

DEVELOPING 21ST-CENTURY SKILLS IN EARLY CHILDHOOD THROUGH STEAM LEARNING CENTERS

Tiffany Berman





ABOUT ME: TIFFANY BERMAN

EXPERIENCE

Mom of 3 (20, 17, and 9 years old)
Former preschool teacher (13 years)
Instructor at the University of Cincinnati (4 years)
* Early Childhood and Elementary Education
* Math and Science

EDUCATION

Ph.D. Candidate in Educational Studies
* Research focus: Play-based Learning and STEAM
M.Ed. in STEM Curriculum & Instruction
Licensed Educator (Pre-K to Grade 3)



TODAY'S GOALS

1. Discover how to use an observation and discussion tool to identify children's curiosities and classroom challenges that can spark STEAM investigations.
2. Create a plan for a developmentally appropriate, problem-based STEAM learning center that fosters exploration and discovery.
3. Explore practical strategies for facilitating child-led investigations that encourage independence, creativity, and joyful learning through play.



EMOJI CHECK-IN

How familiar are you with the concept of 21st Century Skills?

- ❤️ I know a lot about it
- 👍 I know a little about it
- 😬 I have not heard of this

WHAT ARE 21ST CENTURY SKILLS?

WHAT DO THOSE SKILLS LOOK LIKE IN THE CLASSROOM?

EMOJI CHECK-IN

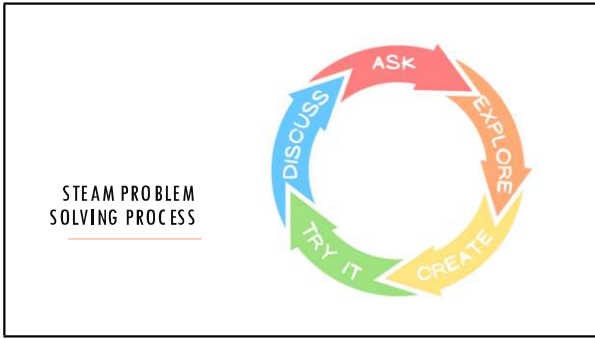
How much experience do you have with STEAM learning?

- ❤️ I have a lot of experience
- 👍 I have some experience
- 😞 I do not have experience

"For the things we have to learn before we can do them, we learn by doing them."
Aristotle, Nicomachean Ethics

WHAT IS STEAM?

The logo features the word "STEAM" in large, colorful letters. Above the 'S' is "SCIENCE", above the 'E' is "ENGINEERING", and above the 'M' is "MATHEMATICS". Below the 'S' is "TECHNOLOGY" and below the 'A' is "THE ARTS".



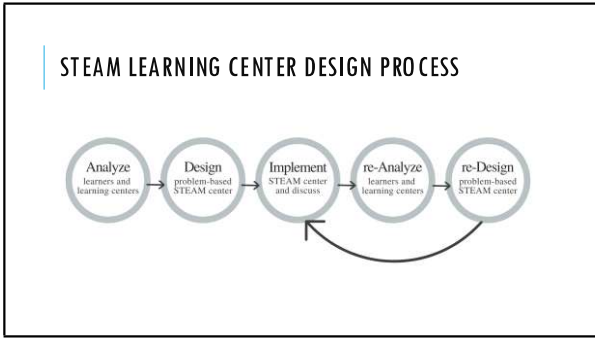
WHY?

Preschoolers have a natural inclination toward STEAM learning.
(Campbell et al., 2018; Inan & Inan, 2015)

STEAM improves conceptual development in related areas.
(Aldemir & Kermani, 2017)

The arts help students to immerse themselves into the experience of STEAM.
(Reighard et al., 2016)

HOW DO WE GET STARTED?



STEAM LEARNING CENTER TOOLS

Leamer Observations →

Student	Interest	Question	Problem Encountered

Needs Tracking →

Student	Identified Needs	Accommodations/Modifications

Learning Center Analysis →

Question or Problem	Material Availability	Needs

LEARNER OBSERVATIONS

What do you know about your students?

What are they interested in?

Where do they play after?

What questions are they asking as they play?

What problems are they encountering during play?

Student	Interest	Question	Problem Encountered

OBSERVING OUR LEARNERS



NEEDS TRACKING

What are the developmental needs of your class as a whole?

What are the needs of individual students?

What adaptations will you need to consider?

Student Needs: 450-456 Learning Centers in Early Childhood

Identified Needs: List developmental or individual needs as identified by the teacher or the student's family.

Appropriate Modifications: Use this section to note any accommodations that may need to be considered in the design of the learning center to meet each student's needs.

Student	Identified Needs	Appropriate Modifications

ADAPTATIONS

- Task Cards
- Visual Tools
- Reduced or Extended Materials
- Modeling
- Word Cards with Photos
- Multi-Level Height
- Sensory Helpers



Learning Center Analysis: STREAM Learning Centers in Early Childhood

Question or Problem: List possible questions or problems to use as the central focus for the portfolio of STREAM learning centers here.

Materials availability: Check your materials to what Learning Center currently address this question or problem.

Note: This collection of questions could be adapted for questions or problems to other classrooms.

Question or Problem	Materials Availability	Notes

What question or problem do you want to solve?

What materials might be needed?

What do you already have in your classroom?

What else do you need?

LEARNING CENTER ANALYSIS

HOW DOES IT ALL COME TOGETHER?



MY CLASSROOM

ABOUT MY CLASS

Private suburban preschool

Half day program from 8:45 AM to 12:30 PM

Play-based learning philosophy

20 students and 2 teachers in the classroom

CREATING THE CENTER

Observation: Your students are frustrated that their block towers fall down as soon as they get a more than a few blocks high. Clara asks, "Can you make this stay up?"

Problem: How can we build a tall tower that does not fall?

Needs: soft materials, variety to provide a challenge, visual examples

Materials:

Blocks (wooden, foam, cardboard)

Other building materials

Marble Run and Marbles

Disposable Cups

Measuring tools

Example images of tall towers

Clipboard and Paper (plain, grid, blueprint)

Pencil, markers, crayons

Dress-up (goggles, hard hats, vests)



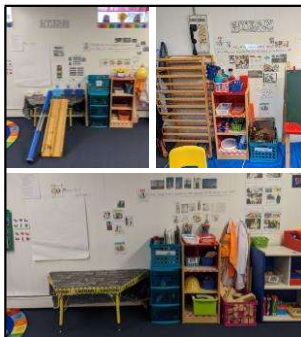
STEAM LEARNING CENTER EXAMPLES


Tall Structures: How can I build a tall tower that does not fall?

Movement: Why do some objects move faster? How can I make my vehicle move faster?

Liquid Movement: Paint: Why does paint drip?

Liquid Movement: Houses: Why do houses have a pointed, tily Roof?





THE TEACHER'S ROLE

Introduce

- Pose the problem
- Describe the materials
- Engage curiosity with "I wonder..."

Facilitate

- Ask questions: "What happened when you tried...?"
- Use comments: "You put the heaviest block on the bottom."
- Add language: "You put a large base at the bottom of your tower."

Debrief

- "What did you try?"
- "What worked?"
- "What didn't work?"
- "Why do you think that happened?"
- "How can we build a tall tower that does not fall?"

WHAT DOES EXPLORATION AND DEBRIEFING LOOK LIKE?




TALL STRUCTURES | Exploration and Discussion

WHAT'S NEXT?



Observation Data

Ellen and Kyle are testing their and recording down a map on one side of the classroom. After exploring how to make sure their paper is a previous learning center. They have gotten a little too good at it. Sophie and Kyle are getting frustrated that the test and rigging keep hitting that bar at the table on the other side of the room.

You have noticed that this is becoming a problem for many students in the classroom. You could take the map away or change the classroom design...or this might be an opportunity for a new STEAM learning center.

WHAT COULD I DO TOMORROW TO START USING STEAM LEARNING CENTERS IN MY CLASSROOM?

EMOJI CHECK-IN

How comfortable do you feel trying to set up a STEAM learning center in your classroom?

- ❤️ I am ready to start tomorrow!
- 👍 I think I can do it.
- 😬 I am still not sure.

WHAT TO KNOW MORE?

FIND ME AT:
TIFFANYBERMAN.COM

CURRENT RESEARCH PROJECT:
PARENT PERSPECTIVES ON PLAY IN 2ND THROUGH
5TH GRADE

QUESTIONS?

Student Needs: STEAM Learning Centers in Early Childhood

Identified Needs – List developmental or individual needs as identified by the teacher or the student’s family.

Accommodations/Modifications – Use this section to note any accommodations that may need to be considered in the design of the learning center to meet each student’s needs.

Student	Identified Needs	Accommodations/Modifications

Notes:

Learning Center Analysis: STEAM Learning Centers in Early Childhood

Question or Problem – List possible questions or problems to use as the central focus for the problem-based STEAM learning centers here.

Material Availability – Note how materials in other classroom learning centers currently address this question or problem.

Needs – Note additional materials needed to address the question or problem in the classroom.

Question or Problem	Material Availability	Needs

Notes:

Learner Observations Tool: STEAM Learning Centers in Early Childhood

Instructions: Observe students for a minimum of one week. Use the recording sheet below to note interests, questions asked, and problems they encounter in the classroom. Student interviews and parent questionnaires may also provide important information on student interests.

Interests – activities, colors, characters, games, sports, television shows, classroom materials, and music.

Questions – Any questions asked by students that the current classroom set-up cannot answer should be noted below in full. For example, “Why did the leaves change colors?” or “What happens to plants when we pick them?”

Problems Encountered – Note any problems that students encounter below. For example, “Why does my block tower keep falling?” or “Why does his car move faster than mine?”

Learner Observations: STEAM Learning Centers in Early Childhood

Student	Interests	Questions	Problems Encountered

Notes: