

## Zero A.D.

*Inviting 5th graders to enjoy math through augmented reality with an historical adventure game*

### Team Members and Roles

Ashlee Reynolds - User Testing, Director of Concept Video

Brad Huang - Manager, Documentation, Writeup

Charles Yu - Development, Website Setup

David Young - Design, Video Editing

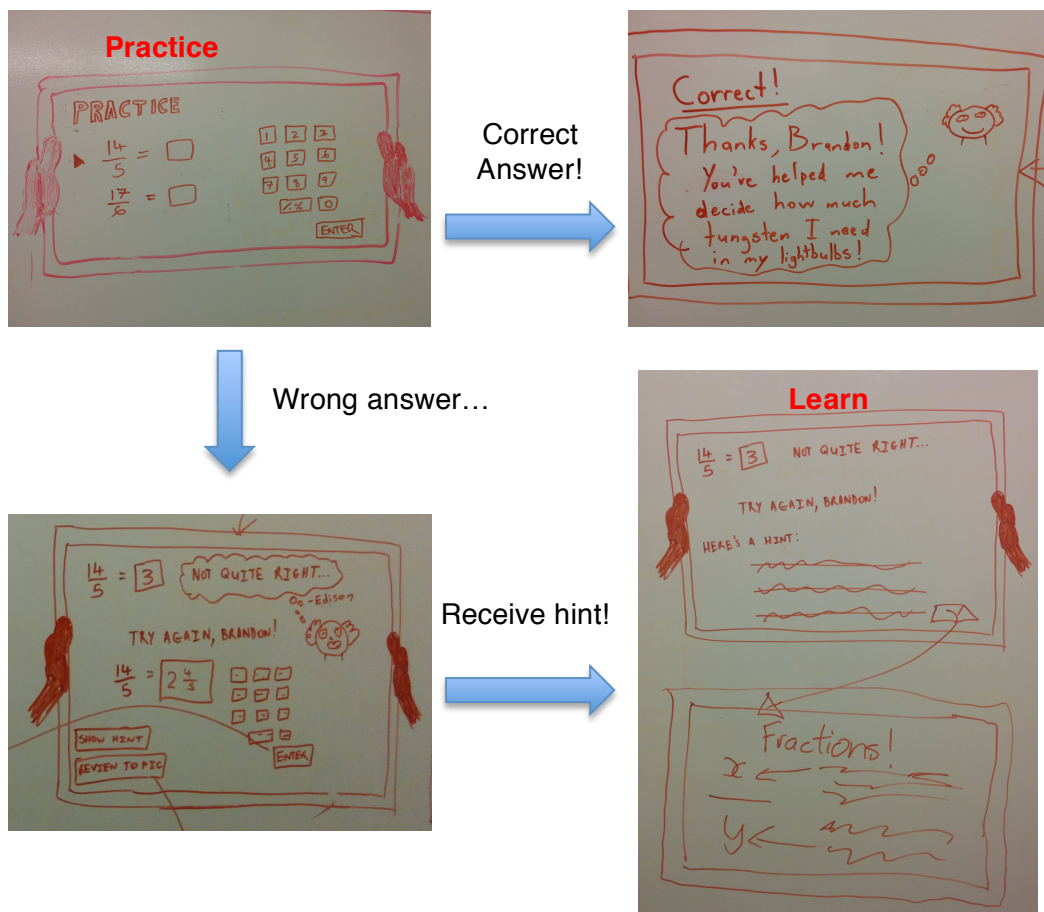
### Problem and Solution Overview

Imagine a child's perspective on learning math: sit in class for a few consecutive hours in school, go home to do sheets and booklets of similar math questions, and do it again next day. The repetitive and static nature of this learning system does not motivate children's interest in math, but makes learning math a programmed chore. Furthermore, the system does not always provides children math materials based on their needs and understandings. As a result, we want to design an application that can make the experiences of learning math positive and encouraging to elementary school children. We want to focus on the dynamic and adaptive aspects of learning through making the children interact with more than just math questions when learning, but also historic figures and the environment.

### UI Sketches and Storyboards

We divided into two pairs at first to generate different UI ideas. The three tasks in these storyboards are practicing problems, learning and reviewing topics, and feedback for parents.

#### 1. Edison Teaching Fraction:

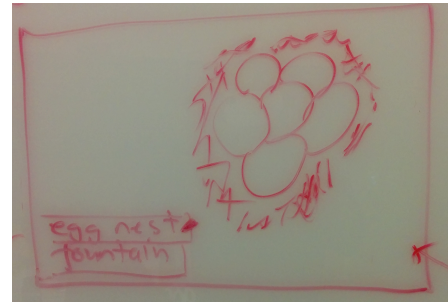




2. Dino-nest and Eggs:

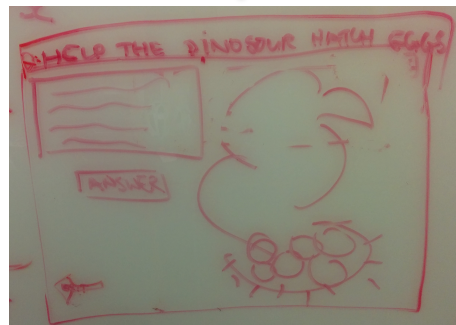
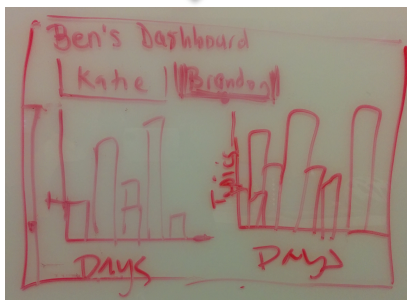


Play!



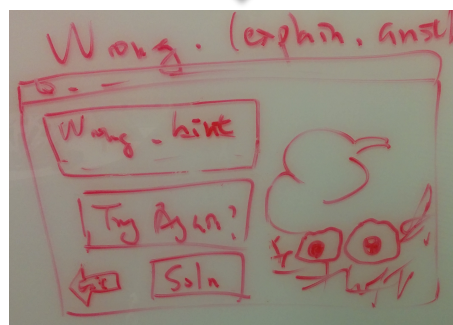
Select Quest!

Parent Mode!

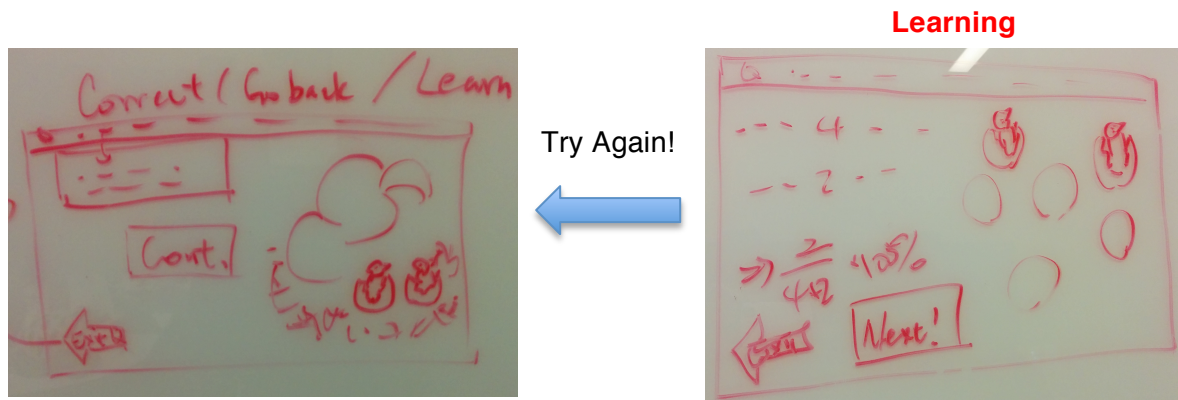


Practice

Wrong Answer...



Parent Feedback



Since we have been thinking about example uses along with the interface design, the sketches are also storyboards. The first idea illustrates a child answering a question about lightbulbs and fractions, and involves Thomas Edison in the process. The second idea shows how the application brings the child back to prehistoric era and learn fraction after scanning a bird nest outside.

### *Selected Design Choice*

We decided to use the UI in idea 1 as the main type of interface in our final design. Both designs have their pros and cons. The platform of entering answers and clear marks between tasks of design idea is the most valued aspect of it. In addition, the message interface provides important information and humor to the application. However, the link between the environment and the application in design idea 2 is one aspect we want to preserve. Another thing about idea 2 is the design of parent mode as dashboards, filling more information into easier and more familiar interfaces.

As a result, our selected design choice presented in the video is a merge of the two ideas with an emphasis on the first idea. Several detailed functionality of the design is below:

Task	Detail
Interact with Environment	With the use of camera and possibly photosphere function, the application captures objects in the surrounding environment to base the problems on.
Select Quest	After scanning the environment, the user can select which object they would like to investigate further, and a related quest containing a series of questions would be proposed to the user. At any stage when using the application, the user can return to this page and select a different task.
Practice Problems	Whenever the user finishes reviewing a topic or answering a problem, s/he would face more practices of different difficulty levels.
Children Receive Feedback	After the user answers a problem, the application would give the user response on whether the answer is correct or not, and let the user choose to review topic, try again or move on to the next problem.
Review Topics	Whenever the user is stuck on a problem, s/he can read and view a simple summary of concepts required for solving the problem.
Parent Receive Feedback	In the parent mode, parents can view summary statistics of all the children associated with them. This includes daily usage time, progress in topics and solving problems, and the accuracy of their answers.

### Video Planning Storyboards

Since we did not draw the storyboards out, but planned and discussed them together, we use tables to present the video planning storyboards.

1. Child coming home: A child comes back home after school one day, and has conversation with his/her father about math homework

What	How	Who
Child	The point of view (POV) Simulating running with ups and downs.	Voice: Ashlee Camera: Charles
Father	Sitting and reading	David
Screens	NA	NA
Music	Upbeat music until the child hears homework Upbeat again after knowing s/he can use OAD.	David and Ashlee are in charge

Child: Hey dad!

Father: Brandon, have you done homework today? Go do homework!

Child: Oh... But homework was boring...

Father: Okay you did well on the last one, so you can use OAD tonight.

Child: Really? Thanks dad!

2. Practice: The child starts using OAD to do practice problems. S/he goes through the process of answering a question, getting it wrong the first time, reviewing the materials, and trying again to be successful.

What	How	Who
Child	Tried a question, failed and reviewed the materials again. The next attempt was successful!	Voice: Ashlee Camera: Charles User: Brad
Edison	Main character of the quest, introduce the question and lead the child through it	Voice: Charles
Textbook	Thrown away to indicate that the child does not like it.	Ashlee's Tutor books
Screens	Logo, the start screen, Edison introducing the question, problem page, success and failed page	
iPad	Use photos of sketches simulating the actual application.	Brad's iPad

(Child opens the app.)

Edison: Hey Brandon! ... (introduce the lightbulb problem)

(Child answers it incorrectly.)

Edison: Not quite right... Try again!

Child: Oh no...

(Child reads the review.)

Child: Oh I got it!

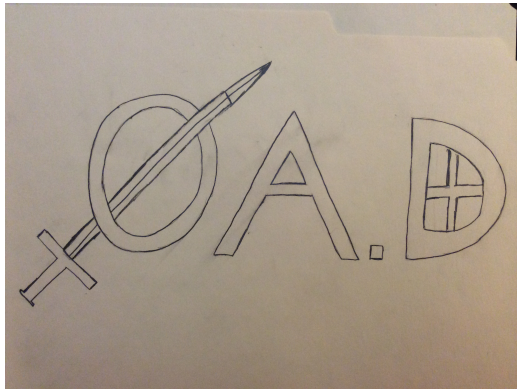
(Child answers the problem correctly.)

Edison: Thanks Brandon! (congratulate the child)

3. Parent Feedback: The father is reading the report of the child's progress, and makes some compliments about the feedback system. In the end, the father smiles as he is satisfied by both the app and the child's achievements.

Sketches used in this scene can be taken from the parent mode sketches of design idea 2.

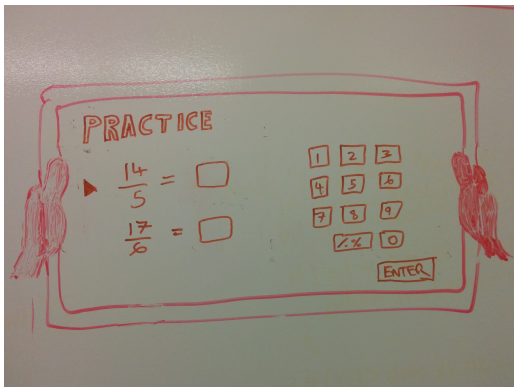
Sketches Used in the Concept Video Scene 2



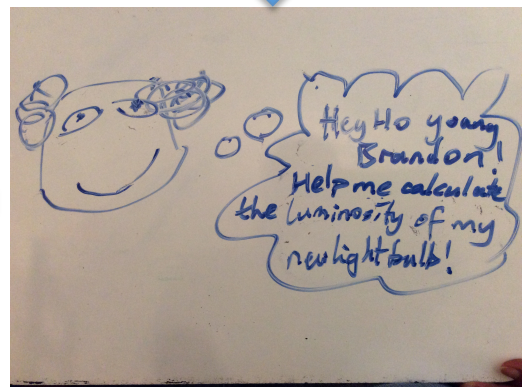
Get Lightbulb!



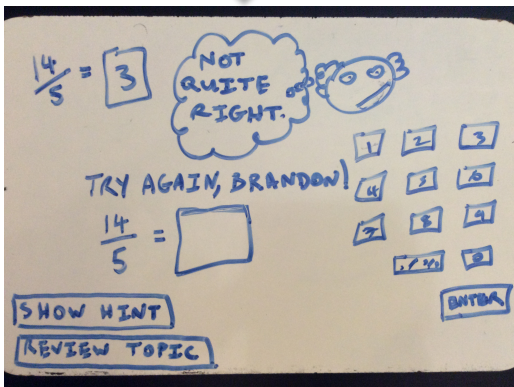
Click for quest!



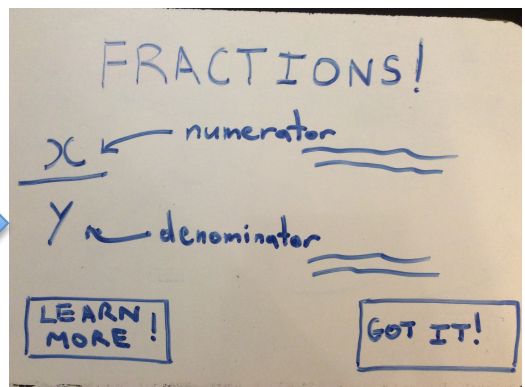
Answer the question!



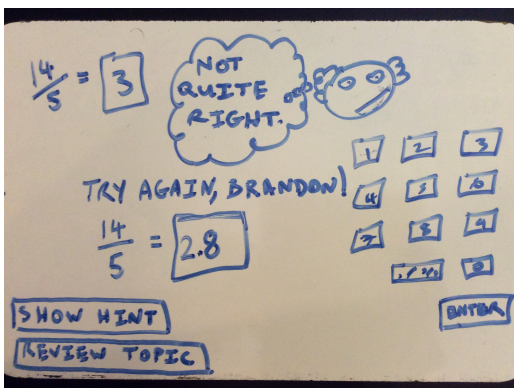
Uh oh...



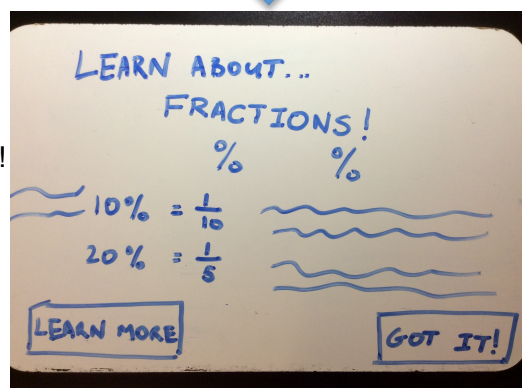
Check out hint!



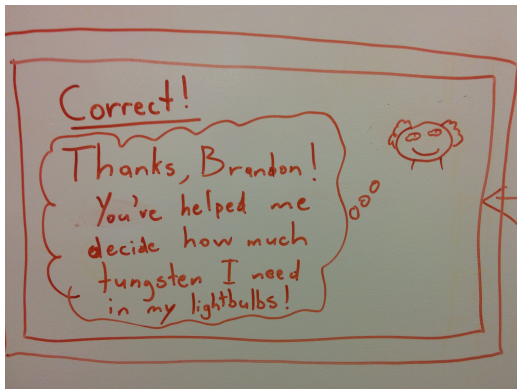
Hmm... Learn more!



Okay I got it!



Success!



### *Producing Concept Video*

Link to the website and video: <http://web.stanford.edu/~haichuan/html/index.html#>

The video storyboard was planned out on Sunday evening, and it did not take long as we were already thinking about the scenes on our own. Sketch ideas were also completed in the same meeting. The whole meeting took two and a half hour, and we were able to fill the whiteboard wall of Lathrop's study room with sketches and ideas.

After that, we met together in Charles' apartment to film the video. Although we made sketches in the previous meeting, the photos of them were not usable in the video because they were really rough. As a result, we almost re-draw the sketches, which took quite some time to finalize.

Even then, since we had our storyboard planned pretty detailed, we were able to finish filming within three hours. We filmed extra footages, including several clips of us explaining the concepts of the application, and some teasers. We were not able to correctly gauge the time of the complete video, and assumed that since we did not have many scenes, it would be easy to limit the video time to less than 1 minute. However, as we realized when we were looking through the clips, the total time may be too long. So we took some time to discuss the entire plot again.

Our time spent in finalizing the flow of the sketches before shooting paid off, as the order of the clips seemed apparent and natural when editing. David and Ashlee edited the video on Thursday, and it took them about 4 hours to complete. We thought of adding a screen of logo and several screens of explanatory texts, but we did not produce a satisfying logo at the end and adding more screens would take more than 2 minutes.

Because we divided our tasks pretty well in producing the concept video, we were able to finish this week's tasks efficiently!