



Digital Design for English Language Learners: Andrea Case Study

Documenting the diverse stories of English Language Learners was an important part of the Digital Design for ELLs project. Students came in with a variety of backgrounds in mathematical knowledge and in English language proficiency. Some self-identified as persons who enjoyed math and others voiced their everyday struggles in the classroom. These case studies show the possibilities for English Language Learners when using NYSCI's Noticing Tools™ alongside multimodal learning experiences that were developed and tested in NYSCI workshops.

Andrea came to the United States from the Dominican Republic with her father, mother, and sister in October of 2016. She attended the first pilot session of Digital Design For English Language Learners in the spring of 2017 as a sixth grader, during which she spoke primarily Spanish.

Finding her voice and speaking with confidence.

Andrea joined the first session because she thought it might improve her math skills. She told Explainers that she had previously learned the math concepts in Spanish, and was now working to learn the English terminology for them. In that same session, Andrea said her favorite part of the workshop had been gaining confidence in presenting to the class, and not getting “shy when people try to talk to [her].” She felt that the teaching approaches used in the workshop worked better for her, especially the fact that she was able to relate math to her everyday life and that the instructors were clear and patient with her.

In the first session, Andrea worked in groups with at least one other student for each project. In her final project, she worked with two other girls to create a three-part [Choreo Graph](#) animation involving a maze and a ferris wheel. Her presentation was in Spanish, with one instructor translating into English.

She entered this second session of Digital Design for English Language Learners as a seventh grader with a determination to practice using English whenever possible.

Andrea admitted she did not enjoy math before these workshops and did not see herself as good at math. She had difficulties getting the help she needed in school since teachers often did not speak Spanish and could not take extra time out to help her, and her peers could not help her in class:

Mariana (a workshop participant): "Besides in school they speak in English and we don't understand everything in English. So when they [Digital Design instructors] do it in Spanish ..."

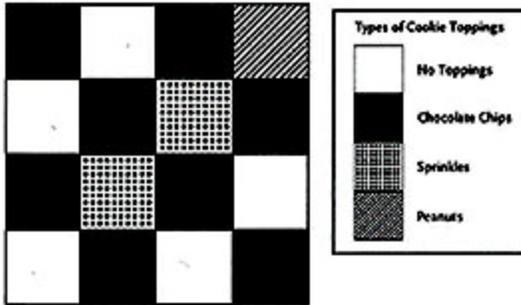
Andrea (interrupting Mariana): "When they [instructors] are going to ask a question to us, they explain to us, but they don't have to translate. There are children [in school] but they don't like translating for other people."

Interviewer: "They don't like translating? Why?"

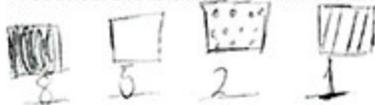
Andrea: "Because they speak English and believe that others know too."

Name: _____

Square Cookie



1. Use fractions to describe how much of the square cookie each topping covers.



2. Design your own square cookie. You can use the toppings in the key above, or come up with your own. Use fractions to describe how much of your square cookie each topping covers.

Handwritten student work for designing a square cookie:

- = 1 = Peanuts
 $\frac{1}{4}$
- = chocolate chips
 $\frac{8}{3}$
- = sprinkles
 $\frac{2}{1}$
- = no toppings
 $\frac{5}{11}$

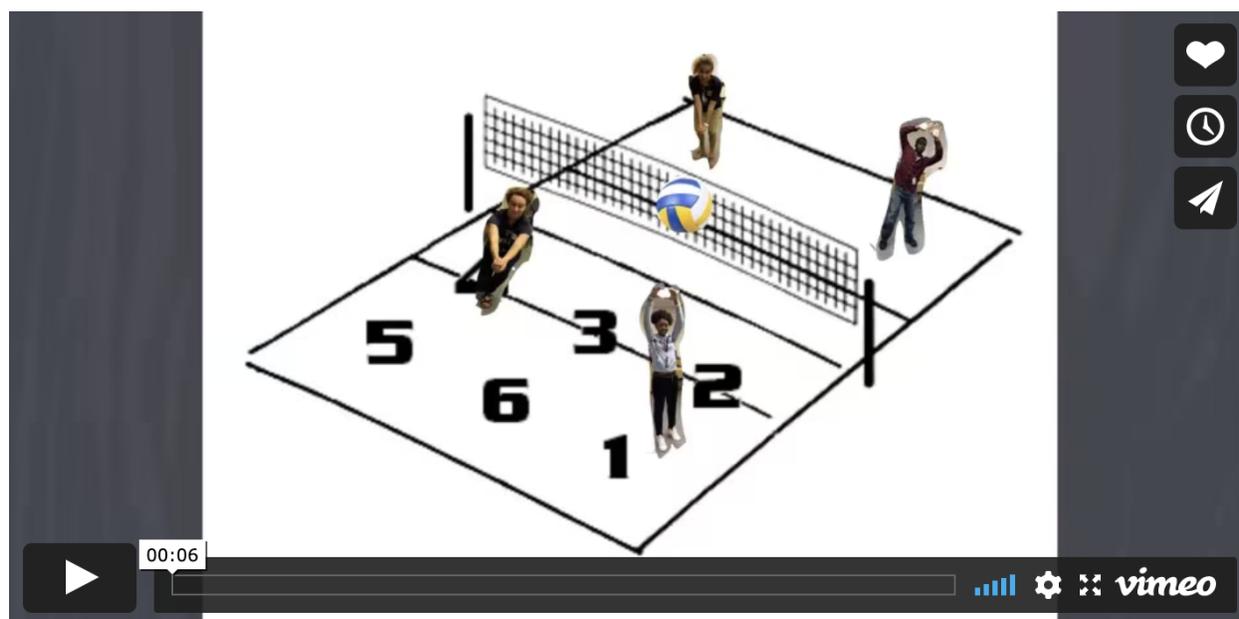
Hand-drawn 4x4 grid with various toppings:

Example 1: Andrea's second session pre-assessment shows her difficulties in building fractions – specifically denominators.

Andrea's first session pre-assessment and post-assessment showed an apt understanding of how to calculate fractional parts of a whole and where to derive a numerator or denominator. Her second session pre-assessment (Example 1) showed difficulties constructing fractions.

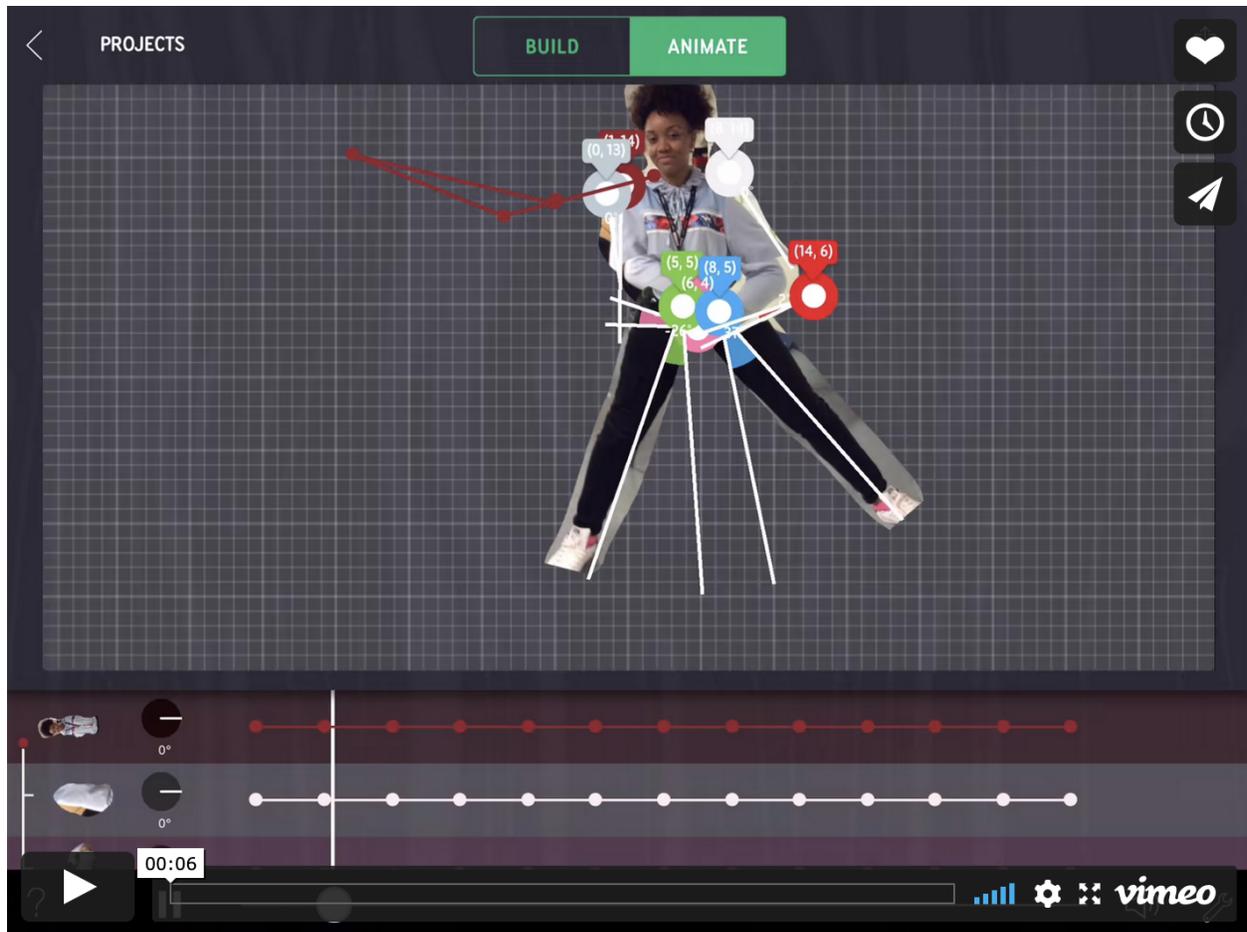
Specifically, denominators for the fraction cookie were either inaccurate or absent. Coming into the second session, her errors possibly indicated a lack of practice over the months of summer since the previous session.

During this workshop, she repeatedly sought help from NYSCI Explainers, peers, and instructors for help understanding the number line and how fractions with different size denominators related to it. She built confidence in fraction work by presenting in front of the class, and the instructors challenged her to discuss her designs and their fractions in greater depth as they saw her progress. If she stumbled during her presentations, the low-stakes environment combined with the enthusiastic support of the facilitators supported Andrea to find the correct vocabulary or concept, and push through with her presentation in English.



Example 2: Andrea was deeply engaged with creating realistic translation animations. Such as this volleyball match.

Andrea was most confident when working with translation scenes (Example 2) in [Choreo Graph](#), and stumbled when assigned work with a single figure with multiple joints (Example 3) that could be animated. Due to her relative lack of comfort with the multi-jointed animation and her extreme comfort in creating translation scenes, it was a continual effort to keep her on task through the challenges of learning a new skill when she could easily return to her comfort zone of animation.

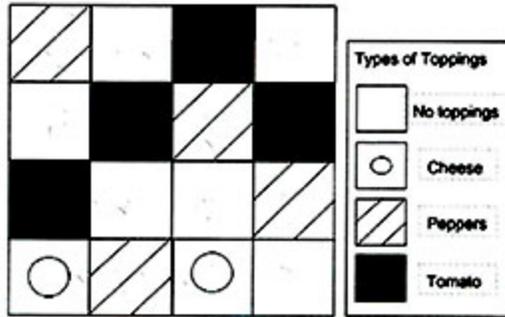


Example 3: Andrea worked heavily on translations scenes in Choreo Graph for creating a dance move activity. She struggled to work with multiple joints on single figures.

Andrea seemed to have a self-directed goal in this workshop to learn the English terminology for math she had already learned in Spanish in the Dominican Republic, as well as solidifying the math she was still having trouble with. The workshop seemed to provide an environment for Andrea to work at a manageable level of complexity by creating intricate translation animations with clear goals of making realistic scenes, such as animating a small volleyball match. By focusing on the portions of the workshop that were the most interesting and important to her, Andrea did improve her understanding of fractions in this workshop as well as her skills for describing complex mathematical translations in English to an audience. In her post-assessment (Example 4), Andrea showed marked improvement in her use of denominators for the fraction pizza, accurately identifying and using the denominator for each of her fractions.

Name: _____

Rectangle Pizza

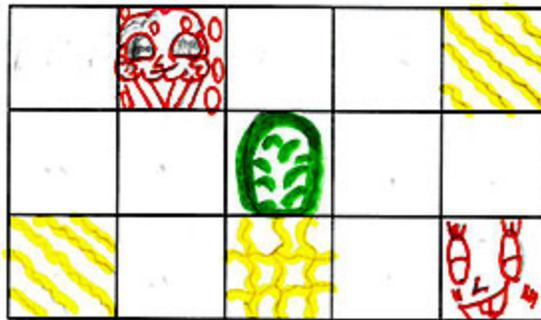


1. Use fractions to describe how much of the pizza each topping covers.

$$\begin{array}{l} \square = \frac{6}{16} \\ \bigcirc = \frac{2}{16} \\ \text{Diagonal lines} = \frac{4}{16} \\ \blacksquare = \frac{4}{16} \end{array}$$

2. Design your own pizza. You can use the toppings in the key above, or come up with your own. Use fractions to describe how much of your pizza each topping covers.

$$\begin{array}{l} \text{Red pepperoni} = \frac{2}{15} \\ \text{Yellow stripes} = \frac{2}{15} \\ \text{Yellow dots} = \frac{1}{15} \\ \text{Green pepper} = \frac{1}{15} \\ \text{Empty square} = \frac{9}{15} \end{array}$$



Example 4: Andrea's post-assessment shows an improvement in her understanding of fractions compared to her pre-assessment. The denominators are accurate as shown above.

Andrea presented on her own for the majority of her presentations to the class, contrasting with her approach to the first session of letting others present or translate for

her in front of the class. Before the Family Celebration, she expressed confidence in her presentation and comfort in the workshop:

"I like this [session] because other people [are] nervous and [I] have little nervous because ... the teacher helps you [with] the complications and the teacher is really good with you."

I have a one girl good person
I have a three bad people

and I have Jesus

There is one woman that's willing to help to save Jesus.

There are 3 people who wants to kill him. So, she throws all kinds of objects to kill the bad guys. She's able to separate 2 bad guys from Jesus. She use the lightning to kill them. But one was able to get Jesus from the back. She is able to get the other bad guy away from Jesus. Her name is "Nelky". She is Jesus angel.

I did this first starting with the first part the numbers no

Then, I made the bad guys.
 With Coordinate grid $(25, 14)$ ↑.
 The middle bad guy, $(-12, 6)$ ↓ ↑
 Last, bad guy I used $(-18, -12)$ ↓ ↓
 to stay down on the grid.
 Jesus stayed down until the end
 $(29, -19)$ ↓ ↑. I went to Safari and
 google and I looked for signs
 like "Zoom, Zap, No²⁰²¹ The Final Save).
 Finally, I got Jesus from the
 internet, and he saved the
 Dominican Republic.

Example 5: Andrea worked hard with an instructor to transcribe a script for her final presentation — a cultural narrative. She was invested in practicing the script for her final celebration.

The combination of presenting her own work in a safe place as well presenting on the material she was most familiar with (Choreo Graph and a translation design piece she had created)

allowed Andrea to speak at length, independently and in English about the narrative and math involved with her superhero scene. To do this, she worked with an instructor to transcribe a script for her presentation (Example 5), including coordinates for her figures, as well as the narrative and cultural significance of her project. Andrea practiced this script at every chance she had leading up to the final presentation and requested feedback from listeners on her story and pronunciation of the English.



Example 6: Andrea's final project is a cultural animation battle to save the religion of the Dominican Republic. Andrea includes a superhero angel and villains using the Choreo Graph app.

Andrea's final project consisted of a battle to save the religion of the Dominican Republic (Example 6), complete with a superhero angel named after her mother coming down to save Jesus from the bad guys attacking him and letting him perform the "Final Save" of the battle.