Lesson Plan Format

(an optional resource)

In the context of the *PPAT*[®] Assessment, this lesson plan format is a template provided for teacher candidates to use as they develop well-planned and structured lessons. This resource also can help a teacher candidate better understand and design meaningful daily lessons that will positively enhance instructional practice and student learning. It is intended for use in conjunction with Tasks 2, 3, and 4. You have the option of using your own lesson plan format.

Standards/Performance Indicators/Skills

Identify the state and national standards, performance indicators, and skills addressed by the lesson.

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

TA.3-5.1.A: Create original products using a variety of resources.

Learning Objectives/Goals

Describe the lesson's objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.

By the end of the lesson, students will create and test a circuit containing a power source, inputs, outputs, and construct a prototype of an autonomous art machine using LittleBits and other materials as well as test their prototypes and make improvements.

Assessment (the type[s] of assessment used throughout the lesson)

Identify the assessment that occurred before, during, and after the lesson.

Before: To begin, students will be asked if they know what the invention and design cycle is and if they can describe in what context the cycle would be useful for.

Pre-Test Questions:

- 1. How much do you think you know about what an art machine is?
 - A. I have no idea.
 - B. I have an idea
 - C. Yes I know what it is.
 - D. I have no idea at all what it is.
- 2. What was the name on the box you opened to build the art machine?
- A. Art Machine
- B. Little Bits
- C. Lego Spikes
- D. Sphero
- 3. What does CCW mean?
 - A. Clock Counter Clock Wise
 - B. Count Clock Wise
 - C. Counter Clock Wise
 - D. Clock count wise

4. What was the name of the project build that you and your group constructed?

- A. Art Machine
- B. Marker Machine
- C. Wheel Machine
- 5. What would happen if you took the wheel off the machine?
 - A. The machine would keep going.
 - B. The machine will stop working.
 - C. The machine will break.

D. The machine would draw a square.

6. What shape are you trying to draw with the machine?

A. Circle

B. Square

C. Rectangle

D. Triangle

7. How many pieces of art paper did your group need for the art machine?

A. 4

B. 2

C. 1

D. 3

8. What was your favorite part of the project?

- A. Building the art machine.
- B. Watching the art machine work.
- C. Taking the pre-test.
- D. Taking the post-test.

During: Students will be brainstorming ideas as to when they can use the art machine and what it could be useful for.

After: Students will be encouraged to participate in a student led discussion on their machines and what errors occurred when they were building. Students will also be asked about their testing variables and how it changed the outcome of the machine. Students will also be discussing the invention cycle and where this machine could be useful.

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The robot does not have any movement to make an art representation.The robot shows some type of understanding of the movement to make an art representation.The robot shows a good understanding of the movement to make an art representation.	The robot is lacking movement to create art.	The robot has little to no movement to create art.	The robot has a general amount of movement to create some art.	The robot has plenty of movement and created a large piece of art
	The robot does not have any movement to make an art representation.	The robot shows some type of understanding of the movement to make an art representation.	The robot shows a good understanding of the movement to make an art representation.	The robot shows a complete understanding of the movement to make an art representation.

Lesson Structure and Procedures

Describe the sequence of events of the lesson elements, including the before, during, and after of the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice, and the conclusion).

This lesson correlates with coding and students will be given the opportunity to create an Art Machine that consists of power sources, inputs, and outputs. Students will need to explicitly follow directions so that their machines will work properly. Students will be asked multiple questions pertaining to if something were to fail on their machine and how they would need to be conscious of what they are doing and what they are building. Students will also be able to test the machine at various speeds letting them explore trial and error.

This lesson is a project-based learning opportunity as students are working collaboratively and ensuring that their machines are collectively working together. This also is essentially a project where students are using hands-on learning and making their own art machine. The assessment to show student learning is that they are making the machine and the rubric is given to students beforehand.

Engage: To begin, the teacher will be explaining what the invention and design cycle is and how it is used today in our world. Students will be given the chance to explain what they think this cycle could be used for and how it helps with creating things. Students will be if there was a machine that could draw for them and how they would use it.

Explore: The students will be exploring the Little Bits Classroom Kit and will be making their own art machines. This structure will have trial and error moments and still will need to follow the instructions in the Little Bits Classroom Kit precisely as if they miss something it will cause an error. Students will create their machine and test various speeds as the teacher will ask questions about their machines.

Explain: The teacher will explain to students how this connects with the invention and design cycle as students will see the need of a machine that can draw circles for them on a paper in a matter of seconds.

Elaborate: The teacher then will have students answer multiple questions about their machines such as if a wheel was missing or if they flipped switches in the opposite direction that was asked what would happen. Students will then be able to carry out those experiments and explain how it changes the machine. Students will also be asked to test various speeds to change the variable of speed.

Evaluate: To evaluate student knowledge the teacher will be observing throughout the lesson that students are following directions precisely and that their machines are working properly.

Instructional Strategies

Describe the teacher's approach to achieving the learning objectives and meeting the students' needs.

The teacher will use explicit instruction as students will need to follow directions precisely as their machines will not work if they do not. The teacher will also use explicit instruction when explaining the invention and design cycle as it relates to the lesson. Student needs are met by the basis that they will be showing what happens to their machines if an error occurs.

Learning Activities

Describe the opportunities provided for the students to develop the skills of the objective.

Students will be working in pairs as they begin making their machines. Students will be working together to find the appropriate pieces for the machine as well as building the machine and making sure that it works properly. Students will be instructed to use the guide provided in the instruction manual to understand what pieces are what. Once the machines are built students will be asked to test the machines and have a moment to play with the machine and make adjustments as needed as some students' machines will have errors and students will have to work together to fix them and/or discover what is wrong with their machines. Students will also be asked to test at various speeds and make predictions as to what the machine might do.

Resources and Materials

List the materials used to plan and deliver the lesson.

Bits:

Battery and Cable

P1 Power

DC Motor (x2)

Pulse

Accessories:

Wheels (x2)

Mounting Board

Drawing Material

Paper

Rubber Bands

Technology

Describe the instructional and/or assistive technology that was incorporated into the lesson to enhance instruction and student learning.

Little Bits STEM Build Kit

Little Bits STEM Website/Video

Invent an Art Machine: a littleBits Project by littleBitsInvent an Art Machine: a littleBits Project by littleBits Differentiation/Accommodations/Modifications/Increases in Rigor

Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.

Focus Student #1: Some of the portions of the machine were already built. The student will continue on with the build by providing an explanation about why certain parts are in the correct spot/why did this error occur?

Focus Student #2: The instructions for designing the machine could be provided in the student's native language. The student can watch the video provided on the website and use subtitles in their language.

Instructional Strategies: Play- Based Learning, Project Based Learning, Model

Classroom Management

Identify the strategies used that are consistent with the learning objectives of the lesson and that also met student behavior needs to help keep the students on task and actively engaged.

Extensions

Describe the activities for early finishers that extended the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.

Students can look up other machines that can be made out of the little bits and make them.

Follow-Up Activity to the Lesson

Describe a quick activity for review or for building on the lesson that will deepen student understanding and interconnect concepts. (The activity may be incorporated in class the next day or throughout the unit.)

Additional Information

Identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.



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