CURIOSITY MACHINE iridescent

"Curiosity Machine (CM) is Iridescent's way of ensuring that underserved urban youth continue to have access to inspirational scientists and engineers and that they continue to learn about and practice the engineering design process, even when the (Be a Scientist) program is no longer running."

- EDC

Project Deliverables

Build Curiosity Machine (CM) online platform

Develop open-ended engineering design challenges (hands-on problem solving activities) supported by videos

Engage learners in the engineering design process with the aim of developing curiosity, creativity, and persistence

Execute in-person programs to introduce CM to families with the goal of encouraging families to build at home

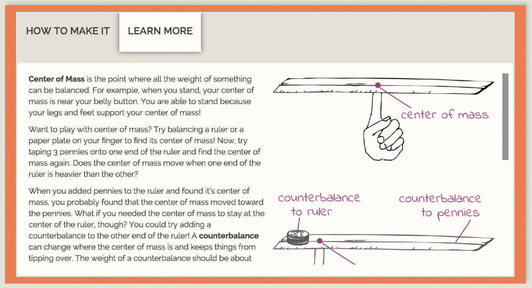
Curiosity Machine Key Features

Badges to benchmark learners' progress toward core competencies°

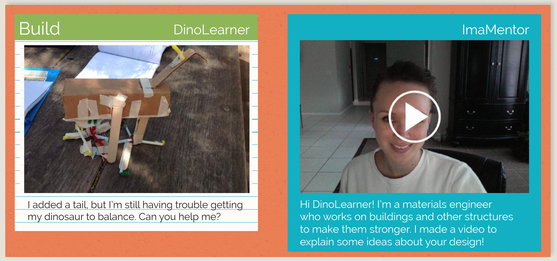
°Online implementation in progress

Children learn to build using the engineering design process:

Complex science concepts are explained in simple terms:



Online mentorship is unique for each child and challenge:



Our Model

Train Parents & Educators

To use online curriculum and increase impact

Mentor Online

So families anywhere can learn directly from scientists and engineers

Train Scientists and Engineers

To develop design challenges and teach children

CM Design Challenges

Must

Have Purpose: Clearly state a problem and incorporate fundamental engineering or science concepts

Be Explanatory: Focus on concept-related parts of the design challenge

Encourage Exploration: Be open-ended and allow for multiple solutions in each stage of the engineering design process

Should

Be Testable: Have a measurable outcome to demonstrate success

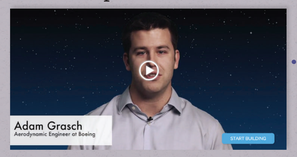
Be Exciting: Inspire by having real-world applications

Be Original: Offer an unforgettable experience

Example Design Challenge

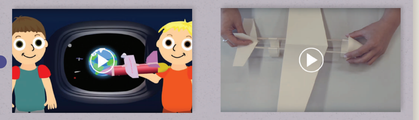
Build a Plane Powered by Stored Energy

Inspiration Video



A Boeing aerospace engineer explains his work on innovative aircraft.

Content & Instructional Videos



A guide helps children who have trouble getting started with videos giving additional explanation of concepts including stability and potential energy.

We Found

Families are satisfied with CM, design challenges, and mentors

Children improve more after we made changes based on previous experiences, suggesting that efforts to improve the courses were successful.

Iridescent's investment in a framework for finding and training volunteer mentors (who are scientists and engineers) was very worthwhile.

- Dr. Dan Hickey, Indiana University

Challenges	Solutions
Connections between our scientist videos and design challenges were unclear to families .	Revise scripts of scientist videos to have a clear connection to specific design challenges.
Open-ended instructions were too vague since they are different from typical classroom activities.	Develop "Redesign Tip Videos" that learners can see after building their first prototype.
Mentors found it difficult to provide feedback on projects when student submissions were of poor quality.	Train mentors to ask clarifying questions. Train teachers and parents to help children submit more complete submissions.

Learning Gains Over Time

	10 hours of CM	40 hours of CM
Observing	Notices applications of learning	Makes connections & conclusions about observations
Planning	Makes simple, illegible sketches	Makes legible sketches with labels that can be executed upon
Using Tools	Recognizes materials & tools	Substitutes materials & tools creatively
Designing	Follows directions and visual models	Create new designs entirely unassisted
Vocabulary	Remembers new words and definitions	Applies definitions & concepts to improve design
Redesign + Invention	Understands some models wont work in the first try	Redesigns until the model works; has ideas for improving

Next Steps

Incorporate digital badges to CM to mark progress in children's learning journey

Improve mentor training and mentor community by encouraging mentors to discuss curiosity, creativity, and persistence in their feedback.

Test multiple options for providing mentorship to learners building hand on projects - group webinar lead by instructor, tip videos, one-on-one online mentoring etc.

Develop additional resource for parents to help their children use CM at home (Parent training, FAQ sheets, etc.)

Clearly map learning gains children can develop by devoting 40 hours to hands-on learning per year (15 design challenges)

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