Curiosity Camp in the Woods

2015 Assessment Report

Iridescent

Funded by the Gordon & Betty Moore Foundation

Introduction

The *Curiosity Summer Camp* was held in the Redwoods of Huddart Park, Woodside, CA. The camp provided an opportunity for students (ages 4-10) to experience learning in ways that are not always supported by the formal school science curriculum. By focusing on the engineering design process, the children learned to iterate and come back to the same model with a different approach, resulting in development of critical thinking skills and persistence.

The camp was designed for young children who are natural explorers, builders and inventors. The camp was an education opportunity held outdoors, in a classroom "without ceilings or walls." The outdoor environment provided the children with an investigative zone that supports young children to develop some important skills that will help them in their continuing education.

Our aims of our outdoor camp were to:

- Provide a safe and stimulating environment in which children feel happy and secure.
- Encourage the emotional, social, physical, creative, and intellectual development of children in the outdoors.
- Encourage children to explore, appreciate and respect their environment.
- Provide opportunities to stimulate interest and imagination.
- Improve children's abilities to communicate ideas in a variety of ways.
- Offer experiences where children are involved in the planning processes and experiences that are relevant and led by the children's interest.

Critical Thinking Milestones

These are the milestones long term engagement in our learning philosophy will lead to:

STAGE 1 - OBSERVER (10-20 hours)	• Child notices features such as size, types of movement, cause and effect. • Child is able to verbally describe the problem and propose a design for the model to be built. • Child follows (verbal, pictorial or written) directions and builds a model • Child troubleshoots model and gets it to work • Child understands that objects in the world are designed and can be re-designed
STAGE 2 - BUILDER (20-40 hours)	• Child notices similarities and patterns in her world • Child uses simple sketches/diagrams • Child persists through failing designs and models. • Child evaluates results (from testing the model) and changes the design.
STAGE 3 - APPRENTICE ENGINEER (40-300 hours)	• Child notices contradictions and unusual phenomena in her world • Child formulates questions around specific observations • Child labels sketches/diagrams so that others can understand the design • Child solves design problems by applying knowledge, interest and prior experience • Child identifies limitations of a model and suggests improvements.
STAGE 4 - INVENTOR (300-900 hours)	• Child constrains the problem so that it can be investigated • Child uses more sophisticated ways and tools (such as maps, annotated photographs, 3D models etc) to present ideas. • Child invents a totally new design (after repeated development and testing) based on the characteristics of the best design. Child compares the effectiveness of different designs and outlines a successful design

Assessment

The summer camp included 12 children between the ages 4 -10. With such age diversity, from an assessment perspective, we decided to split the children up into age cohorts where we expected to see similar results based on life-to-date experiences. This acknowledges, for example,

the expectation that a 10 year old should have a more mature way of drawing out a plan on paper, than a 4 year old. The age cohorts we assessed were: 4-5, 6-7 and 8-10.

We worked with our two lead educators to develop a rubric to assess the children during the four weeks of camp. The rubric assessed the children on seven behaviors where, based on our past programming, children using our curriculum have demonstrated. The rubric was completed for every day for each child by our lead educators and our high school explainers. The categories of the rubric are described below.

Behavior/Learning	Demonstration by Student
Observing	Noticing things in their immediate environment; asking questions to gain understanding; makes connections and draws conclusions
Planning	Makes simple illegible or legible sketches; includes labels
Tools and Materials	Recognizes materials; understands how to use them and why; determines new materials to use other than what is suggested
Building	Follows lead of instructor for some or most of building phase; shows independence when building
Designing	Follows step by step instructions; follows some guidelines and makes up own process; completely independent in designing solution
Vocabulary	Remembers definitions, explains in own terms, applies vocabulary in context
Redesigning	Understands that things don't always work on the first try; can troubleshoot and improve design; does improve design and reflects on why design did or did not work

A three point system was used to evaluate these rubrics. In some areas of learning, such as planning, the behaviors are mutually exclusive. A child cannot make an illegible sketch at the same time as making a legible and labeled one, so the child received a score of 1 if she made a simple illegible sketch and a score of 3 if she made a legible and labeled sketch. In the other categories, such as observing, all of the behaviors can be done at once, such as noticing things and asking questions, so the child earned one point for each of the behaviors if she did them.

In order to account for a child's absences from camp, we calculated the average number of points per week. We then compared the score from each week in each of the seven categories to see if the average number of points increased. If the average number of points increased after the initial evaluation during week 2, we considered this an improvement. For each of the age groups, we found which areas there was greatest point increase as well as which areas no was no improvement in. We also found the percentage of the seven categories the children improved in and average it for each age group.

Results

Age Group	Number of Children	Average % Improvement	Behavior(s) most improved	Behavior(s) least improved
4-5 years	5	59	Tools and Materials, Designing, Vocabulary	Planning
6-7 years	3	48	Redesigning	Observing, Designing
8-10 years	4	54	Redesigning	Vocabulary

This confirms that indeed, our age cohorts did demonstrate some common improvements in like behaviors, during the 4 week camp. Not surprisingly, we noted that the younger children improved most noticeably in their understanding of vocabulary and how to use materials for building. This is especially important as the language and teaching techniques utilized by the instructors were aimed at the early age cohorts so as to ensure that the camp would be helpful to all ages. Because of the open ended nature of the design challenges, we designed the camp to be flexible so that young children could be guided more closely through instruction while the older children could have the ability to go beyond traditional "ceilings and walls" in order to learn at their own pace and explore more deeply.

It is also not surprising that the older children improved most on the redesign behavior. Redesigning is something that we found somewhat difficult to encourage the younger children to do because of time constraints, limited motor skills,and shorter attention spans. The older children however were able to build their initial designs more efficiently and therefore have time to consider feedback from the explainers and instructors, so that they could redesign and rebuild their projects.

For the areas where children demonstrated the least improvement, they follow a sensible pattern as well. The 8-10 year olds demonstrated the least improvement in vocabulary, reflecting their prior familiarity with the vocabulary and the fact that it was aimed at a younger age cohort. Similarly, the youngest learners also showed no improvement in planning - most likely due to their underdeveloped abilities to put ideas onto paper in a coherent, legible way. Most interesting is the finding that the 6-7 year olds improved least on designing. Looking more closely, the result is more nuanced. One of the participants in fact, for 3 days during week 2 of the camp, demonstrated the *highest* scoring behavior for design: "Thinks of a new design". So, in the case of this participant, the reason the average score on design is low, is because he missed two weeks of the camp and therefore the simple average score was affected by that absence. In summary, although it is informative to see where the children improve most and don't, areas with less improvement could also indicate very consistent performance, week over week throughout the camp.

Incentives

We also introduced various incentives to encourage and make it easier for the children and their parents to continue learning at home through our Curiosity Machine online platform - after the camp was over. We used these incentives both during and after the 4 weeks of Summer Camp. The incentives are listed below:

Week 1	Information Session on how to use Curiosity Machine Email with child's username and password
Week 2	Pins offered for redesign Email reminding parents of the pins Email with child's username and password Wrote the children's usernames and passwords in their dino books, which they took home at the end of the week
Week 3	Pins offered for redesign or a new upload Email reminding parents of the pins Viewed mentor feedback with the children during camp Children specified what they would need to redesign at home and we sent them home with those materials Gave parents paper plates with their child's username and password
Week 4	Pins offered for redesign or a reflection or a new upload Informational session on what the mentor feedback looks like Children older than 8 practiced logging on and uploading by themselves during camp Sent a bag home of all general tinkering supplies Gave parents a paper plate with child's username and password Wrote the children usernames and passwords on their folders, which they took home on Friday Sent an email reminding parents of the pins

What we were successful in achieving

- The children were excited about earning badges because the high school explainers modeled wearing them on their Curiosity Machine hats and the campers looked up to the explainers as role models. So we were successful in assigning value to the badges (for the campers).
- We also helped all the campers get very familiar with the Curiosity Machine platform and helping the children use the platform as a way to mark key learning milestones - planning, building, testing, redesign and reflect. Thus the campers knew that getting to the later stages was more desirable. So through a combination of social modeling (by the high school explainers), we were able to make

progression through the various stages of the platform itself very valuable.

- The campers were also introduced to the concept of getting feedback from a mentor and learned to wait for feedback and recognize that it was special. So campers were excited to receive a feedback video from a mentor.

What didn't work

We were not successful in getting students to redesign their projects at home using the Curiosity Machine. There were a few students who did this, but these were campers who were returning from last year's camp and were unusually motivated students.

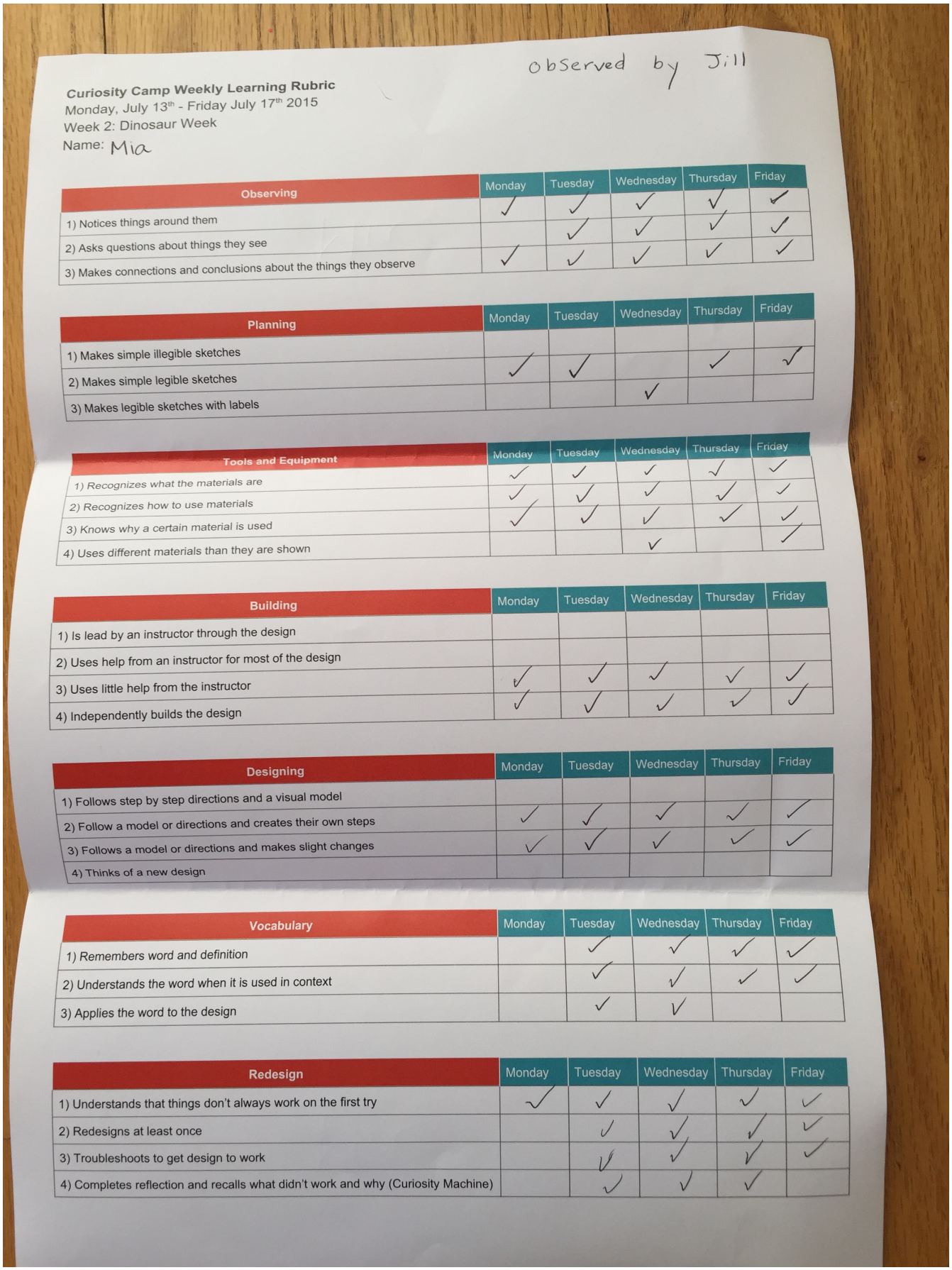
Overall, students were tired after 6 hours out in a forest, building and re-designing the incentives were not powerful enough to motivate them to keep building at home.

Recommendations for next time

It is possible to help young children assign significant value to something external such as badges. The fastest way to do this by having older children (whom the younger children look up to) model assigning value to the badges or tasks.

When trying to move a certain type of behavior from an in-person, dense activity led by an instructor (such as a summer camp), to an online program supported by a parent, there have to be certain structures that bridge the two environments. An easy way to do that is to form playgroups with certain families and establish some structure before and after the camp that introduces the families to each other as well as the Curiosity Machine. So these gradual onramps can help make Curiosity Machine and at-home exploration more familiar to the parents.

Finally, it is not enough to just train the parents and form playgroups. They have to be regularly reminded of the success they had, how they overcame challenges and provide a clear goal with regular milestones that can keep them motivated as a collective learning unit. This is where the badges that were introduced in the camp setting can be used as a powerful "pull" mechanism.



Curiosity Camp Weekly Learning Rubric
Monday, July 13th - Friday July 17th 2015
Week 2: Dinosaur Week
Name: Mia

observed by Jill

Observing	Monday	Tuesday	Wednesday	Thursday	Friday
1) Notices things around them	✓	✓	✓	✓	✓
2) Asks questions about things they see		✓	✓	✓	✓
3) Makes connections and conclusions about the things they observe	✓	✓	✓	✓	✓

Planning	Monday	Tuesday	Wednesday	Thursday	Friday
1) Makes simple illegible sketches					
2) Makes simple legible sketches	✓	✓		✓	✓
3) Makes legible sketches with labels			✓		

Tools and Equipment	Monday	Tuesday	Wednesday	Thursday	Friday
1) Recognizes what the materials are	✓	✓	✓	✓	✓
2) Recognizes how to use materials	✓	✓	✓	✓	✓
3) Knows why a certain material is used	✓	✓	✓	✓	✓
4) Uses different materials than they are shown			✓		✓

Building	Monday	Tuesday	Wednesday	Thursday	Friday
1) Is lead by an instructor through the design					
2) Uses help from an instructor for most of the design					
3) Uses little help from the instructor	✓	✓	✓	✓	✓
4) Independently builds the design	✓	✓	✓	✓	✓

Designing	Monday	Tuesday	Wednesday	Thursday	Friday
1) Follows step by step directions and a visual model					
2) Follow a model or directions and creates their own steps	✓	✓	✓	✓	✓
3) Follows a model or directions and makes slight changes	✓	✓	✓	✓	✓
4) Thinks of a new design					

Vocabulary	Monday	Tuesday	Wednesday	Thursday	Friday
1) Remembers word and definition		✓	✓	✓	✓
2) Understands the word when it is used in context		✓	✓	✓	✓
3) Applies the word to the design		✓	✓		

Redesign	Monday	Tuesday	Wednesday	Thursday	Friday
1) Understands that things don't always work on the first try	✓	✓	✓	✓	✓
2) Redesigns at least once		✓	✓	✓	✓
3) Troubleshoots to get design to work		✓	✓	✓	✓
4) Completes reflection and recalls what didn't work and why (Curiosity Machine)		✓	✓	✓	