Middle School Unit: Why is it important to spend time thinking about your future career?

Lesson Level Performance Expectations:

Students work individually and in small groups to apply or create a use for technology to a problem they see in the world. Students are introduced to the design thinking process as part of this linkage. Design thinking is a multi-step process for creating and evaluating solutions. As introduced in the STEM class, this process will focus on technology-based solutions.

Previous Lesson:

Students explored how they are using technology in their environment. They discuss how technology is used in the world and what things technology can do that humans cannot do.

What We Figure Out: (Learning Objectives)

Students identify local and global problems that concern them and/or impact people close to them and understand the design thinking process. They come up with uses for technology to help solve the problems they identified. Students work in small groups to practice compassion for each other and the people they are attempting to help with their solution. They observe and learn from the solutions chosen by other groups.

BUILDING TOWARD

Connections to Engineering, Technology, and Applications of Science: Technologies extend the measurement, exploration, modeling, and computational capacity of scientific investigations.

TIMELINE

110 minutes (2 class periods)

INVESTIGATING

Local and global problems that concern them and/or impact people close to them.

SENSEMAKING

Using technology to help solve the problems they identified.

CRITIQUING

Gain experience working in a small group and practice compassion for each other and the people they are attempting to help with their solution.

GETTING READY: Materials

TEACHER

Teacher materials

- Slides
- Design Thinking Example

STUDENTS

Student/Classroom Materials

- Design Thinking Activity Sheet (EN)
- Design Thinking Activity Sheet (SP)

ACTIVITY LAB

Activity supplies

- Charged laptops
- Sticky notes
- Markers

LEARNING PLAN: (for a more detailed description, click on the number to the left)

1. **(5 min)** Introduce students to mindset standards - a positive attitude toward work and learning.
2. **(20 min)** Introduce students to design thinking stages (empathize, define, ideate), a non-STEM design thinking example, and brainstorming an issue using the activity sheet.
3. **(20 min)** Students work in small groups on creative work using the first three steps of the design thinking process.
4. **(10 min)** Review learning objectives with students, and students gather into the same small groups and review their chosen technology solution.
5. **(15 min)** Students do a gallery walk to view the ideas of other teams and provide feedback. **(5 min)** Introduce the STEM career scavenger hunt.
6. **(15 min)** Students reflect on their technology solutions as a group
7. **(5 min)** Revisit learning objectives with students.

LEARNING PLAN

1 (5 min) Introduce students to mindset standards - positive attitude toward work and learning

Ask the question of the day: "What percentage of your life will you spend at work?" Have students use their fingers to indicate their answers. One finger is 10%, Two fingers is 20 percent, etc.

This question sets up the reason for time spent with career connection activities and questions.

Share the learning objectives with students.

The process: linking classroom activities to STEM career pathways and community engagement opportunities

Suggested Prompts:

- What percentage of your life will you spend at work?
- Why is it important to spend time thinking about your future career?
- If you are going to spend a significant portion of your life at work, it makes sense to find a good fit for your interests, values, strengths, and abilities.

Listen for student responses such as:

(Note: answers may vary, and at this point there is not a right or wrong answer; we are only trying to elicit students' ideas)

- STEM is Science, Technology, Engineering, and Math. So, it is something that uses some or all of these parts.
- A STEM job uses Science, Technology, Engineering, and Math
- A STEM job might be one that uses most of these parts and focuses on one more than the others.
- For a job to be a STEM job, it has to use at least…

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LEARNING PLAN

(20 min) Introduce students to design thinking stages (empathize, define, ideate), a non-STEM design thinking example, and brainstorming an issue using the activity sheet.

Introduce the design thinking process to students. Share with students that design thinking uses a series of steps to create solutions to problems.

Go over each of the steps of the design thinking process with students.
Note: this activity focuses on the first three stages of design thinking: Empathy, Design, and Ideation.

Read through the Design Thinking Example as a class. Have students identify each of the steps of the design thinking process from the story as you go.
The example provides a hypothetical school-based situation (maintaining a clean cafeteria) to help students visualize how to use the design thinking process to solve a problem.

Provide students access to the Design Thinking & Technology Solution Activity Sheet (either online or paper handout). For those using a laptop, have them log in to their assignment page.

Suggested Prompts:

- Design thinking is a skill we can use in STEM and in other areas of our lives.
- We are going to consider an example of the design process together.
- We are going to use the design thinking process to come up with a way to use technology to help solve a problem.

Discussion Strategies

DESIGN THINKING INITIAL IDEAS DISCUSSION

Purposes

- To provide a supportive opportunity for students to make some sense of what may be not yet fully formed ideas (either their own or those of others).
- To support students in making tentative connections between questions being asked and the participants' experience and everyday ideas about observing a problem.

POTENTIAL TALK MOVES FOR THIS DISCUSSION

Introduce the first design thinking stage - Empathy (as a class)
Point out that we can think about concerns or problems at different levels; they can be things that affect people locally or globally. Tell students to focus on problems we could help solve with technology. Also, point out that we might only be able to solve a part of the problem with the technology we have, and that is okay! To help students get in the mindset of empathy, ask them to visualize the following:

- When have you seen someone in a bad situation?
- How did you feel?
- What did you do or want to do?

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When clarifying ideas and pressing for reasoning:
Give students a few minutes to consider the empathy questions posed on the slide and answer items 1-2 on their activity sheet. They will make a list of problems that concern them and draw a sketch of how technology could be used to help solve a problem.

- Can you say more about that? Where does that idea come from?
- Is that something you've heard, observed, or experienced before?
- Can anyone add to this idea?

Introduce the second design thinking stage - Define (as a class)
Highlight the goal of the second stage - to identify one problem that could be addressed to some degree with the technology. Have a class discussion using the question prompts below to get students thinking about which problem they'd like to focus on:

- What did you learn in your recent lessons about technology?
- What technology can you spot in this room in 20 seconds?
- How is technology being used in your lessons and in this room to solve problems?
- What types of problems is the technology helping to solve?

After considering the questions above, **instruct students to choose one of the problems** from their list to focus on. Have them highlight or circle the problem they chose on their activity sheet. Tell students to answer item four on the activity sheet. They will describe their chosen problem and how technology can help address the problem.
Transition the class to small group work. The **suggested group size is three to four students** already at a table together who will stay together for the remainder of this lesson. Remote students can be designated in small breakout groups.

Introduce the third design thinking stage - Ideate (as a class)
The goal of the small group is to brainstorm ideas about how we could use technology to help solve problems with their group and to choose one problem to focus on. Share that we are going to use an inverted pyramid discussion structure. Explain that they have already completed the individual part of the structure, and now they will work on the small group part, with the final goal of sharing with the whole class.

MAKING PARTICIPATION EQUITABLE

Think about what kinds of support your students might need to be able to ask each other these kinds of clarifying and summarizing questions without being critical or evaluative. You might try using the metaphor of a coach to introduce these think-pair-share routines. You could try telling students, "This is about helping your partner practice as a scientist and supporting them in their thinking. So you're going to ask questions and encourage them, and for now, your ideas will stay on the sideline. Then we'll switch, and you'll get a chance to share your ideas as your partner coaches you."

Tip: Have sentence starters ready for students so they know what to ask to push their partner further, but also have sentence starters to slow down the fast explainers, such as "Wait - you said that really fast. Can you say that again?"

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LEARNING PLAN

3 (20 min) Students work in small groups on the creative work using the first three steps of the design thinking process

Students take turns sharing their problems and technology-based solutions within their groups. Once all group members have shared their problem/solution, they can begin asking questions and sharing ideas about each other's solutions. Direct students to use the question prompts listed in item six on their activity sheet to guide their discussion.

After each group has had about 10 minutes to share and ask questions, bring the class back together to share their next task: to choose one problem and solution to focus on and eventually share with the whole class. Groups should try to reach a consensus about which solution to showcase and may need to vote within their groups if they cannot all agree.

Once each group has chosen a solution to showcase, they should brainstorm ways to improve or build upon the solution with their group, including adding details about how technology will be used. Show students the questions from the slides to help guide them.

Students should record notes from the group brainstorming as item eight on their activity sheet.

Suggested Prompts:

- What are the strengths of each solution?
- What are the challenges of each solution?
- What are other uses for this solution?
- How could we expand or build upon this solution?
- What details can we provide to explain how the technology will work in this solution?

4 (10 min) Review learning objectives with students, and students gather into the same small groups and review their chosen technology solution

Students return to the same table group or remote breakout group with their Design Thinking & Technology Solution Activity Sheet from the prior session. Remind students of the learning objectives for the design thinking activity (see Page 1 of this document).

5 (15 min) Students do a gallery walk to view the ideas of other teams and provide feedback

Hand each student a small stack of sticky notes for giving feedback at each table. Explain that we are going to have a gallery walk to share and provide feedback about the technology solutions. Students will move around the room in their small groups while viewing the solutions from each group.
They should take enough time at each table to evaluate the solution. Each student should leave at least one question and one comment on sticky notes about the featured solution before rotating to the next table.

Once all groups have viewed and evaluated all of the featured solutions, everyone returns to their original table to review the feedback that other groups left for them on sticky notes.

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LEARNING PLAN

6 (15 min) Students reflect on their technology solutions as a group

Tell students to discuss the reflection questions at the end of the activity sheet with their small group. Ask students to record their responses to the questions on the activity sheet. Use the slides as a visual reference.

Ask a few students to share their impressions from each category of reflection questions.

Suggested Prompts:

- Who can summarize some of the ideas we've heard today?
- Is this a complete summary? Can someone add what's missing?
- Does the summary capture our ideas accurately?

7 (5 min) Revisit learning objectives with students

Review the learning objectives for the activity, connecting reflections to the learning objectives (see Page 1 of this document) when possible.