



## Digital Design for English Language Learners: Design Project Guidelines

### Getting Started: Coming up With a Project Idea

Because the [Noticing Tools™](#) are highly visual and can capture any content by taking a photo, there are endless opportunities to bring in students' interests and to celebrate what they bring from their own backgrounds and cultures. Here are a number of strategies we used to support students in creating projects they cared about.

#### **Share sample projects.**

Share a range of sample projects, from humble to more complex projects to spark students' imagination. It helps them visualize what the possibilities are within each of the tools. It is important to frame examples as things other students did (e.g., one child loved skateboarding and created this project).

#### **Have students revisit earlier designs they have made.**

There were a variety of activities we did before the final design projects that helped students to think about the things that were unique about them. For example, the [Personality Plus activity](#) in [Fraction Mash](#) encourages them to brainstorm their personal interests and cultural influences. When students revisit those projects for ideas, they may be inspired to elaborate on these ideas by animating in [Choreo Graph](#) or creating artistic representations of in Fraction Mash.

#### **Provide other sources of inspiration.**

We were sure to have multiple sources of inspiration for project ideas:

- Visual art books that showed interesting combinations of math and art.
- Illustrated stories in the primary languages of the students.
- Scavenger hunts to look for things that moved or things that had interesting parts of the whole outside or inside the museum.
- Conversations with other students/instructors, reminders of interesting stories or connections that came up during the week (i.e. remembering that a student was passionate about superheroes and encouraging them to think of how to include them in a final project).

### **Brainstorm what they love to do through sketching and labeling in design notebooks.**

Have students write down or sketch things in their design notebooks that they are interested in. Have them sketch how they could make these things come to life in Choreo Graph or Fraction Mash. Some possible prompts you can use:

- Jot down or sketch activities you like to do, such as your favorite sport or activity after school. What kinds of moves does this involve?
- Think of a story involving your favorite cartoon characters or people going from one place to another. How would you make that happen in Choreo Graph?
- Think of a place or setting that you would like to bring to life. Who is in this place? What will you make move?
- Think of something that you would want to combine that would be funny or special. Sketch out your idea. What parts do you need?
- Can you name your favorite artists? How might you combine some of their art pieces to make it into a new, unique mural? Sketch it out.
- What is your favorite movie? What would an iconic scene look like if you mashed it up with your favorite place to hang out?

### **Encourage students with varied English language proficiency to work together.**

Projects can be done individually but presented together to address a common theme. We saw this work particularly well with girls with varied levels of English Language proficiency who made an underwater amusement park together in Choreo Graph. Each designed an individual project that was part of a bigger story that was later presented together.

### **Don't let the most vocal students define what makes for a good project idea.**

Some students may have intense interests that they love to talk about, and this can dominate the entire classroom. This can be inspiring to other students, but can also shut down those who are not interested in that topic. By redirecting the conversation back to sharing examples and encouraging everyone to find things they are truly interested in, students with varying interests can feel comfortable in working on their own project ideas.

## **Bringing Out the Math**

Students can get caught up in the creative process and might not directly attend to the math that is central to their work. There are a couple of things we found to be effective in bringing out the math in authentic ways.

Questioning rooted in the students' designs. Targeted questioning about what they are designing and how the available math tools are helpful is critical. Be sure to keep questions focused on how the math can further their goals versus having them recite the math they are using. Questions such as:

- Why are you moving the angle this way versus the other way? How would you adjust that so you get what you want?
- Is that symmetrical yet? Use the angle tool or grid tool to see.

- What do you see going on with your character as it moves between this coordinate and the next one? Is that what you wanted to happen? What might you change there?
- How do you know who won the race you just animated? Can you use the translation tool to help you know?
- What can you do to make your mashup more precise?
- What happens to your mashup if you change the grid you initially intended to use?
- Could you make the same effect with a different grid or denominator?

### **Pairing up students to explain how they made their designs work.**

Having learners explain to a peer how to recreate what they did can encourage students to attend to precision and to the mathematics they used to create their designs. While this may not work for everyone, encouraging students to share their “math tips” can promote math discourse that is foundational to ELL’s content learning.

## **Preparing for Final Presentations**

### **Create an atmosphere of celebration rather than assessment.**

Up to this point, students should have had some opportunities to informally present what they have been creating in build-up sessions. Be clear that this is the time to show off what they have learned and to present things they are most proud of.

### **Have an authentic audience for their work (parents and families are a big plus!)**

Families coming in to see the students’ work is a great motivator for the students to prepare. If recruiting families is difficult, be sure to recruit friendly faces the students know. They do not only have to be fellow teachers but people that the students may interact with on a regular basis and who also speak their first language (e.g., the school secretary, aides, etc.).

### **Keep it short.**

Conversational English is probably the most difficult thing for English Language Learners, particularly when there is also new academic language. Have them prepare to speak for only 2 – 5 minutes depending on how many students you have in your program or class. Ask them to describe:

- What their project is about.
- How they used math to design it.
- What they are most proud of or an interesting thing they learned.

Be sure to have a projector or whiteboard where students can showcase and point to the things they have made or they can hold up their iPads.

### **Let them rehearse and practice with peers and instructors.**

Before final presentation day, have them pair up with the instructor, peers or youth facilitators to practice their presentation. Encourage them to write out what they want to say but to also think

about what they want to show. Encourage them to use the math tools within the apps to show how the math was part of their projects.

**Encourage students to present in both English and their first language.**

Particularly for newcomers, getting up in front of a large group speaking only English is often difficult. The goal is for the students to showcase what they have learned. There are students that have a high level of mathematical understanding and less command of the English language to communicate. Encourage these students to use their artifacts to show what they did and encourage them to ask classmates to help interpret if/when possible.

**Commemorate with a certificate of accomplishment.**

Honor everyone's work with certificates to further set the atmosphere as a time for celebration. You can get creative with the certificates you disperse by highlighting what they exhibited in their work: artistry, deep math exploration, great communication, persistence, and creativity.