Unit 2: Technology & Humans

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

UNIT RATIONALE

In Unit 2, students will explore the dynamic relationship between humans and technology. They will examine the impact of technology on society, ethical considerations in technology use, human-computer interaction, and emerging technologies and innovation. Through engaging activities and projects, students will develop an understanding of the ethical, social, and cultural implications of technology while fostering critical thinking and design skills.

ESSENTIAL QUESTIONS

Essential Questions:

1. How does technology shape and influence society?
2. What ethical considerations are involved in the use of technology?
3. How can we design technology that enhances human-computer interaction?
4. What are the potential benefits and challenges of emerging technologies?
5. How can we use technology to drive innovation and solve real-world problems?

STANDARDS

NEW JERSEY STUDENT LEARNING STANDARDS: CONTENT AREA

New Jersey (NJSLS) - Grade 8 - Mathematics (2020)

8.NS.A

Know that there are numbers that are not rational, and approximate them by rational numbers.

8.NS.A.1

Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

8.NS.A.2

Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.

8.EE.A.1

Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3–5 = 3–3 = 1/33 = 1/27.

New Jersey (NJSLS) - Grades 6-8 - Computer Science and Design Thinking (2020)

8.2.8.ITH.1:

Explain how the development and use of technology influences economic, political, social, and cultural issues.

8.2.8.ITH.2:

Compare how technologies have influenced society over time.

8.2.8.ITH.3:

Evaluate the impact of sustainability on the development of a designed product or system.

8.2.8.ITH.4:

Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.

8.2.8.ITH.5:

Compare the impacts of a given technology on different societies, noting factors that may make a technology appropriate and sustainable in one society but not in another.

8.2.8.ETW.4:

Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best.

8.2.8.EC.1:

Explain ethical issues that may arise from the use of new technologies.

8.2.8.EC.2:

Examine the effects of ethical and unethical practices in product design and development.

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MA.8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).
MA.8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.
CS.6-8.8.2.8.EC.1	Explain ethical issues that may arise from the use of new technologies.
CS.6-8.8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.
CS.6-8.8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best.
CS.6-8.8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
CS.6-8.8.2.8.ITH.2	Compare how technologies have influenced society over time.

CS.6-8.8.2.8.ITH.3	Evaluate the impact of sustainability on the development of a designed product or system.
CS.6-8.8.2.8.ITH.4	Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.
CS.6-8.8.2.8.ITH.5	Compare the impacts of a given technology on different societies, noting factors that may make a technology appropriate and sustainable in one society but not in another.

NEW JERSEY STUDENT LEARNING STANDARDS: CAREER READINESS, LIFE LITERACIES AND KEY SKILLS

MA.8.NS.A	Know that there are numbers that are not rational, and approximate them by rational numbers.
MA.8.NS.A.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
MA.8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).
MA.8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.

NEW JERSEY STUDENT LEARNING STANDARDS: COMPUTER SCIENCE AND DESIGN THINKING

CS.6-8.8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.
CS.6-8.8.1.8.DA.2	Explain the difference between how the computer stores data as bits and how the data is displayed.
CS.6-8.8.1.8.IC.1	Compare the trade-offs associated with computing technologies that affect individual's everyday activities and career options.
CS.6-8.8.1.8.IC.2	Describe issues of bias and accessibility in the design of existing technologies.
CS.6-8.8.1.8.NI.4	Explain how new security measures have been created in response to key malware events.

PRE-ASSESSMENTS

1. Technology Use Inventory: Have students complete an inventory or survey that assesses their use and knowledge of various technologies in their everyday lives. Ask questions about their familiarity with different devices, software applications, and online platforms.

2. Technological Impact Reflection: Ask students to reflect on the impact of technology in their lives or in society as a whole. Encourage them to think about both positive and negative aspects and provide specific examples. This will help you gauge their awareness of the role of technology in society.

3. Ethical Dilemma Discussion: Present students with ethical dilemmas related to technology use, such as privacy concerns, cybersecurity issues, or the impact of social media. Engage them in a class discussion where they can share their thoughts, opinions, and reasoning behind their choices.

INSTRUCTIONAL PLAN

MODULE 1

Subtopic 2.1: The Impact of Technology on Society

Subtopic 2.2: Ethical Considerations in Technology

Subtopic 2.3: Emerging Technologies and Innovations

Subtopic 2.4: Ethical Considerations in Technology

Subtopic 2.1

Subtopic 2.1: The Impact of Technology on Society

Essential Questions:
1. How does technology shape and influence society?
2. What are the positive and negative impacts of technology on individuals and communities?
3. How has technology transformed various aspects of human life?

Success Criteria:
1. Identify and describe examples of how technology has influenced society.
2. Analyze the social, cultural, and economic implications of technology.
3. Evaluate the benefits and drawbacks of technological advancements.
4. Understand the role of technology in addressing global challenges.

Learning Intentions:
1. Explore the historical and contemporary impact of technology on society.
2. Recognize the interplay between technology and social, cultural, and economic factors.
3. Develop critical thinking skills to assess the effects of technology on individuals and communities.
4. Foster an awareness of the potential of technology in addressing global challenges.

Learning Strategies:
1. Research and analysis: Investigate case studies and historical examples to understand the impact of technology on society.
2. Group discussions: Engage in discussions to analyze different perspectives on the influence of technology.
3. Reflective writing: Encourage students to reflect on their personal experiences with technology and its impact on their lives.
4. Current events analysis: Explore news articles or documentaries that highlight the role of technology in shaping society.

5. Project-based learning: Design projects that require students to examine the positive and negative impacts of technology and propose innovative solutions.

NJ Design Thinking Standards:
- DT.1: Develop and use a systematic design process.
- DT.2: Use creative and critical thinking skills to solve problems.
- DT.4: Communicate and present design ideas and solutions effectively.

YouTube Videos:
1. Title: "The Evolution of Technology: From Past to Present"

2. Title: "The Impact of Technology on Society: Positive and Negative Effects"

3. Title: "Technology and Social Change: How Technology Shapes Communities"

4. Title: "Technology's Role in Addressing Global Challenges"

5. Title: "The Future of Technology: Innovations and Implications"

Hands-On Project Ideas:
1. Technological Timeline: Create a visual timeline that showcases significant technological advancements throughout history, using a combination of images, text, and interactive elements.

2. Impact Analysis Presentation: Research and present the positive and negative impacts of a specific technology on society, using multimedia presentations.

3. Design a Sustainable Solution: Choose an environmental issue and design a technological solution that addresses the problem, using materials like recycled materials, cardboard, and electronics.

4. Future Technology Invention: Imagine and design a future technology that could improve people's lives, using a combination of drawing, modeling, and digital tools.

5. Social Media Campaign: Create a social media campaign that raises awareness about the ethical use of technology or promotes responsible digital citizenship, using graphic design and multimedia content.

Subtopic 2.2

Subtopic 2.2: Ethical Considerations in Technology

Essential Questions:
1. What are the ethical implications of technological advancements?
2. How do we make responsible and ethical decisions in the use of technology?
3. What are the ethical considerations in areas such as privacy, security, and accessibility?

Success Criteria:
1. Identify and describe ethical dilemmas related to technology.
2. Analyze the ethical implications of different technological applications.
3. Apply ethical frameworks and principles to make informed decisions.
4. Understand the importance of privacy, security, and accessibility in technology.

Learning Intentions:
1. Explore the ethical dimensions of technology and its impact on individuals and society.
2. Develop an understanding of ethical decision-making processes related to technology.
3. Foster a sense of responsibility and digital ethics in the use of technology.
4. Promote awareness of privacy, security, and accessibility considerations in technological systems.

Learning Strategies:
1. Case studies and discussions: Analyze real-life scenarios to understand ethical dilemmas and engage in group discussions to explore different perspectives.
2. Debates and role-playing: Participate in debates or role-playing activities to examine contrasting viewpoints and ethical implications of technology.
3. Ethical reflection: Reflect on personal values and beliefs in relation to technology use, and discuss the ethical considerations that arise.
4. Guest speakers and expert talks: Invite professionals from the field of technology ethics to share insights and engage in discussions with students.
5. Design challenges with ethical constraints: Create design challenges that require students to consider ethical aspects while developing technological solutions.

NJ Design Thinking Standards:
- DT.3: Understand ethical issues related to technology.
- DT.5: Collaborate and work effectively in teams.
- DT.6: Use an iterative design process to improve and refine solutions.

YouTube Videos:
1. Title: "Ethics in Technology: Balancing Innovation and Responsibility"

2. Title: "The Power of Ethical Design: Shaping a Better Digital Future"

3. Title: "Privacy in the Digital Age: Balancing Security and Personal Freedoms"

4. Title: "Accessibility and Inclusion in Technology: Designing for All"

5. Title: "Data Ethics: The Ethical Implications of Collecting and Analyzing Data"

Hands-On Project Ideas:
1. Ethical Technology Design Challenge: Design a technology product or application that addresses a specific societal need while considering ethical implications and social impact.

2. Ethical Dilemma Debates: Organize a classroom debate on ethical dilemmas related to technology, such

as artificial intelligence, privacy, or data collection.

3. Code of Ethics Poster: Create a visually appealing and informative poster that outlines a code of ethics for technology use, highlighting principles like honesty, privacy, and respect.

4. Accessibility Audit: Evaluate the accessibility features and user experience of a website or mobile application and propose improvements to ensure inclusivity.

5. Ethical Reflection Journal: Maintain a journal where students reflect on their experiences with technology, discussing ethical challenges they have encountered and how they have addressed them.

Subtopic 2.3

Subtopic 2.3: Emerging Technologies and Innovations

Essential Questions:
1. What are the latest advancements and trends in technology?
2. How do emerging technologies impact various industries and society as a whole?
3. What are the opportunities and challenges associated with adopting new technologies?

Success Criteria:
1. Identify and describe emerging technologies and their applications.
2. Analyze the potential impact of emerging technologies on different sectors.
3. Evaluate the benefits and risks associated with adopting new technologies.
4. Explore innovative solutions and ideas using emerging technologies.

Learning Intentions:
1. Stay updated on the latest technological advancements and trends.
2. Understand the implications of emerging technologies on various aspects of society and industry.
3. Foster creativity and innovative thinking in leveraging emerging technologies.
4. Develop critical thinking skills to evaluate the advantages and disadvantages of adopting new technologies.

Learning Strategies:
1. Research and presentations: Assign students to research and present on different emerging technologies, discussing their applications and potential impact.
2. Guest speakers and industry visits: Invite professionals from technology companies or research institutes to share insights on emerging technologies and their real-world applications.
3. Design thinking challenges: Engage students in design challenges that require them to think creatively and develop innovative solutions using emerging technologies.
4. Group discussions and debates: Facilitate group discussions and debates on the benefits, risks, and

ethical considerations of adopting new technologies.
5. Hands-on exploration: Provide opportunities for students to interact with emerging technologies through workshops, demonstrations, or hands-on projects.

NJ Design Thinking Standards:
- DT.1: Apply the design process to solve problems.
- DT.2: Develop solutions using creativity and innovation.
- DT.4: Analyze and synthesize data to inform design decisions.

YouTube Videos:
1. Title: "The Top 10 Emerging Technologies of 20XX"

2. Title: "Innovation and Disruption: How Emerging Technologies Are Shaping the Future"

3. Title: "The Impact of AI and Machine Learning on Industries"

4. Title: "The Future of Transportation: Exploring Autonomous Vehicles and Hyperloop"

5. Title: "The Role of Blockchain Technology in Transforming Industries"

Hands-On Project Ideas:
1. Prototyping with 3D Printing: Use 3D printers to design and create prototypes of innovative products or solutions using emerging technologies.

2. Augmented Reality (AR) Experience: Design and develop an interactive AR experience that enhances learning or entertainment in a specific field or topic.

3. Internet of Things (IoT) Smart Home Project: Create a prototype of a smart home system that integrates IoT devices for improved automation and convenience.

4. Drone Innovation Challenge: Explore the possibilities of drones in solving real-world problems and design a drone-based solution for a specific application.

5. Virtual Reality (VR) Application: Design and develop a virtual reality application that addresses a societal or educational challenge, providing an immersive and engaging experience.

Subtopic 2.4

Subtopic 2.4: Ethical Considerations in Technology

Essential Questions:
1. What ethical dilemmas arise from the use of technology in various contexts?
2. How can technology be used responsibly and ethically to benefit individuals and society?
3. What are the potential consequences of unethical use of technology?

Success Criteria:
1. Recognize and analyze ethical considerations related to technology use.
2. Evaluate the ethical implications of technology in different domains.
3. Apply ethical frameworks and decision-making processes to technology-related scenarios.
4. Advocate for responsible and ethical use of technology.

Learning Intentions:
1. Develop awareness of ethical considerations associated with technology use.
2. Understand the impact of technology on individuals, communities, and society.
3. Foster ethical reasoning and decision-making skills.
4. Promote responsible and ethical use of technology in personal and professional contexts.

Learning Strategies:
1. Case studies: Explore real-life case studies that highlight ethical dilemmas related to technology and engage students in analyzing and discussing the ethical implications.
2. Debates and discussions: Facilitate class debates and discussions on ethical issues surrounding technology, encouraging students to express and defend their viewpoints.
3. Ethical decision-making frameworks: Introduce ethical decision-making models or frameworks, such as the "Ethical Decision-Making Framework" or "Ethics of Technology Use Framework," to guide students in analyzing and resolving ethical dilemmas.
4. Reflection and writing exercises: Assign reflective writing prompts or journal entries to encourage students to contemplate their own ethical responsibilities as technology users.
5. Guest speakers: Invite professionals from ethics-related fields or organizations to share their insights and experiences on ethical considerations in technology.

NJ Design Thinking Standards:
- DT.3: Collaborate and communicate effectively.
- DT.5: Demonstrate empathy, ethics, and respect for diversity.

YouTube Videos:
1. Title: "The Ethics of Artificial Intelligence"

2. Title: "Data Privacy and Security: Protecting Personal Information Online"

3. Title: "The Social Impact of Technology: Balancing Advancements and Ethical Considerations"

4. Title: "Responsible Use of Technology: Digital Citizenship and Online Behavior"

5. Title: "Ethical Hacking and Cybersecurity: Protecting Systems and Information"

Hands-On Project Ideas:
1. Design an Ethical Technology Code: Collaboratively develop a code of ethics for technology use, focusing on responsible and ethical behavior in different scenarios.

2. Interactive Digital Storytelling: Create an interactive digital story that raises awareness of ethical considerations in technology use and encourages users to make ethical decisions within the narrative.

3. Ethical Design Challenge: Engage students in a design challenge where they must consider ethical considerations in developing a technology product or solution.

4. Privacy and Security Audit: Conduct a privacy and security audit of a website or mobile application, identifying potential vulnerabilities and proposing ethical solutions to enhance privacy and security.

5. Public Service Announcement (PSA) Video: Collaboratively create a PSA video that educates others about responsible and ethical use of technology, raising awareness of potential consequences and promoting positive digital citizenship.

REFLECTIONS

Make sure 3D prints are finished printing within appropriate amounts of time, using student helpers

INTERDISCIPLINARY CONNECTIONS: NEW JERSEY STUDENT LEARNING STANDARDS FOR ELA, SOCIAL STUDIES, SCIENCE AND/OR MATHEMATICS

1. English Language Arts (ELA) Standards:
   - Reading Informational Text: CCSS.ELA-LITERACY.RI.6-8
   - Writing: CCSS.ELA-LITERACY.W.6-8
   - Speaking and Listening: CCSS.ELA-LITERACY.SL.6-8

2. Mathematics Standards:
   - Ratios and Proportional Relationships: CCSS.MATH.CONTENT.6.RP.A
   - Statistics and Probability: CCSS.MATH.CONTENT.6.SP.A
   - Mathematical Practices: CCSS.MATH.PRACTICE.MP.1-8

3. Science and Engineering Practices: CCSS.ELA-LITERACY.RST.6-8

4. Social Studies Standards:
   - Technology and Society: CCSS.SS.6-8.TS.1-6
   - Economics: CCSS.SS.6-8.E.1-4

5. Digital Literacy Standards:
   - Information Literacy: CCSS.ELA-LITERACY.CCRA.W.8
   - Media Literacy: CCSS.ELA-LITERACY.CCRA.R.7

6. Critical Thinking and Problem Solving: CCSS.ELA-LITERACY.CCRA.SL.4