ZooMS! Enrichment Design Challenge

MINNESOTA ZOO

2015-2016

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The ZooMS design challenge offers students a chance to develop a solution to a 'real' problem faced by zoo keepers and staff at the Minnesota Zoo. From designing an enrichment, to engineering a model of a renovated animal exhibit, the problem will challenge students to use their science and math knowledge, creativity, problem solving, and research skills during the engineering design process in order to best solve the problem and present a solution. Selected students will then be invited to showcase their design challenge solution in the ZooMS Design Exhibition in March at the Minnesota Zoo for a chance to win a backstage pass experience with our animals!



The Challenge

The Minnesota Zoo's Tropics Trail is home to 7 species of primates: Colobus Monkey, Cotton Top and Golden Lion Tamarin, DeBrazza's Monkey, White-Cheeked Gibbon, Red Ruffed Lemur and the Ring Tailed Lemur. Because of the level of intelligence that these animals possess, keepers are challenged daily to provide a constantly changing assortment of engaging enrichments to keep the animals happy and mentally stimulated. A puzzle feeder can act as a great challenge, but when the primate has figured out how to use it, the enrichment value is lost. Therefore, the zoo keepers need help in designing a unique enrichment that could be used by multiple primate species. By containing features that meet the needs of different primates in one design, keepers will be able to rotate or easily modify the enrichment for use in several exhibits and therefore allowing them more time to get work done in their day!

The Task

The Enrichment Design challenge will require students to design a multi-species puzzle feeder to engage 2-3 species (*Level 1*) or 4+ species (*Level 2*) of primates on the tropics trail. Students will need to make special considerations such as:

What types of primate can one enrichment design serve best?

How can the puzzle feeder be easily modified or designed to meet the needs of each species?

How will you expect the animal to interact with the enrichment?

How will the enrichment encourage natural behaviors?

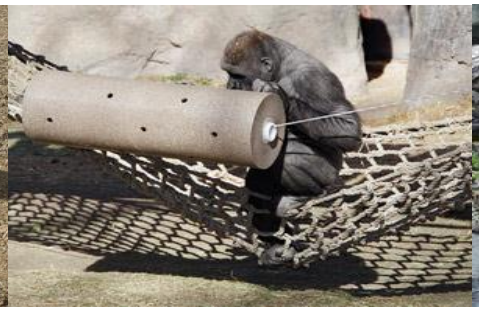
What materials can be used safely with three different primates?

What is Animal Enrichment?

Animals in zoos don't have the same opportunities for physical and mental stimulation that wild animals do, so zoo keepers provide the animals with objects or changes to their environment that will stimulate the behaviors of healthy wild animals. Enrichment can help to improve animal welfare and reduce stress.

Enrichment gives animals something to think about, encourages exercise and gives animals a degree of control of their environment by giving them choices. Basically, enrichment helps keep animals active and interested in their environment. Zoos may do this by presenting objects for animals to explore (manipulable), or changing how their food is presented to encourage natural foraging and hunting behaviors (dietary enrichment).

Goals of Enrichment
Encourage animals to use their natural abilities Increase their activity Allow them to make choices Give them new experiences. Animals in a stimulating environment have fewer physical problems, breed more successfully, are better parents and live longer. Challenges and stimulation make animal life in captivity more normal and visitors are more likely to see natural behavior from behaviorally-enriched animals. Food, or rather the way an animal gains access to food is a major component of behavioral enrichment. Presenting food in a way that makes animals search, forage, climb, jump and cooperate, will stimulate them.


The Solution Requirements

This year, each design challenge will offer two levels of competition to allow classrooms to choose between the enrichment challenge and exhibit design challenge.

Level 1: 3rd – 5th Grade Enrichment Challenge



- Enrichment solution must address **2-3 primate species**.
- Development of one prototype enrichment that can easily be modified to serve all species.
- **Measurements/dimensions** of enrichment
    - Length, Width, Height of key features, including dimensions of openings/holes if applicable (English or metric)
    - Optional:
        - Volume of Feeder/Amount of food it can hold
        - Area of any openings/holes
        - Area of any key measurable surfaces

Level 2: Middle School Enrichment Challenge



- Enrichment solution must address **4+ primate species**.
- Develop one enrichment style and vary it in complexity and difficult according to the species it will serve (example: 4 species = 4 prototype variations).
- **Metric measurements/dimensions**, of each variation
    - Length, width, height of key features
    - Total Surface Area
    - Include if applicable to design:
        - Volume of Feeder/Amount of food it can hold
        - Surface area and circumference of any openings/holes

ALL Levels of student submissions for the enrichment challenge will need to include:

- ☐ **3D prototype**: Hand built model of the enrichment design
- ☐ **Poster Tri-Fold**: A visual presentation documenting the following:

    - ***Research*:** Does the enrichment demonstrate knowledge of the primates it serves and their environment? Were natural behaviors of the each species considered when determining materials and features of the object?

    - ***Design Process:*** Prototype sketches and redesign changes made throughout the design process. How did you modify your design along the way? Save sketches and documents created along the way.

    - ***Prototype Description*:** What will the design be called? What primates does it serve? What are the main features? What are the instructions for use? What are the dimensions/measurements?

    - ***Constraints*:** What factors prevented a perfect design? Could your solution exist in real life? If the primates were to use your prototype, what might impact a successful use of the enrichment?

    - ***Solution**:* How does the enrichment act as a solution to the problem?
        - Does the enrichment encourage natural behaviors?
        - Is the enrichment object safe, functional, and engaging?
        - How was a zookeeper use the enrichment with the animal?
        - How can the enrichment be modified to serve the other species? Is the enrichment challenging enough without being too difficult?

Evaluation

Enrichments will be evaluated based on the following criteria: *(A rubric will be provided at a later date)*

1. Whether the enrichment itself poses an unacceptable risk to the animal
2. What benefit the animal will derive from the enrichment
3. The ability for the enrichment to serve multiple species as result of modification or variation.
4. The enrichment solutions presentation demonstrates use of the engineering design process.
5. Innovative and creative approach to developing a design solution.

Advancing to the ZooMS Exhibition

Students will be selected to participate for the ZooMS Design Exhibition in one of two ways depending on the classroom teacher's decision of the following options:

Option 1: Host an Exhibition Event at your school attended by Minnesota Zoo Staff

One or two education staff members may be available to assist in informally evaluating or listening to student presentations. Because of staff time constraints and the number of student participants, education staff are not able be the sole evaluator. We ask teachers to be responsible for determining which projects advance to the zoo for consideration. Appointments for zoo staff to attend your school's Exhibition Day must be scheduled 2 weeks in advance and no later than February 19th. We cannot guarantee availability to attend. Please contact Kristi.Berg@state.mn.us to arrange.

Option 2: Plan a Classroom Showcase

Teachers may use the evaluation criteria rubric and host their own Design Challenge Classroom Showcase with the teacher submitting the top student designs to the Minnesota Zoo before February 19th to be involved in the Design Exhibition. Contact Kristi.Berg@state.mn.us for exhibition registration of school wide winning designs.

Number of ZooMS Exhibition Submissions

- Each teacher may submit up to ¼ of the number of projects created**.**
  Example: 15 total projects = 3 to 4 project submissions
- All teachers can submit a minimum of one project
- Not all projects submitted will advance to the March ZooMS Exhibition. Projects will be narrowed and announced

Top Project Submissions to Design Challenge Exhibition must include:

- Online Submission Form (Available in January 2016)
  - Names of team members
  - Teacher and school name
  - Grade
  - Written Description of the solution and how it met design requirements
- 1-2 Photos of Tri-Fold Board
- 1-2 Photos of Students with 3D Model
- Signed Media Release Form (Available in January 2016)

Conditions

- ☐ Open to all 3rd-8th graders
- ☐ Students may work individual or in a maximum group of four.
- ☐ All application forms need to be submitted to the Minnesota Zoo by September 19th.

2014-2015 Teacher Application Form

Participation is FREE! Apply online by clicking on the **APPLY NOW** link. The first 10 elementary teacher and 10 middle school teacher applications reviewed will receive a $200 stipend upon completion of the following:

- ☐ Attendance to one of the ZooMS Design Challenge Workshops offered
- ☐ Participate in periodic ZooMS program assessment surveys
- ☐ Implement the ZooMS design challenge in to your classroom
- ☐ Submit student projects to be considered for the ZooMS Design Challenge Exhibition in March.

Both new and former ZooMS Challenge teachers are eligible! You will be notified by email if you are one of the first 10 teachers to apply.

Important Dates

Closing Date for Application Forms	Friday, September 19th.
ZooMS: Design Challenge Workshop **Attend one*	Thurs., September 25th or Sat. September 26th
**Design Challenge Implementation Support -*Optional*	Saturday, October 24th, 2015
	Saturday, January 23, 2015
Closing Date for Design Challenge Winner Submissions	Wednesday, February 17th
Projects Advancing to MN Zoo ZooMS Exhibition Notified	Friday, February 19th
Elementary ZooMS Design Challenge Exhibition	Tuesday, March 8th
Middle School ZooMS Design Challenge Exhibition	Thursday, March 10th

****** A zoo classroom will be reserved and available to serve as an open ended Design Challenge Implementation Support space for teachers to come to the zoo to work with the ZooMS coordinator, collaborate with other teachers, or work independently anytime between 9 am and 4 pm.

Contact

Contact Kristi Berg for further questions and information

Email: STEM@mnzoo.org Phone: 952-431-9243