

How to Train your Bot

AN EXPLORATION OF TEAMWORK AND COORDINATION

NARRATIVE

- It's 2200, and the ever increasing number of natural disasters have started to take their toll. The world is in turmoil. Your squadron of elite pilots can be called in to rescue those that have been trapped at any moment. In preparation for that day, your squadron must create the training grounds for your pinball-ball "bots" that will be sent into the field. These obstacle courses, made of cardstock, scissors, rubber bands, and your imagination, will train the pilots that will one day save the lives of those in danger. The better your folding, creasing, structural design, and creativity with your materials, the more lives can be saved.
- We no longer use handheld controllers. Now we use these screens we can tilt to move the robot through space. Soldiers use them to drive their remote bots through the field. The better the pilot, the better the steering. So, we need to create training camps for the soldiers to learn how to pilot the bots through these screens.
- Each board is a training camp for a bot. Your mission is to create a training camp of different obstacles for your bot. Your bot will maneuver around, completing each obstacle. I will be relaying challenges from The General as they come in.

STAGING

A board of miscellaneous obstacles sits atop the pedestal. Students gather around it for their discussion. Materials are passed out amongst "soldier teams" of student pairs for them to work with. Their boards, ropes, and wooden handles are at their desks for them to assemble (to save time with prep, you can assemble these in advance of the students coming in).

RULES

1. Your obstacles must meet the Training Milestones provided by The General.
2. You will work in soldier teams of two students, with each soldier making a different version or solution of the Training Milestones for The General.
3. You may not tape tape to itself or to the wooden pegs.

MATERIALS

- Cardstock, ¼ pages
- Cardstock, full sheet
- Plastic straws
- Rubber bands, different sizes
- Masking tape

TOOLS

- Wooden pegs
- Scissors
- Pliers
- Hole puncher
- Straight edges
- Rulers
- Pens
- 3-6 Pegboards for class

Per student pairs:

- 1 Pegboard
- 2 ropes, 4 handles
- 1 steel pinball

LEARNING OBJECTIVES

- To defend an evaluation of a difficulty rating for a constructed obstacle.
- To articulate a game-play experience through a framework of visual interest and balance of challenge and skill.

SKILL OBJECTIVES

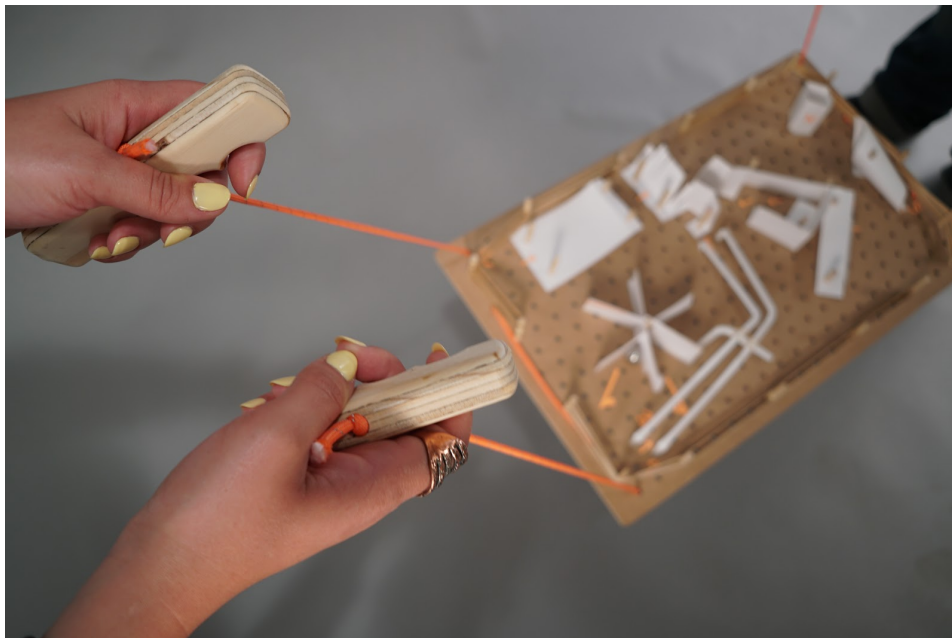
- To construct working obstacles from given prompts.

Reference Samples

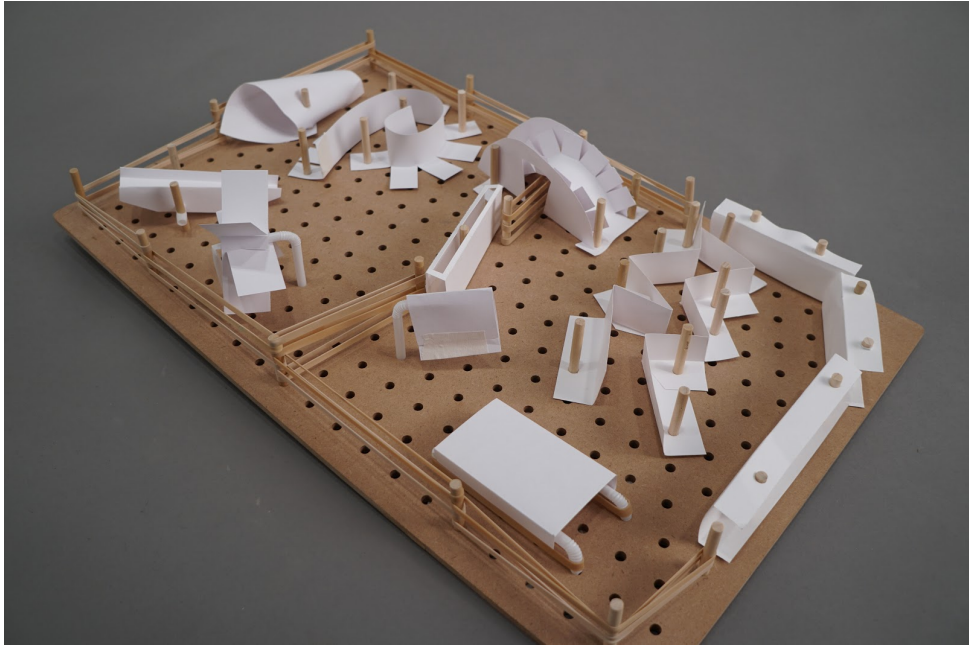
Material Layout and Pedestal Board for Discussion



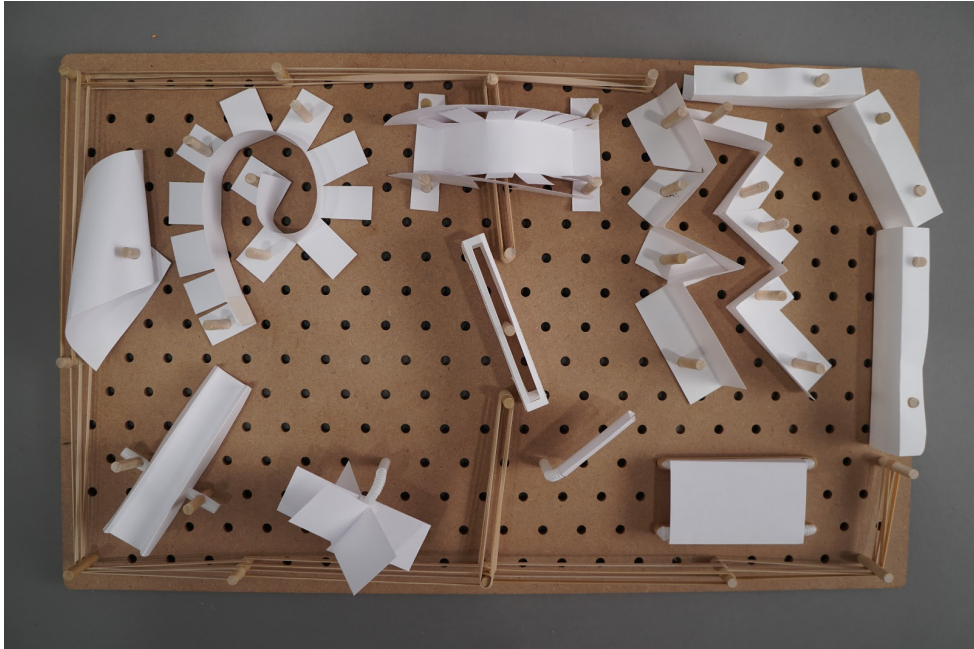
Materials for the project



Ropes woven through board and into handles.



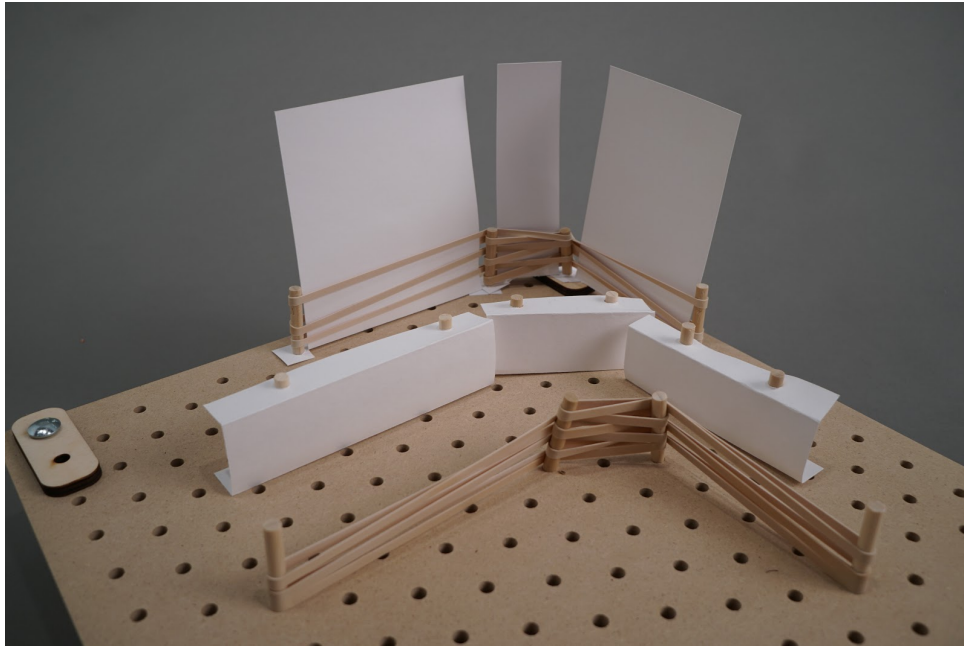
Board for the introductory Pedestal Discussion
Place atop Pedestal during Room Setup and let students gather around the Board.



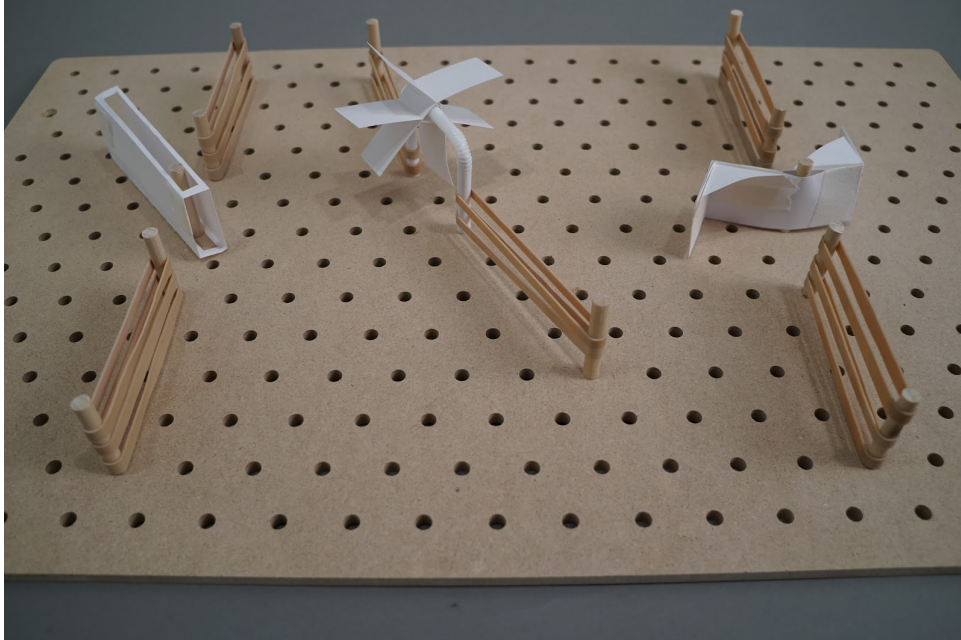
Aerial view of the Board for the introductory Pedestal Discussion

Samples of Obstacles meeting the Training Milestones

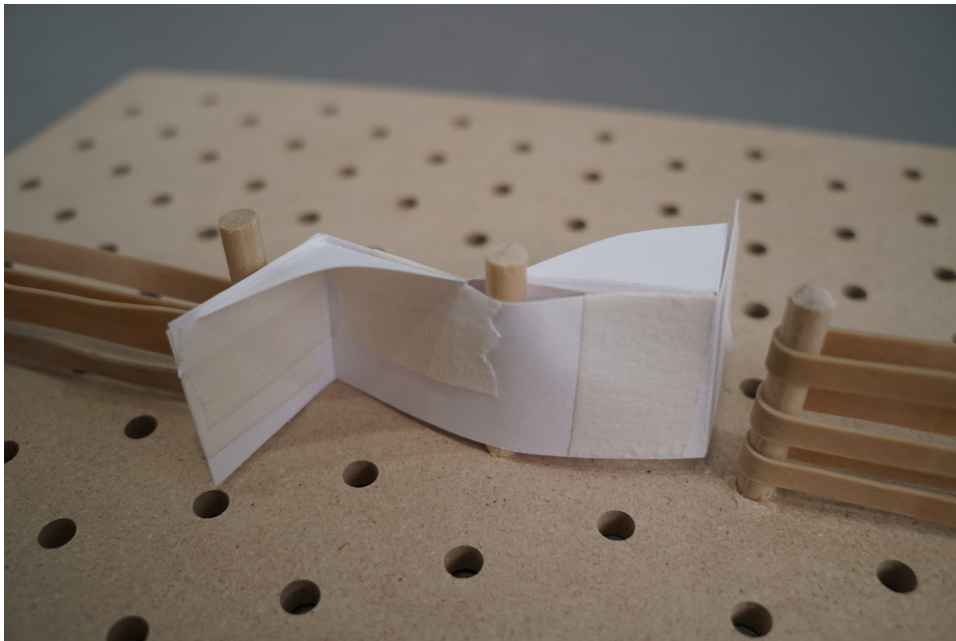
Examples of how Training Milestones could be met with different techniques, materials, and interpretations.



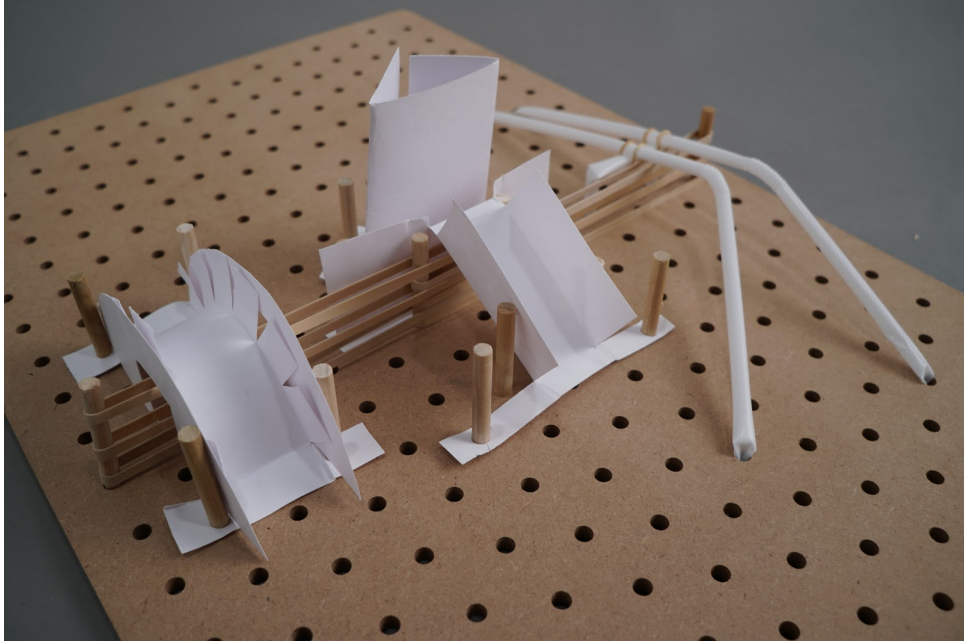
“Make a border edge for your training camp. Use at least three different types of walls, in materials used and in visual aesthetic.”



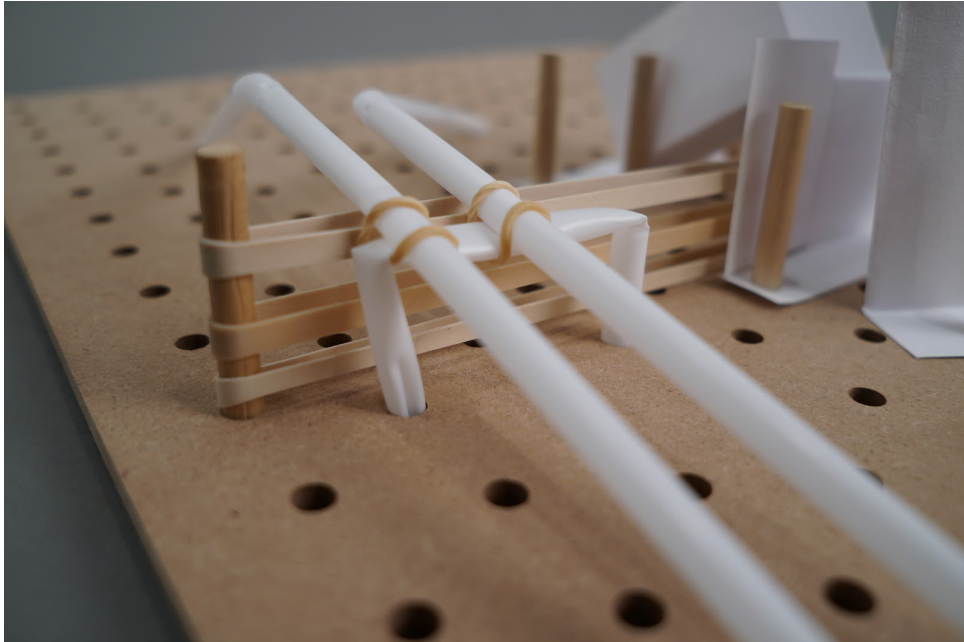
“Make a wall halfway through the camp with 2 moving doors (rotating, sliding, revolving, open and close, etc.) to go from one side of the camp to the other.”



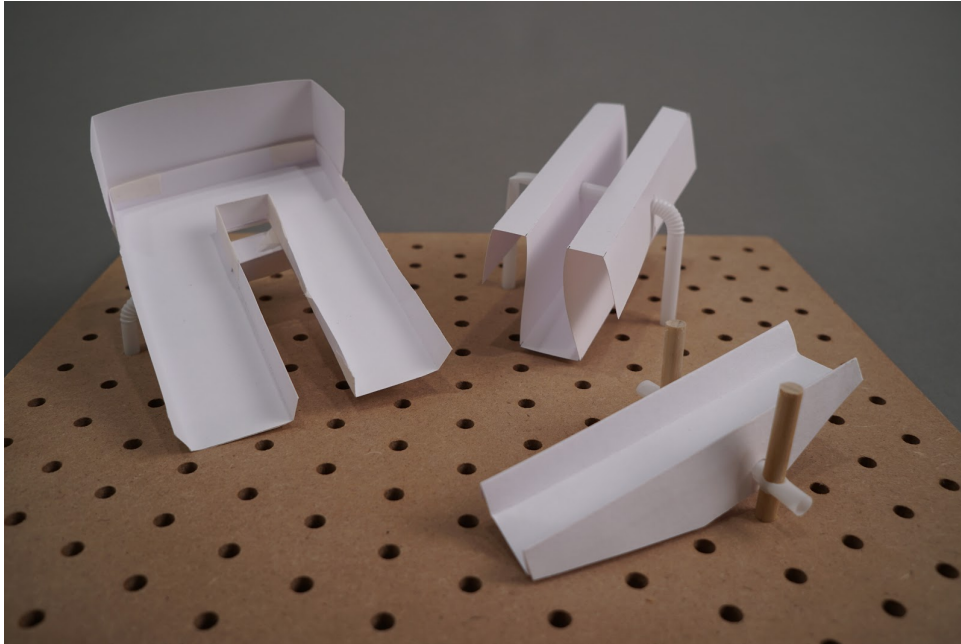
Close up of revolving L-bracket door.



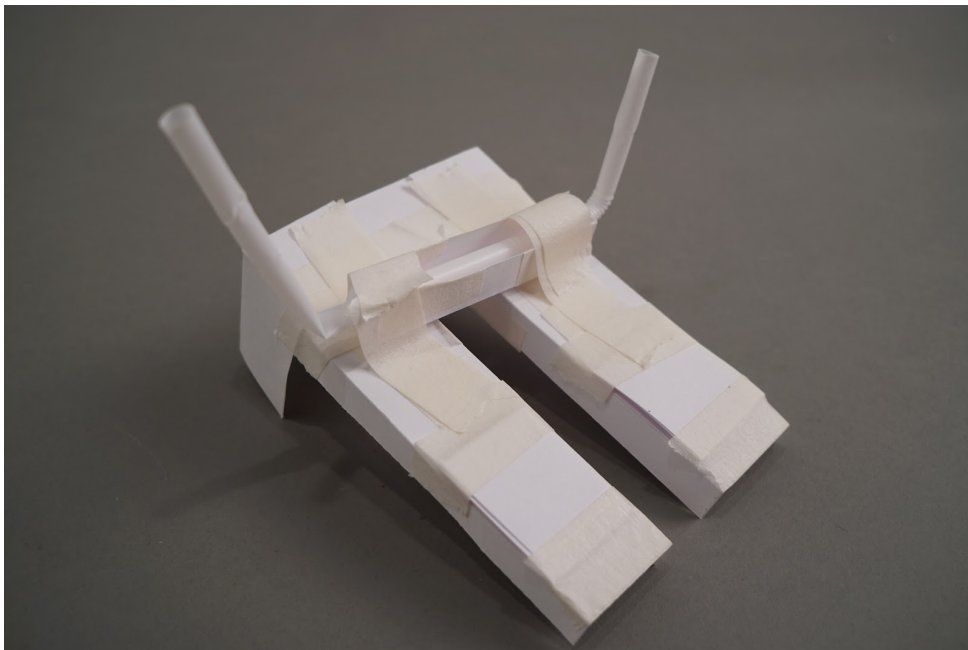
“Make 2 ramps to go over the wall, one on each side.”



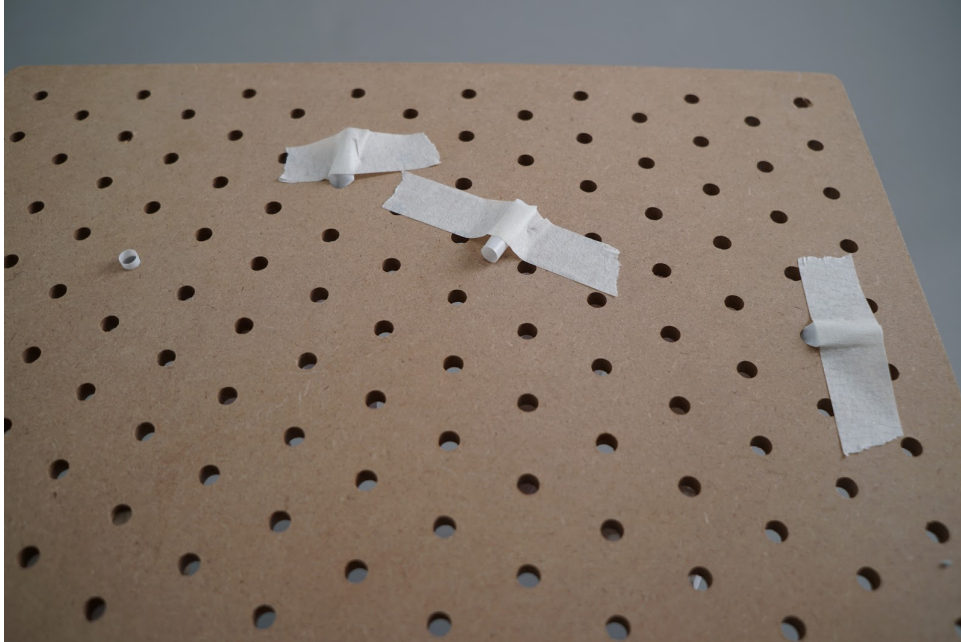
Close up of a ramp obstacle using straws for support and to hold the track closer for the ball to travel over.



“Make 2 teeter-totter, one on each side.”



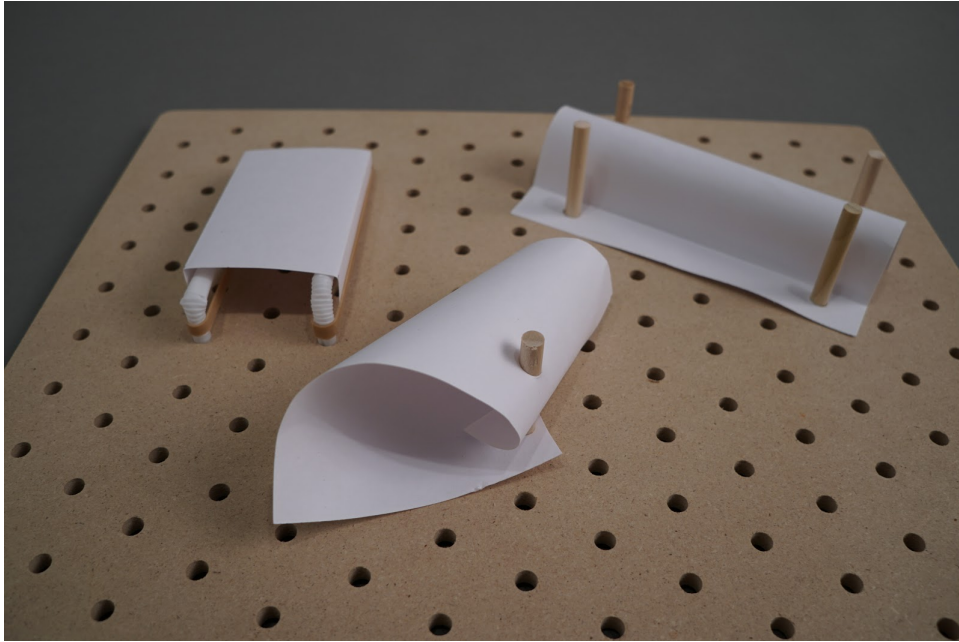
Underside view of the U-turn teeter-totter.



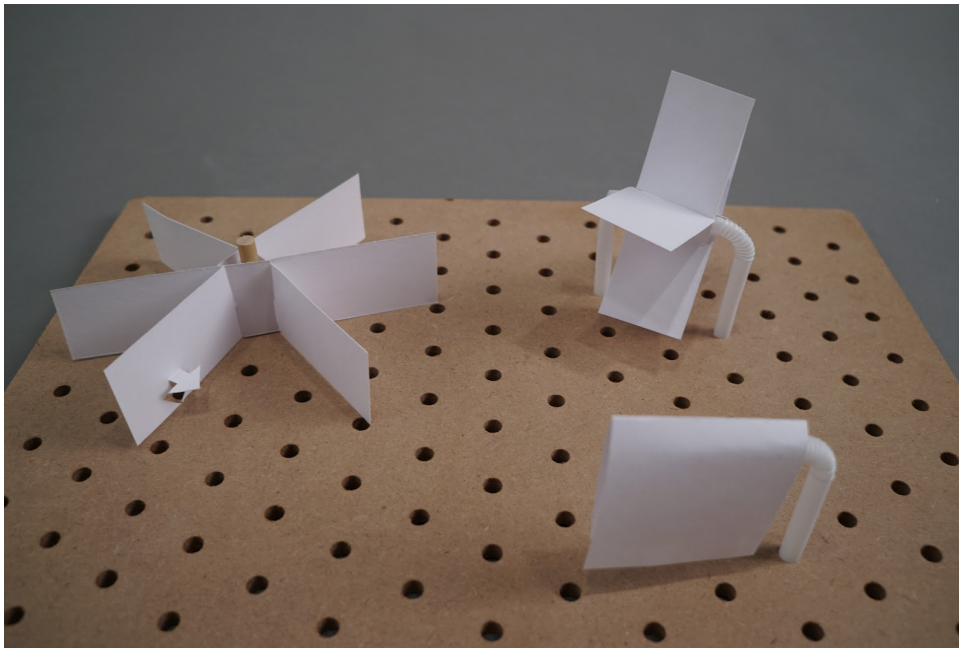
A trick to flatten the ends of plastic straws as they stick out from under the pegboard: Bend them and tape them down.



“Make 2 different kinds of pockets, one on each side.”



“Make 2 different tunnels to go through, one on each side.”



“Make 2 different spinning obstacles, one on each side.”

Procedures

Methodically producing all types of obstacles as “Training Milestones.”

In this exploration, “solder teams” of two students will work together to produce obstacles that will populate their training camps, or obstacle boards, for training. The obstacles they make here will be adapted to a given theme and used in their next project on building a collaborative board.

1. **Gather the students around the pedestal.** A board of obstacles (shown in Reference Samples above) sits atop the pedestal. Discuss key concepts and strategies:
 - a. Goals of this discussion:
 - i. **Visual interest:**
 1. What makes the boards appealing? What elements contribute to that? Do they remind you of other things that have that visual aesthetic?
 - ii. **Information design:**
 1. What would you interpret you are being instructed to do? What can you understand about the order by which to play this board?
 - iii. **Balance of challenge and skill:**
 1. What does it mean to need to balance challenge and skill? In what ways can we begin to gauge how challenging the obstacles are? (The challenge of the game should be commensurate with the skill of the player. If challenge is much lesser than what the person is capable of, it's "too easy" and unattractive. If the challenge is much harder than what the person is capable of, it will seem "too hard" or impossible.)
 - b. What do you see?
 - i. What kinds of obstacles? (let them make names and associations)
 - ii. Maze vs. obstacle course vs. puzzle vs. game?
 - c. Do you want to play with it? What's attracting you?
 - d. Do you know how to play it? How do you know?
 - e. Give a student a ball and invite them to try it.
 - f. What do you experience?
 - g. What was it like to play the board through the ropes?
 - h. What questions do you have now?
 - i. What do you know about obstacle courses? In what circumstances are there obstacle courses? (Tough Mudder, sports practice, army training)
 - j. Who or what do you think this board is for? What if we told you this was a training camp for a robot? Can you see differently purposed obstacles?
2. **Read the narrative to the students.**
 - a. “You are allowed two questions.”
3. **Read the Rules.**
4. **Assemble the Boards.** Using the reference photo above, guide students through the weaving of their ropes:
 - a. Insert the rope through one of the wooden handles. Make an end knot on the flat side.

- b. Insert the other end of the rope through a corner hole of the pegboard. The rope will weave through the short side of the board. Skip a few holes to weave the rope to the other side of the board and back so as to end up going through the last corner hole. Take care to come out the same side you entered the board so it hangs uninterrupted.
 - c. Insert the rope through the finger-holds of the second handle. Tie the end of the rope on the flat side.
 - d. Try picking up the board through the handles and check they enter and leave the holes on the correct sides. If the board is lopsided, adjust the rope to pull evenly on both sides.
5. **Instruct the students through each of the Training Milestones.** As they finish one Milestone they may receive the next one. They may clear the board as needed to make space for the next Milestone (See Reference Samples of Obstacles above for examples).
- a. The Milestones are:
 - i. Make a border edge for your training camp. Use at least three different types of walls— different in materials used and in visual aesthetic.
 - ii. Make a wall halfway through the camp with 2 moving doors (rotating, sliding, revolving, open and close, etc.) to go from one side of the camp to the other.
 - iii. Make 2 ramps to go over the wall, one on each side.
 - iv. Make 2 teeter-totters, one on each side.
 - v. Make 2 different kinds of pockets, one on each side.
 - vi. Make 2 different tunnels to go through, one on each side.
 - vii. Make 2 different spinning obstacles, one on each side.

Maker Tips that you can share or prompt as needed:

- Reinforce the plastic straws with rolled cardstock on the inside.
- Tape straws under the board to lie flat.
- Use a ballpoint pen or pencil to punch through the cardstock while holding it over a hole in the pegboard. Then, use the hole puncher to make a proper hole over the mark.
- Pliers can help hammer in the pegs into the board (not good practice, but good resourcefulness).
- Beware: Masking tape does not hold over night. Acquire stronger tape, like scotch tape, if you'd like to leave the obstacles assembled overnight.
- Consider the height of your obstacles and how that affects the line of sight for the opposite partner.
- Share pictures from the References whenever students need to be urged to move forward.

Resetting the ball: For a difficult challenge, ask a student to create a return that resets the ball from the end of the course to the starting position. They can use as much tape as needed, and go outside the board as needed.

6. **Create and catalog all types of Milestones** by building a class inventory of all obstacles created. Gather three boards and label them:
 - i. Least difficult,
 - ii. Medium difficult,

- iii. Most difficult.
 - b. Every time a student creates a new, unique, obstacle, have the student replicate it and add the copy to this class-wide “Stuff that Might be Useful” set of boards.
- Sacrifice the Original:** If time is running out, or you find it's taking them too long to replicate their solutions, you can simply have them move their original solution to the “Stuff that Might be Useful” board and continue working without a replica of it on their board.
- c. Have a conversation with the students about whether they are categorizing their obstacles by the "difficulty" of the obstacle for the bot, the difficulty of making the obstacle, or both.
 - i. Which classification might be most useful to you later, as soldiers building obstacle courses for training?
 - ii. What part of the obstacle makes it that difficult?
 - iii. What would you change to make this obstacle more or less difficult?
7. Halfway through completing the Training Milestones, take a break, and position the boards. **Gather around the "Stuff that Might be Useful" set of boards:**
- a. What do you notice?
 - b. What are some trends in the obstacles made?
 - c. What ratings do you agree or disagree with?
 - d. Are there some that impress you by how they were made?
 - e. Which obstacles are the most like things you've made in the past? Which are the farthest from something you've made before? What are some steps that you could take to make your work a bit more expansive?

This is a good stopping point.

8. **Resume the work of getting through the Training Milestones.** Challenge students to create obstacles outside their comfort zone.

How It's Made: If students are limiting themselves to only familiar shapes, stop the class and have them replicate a few from the "Stuff that Might be Useful" boards. You could have the maker of one of the obstacles walk the class through how they did it. Repeat this for a few obstacles until you feel they are equipped to make obstacles outside of their comfort zone.

9. **Do a Gallery Walk.** At the end of making the boards, put up the boards along the sides of the classroom and have students go around, examining the boards:
- a. What do you notice?
 - b. What are some trends in the obstacles made?
 - c. Are there some that impress you by how they were made?
 - d. Are there some that make you want to play them? What about them attract you?
10. **Play the boards!** Allow the student teams to choose a board they'd like to play. After some playing, have them reflect onto an index card:

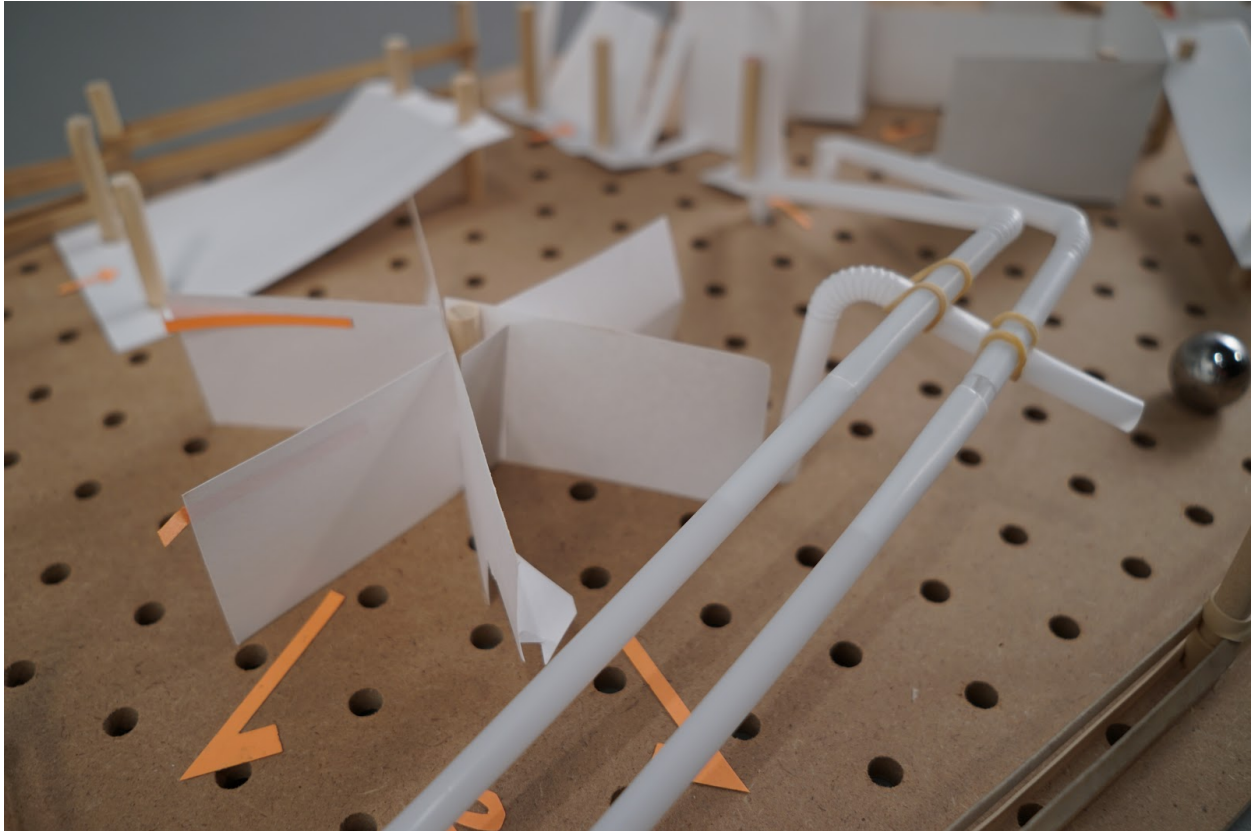
- a. What was fun to play? What made it fun?
 - b. Point to an obstacle that you enjoyed doing over and over again. What about its construction would you attribute to your game play experience?
 - c. Were you playing a game or simply completing each obstacle? What is necessary for play to be a game? (Competition, rules, order, endgame, way to win, skill, strength, luck, etc.)
 - d. What was frustrating? What made it frustrating?
 - e. What was the most both fun and frustrating?
 - f. What percentage of fun and what percentage of frustrating is the ideal for game play?
 - g. (They can repeat this and play multiple boards, too.)
11. **Clean Up.** To prep for next class, have students clear out their boards by removing their obstacles (the woven rope can stay). They should save any interesting obstacles by saving them to the “Stuff that Might be Useful” boards.

Break-Outs/Extensions

Use these activities to extend the project or increase the challenge.

Comments

Use this space to provide feedback and comment on this lesson



All For One and One For All

AN EXPLORATION OF CROWDSOURCING AND OBSTACLE COURSES

NARRATIVE

- The General loved the obstacle courses that you all came up with.
- Now, he would like us to make training boards for the bots that are diverse in their strategies, a bit more unpredictable. To do this, we're going to crowdsource the design of a themed obstacle course. You will receive a theme for your training board and then you will add one obstacle to the board before passing it down. When you're done, we'll pass the training board to the next member of your squadron and they will add the next Training Milestone. We'll repeat this and go all around the squadron. At the end, altogether, we will have completed full, crowdsourced obstacle courses.
- The final addition will be to add directions to the board. But, to keep our missions Top Secret and safe against any enemy interference, our communication must be strategic. You must communicate the order of your obstacles, how to overcome them, and any other information as well as possible on the board itself. The design of your maze should embed and communicate any rules— Your maze must "speak for itself," you will not give any verbal instruction to those playing your game.

STAGING

A themed obstacle board with directions sits atop the pedestal. Other materials for students are distributed amongst the squadron desks. Their boards, ropes, and wooden handles are at their desks for them to assemble (to save time with prep, you can assemble these in advance of the students coming in).

RULES

1. You will work on each board in soldier teams of two students. Each squadron will have 6-8 students, or 3-4 soldier teams.
2. Your obstacles must support the assigned theme of the board.
3. Obstacles should be technically sophisticated while being easily understood by the pilots in command.
4. You must design a point structure for your maze. You may oversee your game being played by others and shout out the score as it updates.
5. Your instructions should be self-explanatory, embedded into the board design, such that anyone can pick up the board and know:
 - a. how to play,
 - b. what order to go in,
 - c. how to complete each obstacle, and
 - d. how to accumulate scores.
6. You may not use words on the board, you may not write down or say aloud any rules for how to complete the maze.
7. You may award 2 time-outs with 2 questions during the game play.

MATERIALS

- Cardstock, ¼ pages
- Cardstock, full sheet
- Plastic straws
- Rubber bands, different sizes
- Masking tape

TOOLS

- Wooden pegs
- Scissors
- Pliers
- Hole puncher
- Straight edges
- Rulers
- Pens

Per student pairs:

- 1 Pegboard
- 2 ropes, 4 handles
- 1 steel pinball

LEARNING OBJECTIVES

- To critique a game through a framework of visual interest, information design, and balance of challenge and skill.
- To construct working obstacles responding to a given prompt and theme.

SKILL OBJECTIVES

- To effectively communicate through non-text based design elements.
- To quickly prototype and make decisions collaboratively with a partner.
- To demonstrate examples of honest, specific, and kind feedback of others' work.

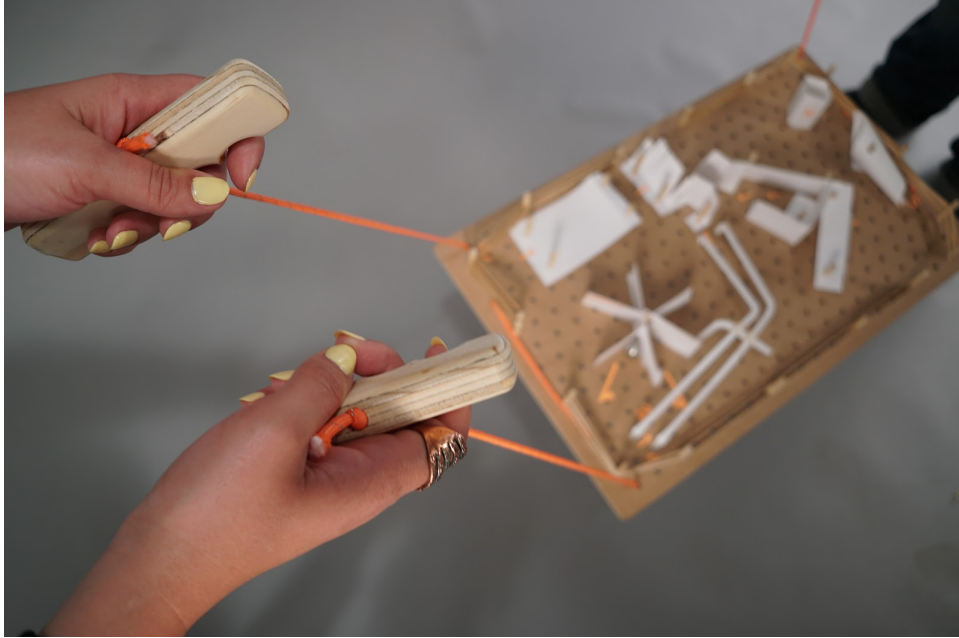
Reference Samples

Material Layout and Pedestal Board for Discussion

The way an obstacle board does or does not meet its given theme is always up for debate. The intent here is that students will be able to defend and argue using evidence of the obstacles they built to make the case for how one construction technique or an added visual element contributes to their given theme.



Materials for the project



Ropes woven through board and into handles.



Themed obstacle board example to sit atop the pedestal.

Procedures

Applying obstacles to thematic Obstacle Boards.

In this collaboration, squadrons made up of soldier teams pass around obstacle boards and all together contribute to populating them with obstacles fit for their given theme. They apply the techniques gained from making their basic Training Milestones, and adapt them to the given theme.

1. **Gather the students around the pedestal.** A themed obstacle board with directions sits atop the pedestal (see Reference Sample above). Discuss key concepts and strategies:
 - i. Goals of this discussion:
 1. **Visual interest:**
 - a. What makes the boards appealing? What elements contribute to that? Do they remind you of other things that have that visual aesthetic?
 2. **Information design:**
 - a. What would you interpret you are being instructed to do? What can you understand about the order by which to play this board?
 3. **Balance of challenge and skill:**
 - a. What does it mean to need to balance challenge and skill? In what ways can we begin to gauge how challenging the obstacles are? (The challenge of the game should be commensurate with the skill of the player. If challenge is much lesser than what the person is capable of, it's "too easy" and unattractive. If the challenge is much harder than what the person is capable of, it will seem "too hard" or impossible.)
 - b. What do you see?
 - i. Maze vs. obstacle course vs. puzzle vs. game?
 - c. Do you want to play it? What's attracting you?
 - d. Do you know how to play it? How do you know?
 - e. Do you know how to win it? How do you know?
 - f. Is there a theme to this board? If I said there was, what would you guess it is?
 - g. In what kinds of games do you start with by reading all the rules, front to back?
 - h. In what kinds of games do you dive in and figure it out as you go?
 - i. What does this saying mean: "The best games have no rules" ?
 - j. What makes a game fun to play? How about in regards to difficulty? And in regards to skill level needed?
2. **Read the narrative to the students.**
 - a. "You are allowed two questions."
3. **Read The Rules.**
4. **Give students the theme to their current board.** Have them write it down on tape on an edge of the board. Themes could include:
 - a. Round & Round

- b. Frustrating
 - c. 1x3
 - d. Noisy
 - e. Square beginnings
 - f. Ups and downs
 - g. Spirals
 - h. Jagged edges
 - i. Rough terrain
 - j. Edge of death
 - k. No show zones
 - l. That was close!
5. **Instruct the soldier teams to add an obstacle that considers their course theme.** Each obstacle will be one of the Training Milestones explored before, this time adapted for each theme.

Think, then Build: When you deliver the Training Milestone, you might want to ask the soldiers to think before they build. You can try different strategies with them, including: having a squadron-wide discussion around the different Training Milestones that were made previously; have them write down their ideas to their approach; use post-its to capture different options for their solution.

The Training Milestones are:

- a. Make a border edge for your training camp. Use at least three different types of walls— different in materials used and in visual aesthetic.
 - b. Make a wall halfway through the camp with 2 moving doors (rotating, sliding, revolving, open and close, etc.) to go from one side to the other.
 - c. Make 2 ramps to go over the wall, one on each side.
 - d. Make 2 teeter-totters, one on each side.
 - e. Make 2 different kinds of pockets, one on each side.
 - f. Make 2 different tunnels to go through, one on each side.
 - g. Make 2 different spinning obstacles, one on each side.
6. **Reflect and Recap.** At the end of each Training Milestone, soldier teams will pass the board around their squadron, resulting in a collaboration on each board. Instruct them to reflect and connect their work as they add to the board:
- a. "Every time you pass the board, explain how the theme was incorporated into the latest obstacle made. The new soldier team can try guessing the theme elements present, first, and the makers can elaborate afterwards. If you have any questions on how to complete an obstacle, now is the time to ask. "

This is a good stopping point.

7. **Information Design.** Once all the Training Milestones have been incorporated (or once the boards are full), give students the final challenge. Have the last soldier team create instructions for how to play the board. Remind them that they should design this information into the board such that anyone can pick up the board and know:
- a. how to play,
 - b. Where to start and end,
 - c. what order to go in,
 - d. how to complete each obstacle, and

- e. how to accumulate scores.
 - i. The students are allowed to oversee the gameplay and act like a scoreboard by saying the updated score aloud as the game updates.
- 8. **Do a gallery walk.** When the boards are complete, lay the boards against the wall and have the students circle the room, observing the boards.
 - a. “What are some of the comments you can make on the boards’ basic framework: visual interest, information design, and balance of challenge and skill?”
 - b. Which obstacle would you say fits its theme the most?
 - c. Which board looks the most fun to play?
 - d. Which board looks the easiest to follow?
 - e. Which board looks the farthest from something you think you can make? What makes that seem difficult? How could it be made easier?
 - f. Was this a collaboration?
 - g. How did it feel to pass off your board without having any control of what was being done to it? In what ways was it better or worse to pass it off without retaining control of what was done to it?
 - h. Does this passing off of a project from maker to maker ever happen in the real world?

This is a good stopping point.

Pilot the robots!

- 9. **Deploy your game for testing!** Trade boards with your neighbors and take turns piloting each other’s game.
 - a. Observe your neighboring pilots complete your training maze.
 - i. What kind of information are you gaining from watching them play? What are you observing? What are you learning?
 - 1. Imagine you were going to test something, or interview someone on what they thought of your product. Would you do any preparation for it or would you walk in empty-handed?
 - a. In what ways could it be helpful to walk in with notes and prepared questions?
 - b. In what ways could it be important to be reactive and flexible to your interviewee?
 - b. Strategize: what should you do while you oversee the gameplay?
 - i. One student should keep score as the game is played.
 - 1. Make a scoring rubric, write down the points, and make a table to keep score as the game is played.
 - ii. One student should take notes on the game play:

1. Here you want to ask yourselves: 'What kind of questions do I have around my game? What do I want to know? What would be helpful to know in order to make my game better?' Make a list of observational questions and interviewed questions to bring to your user study:
 - a. What is too difficult?
 - b. What obstacles bring joy to the players?
 - c. When are they frustrated with the obstacle?
 - d. What rules are (or are not) understood?
 - e. What was most memorable?
 - f. When do they not understand the game order?
 - g. Are they able to understand the point system?
 - h. When do they not understand how to complete the obstacle?
- c. Class demo.
 - i. Volunteer a group of students to do their user testing in front of the class.
 - ii. Have the group share the questions they prepared. Copy them onto the board for all to see and critique the questions they chose- how might they be improved?
 - iii. Have the students conduct their user test and have spectating students take note of what they did well and not so well:
 1. What questions did they improvise in reaction to the test?
 2. In what ways was their body language conducive to their test? Inviting to their users?
 3. What other information were they given that they had not planned on observing? Did they collect it during the test?

Friendly Feedback: Review the Critical Making Rules Poster that says "Feedback should be honest, specific, and kind." What are some examples of when feedback is this and when it isn't this?

- iv. Let the players of the test board give "honest, kind, and specific" feedback to the game designers. Let spectator students take notes on what they did or did not do well.
 - v. Have students share. Let the testers share the notes they gathered. Have the spectators share the notes they gathered. Remind students this is a chance to practice giving "honest, kind, and specific" feedback.
 1. User testing gets better the more you do it.
 2. Learning from your peers' best practices helps your user testing be more informed and go more smoothly.
 - vi. Go ahead and use what you just learned from this user test to edit your plan for user testing.
10. **Play your neighbors' maze.** Give and receive feedback to game designer.
- a. Have game players rate the frustration levels for game play. How does it fall with the given challenge?
11. **Incorporate feedback.** Make changes to your course depending on how your bot performed.
- a. A case should be made for any feedback that is not going to be incorporated. One possible reason is the dilemma inherent in designing for a universal user instead

of a unique one. It is okay for the game designer to disagree with the feedback given because their design intention was different, but they just need to be able to defend their position. Another way to validate user feedback is to increase the sample size by asking others to play it and give feedback, too.

- b. After adapting your game, test it on a new team. Again, as they play, you may give two time-outs for the pilots to strategize.

12. De-brief the game testing experience. Engage in an all-class wrap-up.

- a. Was it helpful to see other teams play your game?
- b. What was hard about it? What did you learn through it?
- c. Was it difficult to strike a balance of making a challenging game that also honors the skills of the players? How did you find a universal “sweet spot”?
- d. Talk about the experience of being in the game and being critical of the game to try to review it at the same time.
 - i. (Imagine movie critics and game critics and art critics and their process of experiencing whilst analyzing. Consider Corita Kent's Rule 8: “Don't try to create and analyse at the same time. They're different processes.” Could the same be true of experiencing and analyzing?)
- e. Was it difficult to give “honest, kind, and specific” feedback?

Extensions

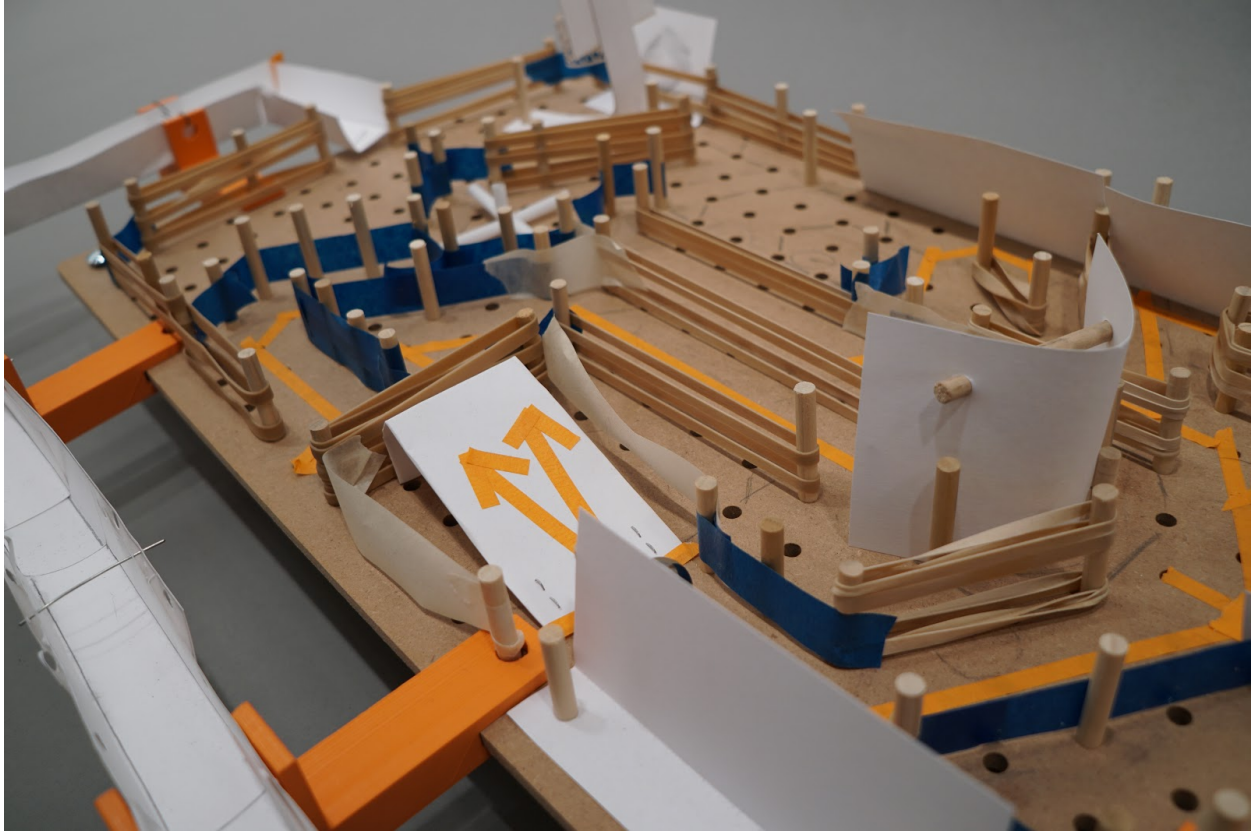
Use these activities to extend the project or increase the challenge.

Self-explained Game Design and Score Rubrics

For an added element of game play, have students explore what it takes to create a scoring rubric for a game. They might assign point values to different obstacles, require a specific order to complete the obstacles, hidden methods for doubling the score, or ways to reset the scoreboard. After mapping out their game play and how they'd like to communicate, students should integrate their instructions and score rubrics and all their information generated onto the game board itself. Much like a pinball board, all of the information should be on the game itself. You can let the students decide to be the scoreboard themselves (by shouting out the updated score every time a move is made) or to make the scoreboard themselves out of their given materials (that they still manipulate and update as they oversee the game).

Comments

Use this space to provide feedback and comment on this lesson



Maze Daze

AN EXPLORATION OF FORMS AND PATHWAYS

NARRATIVE

- It is time to renew the training modules that pilots use to practice their bot driving. And, we want to experiment with new ways of learning: through the use of games, specifically, mazes. We recognize that the best games are a balance of challenge and skill. Your mission is to design a two-player maze for pilots to practice their bot maneuverability.
- To keep our missions Top Secret and safe against any enemy interference, our communication must be strategic. You must communicate the order of your obstacles, how to overcome them, and any other information as well as possible on the board itself. The design of your maze should embed and communicate any rules— Your maze must "speak for itself." You, the makers, will not be able to say anything to the pilots on how to get through the maze. The two pilots themselves will also not be to speak to each other while navigating the maze.

STAGING

A completed maze board sits atop the pedestal. Materials have been passed out to where soldier teams will be working.

RULES

1. You will work with another soldier in a team.
2. You should have as many obstacles as possible from the Training Milestones, minimum five.
3. You must design a point structure for your maze.
4. Your instructions should be self-explanatory, embedded into the board design, such that anyone can pick up the board and know:
 - a. how to play,
 - b. what order to go in,
 - c. how to complete each obstacle, and
 - d. how to accumulate scores, all without reading a set of instructions.
5. You may not use words on the board, you may not write down or say aloud any rules for how to complete the maze. You may announce the score as it updates while you oversee the game.
6. You may award 2 time-outs with 2 questions during the game play.
7. Successful Bots are those that learn the most. To learn the most, you must incorporate as many of the Training Milestones:
 - a. A border edge
 - b. A wall through the camp with moving doors

MATERIALS

- Cardstock, ¼ pages
- Cardstock, full sheet
- Plastic straws
- Rubber bands, different sizes
- Masking tape

TOOLS

- Wooden pegs
- Scissors
- Pliers
- Hole puncher
- Straight edges
- Rulers
- Pens

Per student pairs:

- 1 Pegboard
- 2 ropes, 4 handles
- 1 steel pinball

- c. Ramps to go over walls
- d. Teeter-totters
- e. Pockets
- f. Tunnels
- g. Spinning obstacles

LEARNING OBJECTIVES

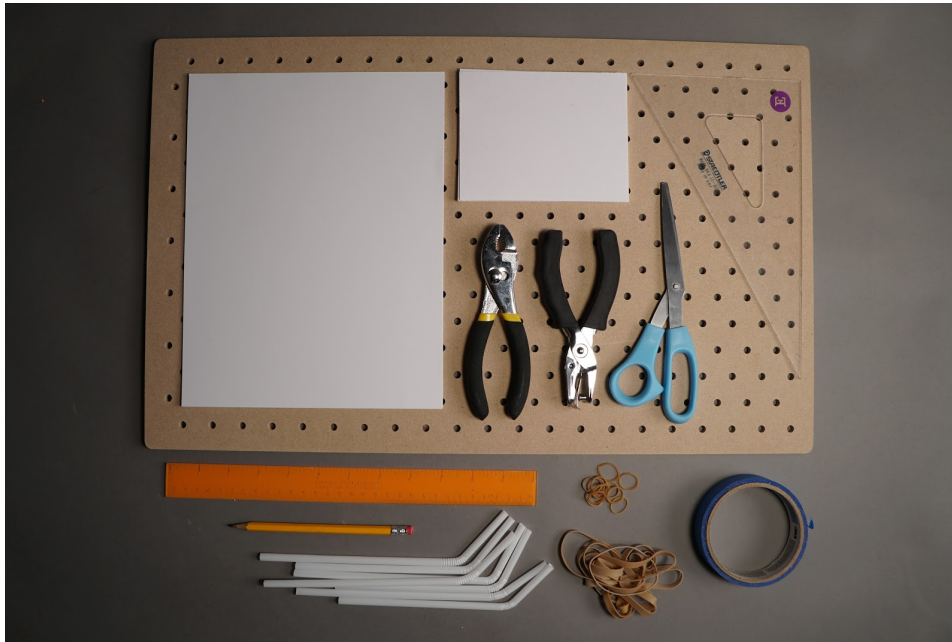
- To articulate game design strategies for matching a game's challenge level with a player's skill level.
- To demonstrate examples of honest, specific, and kind feedback.

SKILL OBJECTIVES

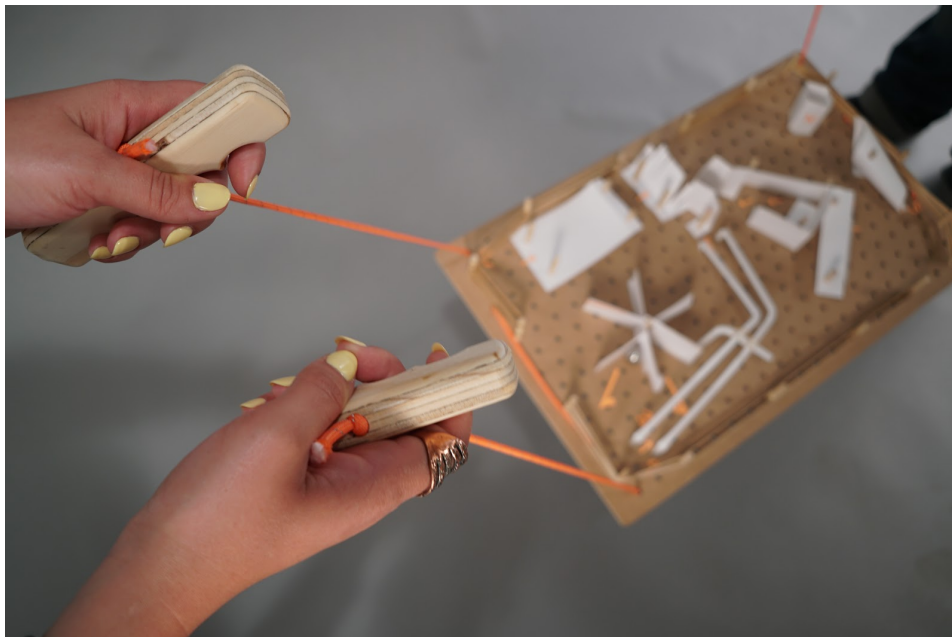
- To negotiate the spacing needed to navigate through and around obstacles occupying a player board.
- To apply critical making skills to execute a challenge.

Reference Samples

An example of themed maze boards the students will be making in soldier teams.



Materials for the project



Ropes woven through board and into handles.



Themed maze board to sit atop the pedestal.

Procedures

Applying skills into making a maze board.

In this partner work, soldier teams will be working together to create mazes that incorporate all their learned knowledge.

1. **Gather the students around the pedestal.** A completed maze board sits atop the pedestal (See reference photo above). Discuss key concepts and strategies:
 - i. Goals of the discussion: Intend on mentioning and connect topics like interactivity, game play, point structure, balance of skill and challenge, time, etc.
 - b. What do you see?
 - i. Maze vs. obstacle course vs. puzzle vs. game?
 - ii. What is the difference between a maze and an obstacle course?
 - c. Do you want to play it? What's attracting you?
 - d. Do you know how to play it? How do you know?
 - e. How do you learn to play a game?
 - f. What kinds of games do you start with by reading all the rules, front to back?
 - g. In what kinds of games do you dive in and figure it out as you go?
 - h. In what ways do games inform you as you go? (buzzers, game resets, point score changes as you go, etc).
 - i. What does this saying mean: "The best games have no rules" ?
 - j. What makes a game fun to play? How about in regards to difficulty? And in regards to skill level needed?

What's in a game: If the students aren't interested in games, engage with why not and how this game play might be different. What elements could they change to finally design a game they want to play? (what are the differences between Candyland, Monopoly, and Nervous, the card game?)

2. **Read the narrative to the students.**
 - a. "You are allowed two questions."
 - b. Prompt them:
 - i. What does it mean to need to balance challenge and skill?
 1. (The challenge of the game should be commensurate with the skill of the player. If challenge is much lesser than what the person is capable of, or skilled to do, it's "too easy" and unattractive. If the challenge is much harder than what the person is capable of, it will seem "too hard" or impossible.)
3. **Read The Rules.**
4. **Push the students forward.** As you go around, encourage students to be clever with the design of their information:
 - a. How might you delineate movement through arrows?
 - b. How might you communicate the order of the obstacles or the direction of the path?
 - c. How might you communicate the point system for each obstacle?

- d. (circles with increasing rings, shapes of increasing number of sides, bars of color, etc.)

This is a good stopping point.

Pilot the robots!

- 5. **Deploy your game for testing!** Trade boards with your neighbors and take turns piloting each other's game.
 - a. Observe your neighboring pilots complete your training maze.
 - i. What kind of information are you gaining from watching them play? What are you observing? What are you learning?
 - 1. Imagine you were going to test something, or interview someone on what they thought of your product. Would you do any preparation for it or would you walk in empty-handed?
 - a. In what ways could it be helpful to walk in with notes and prepared questions?
 - b. In what ways could it be important to be reactive and flexible to your interviewee?
 - b. Strategize: what should you do while you oversee the gameplay?
 - i. One student should keep score as the game is played.
 - 1. Make a scoring rubric, write down the points, and make a table to keep score as the game is played.
 - ii. One student should take notes on the game play:
 - 1. Here you want to ask yourselves: 'What kind of questions do I have around my game? What do I want to know? What would be helpful to know in order to make my game better?' Make a list of observational questions and interviewed questions to bring to your user study:
 - a. What is too difficult?
 - b. What obstacles bring joy to the players?
 - c. When are they frustrated with the obstacle?
 - d. What rules are (or are not) understood?
 - e. What was most memorable?
 - f. When do they not understand the game order?
 - g. Are they able to understand the point system?
 - h. When do they not understand how to complete the obstacle?
 - c. Class demo.
 - i. Volunteer a group of students to do their user testing in front of the class.
 - ii. Have the group share the questions they prepared. Copy them onto the board for all to see and critique the questions they chose- how might they be improved?
 - iii. Have the students conduct their user test and have spectating students take note of what they did well and not so well:
 - 1. What questions did they improvise in reaction to the test?

2. In what ways was their body language conducive to their test?
Inviting to their users?
3. What other information were they given that they had not planned on observing? Did they collect it during the test?

Friendly Feedback: Review the Critical Making Rules Poster that says “Feedback should be honest, specific, and kind.” What are some examples of when feedback is this and when it isn't this?

- iv. Let the players of the test board give “honest, kind, and specific” feedback to the game designers. Let spectator students take notes on what they did or did not do well.
 - v. Have students share. Let the testers share the notes they gathered. Have the spectators share the notes they gathered. Remind students this is a chance to practice giving “honest, kind, and specific” feedback.
 1. User testing gets better the more you do it.
 2. Learning from your peers’ best practices helps your user testing be more informed and go more smoothly.
 - vi. Go ahead and use what you just learned from this user test to edit your plan for user testing.
6. **Play your neighbors' maze.** Give and receive feedback to game designer.
 - a. Have game players rate the frustration levels for game play. How does it fall with the given challenge?
 7. **Incorporate feedback.** Make changes to your course depending on how your bot performed.
 - a. A case should be made for any feedback that is not going to be incorporated. One possible reason is the dilemma inherent in designing for a universal user instead of a unique one. It is okay for the game designer to disagree with the feedback given because their design intention was different, but they just need to be able to defend their position. Another way to validate user feedback is to increase the sample size by asking others to play it and give feedback, too.
 - b. After adapting your game, test it on a new team. Again, as they play, you may give two time-outs for the pilots to strategize.
 8. **De-brief the game testing experience.** Engage in an all-class wrap-up.
 - a. Was it helpful to see other teams play your game?
 - b. What was hard about it? What did you learn through it?
 - c. Was it difficult to strike a balance of making a challenging game that also honors the skills of the players? How did you find a universal “sweet spot”?
 - d. Talk about the experience of being in the game and being critical of the game to try to review it at the same time.
 - i. (Imagine movie critics and game critics and art critics and their process of experiencing whilst analyzing. Consider Corita Kent’s Rule 8: “Don’t try to create and analyse at the same time. They’re different processes.” Could the same be true of experiencing and analyzing?)
 - e. Was it difficult to give “honest, kind, and specific” feedback?

Extensions

Use these activities to extend the project or increase the challenge.

There are ways to increase the challenge of their materials and of how they need to plan around their obstacle courses. The following are some ideas for how to send a soldier team down a more rigorous path of maze-building:

- Use motors taped at bottom underside of board, mate with same materials.
- 3D print or laser cut obstacles
- Add objects that make noise or choose one more material that will make noise when engaged.
- 3D print or laser cut pieces to help make a return that resets the pinball back to the home position.

Comments

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