touch screen. ○ Output: online text, photos, videos, video games, virtual reality, programmed robots. ● That Google Sheets can be utilized to solve math problems, organize information, and graph data.	*Students will be able to:* ● Determine what shortcuts can be used on a computer to help them navigate or accomplish things faster ● Relate an important technological invention and its impact on society and specific jobs today that have evolved since that invention. ● Model how information interacts and flows through input and output. ● Learn how to organize and input data into Google Sheets ● Conduct a class poll and graph the data visually

• **Google Sheets terminology including, workbook, column, row, cell, label, worksheet, formula.**	
ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	**Portfolios** **Rubrics/Checklists** **Notes** **Students will research a topic about how computers works of interest to learn and share what they have learned related to binary data, circuits and logic, and hardware/software.** **Culminating Activity-students will create their own class poll to collect data and graph it via Google Sheets.**
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	**Discussion questions via Google Classroom, teacher observation and notes**
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	**Student research or an individual assignment based on student needs**
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	**Students will discuss what computer shortcuts are and then they will complete a computer SGO Assessment in Google Forms.**
RESOURCES	
Core instructional materials: **Unit 2 Student Presentation/Passport** **Business Insider's Most Important Technological Inventions** **Google Sheets Teacher Demos/Worksheets**	

Code.org's How Computers Work
Supplemental materials: **Book-Step-by-Step Spreadsheet Activities for Microsoft Excel** **The Basics of Google Sheets (Youtube)**
Modifications for Learners
See appendix

Topic/Unit 3 Title	Innovation Lab/Robotics/Intro to Coding	Approximate Pacing	5 cycles

STANDARDS

NJSLS Technology

8.1.5.IC.2: Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.

8.1.5.AP.3: Create programs that include sequences, events, loops, and conditionals.

8.1.5.AP.6: Develop programs using an iterative process, implement the program design, and test the program to ensure it works as intended.

8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.

8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system.

8.2.5.ETW.3: Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.

Interdisciplinary Connections:	21st Century Skills:
RL.4.3. Describe in depth a character, setting, or event in a story or drama, drawing on specific details in the text (e.g., a character's thoughts, words, or actions). **Example-video games or coding stories can have the same literary elements found in literature and should be considered when creating with technology**	**9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).** **Example-students will learn how collaboration and brainstorming cna be the beginning of the learning process.** **9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).**

	Example-students can utilize demos and other information/data to help them solve problems and learn from mistakes when designing or coding.
Technology Standards:	**Career Ready Practices:**
2020 Standard Disciplinary Concepts (See Standards Above): **Computing Systems (CS)** / **Engineering Design (ED)** **Networks & the Internet (NI)** / **Interaction of Technology and Humans (ITH)** **Impacts of Computing (IC)** / **Nature of Technology (NT)** **Data & Analysis (DA)** / **Effects of Tech on the Natural World (ETW)** **Algorithm & Programming (AP)** / **Ethics & Culture (EC)**	**9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.** **Example-Students will utilize the coding platforms on Tynker or Code.org help learn and teach us.** **9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.** **Example-students learn that specific skills are required for specifical technological jobs. People use coding languages to code programs/video games.**

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

ENDURING OBJECTIVES/UNDERSTANDINGS

1.) **Video games are a form of media that are coded by programmers.**
2.) **Collaborative work is essential to problem solving and computer science.**
3.) **Artists create animation through subtle differences in frames and speed transitions.**
4.) **The language behind the creation of video games is called code and utilizes many different languages.**
5.) **Coding languages can be blocked based or text based.**
6.) **There are different coding programs with different language that users can use to create.**
7.) **Coding requires perseverance and problem solving skills to be successful.**
8.) **Experimenting with different features in a program is one of the best ways to learn how to utilize a platform.**

9.) **Some of the first video games created follow simple coding language we can understand.**

ESSENTIAL QUESTIONS

1.) **What is and why do we celebrate Computer Science Week in December**
2.) **What different roles and jobs do video game programmers have?**
3.) **What are some of the most common types of coding languages used today when programming? Are different languages used for different things?**
4.) **What are accessibility features, why do we need them, and how do they relate to video games?**
5.) **What type of information can be input into a computer to get it to accomplish an outlined task?**
6.) **What is a robot and how will robots impact our future? How do robots work with input, output, and code?**
7.) **How can we take a product/video game of the past and improve it or modernize it?**

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
Students will know: ● **Pong was one of the earliest video games ever created. They will consider how it evolved.** ● **Why one might play video games. They will consider the positives and negatives of this form of entertainment.** ● **That the movement/rotation of an object is determined by a degrees measurement when coding.** ● **That video games and technology offer many ways for individuals with disabilities** ● **An introduction to coding technology including the terms, coding/program, input, output, pixels, sequence, actor/sprite, command, loop, counting loop, and condition.**	***Students will be able to:*** ● **Identify the x and y axis on a coding platform.** ● **Turn and rotate to define 90*, 180*, 270*, 360* to understand the manipulation of an item.** ● **Drag and drop coding with directions from a teacher/assignment.** ● **Identify the jobs and roles in creating a video game.** ● **Use a coding platform to create and make an animation or video game.** ● **Customize an existing video game to make it unique.**

ASSESSMENT OF LEARNING

Summative Assessment (Assessment at the end of the learning period)	**Portfolios** **Rubrics/Checklists** **Notes**

	Culminating Activity-Students creat their own video game character, animate it with pixel art, research jobs in the video game industry, modernize the video game Pacman, and codes their own interactive space patch via Tynker on their "Computer Sciene Passport."
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	**Discussion questions via Google Classroom, teacher observation and notes**
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	**Student research or an individual assignment based on student needs**
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	**Students will be assessed at the beginning of the section on familiarity with programs, and will be able to progress further based on progress.**
RESOURCES	
Core instructional materials: **CS Science Week Passport (4th and 5th Grade)** **Computer Science Week Website** **Xbox Accessibility Controller** **Student Assistive Technology** **Disruptus Innovation Game**	
Supplemental materials: **Scratch Coding Flash Card Objectives Flashcards** **Scratch Coding Pong Game Resource** **Scratch 2 Players Pong Game Tutorial (Youtube)**	
Modifications for Learners	
See appendix	

Topic/Unit 4 Title	Coding/Programming with Tynker	Approximate Pacing	10 cycles

STANDARDS

NJSLS Technology

8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

8.1.5.AP.3: Create programs that include sequences, events, loops, and conditionals.

8.1.5.AP.4: Break down problems into smaller, manageable sub-problems to facilitate program development.

8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.

8.2.5.NT.3: Redesign an existing product for a different purpose in a collaborative team.

8.2.5.ETW.3: Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.

Interdisciplinary Connections:	21st Century Skills:
NJSLSA.W3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. **Example-students will add "life" to their coding projects by considering how to develop specific literary elements to enhance their work.**	**9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).** **Example-students consider how to utilize a coding platform to engage themselves to become curious about a topic.** **9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).**

	Example-students will use their computer code to showcase how they solved a problem by describing the steps of their code.
Technology Standards:	**Career Ready Practices:**
2020 Standard Disciplinary Concepts (See Standards Above): **Computing Systems (CS)** / **Engineering Design (ED)** **Networks & the Internet (NI)** / **Interaction of Technology and Humans (ITH)** **Impacts of Computing (IC)** / **Nature of Technology (NT)** **Data & Analysis (DA)** / **Effects of Tech on the Natural World (ETW)** **Algorithm & Programming (AP)** / **Ethics & Culture (EC)**	**• 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.** **Example-students can use a multitude of tools or technology to solve problem based coding problems/questions.**

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

ENDURING OBJECTIVES/UNDERSTANDINGS

1.) **Debugging is a process of finding errors code**
2.) **Functions are a way one can simplify and make code more efficient**
3.) **Loops can be used to repeat something over and over including a geometrical drawing**
4.) **Conditionals in coding are a way to make something occur if specific conditions are met.**

ESSENTIAL QUESTIONS

1.) **What is the correct way to debug when you have errors in your code?**
2.) **How can we work collaboratively to find mistakes in our code?**
3.) **How can a student take responsibility for learning at their own pace when it comes to computer science?**

<table>
<tr><th colspan="2">STUDENT LEARNING OBJECTIVES</th></tr>
<tr><th>Key Knowledge</th><th>Process/Skills/Procedures/Application of Key Knowledge</th></tr>
<tr><td>Students will know:
There are many different coding platforms such as Code.org and Tynker that can teach computer science.
Students will reinforce coding terminology such as sequence, loops, conditionals, nested loops, and functions.
Students learn by themselves as they progress through interactive tutorials, solve coding puzzles, follow along to build their own projects, and take quizzes, while collaborating and problem solving with classmates and the teacher as a facilitator.</td><td>Students will be able to:
Work on a coding course individually to
Sequence and navigate a maze with loops and nested loops
Draw with loops
Sequencing
Repetition
Events
Conditional logic
Animation
Storytelling
Problem solving and debugging
Pen drawing
Drawing shapes and patterns</td></tr>
<tr><th colspan="2">ASSESSMENT OF LEARNING</th></tr>
<tr><td>Summative Assessment
(Assessment at the end of the learning period)</td><td>Portfolios
Rubrics/Checklists
Notes

Assessment of a student’s progress in a coding course will be followed and monitored on the the Tynker Teacher Dashboard. Students will learn and progress at their own pace after introductory lesson. Advanced students may be placed in a more rigorous curriculum if they show content understanding, have a collaborative mindset, and can follow classroom procedures on their own.

Students will also complete Tynker’s Dragon Dash to focus on sequencing, navigation, and conditionals.</td></tr>
<tr><td>Formative Assessments
(Ongoing assessments during</td><td>Discussion questions via Google Classroom, teacher observation and notes</td></tr>
</table>

the learning period to inform instruction)	
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	**Student research or an individual assignment based on student needs**
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	**Students will be assessed throughout the year on their familiarity with programs, and will be able to progress further based on progress. Their progress is monitored through the Tynker platform. Students have quizzes and badges to earn as they progress through their Tynker Unit.**
RESOURCES	
Core instructional materials: **Tynker Student Handout/Presentation 4th Grade** **Code.org Debugging Guide/Resource** **Tynker Programming 100 Curriculum** **Tynker Programming 101 Curriculum (for independent students)** **Dragon Dash Conditional Programming** **Assistive handouts/anchor charts to help students**	
Supplemental materials: **Tynker Programming 101 Curriculum (Advanced CS student course)** **Code.org CS Fundamental Course E Curriculum**	
Modifications for Learners	
See appendix	