

Empathic Design in Cross-cultural STEM Education: Playground Project (Resource exchange)

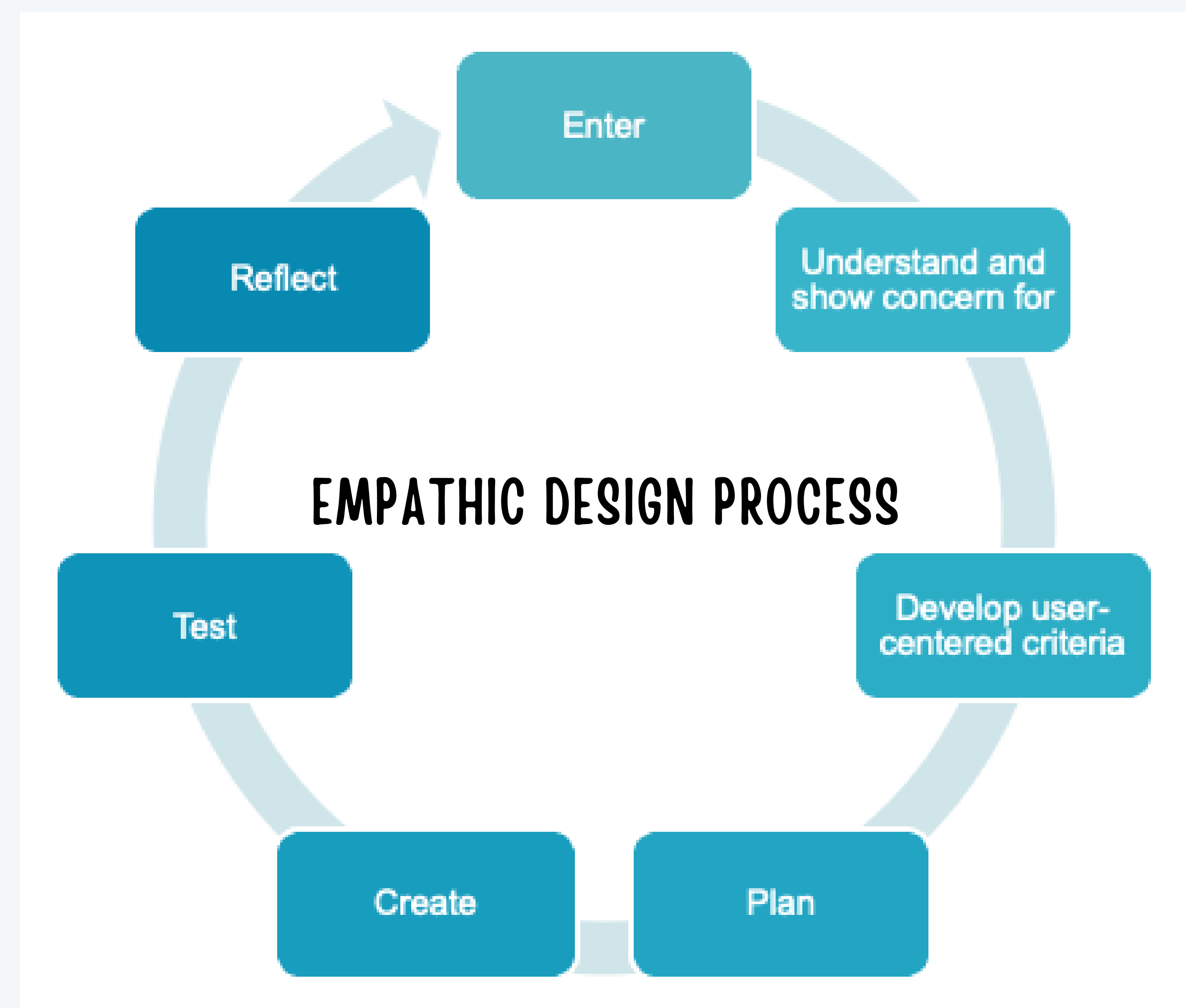
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EMPATHIC DESIGN IN CROSS-CULTURAL STEM EDUCATION

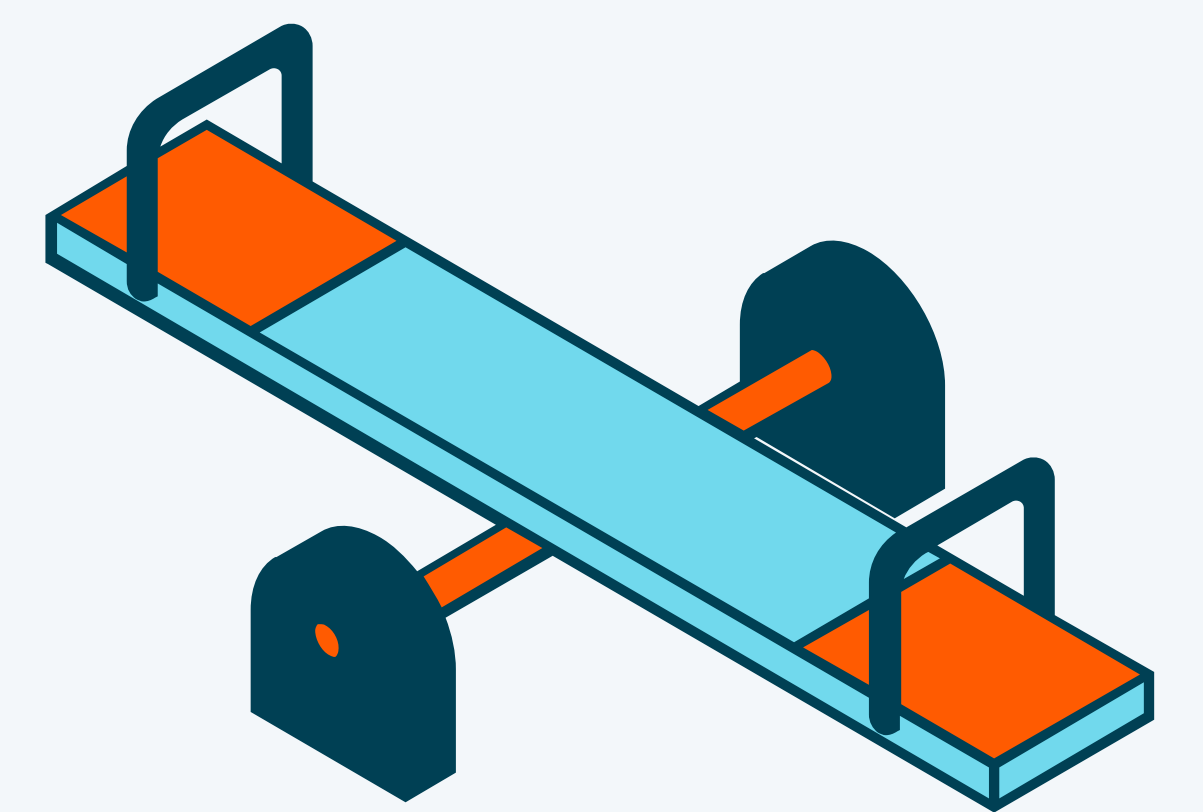
PLAYGROUND PROJECT

- The playground project adopts an empathic engineering design approach in the context of cross-cultural STEM education.
- Grade level: 3-5th
- Meets NGSS 3-5th physical science; 3-5ETS standards
- Students engage in empathic design techniques by exploring various playgrounds in the world, analyzing users' photos, interacting with various users, and reading playground engineers' stories.



DAY 1: PHYSICAL FORCES

- Students rotate to three learning centers to investigate forces in playground equipment.
- Swing set: Discuss how gravity and inertia are involved in swing sets and calculate the rate of the pendulum swing.
- Slide: Investigate how different materials influence friction on the slide.
- Seesaw: Predict and investigate how a lever works.



DAY 2: ENTER THE USERS' WORLD

Enter: Identify users and problems that they need to solve. Plan to understand the users' experiences.

- Students compare their personal experiences with those of other users in a playground.
- Analyze the features of various playgrounds around the world.
- Engage in a user study by analyzing photos of various users.
- Read articles about how engineers collaborate with local people to build a new playground.

DAY 3: EMPATHIZE WITH THE USERS

Understand and show concern for: Observe users in their contexts. Interact with users. Empathize by experiencing or imagining users' experiences.

- Students interview primary and/or extreme users (who are not primary users).



PLAYGROUND PROJECT

DAY 3: EMPATHIZE WITH THE USERS

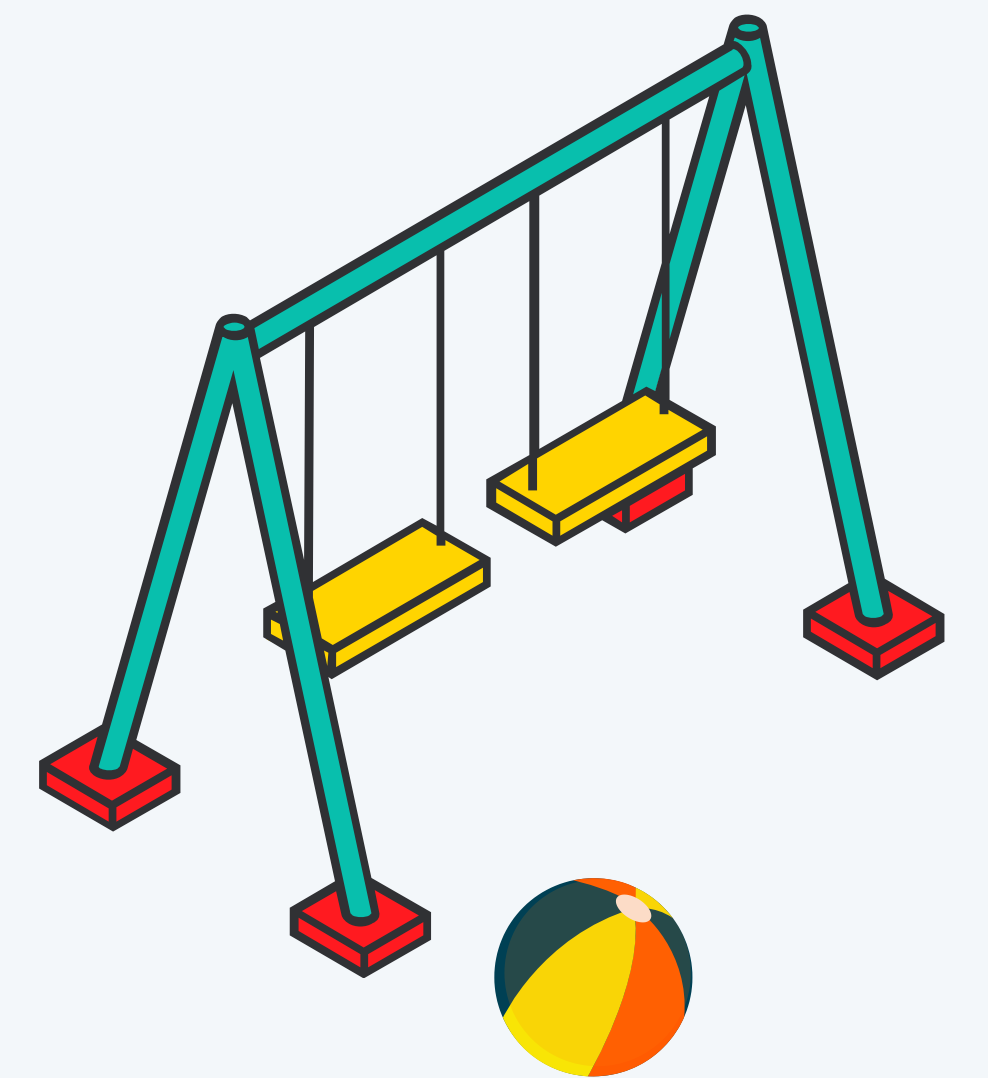
Develop user-centered criteria: Define the problem based on users' perspectives. Capture users' information, suggestions, values, and feelings. Reflect on the potential impact of the criteria and outcomes.

- Develop user-centered criteria based on users' needs, desires, and values.

Plan: Generate multiple ideas with fluency and flexibility. Discuss team perspectives and strengths.

- Generate various design ideas and recognize students' strengths in their design work.
- Collaboratively select a team design.

Create: Build a prototype



DAY 4: TEST WITH USERS

Test: Present your design to users and gather feedback. Utilize imagined use scenarios.

- Share designs with users and implement imagined use scenarios.
- Receive feedback from both users and peers.
- Share the ideas for improvement.

Reflect: Refine your design. Recognize what you learned from others.

- Revise the designs based on feedback.
- Reflect on the lessons students learned from users and peers, the impacts of their designs, and their contributions to the solutions.



DESIGN BRIEF

- Goal: Design a piece of playground equipment for community people by understanding various users' needs and values.
- Criteria:
 - Adaptability: Consider a group of extreme users.
 - Creativity: Combine two play areas into one, such as a tire swing, merry-go-cycle, or climbing dome.
 - Safety: Include a design feature for safety.
 - Measurements: Ensure all measurements are labeled.
- Constraints
 - Materials: Use only provided materials.
 - Size: Ensure the equipment should be within a specific dimension.

