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Benjamin Duong

University of Texas
BS in Mathematics 2019

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Greeting!

My name is Benjamin. Thank you for stopping by my maker showcase page. This website is a portfolio of what I have done so far as a Uteach Maker. I will show off my thoughts and creations here.

About Me and Why I Join Uteach Maker

I am currently a teacher in training, and wanting to incorporate making into my classroom. My student teaching experience is at Round Rock High school, and I am teaching PRE-AP Algebra II. Some of the influences that have shaped my thoughts and creations have been food and watching content on the internet. I've always been amazed at what people can design and by listening to them explain their process always make my mind wander into how it is made. Deciding to be a maker was driven to learn new skills, and get out of my comfort zone.

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Background

I come from a background of cooking and STEM, but I do not excel in arts and craft. I am actually a person who is dyslexia and grew up as ELL. Those aspects of me shaped how I approach learning and what I liked to do. So anything that I can do by hand and avoid writing and reading I try to do it.

When I cook, my first goal is to cook something edible. The second goal is to improve the taste of the dish. I try recreating dishes whenever I can because then I can figure out what I can do differently. Whether it is the procedure, the ingredient, temperature, or how long something is cooked, I trial and error my way through my dishes. I reflect on what I made and take note of what I like and didn't like, then maybe do a little bit of research about taking a new step.

My procedure about how I make food is how I view making. Making has always been about the process for me. The act of creating, planning, trials, research, reflection, and repeat all of those steps again. The product of the outcome usually represents an aspect of oneself. However, my background also limited the perspective of what could also consider making in a stem field. As I said before, my strong suit is not arts and crafts, which also includes the art of writing. Writing is a barrier I saw and ran away from it. I didn't want incorrupt any part of art, or writing into my idea of what a maker project could be, but as I went through student teaching my thought process changed.



Me getting excited to practice making crepes in when I was

Change in perspective

I was given a restrictive playground when it came to lesson planning. I didn't know how to approach it, because my other experiences have been a more open one. I had to start being creative because I wanted to express my teaching, but still, follow the structure I was given. What I did was write lesson plans a little bit differently from how my teacher delivered it. I would add my quick antinode or talk about how people use a variation of this formula in the world. Those were small things, but the main thing I did was write up a project outline. That process got me in the thinking about how much words affect our interpretation of things. I realize that what I wrote down didn't convey my idea to the team or the students, so my project needed to be revised. Writing, and storytelling is a form of making that I didn't consider until I started to teach. Because making something out of wood is cool and impressive, but words and art have the same impact if not more. With limited resources, sometimes the simple tools have the most impact.

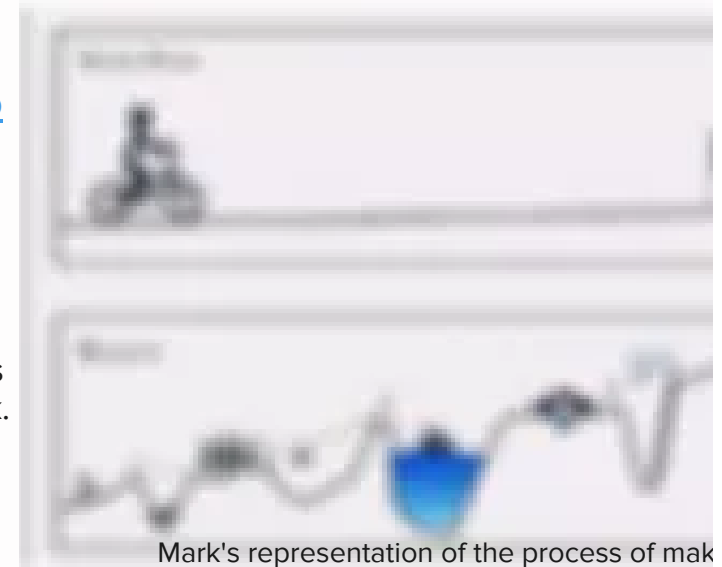
Mark Rober and the Super Mario Effect

Mark Rober is a creator on YouTube designing some cool contraption since he comes from an engineering background. He has also done a [TED Talk about Super Mario Effect](#). In the TED Talk, he makes a similarity between creating and learning to the process of playing a video game. When playing Super Mario, we do trial and error until we beat the game. Each attempt and struggle with the level lead us back to learning something to add to our tools to beat the game.

In terms of making, I viewed this as learning new skills as we work towards accomplishing our goals, and taking notes of what worked and didn't work.

Mark's message is about how when trying to achieve something there will always be challenges, but it is so satisfying to overcome those challenges and to complete one's goal. His philosophy reflects many my ideas about how to approach making, and appeals to me because I come from a similar background. Beating a level in a video game that I have been struggling with has been one of the most satisfying experience. I get that same feeling every time I create something that has been challenging, or whenever I finally understand a concept that I struggle with for a while.

That feeling drove me to want to learn and pushed me to keep up with the



Mark's representation of the process of mak

reward at the end is worth the trials. I like this perspective because it reflects both my maker and teaching philosophy.

My Teaching Philosophy and the connection to making.

My Teaching Philosophy follows a similar in the mindset of the Mario Effect. I grew up doing material arts, and that process of learning is very similar to the process of making. There is always the constant practice, and trying to figure out how to improve and reach your goal. The goal setting is an aspect of material art is something I carried onto my own life and teaching. Teaching student's math is cool, but I want to teach students how to set goals, and how to work towards them. Like the image of your plan versus reality, goals are tricky and comes with personal obstacles. I could teach students to multiply and divided, but what happens if that is something students already know or something too challenging? Then I wouldn't be equitable to my students, and not addressing their needs. That is why I want to teach students to set personal goals of learning. Like the image of your plan versus reality, goals are tricky and comes with personal obstacles. However, it is an amazing feeling to accomplish that goal. However, were that learning happens is through the process, and making is about the process. The end product is always satisfying achieving, but the hurdles and the constant persistence is what defines learning and making.

Equity and Diversity

Making provides an opportunity for anyone to grow. The best part about making it doesn't necessarily require many materials to be a maker. The only thing that a person needs an end goal, and maybe a plan to get to that point. Though that plan doesn't always work out, however, there is an inequity about who has access to the maker movement. Tools and resources are limited, so it is not surprising that the majority of the population that is part of the field are white males in the according to Professor Vossoughi. Females and people of color usually don't have equal representation in any area. One thing I believe would help with that problem in terms of making, is not limiting the definition of creating. I realize that is we should first encourage students to use and master the skills that they already are given. Asking them to write, paint, sing or do something that brings in their background adds diversity into the field. By asking students to use the tools that they might already know allows the field to be broader. That will enable them to have access to the maker movement still, but in a way that encourages them to experience it in a way familiar to them.

Once they get to experience the feeling of making, then the introduction of tools could be something that elevates or shows off their known skills. Example of that would be teaching them to do drag and drop programming. Most schools have access to computers, so taking time out the day to teach them that new skill could help them incorporate a digital aspect to the expertise they already know. The introduction of new tools and skills is important in the maker movement, because it will help diverse the maker field, and it allows a chance for students to learn something that could inspire them to make that tool something they want to master. Teaching students how to use new tools is equitable because it allows them to get the opportunity to learn something, and the chance to have the outcome of being a maker.

The other reason I think it is important that we allow everyone accesses to making goes back to the Super Mario Effect. Everyone can have the same end goal in mind, but the path that an individual takes to achieve the goal would be different. We can teach students to use a tool, but they could come up with different ways to use the tool to accomplish the same end goal. Examples of one that students and we use on a daily are how we write and speak. Asking them to explain how they could represent a problem, there could be multiple representations. The different representation brings in the insight of students through the process and where they might have struggled. If we only see one perspective of how something is made or learn, then we miss out on the different ways that students struggle or learn. Getting different students into the field is important because it allows the different path to be explored.

[Patricia Gome](#) and [Benjamin Herold](#) article both talks about the lack of diversity and the need to take action for the maker movement to be equitable. I agree with Patricia Gome that equity and diversity don't happen by accident. If there is no conversation about those issues, then no will take action if we don't explain why the lack of diversity and equity, then why would people care and the problems that it creates. That is why I talked about the lack of diversity and why I think it is a bad thing. However, I also don't want to have a conversation, but also input about how to approach this issue.

In the Benjamin Herold article, he asked why there should be a focus on equity, and I agree with why it is important to bring in students' culture to their learning and making. Their culture helps create a more engaging experience. That reflects a lot of what Patricia is talking about when she speaks about not letting making only be a classroom activity. I agree with her statement full well, and I come from a maker background not rooted in the classroom. To go along with that conversation, I mentioned earlier ago about using skills that students' already know. I was trying to answer that problem of putting making outside the classroom. If it is a skill student already know, then they can continue to work on it outside of school, and with their community. However, when introducing a new skill to students, we should also introduce those skills to parents. To show them how it could impact their children, and to get parents to involve so they can see the purpose of the maker movement. Both of these articles are great at starting the conversation about the lack of equity, and I hope I carried on that conversation about what we could do to close that gap.

Conclusion

Throughout the Uteach, I made an effort to follow my own philosophy whenever I want to accomplish something. It is built into the program because we always have some goal in mind, but the way that we achieve that goal depends on what we want to design. Whether it is a lesson, activities, or personal projects, we are always making something, and we do it in a goal in mind, but then reflect on how it went. All the lessons I have taught have been one with a plan in mind, execution, and reflection.

Everyone can be a maker because it is all about the making process. We all can create something and think about it to improve it, but we need a little encouragement to do so. However, what I realize is that it is also about learning how to use the tools we are given to the best of our ability. Learning a new skill is amazing, but mastery over old ones has the same impact. Some amazing makers are the ones that master a single skill. Understanding that now, I want to approach how I make in a more focused way such that I can focus on mastering a skill before moving on. To be a maker, you only need the drive to challenge yourself to do more and reflect on what you are doing. It is a constant process of learning. I want to constantly apply this knowledge, and encourage my students to bring their background so they can understand that they are makers, and it is okay to struggle because at the end we all achieve our goals.

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Importance of a Community

Makers need a community. Creating and designing is great. However, having a conversation about what you are creating is even better. Some of the ideas and problem-solving come from the community, and it creates this unity to build and develop as a group.

Cohort Meeting

One of those community for me is the cohort meetings. Several of those meetings were design based focus, and those are the one that I enjoyed. The two memorable meetings have been the one about creating a gift for someone else, and the cardboard challenge. Both of those meetings are were ones that I felt represent why I think having a community is essential. The gift one was around Christmas, and the focus was about asking your partner questions and coming up with a gift that your partner could give to someone. At the end of the activity, my partner and I both came up with gift ideas that we liked. This one of my favorite meeting, because it was with a lot of conversation about how to design a gift for someone else. It got everyone thinking and letting ideas come out to be explored.

The second cohort meeting that has meant a lot to me was the cardboard challenge one. As a team, we were given the word, and had to create something with cardboard out of it. The reason why I loved this one was we created a catapult, and it inspired me to try this next year with my students. I had the most fun working with my



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cardboard, hot glue, rubber band, and glue. The meeting shows off the importance of talking, because it was meeting that got me wanting to focus on creating a lesson around cardboards, maybe the focus is on a catapult.



The other community that I share ideas with is the MathHappens one. I have worked for MathHappens past year, and honestly, it got me thinking about math differently. The best example of that was when I was at a museum in New Orleans and saw a STEM Exhibit. My sister and I concluded it was a bad exhibit, but then I started to think about one specific item and started to talk about it with MathHappens. I only started to think about redesigning that item, because of what MathHappens does at museums. When doing something at the museum, they don't say here's something that is math but then allows the audience to interact and display their work. Most of the time they allow them to create something that represents the math model. Most exhibit displays the product and not the science and planning that went into it.

Another aspect that I gain from this community is the idea of using simple tools the best of our abilities. The tools that we create are out of wood and cut from a laser cutter, but the function of the tools are useful and that relates to math. There I learn how to use a quadrant for in multiple ways. I believe working there unintentionally started to change my philosophy to what it is today, and I didn't realize it until I started student teaching. Mastery of tools is as impactful as learning new ones. I have learned to master tools that were used in the olden days, but have used modern tools to recreate them. Both of those aspects are part of my philosophy.

Maker Events

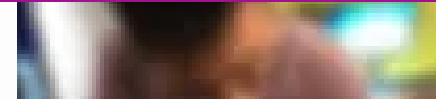
The last community I want to talk about is going to Maker events. I've gone to several events such as SXSW Education, maker meetups, and Maker Faire. At these events, I am either a participant or a volunteer at them. All these events reflect the aspect of communication and sharing ideas. However, looking back at these events, I realize that I see the lack of diversity in a lot of them. The majority of the people are white, or males. Ideas are shared, and people talk about challenges, but a lot of them come from a background of STEM. I have spoken with people at these events that aren't part of the majority, such as a man that came from a background of art and decided to take part in learning how to build

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equity at these events. I know that is not the first thing that someone will want to talk about, but I also believe that there could be a conversation about how one's goal or is an equitable action. The event that has been the most diverse and equitable to me has been the maker meet up where we made a stamp.

The stamp one was one that was the majority of females attended, but also one that brought in a conversation about how to elevate a project by simple programming. The project was about creating a stamp and a sound bit that showed off someone that you admire that has impacted the STEM field by contributing to it. That broadness allowed people to choose a diverse group of people. (I did mine on Jackie Chan.) What was cool about this event was it was one that shared several aspects of my maker philosophy. It is projected that involve using the tools of words, sounds, and art, but it was elevated by adding a technology aspect that was new to some people. There was one end goal, but how people approached was so different. The event was diverse because it shows different perspectives, but also equitable because it focused on incorporating small tools, that students could use, and there was a conversation about those tools in a classroom. It was a well-rounded event that talked about learning, brought in personal background and culture while teaching everyone to use tools while using old tools.



MakerFaire

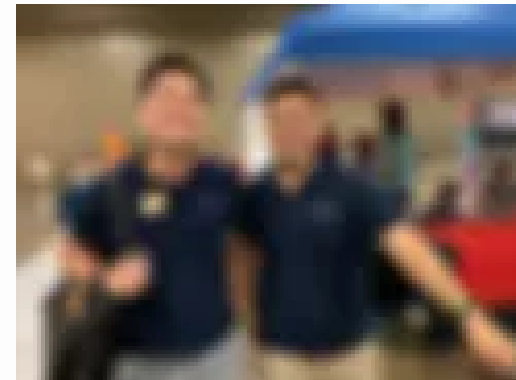
I have gone to two Maker Faires (Austin and Bay Area) helping MathHappen at a booth. Both of them tried to bring in different areas of making while showing off some of them. They want to let people see a broader aspect of what making entails, and focus on specific aspects. One of the fantastic things that the Austin Maker Faire did was bring in children to the event and experience making. The children came from different

Both faires had a similar idea, purpose, but the Bay Area one is bigger, and more people attending. The Bay Area one had a day for students to come in and interact. The other two days were general days. That one I got to see a lot more different and creative ways to make. People were more engaged and wanting to interact with the making there than Austin. It was a lot more technology-focused too.

I did enjoy the experience at both Maker Faire event, but I want to be critical about it. One thing I didn't realize until I went to about the Bay Area one is that there's a lot of people wanting to sell products or promote something so they can earn money. That aspect of that made the movement feel like the people attending have to have money to be part of the movement. I say that because when I was working at the Bay Area one, children kept asking how much did it cost to do our activity of coloring or making fractal patterns. The fact that was a question children have to worry about as they attend an event that supposed to encourage them to practice making and expose them to a different aspect of it, was disappointing. I understand that things cost to produce, but at the same time, I feel like the money wall prevents people from really wanting to dive into the aspect of what making means.

Reflecting over the Bay Area one, I realize that there was a lack of diversity. It was the majority of the attendee was Asians or Caucasian. I was staying at a place that was 10-15 minutes away from the event center and the majority of that community was Hispanic. It felt like a disconnect from part of the local community. I don't know if they knew about the event or even cared, but there could have been an outreach program to get the local community to also attend the event. It was noticeable to me as a guest of the area. Reflecting on the Austin one, I felt it was a bit more diverse, but the majority was still Asian or Caucasian.

I didn't attend the Austin education part of the Maker Faire, but the Bay Area one, MathHappens was one of the only

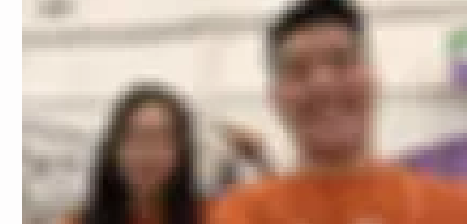


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because there was a disconnect of what of how it relates to making at times, and how it would benefit the children.

Maker Faire was a good experience as a maker. It has several great parts, but I didn't feel like they were reaching to the local community enough to diversify their attendee. As an educator, I don't know if I gained a lot of new ideas, or found any major benefits.



Conclusion

What all these communities have in common, is there is some a goal to a conversation about making, and how we can get people involved in it. Though not every community event is diverse, there is always a conversation about the impact of making and what is the next step to improve it and get it to more people. The community needs more people of different background to come and speak about their experience. If we want to have more making in school, then these events should also have a workshop to show teachers how to do making in class. The maker community is one that is growing and is a place a conversation to build ideas.

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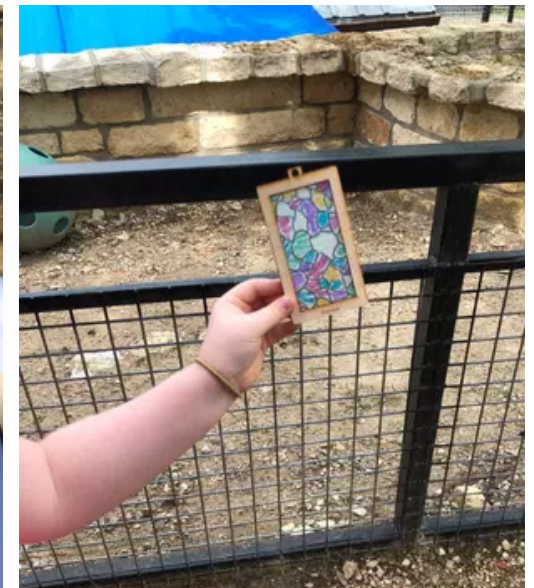
Maker Project

Maker Education

I have taught about making in both a formal and informal way. The formal way is my maker lesson, while my informal way has been through the experience I had with MathHappens. Both gave me a different perspective about making in education, and they both differentiate on the amount of tools students got to use.

MathHappens

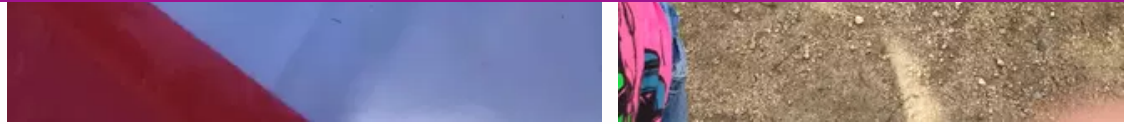
MathHappens does events at the museum, library, and non-conventional areas of learning. Throughout my time working for them, I have crafted and taught kids of all ages about math through making in some form. In these experiences, the children are usually building a tool that they can use for the activity or is a crafting something that represents a mathematical concept. From my experience of hosting a field trip to the Bob Bullock museum, the students got to craft parallel rulers and used them to learn about how sailors used it to navigate the waters. When we are at the Austin Nature Center, we let them create a plumb line, an element to the quadrant, and then teach them how to



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frame that followed the Voronoi Pattern, and talked about the math that went into it. These are all low tech making activity that involved tools like a wrench or crafting.



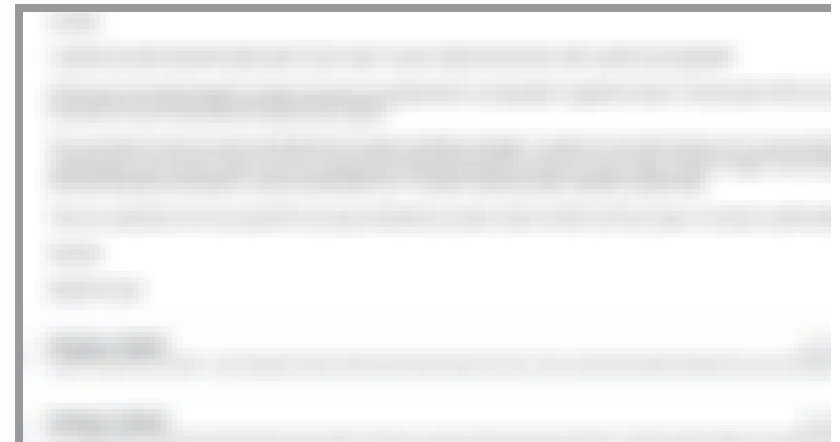
They aren't big making experience, but ones that are interesting because it caters to the public so both young children and teenagers could enjoy the experience of crafting. These informal public interactions mean that the type of making that take place sometimes can't be heavy on technology making, depending on the audience we are addressing. The audience could be five-year-old, or adolescents. So the content that we taught and created at the event could be scaled up or down in terms of educational value. All those experience though did involve making in a way that everyone could enjoy, or used tools that learned from use in an activity.

Maker Lesson

My Maker Lesson honestly has a lot of redesigns and could be debated on if it is truly a maker project. I think it has the potential to be a maker lesson, but I did not execute it in a way that optimizes the opportunity to make. I will attach my [Maker Summary](#) here and all the files that went into the project along the way. At the end of the page, I have attached my new lesson proposal with rubrics.

The planning and decision for the project.

I originally didn't know how to approach doing something that involved exponential and logarithmic, so I talked to my maker mentor, Lauren, Shelly, and a maker fellow, Krystal, about how to approach this problem. One idea was to come up with an activity that they had to continually make one thing, and see you who could do it the fastest. The lesson was supposed to simulate a situation that students are owns a business/making something for charity, and they are debating between hiring a person with no experience to help them make something, in our case something food related, or someone who has the experience, but you'll probably have to pay them more. The idea follows the learning curve. The issue that I felt came from



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This maker lesson was that I didn't think that students have autonomy or differentiate what they would be doing.

Another idea that we talked about was making a project about a certain aspect of Austin growth, such as population, or price of living. But when talking to Pam, a master teacher, she pointed out the fact the project wouldn't be engaging. A spitball idea was to do a folding activity that created an exponential art piece. I liked this idea, but I didn't know if all the students would be engaged with it.

I decided to do a project where students are researching something that is logarithmic or exponential and create a math model from it. This decision was made because it was one that allowed the PRE-AP Algebra 2 team to do it themselves. That was a requirement I had to accomplish because it would be the most equitable thing to do, so no one class is doing something different. The other reason that I decided to do this project is that allow students to differentiate the information they can share and present. It was a project that allowed students to explore their interest and see how it could connect to the math concepts. It creates more diversity in the information. I'll explain more about equity and diversity, along with key aspects of the project in more detail in different sections.

Project Objectives

My main goal from this project is to get my students to research and model a math in a real world context in groups of 2-3 people. I choose to focus on exponential and logarithmic, because that was the one of the subjects in math that connects to several different areas that students could find their interest. I wanted students to look up or create data. Once the students got their information they were suppose to create an artifact that represent their research. They would give each other feedback, before presenting. I graded my student's project with a rubric.

Student's Prior Knowledge

When the students were introduce to the projects, they were finishing up learning about what is an exponential and logarithmic functions. They knew how to write an exponential function based on a word problem, and understand that those two functions were inverse. The project took place will students were learning how to solve those two function given a numbers, and about Euler's number.

Project Proposal

I shared a proposal with the team I was working with at Round Rock High School. It highlighted the main objective, and it is a lesson plan of what the project was in tells. This proposal didn't include the rubric, because I wasn't sure how I wanted to grade the students when I was introducing this project to the team. Unit 9 I mention was the introduction of exponential, and it's inverse.

I will go over what I would have changed about each section of the proposal later on, but for now, I will go over the changes that I would have for this proposal itself.

The goal section and student's objective are fine. They highlight the key objectives in a clear way, without much more explanation. The only thing I would include in those sections is the requirement of creating an artifact, and include examples of what artifacts could be.

I would add a "resources section" in this proposal. It would include possible resources to give to students, and resources that a teacher could use for reference to about a maker lesson, and maker project would look like. When introducing this project, I realize that I didn't have a reference to share to the team, and sources that they could use to help them guide the project. The resources for students is to encourage teachers to have materials that students could be creative with. The material doesn't have to be expensive. It could be simple crafting stuff or even cardboard. If it were cardboard, I would link the cardboard challenge and what teachers and students have created from that challenge.

If I were going to give this proposal to another teacher, I wouldn't have made the timeline specific to the team. It should have been numbers of days, and then explain what days something would have been due. That is easier to follow. It also should include that this is planning in terms of a 90 minute class period.

The last major change would explain how Gallery Walk would work, and that it is a separate thing from the Presentation. I would then add instruction to how Presentation could have gone.

Timeline

I made a decision to make this project a 3 weeks long, because I wanted to give students 20 30

Letter of Introduction

The Letter of Introduction was something I wanted to give students to explain what was going on I

decision to introduce the project before students started the next unit was to give them the weekend to think about the project before submitting the proposal. I gave them the rubric at the beginning, because I wanted students to have reference to what they were being graded on. I thought that would take students longer to research a topic, but majority of students found a topic to research.

The timeline of this project was too spread out. Students felt that it was too long, and didn't connect. The placement of it was poor, because of how students were learning didn't always directly connect to the project, and the fact it wasn't an extend learning opportunity the project timeline didn't get great feedback from fellow teachers or students. The Reflection at the end I will talk about the two options that I came up with to address these timeline issue, but they need more context and deserve their own section.

the introduction because it was too wordy. I agree to a point, but I feel like part of the problem also came from the execution of introducing the project. For one, I made a mistake of not reading the letter as a class and going over it with students. That caused several students to be confused about what their goal was for the project, and when assignments were due. If I were going to do the Intro Letter again, I would make students read over it as a class, or shorten it to the timeline with a little more written into the description. I want to keep the introduction letter because I want students to have something that engages them in the project. What would help is not include dates in the written part, and bullet-point the objects. That would make the letter more concise for the students.

That said, I understand the point of view of only having a table with the due dates and the description of what is due. That approach is more direct, and straight to the point. It won't cause any confusion, but I feel like it lacks personality. Though, direct could be helpful for a classroom that needs more structure in the project.

Gallery Walk

The Gallery Walk was design so students could walk around the classroom and give each other feedback on each other project without any student explaining what is going on. I wanted students to give feedback on the project, before they presented, so they can do the last minutes edits, or find a way to address those feedback. There were 3 main type of feedback I expected my students to give to each other:

1. I like this because ...
2. I am confused by this ..., because ...
3. This ..., could be improved upon with ..., because of "insert reason"

that something isn't making sense. The idea of having students give each other feedback was something I thought was an essential element I need for the project because it allows students to use their community to improve their project. The peers' community help develops ideas, and grow as a unit. That is why this was a section of the rubric that students were getting graded on. However, I would suggest doing the Gallery Walk differently. Looking at the students' reflections, my CT feedback, and my thoughts, I would want to do the feedback part by asking groups to trade and reflect. It could be traded in a triangle or between two groups, but either way, not everyone will be able to see all of the other groups project before the presentation. I want to change that aspect of the Gallery Walk because it felt redundant to do both Gallery Walk and Presentation since both require students to see each other project. Then I would change the number of quality feedback down to at least 4 comments per a student that they reviewed. So if a pair of students are working together and get to review a project, then they both write 4 comments in hopes that it will help the group. I would do the Gallery Walk as a whole class activity. If it was a long project that we had time to do the activity at the midway point, then the presentation could be about the finished product that students could do see how much progress happen. However, if that would happen both the creative and time aspect of the lesson needs to adjust. I'll talk more about that issue in the Reflection.

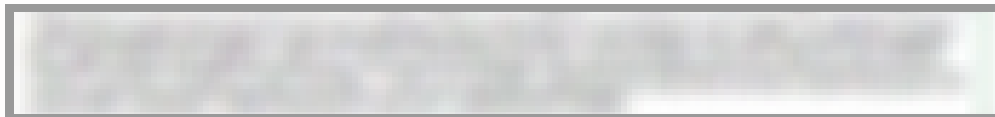
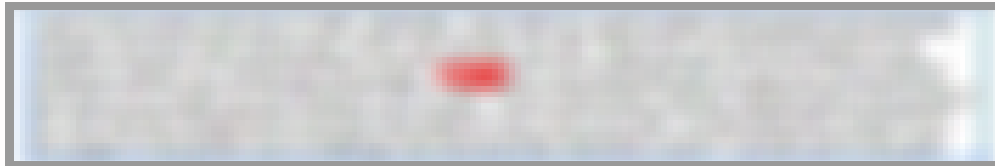
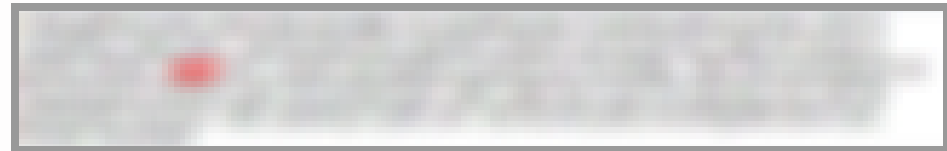
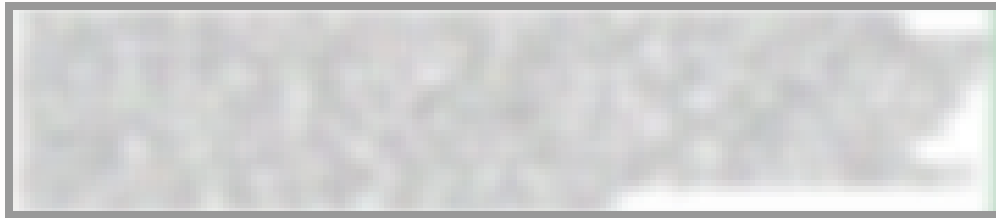
Presentation/Student's Reflection

I originally imagine that students would listen to the presentation of each other informal way. They could walk up start listening to the presenter and then move on. My CT suggested that we make it a rotation every 5 minutes, so there would be more structure. Even with that, the presentation day didn't go that well. Students didn't understand that they were supposed to rotate every 5 minutes, and they eventually got off task as the class went on. That aspect of the lesson was the weakest part of the project. The biggest reason was the fact students didn't have a grade attach to paying attention during other groups presentation. One simple solution would be to give students feedback form that they comment on one thing they learned from the presenter, and one thing the presenter could improve on. I decided not to do that initially because of how I did the Gallery Walk. Another option is to make the students' word problems quiz questions that they have to understand how to solve. Both options help with making students pay attention to presentation. If I had either opportunity, I would allow students to walk around informally,



Asking students to reflect on the project was great. It provided me feedback on what could be improved, but also insight on who was working. The reflection got students to think about the process and one thing I would ask students next time is if they were going to do this again, what would they do differently. Other than that, I enjoyed reading all of the reflections.

Below are some of my students' reflections.





Tools and artifact

This project lacked introducing tools for to the students. When creating the artifacts, many students opted out and got photos, or brought in a premade artifact. The issue comes from the fact that I didn't personally didn't push for students to design or create. I didn't push to bring in materials for my students to express their thought. There is two reason why I this happen. One is that it wouldn't have been fair for my CT other class, or the other teams, not learning the same thing that they were. The second is that time wise, I wasn't sure how this would work, and it end up being a mess for the time management. So I couldn't introduce tools for students to use. They did practice using presentations tools, and some students did creative artifacts, but the majority did not. It also didn't help that there wasn't any examples of what a good artifact would look like. Though I do want to be careful, because showing them example sometime leads students to only do those examples. This has been the weakest element of my maker lesson, and the reason why people could argue that my lesson does not involve making. I will defend why I think it is a maker lesson in the next section.

Rubric

The rubric was something I liked, but needs to be modify. I already talked about how I would change the Gallery Walk Feedback, and I would add that students need to give feedback to a least 3/4 of the presentation to get full credit all the points. I would make that another part of the rubric. The Google Form aspect needs to be clarify in the rubric. I would make them to the description of what needs be submitted to get those points. The other change would be making the artifact part of the rubric, and combine the content and organization of the project into one. I think making the artifact one thing matters, because I got some awesome projects, but at the same time I could reward those students with a deserving grade. It also

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Another idea would be to design a rubric where everything is weighted differently. The idea would be similar to how grades are calculated for the school year. An example of how the grades could be distributed would be like:

Artifact	30 points
Presentation	30 points
Equation/Inverse	5 points
Word Problem	5 points
Data/regression	10 points
Explanation of equation/inverse	10 points
Graphs	5 points
Participation	5 points
Bonus	

Having those value associated to a topic is fairer, because now certain aspects are weighted in a way that reflect the importance of the information. Of course there should be a description of what full credit would look like. If I followed the point rubric above for the project, I would make the gallery walk a quiz grade, and the reflection a daily grade. The participation would be students writing feedback after they view students presentation. I don't want to define what full credit of each of those, because that could differentiate depending on the teacher and what their expectation. I included a bonus for those students who does something amazing that blows your mind, and I wished I added that to mind for someone of my students, because she was the only one that created an art piece that they represented an exponential function.

Reflection

The maker lesson was rough. The allotted time I tried to give to work on the project was not enough, or student did not use that time. This problem forced the flow of the project to be slow and clunky. Not going over the introduction letter also cause a lot of confusion. The experience felt like I was in a play area, but didn't know how to play and build a lesson. I did manage to cover content and make it relevant. Looking at my students' feedback, many of them loved it and enjoyed the project. The student who did the art painting came back to me and told me two weeks later about how she figured out another way to do art exponentially. That statement got me so excited and helps support that my maker philosophy and teaching philosophy is in this lesson. The student went back to the start of the race to explore a different way to reach the end goal. And for me, teaching is about setting goals and trying to figure out how to get there. Once you reach that goal, then reflect and add that knowledge to help you move forward.

Having the fact that I need to make sure that 300 students can do this project with a different instructor,

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that they like the idea it just needs some revision. I agree of course and have thought about ways to improve the lesson. I believe this is a making lesson because even though there wasn't a big on using tools, there was that option to incorporate it. All the elements that define a maker lesson are there. The problem was there wasn't anything to build up the foundation. Example of what would build this lesson up is more time, bring in resources that students could use, and teaching them how to use tools. And it could also be said that students created. They created a math model out of data, something where they had to learn how to do regression on the computer and based on their research. They created, got feedback, and presented. Students practice making without using many physical tools, but they did make through the words that they used to convey their interest. So yes, this is a maker lesson, but one that didn't reach its full potential.

I have different revisions that I want to that I think would help elevate the lesson. The two ideas on how to revise the lesson, and they are similar, but they do have some major difference. Both of these ideas are something that could be fleshed out, but they are general guidelines on how to implement this lesson plans. Let's start with what they have in common. They both can use either adjusted rubric and would help if there was an example of what to expect for an artifact. Another element that I would add to this project is making students listen and write reflection over a [TED Radio Hour "How Things Spread"](#). This podcast is relevant to the students because it talks about exponential growth without mentioning it. The questions that I would add to that assignment would be an open-end one that asked students how does this podcast connect to the lesson, and what was the thing that stood out from this podcast. The last comment I want to add before talking about the revision is that my students didn't use Google form well, and that caused them to lose some points. So the decision to do part or all of this, electronic is dependent on the school and the situation.

The 3 Day Plan

Take three 90 minutes days for the project. The first day is for research and equation building. The second day could be dedicated to building the artifact. That day the instructor would have to bring an assortment of materials that students could work in groups to build an artifact that represents their research and maybe get feedback. The third day is for presentation, reflection, and maybe a quiz.

So this design doesn't have a long period for students to edit their project. That is the only major downside to this option. I would want to implement this lesson at the end the unit that introduces exponential because then it is an activity that challenges the student to think about the how they can apply the knowledge they learn, and maybe try to figure out how to solve before we get to it.

The other time I would want to implement this lesson is at the end of a unit where students learned everything they need to cover for exponential and make the project the summative evaluation. If I did it like this, I would also require students to come up with some practice problems to go along with it, because it would ensure they understood the solving process. I don't necessarily like the second way to implement

The Full Unit

The second option follows the same structure of what I did this semester but with a little more rigid. This lesson has in mind doing the project as the students go through the unit of exponential and logarithms. When introducing exponential and logarithms, I would spend the last 30 minutes of class the first day introducing the project, showing off examples, and then giving them time to do the project. As the lessons go on, I would dedicate 30-45 minutes to about half of the lessons in the unit to teach students either new skills so they can create an artifact, time to work on the project, or time to have a conference about what they are creating and giving them advice.

Some of those days students should be given that time to work on the part of the project that is due that day, before working on the artifact, and some of those days might be dedicated to learning the content so students can be more prepared to present. Middle of the unit students should do a pair activity that groups can give each other feedback about each other artifact and presentation. Then spend the rest of the class working on their project based on the input. After the feedback stage, students only get 15-20 minutes to work on the project if it is needed.

Majority of the hard part is done the first half of the lesson, and the second half should be adding the finishing touches to the artifact and presentation. The second half focus is making sure students understand the properties and solving, before moving onto the next unit. I would dedicate a day to the presentation, and reflection, followed by a review, for a test the next class day.

This plan is something that depends on the school, and how long they want to spend on exponential. That said, teachers could make a judgment call and say that students don't need as much time to work on the project or vice versa. Either way, I like this idea the most because it would be the one that follows along with maker education the most. It allows students to think and be creative while teaching them new skills.

Conclusion

This project brought up a part of the equity that I haven't thought to consider. As teachers, we have to make sure that all students get equal opportunity to learn the same content no matter the instructor. So if I wanted to do something that is fun and unique, it is not equitable if all the other students don't get the same chance. It is something I don't know how to approach or problem solve. But I will say that this project does bring in diversity by asking students to bring in their background. I learn a lot about my students' personal interest, and it was something that my student enjoyed. Overall, maker education is still about teaching, but we need to make fine ways to make it so all students can access it, and that means teaching how to do these lessons to others.

New Maker Lesson Proposal with Edit Rubric.

Resource Recommendation

- Scrape- Drag and drop programming
- Ink Space- Design program
- Cardboard- Resources that could be used for a lot of things.
- Makey Makey- Can be used with Scrape.
- <http://www.agencybydesign.org/>- information on designing by making
- <https://makerspaces.make.co/>- website to find local makerspaces to ask questions and learn more about making.



Maker Lesson Summary

Lesson Title	Let's Make Exponential and Lograthmic Revelant
Name of creator	Benjamin Duong
Name of collaborator/s	Nicole White, Lauren Seigel
Subject and grade level	PREAP Algebra 2
Time required	3 Days or 3 weeks doing it 30 minutes in class
Link to lesson plan and materials	https://docs.google.com/document/d/1YQ5mLXHZ0jtzcupEuQmCd2Mc01lxwZ17aZNFli9YIPQ/edit https://docs.google.com/document/d/1WHLcBxBzf6D1nK_ndrvVQkalM2x5_IXpHZATx_YdG28/edit https://docs.google.com/document/d/1aZpybgcTGNAFvWr-klYE4pAQAT5XXY4bDdRdVysp6Pg/edit

Lesson Description:

The lesson is an add on a project that students got to work on during class. It was about trying to get students to research and design a presentation that explains how their research connects to exponentials or log. Students were required to create an artifact, that some related to their topic.

Lesson Development (*How was this lesson developed? What resources/collaborators were involved in planning?*):

I started to develop the lesson by having a conversation with my maker mentor, and fellow makers. I was required to design a lesson that the whole team could implement. I knew what I wanted students to research and present their information but also wanted them to develop it in a way that they could bring or develop an artifact to show their idea. So I wrote a proposal that got feedback from my CT, the instructional coach and from the team before finalizing it.



Lesson Implementation (*Describe the lesson implementation*):

The lesson was not implemented well. The lesson was done in the background as students were learning. The focus wasn't the project but trying to learn information for the test. Students were given 20-30 minutes once and a while to work on the project. Then they spent a day giving each other feedback before the next day presenting.

Connection to important concepts and skills within the discipline and/or across subject areas:

Students focus is about the real-world application on exponential/logarithmic function. The skill that I wanted students to focus on is the research process. Finding information, and being able to interpret it is important, because many students don't have the experience researching, and presenting. The TEKS that are associated to this is the Algebra II 2B, 2C, 5, and 8. Those TEKS are addressed because students had to find the inverse, apply their knowledge to interpretation.

REFLECTION

What Went Well:

What went well was that students enjoyed this project. They liked that they could apply what they are learning to the real world. It was engaging, and an attempt at something different.

Thoughts for the Next Iteration:

Make the project happen all at once, or make sure students have the focus on the project as the other lesson is being taught. I want to have more resources to let kids create and craft artifacts. Don't make the Gallery Walk as Long, and have some way to ensure students are listening to other presentations.

Exponential/Log Project

The mission of the project is focused on trying to connect students' interest to exponential and logarithmic functions.

- **Students Objectives**

- Research a topic that is connected to the unit.
 - Examples: something in nature(growth of animal or talk about the news of the spread of disease), video game, learning curve, money, historical use, scientific phenomenon, food, or art
- Create a **presentation, item, or object that display their research.**
 - Explain how their topic connects to the unit and why they choose it.
 - **Create or find a mathematical model/equation and a word problem** based on the research.
 - Explain what each variable means in an equation that found or created, and how that affects the function.
 - Find the inverse of the equation and interpret what that would mean in that situation.
 - Show a graph of the equations

- **Time Line**

- Introduce the project on day 6 of unit 9
- Students will have to report what they are researching by the beginning of the next class period.
- Students then will have to submit a rough draft/outline of how they want to present their research by "Solving with log properties".
- Students submit a word problem and equations for our critique on "solving with exponentials properties"
- Gallery walk after applications, so students can write feedback to each other.
- Present the next day.

- **Grouping?** -Students can work in pairs or by themselves
- Dedicate 10-20 minutes a day to work on the project?
- Turn in materials into google classroom.
- Questions created could be part of the review

Gallery Walk Procedure

- Have 3 sticky notes of different color.
 - One of what they liked
 - What they are confused about
 - Something they could explain more about it.
- Split the class in half and so one set of students can walk around, and the other can explain.
- Spend about half the class doing this, and the other half letting students edit or change their project.

- The presentation could be 3-5 minutes.
- **Grading is done by a rubric- needs to be created.**
 - Creation- the word problem, equations
 - Analyze- Is their explanation of the research well thought out
 - Calculation- them solving the problem.

Mission: Making Exponential and Logarithmic Relevant

Greeting Pre-AP Algebra 2 students,

The next unit is about the application of an exponential and logarithmic function, and your goal is to find something you find interesting that you that relates to the topic. Why you ask? Because there are several ways this unit connects to the world, but so little time to bring up all of those connections. So why not make it a project that you all to share the knowledge with each other. You will share your research by creating visual artifacts and presenting it to your classmate. There will be a preshowing of your artifacts in a **Gallery Walk, April 12th/15th**, where fellow classmate will give you **feedback** so you can prep for the presentation the next class period. You'll be presenting the information several times because these are small group presentation, therefore make sure your **presentation is 3-5 minutes** to allow questions and comments. We will go over the procedure of the Gallery Walk and Presentation later in the unit.

This project will be a **test grade**, so do take it seriously, but don't worry, you are working in **groups of 2-3 people from your class**. There will be some class time to work on this project, but the majority of it will be done outside of class. **All Assignments will be turned into Google Classroom**. You will be **presenting** your research to your classmates **April 16th/17th**.

Objects:

1. Your team will research what you are going discuss to the class that is connected to an exponential or logarithmic function, and tell us **why** you choose that research. **(Proposal Due April 2nd/3rd (A/B))**
2. Create or find a **mathematical model/equation** that represents your research. This can be created by looking at data and creating a regression model out of it, creating an equation that you think matches your research, or find an equation. **(Due April 8th/9th)**
 - a. Explain what each variable represent in your mathematical model/equation. **(Due April 8th/9th)**
 - b. Create a word problem themed around your research. **(Due April 8th/9th)**
 - c. Graph your equation. **(Due April 10th/11th)**
 - d. Find the inverse of your function and explain your interpretation of what it represents in context to your research. **(Due April 10th/11th)**
3. Create or find visual artifacts to present. **(Rough draft/outline due April 4th/5th)**
 - a. Artifact examples include but not limited to: Videos showing your phenomenon, an object that is the center of research, pictures, news articles, something that engages your audience
4. Present your research to your classmate. **(April 16th/17th)**
 - a. Why the research and how it connects to the unit
 - b. Explain your visual artifacts

c. The mathematical model and your interpretation of it.

5. Reflection about how you and your teammates. **(April 18th/22nd)**

To get you started, consider these areas to explore: News, Money, Investment, Food, Animals, Scientific Phenomenon, Nature, Art, Historical Use, Video Games, or something else

Good luck, and remember it is okay that this isn't perfect, it is research and that is never perfect.

-Pre-AP Algebra2 Teachers

Time Table

Assignments	Description	Due Date(A/B)
Proposal	What you are researching and why?	April 2nd/3rd
Rough draft of visual artifact and presentation	What are you going create and how will present it?	April 4th/5th
Mathematical model	Find/create a mathematical model/equation and describe what each variable means in context to your test.	April 8th/9th
Graph	Create a graph that is a visual aid to your equation	April 10th/11th
Inverse	Find the inverse of the equation and interpret what that represents.	April 10th/11th
Gallery Walk	Have your presentation visuals and walk around to talking critique each other visuals.	April 12th/15th
Presentation	One person will stand to present and the other will observe other team research. Each team member will have a chance to present and observe other teams.	April 16th/17th
Reflection	Reflection on the whole experience.	April 18th/22nd

Exponential/Logarithmic Project Rubric

Student Names:				
Google Form 1 <input type="checkbox"/> 4 points	Google Form 2 <input type="checkbox"/> 4 points	Google Form 3 <input type="checkbox"/> 4 points	Google Form 4 <input type="checkbox"/> 4 points	Google Form 5 <input type="checkbox"/> 4 points
20 Points		15 Points	10 Points	5 Points
Gallery Walk Visual/Presentation:	Students make a <u>creative</u> and informative quick presentation of the their research. They have an appropriate visual that helps with their explanation.	Students make an informative quick presentation of their research that had appropriate visual aids, but was lacking in creativity or engagement.	Presentation had all basic information, but there were no visual aids or visual aids were not appropriate for the information or had visual aids, but lacked all basic information	Presentation was lacking basic information and had no visual aids or the visual aids were not appropriate for the information
Gallery Walk Feedback:	Student makes a minimum of 12 thoughtful and constructive comments on other groups presentations	Student makes only 10 comments or some comments are not thoughtful or constructive	Student makes only 8 comments or most of the comments made are not thoughtful or constructive	Students makes only 6 comments or their comments are not constructive/thoughtful
Presentation Organization/Time:	Presentation follows a logical path and contains all required information. It is shown in a way that can be understood and meets time requirements. Feedback from Gallery Walk is addressed.	Presentation was lacking some information or was difficult to follow. May also be slightly short on the time limit. Feedback from Gallery Walk is addressed.	Presentation was confusing and difficult to understand. Also short on time limit. Feedback from Gallery Walk is addressed.	There was no logical flow to the presentation. Or is way too short on time limit. Or feedback from Gallery Walk is not addressed.
Participation: (Reflection)	Student fully participated in their partner group work and presentation.	Student mostly participated, but partner mentioned that some participation was lacking.	Partner indicated that student only participated half of the time.	Little participation was indicated by other partner.
	Student participation based on feedback:		Total Points:	Grade:

It is possible for zero points for each category if no participation/no work was completed in that category.

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Benjamin Duong

University of Texas

BS in Mathematics 2019

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Maker Project

My Making Process

I like to dive in the deep end and start working on my projects. There is little research before attempting my project, but most of the first tries are attempts to get my feet wet. The best way to describe this process is learning by doing, and my favorite way to describe it is calling it the "Splash and Dash" attempt because I want to see what happens and what are my initial thoughts. The problem with this method is that it is not efficient since I am doing it without much background to make sure I eventually succeed. I prefer to trial by error and learn along the way, but that is not realistic. The issue comes from that I don't have unlimited resources and unlimited time to work on the project. I understand that, so whenever I can do that, I will make by trial and error, then go back to figure out what I did to get to that point.

So the majority of the time I create by doing research, planning, then executing it. I understand that this is a more efficient way of creating, but sometimes when I research, it makes me lose interest in the project. It still takes time, but more efficient use of time. I like to have some results, and to me, a plan sometime doesn't feel like results. That said, this something I am trying to do every time because I know the benefits from it.

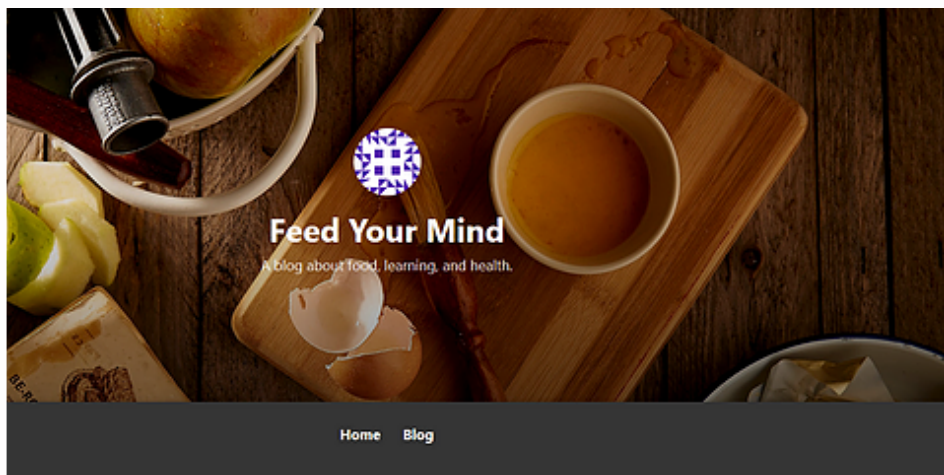
Both processes involve me to reflect and think about what I am doing. That is how I learn, but sometimes it takes me a while to think about what happen and listen to feedback. But afterward, I will always start planning ahead and editing my plan and approach to how I want to accomplish my goals.

Projects!!!

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Feed Your Mind



[Feed Your Mind](#) is a blog about food, health, and education, but one that I want people to comment on and have a conversation about the post. I hope to engage others in thinking about topics that might promote learning tools for students. When I write this post, I try to back it up with scientific evidence from research articles but also make it relevant to modern problems. The posts are usually topics that I have a conversation with or something that I have explored in my education classes.

Update: I have not kept up with this project because I got lost in the research, and how to formulate my thoughts. I want to try starting this back up over the summer.

Dice Tower!

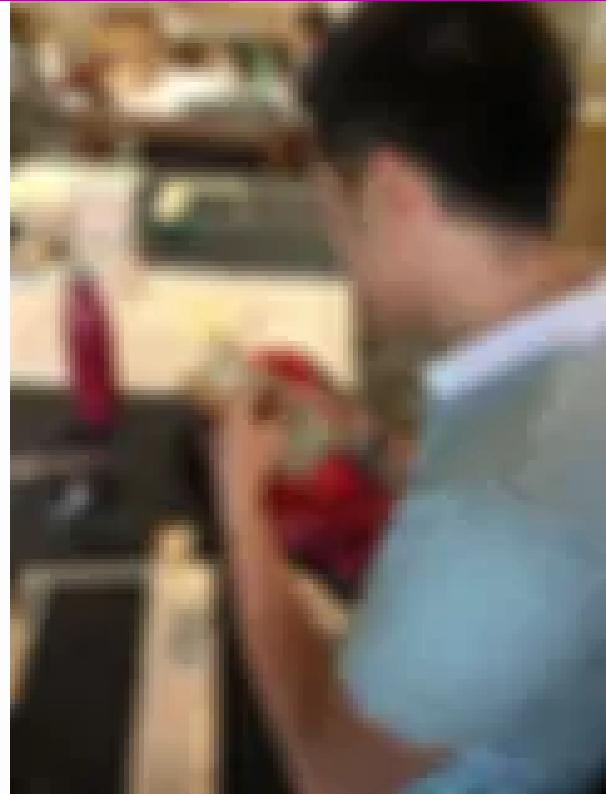
This was the first project that I did as a Maker. I decided to focus on creating something that my friend would like to have in his collection. It was probably the one that I had the biggest learning curve with because I was learning how to make a box on CorelDraw, and learning how to work a laser cutter at MakeATX with MathHappens. Majority of my time was spent trying to figure out how to use CorelDraw, and designing the box by hand and trying to convert it to CorelDraw.

When doing this project, I started to realize that I can use math to create this!!! This was my moment that I made a realization about the power of triangles. I started to use triangles and its properties to help build my tower and the slants inside.

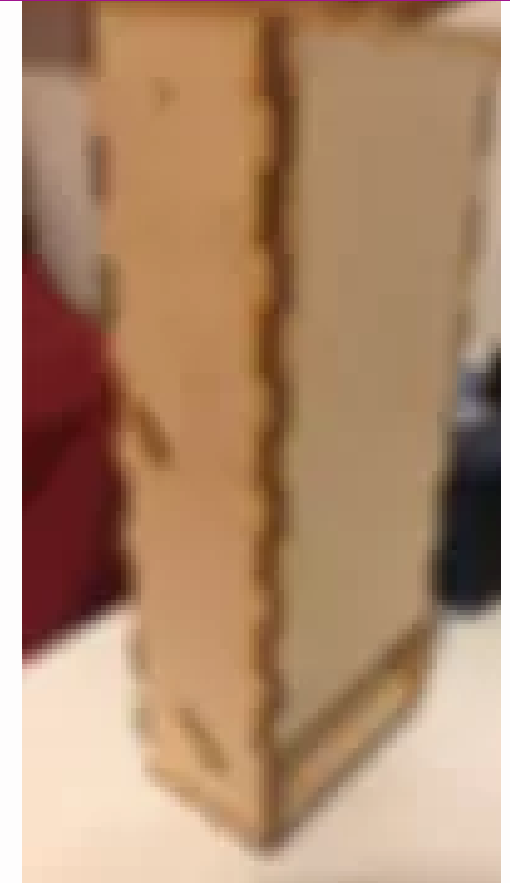
The first attempt at creating the dice tower was all right, and I made the decision to adjust the heights of the slants because it kept getting stuck. Now that I have seen other dice towers, I want to redesign it without

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Me trying to assemble what I created.



String art

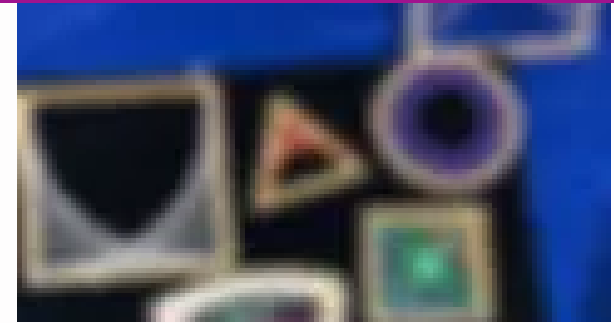
So I saw this will I was helping out with Makerfaire. My first thought was conics cause I saw a quadratic as one of the images. It got me thinking about how I can use the circle to make an ellipse and hyperbola. I accidentally got to that point, but then I went home and started to do it in a scientific way. I first folded some wax paper to get the conics, then try to follow the lines to make a conic shape. This didn't go well because I didn't consider that I only have a limited number of wholes for my string

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the paper. My next attempt I am going to draw a circle based on the circle of the wooden frame and include the wholes from the frame so I can have a point of reference to where to stitch the string.

I wanted to do this to show off the point of a focus and directrix to students. It would be a cool representation and different from the typical wax paper way of discovering the purpose of the focus. I hope to find a pattern on how to stick it so I can get both an ellipse and a hyperbola.



It was hard to see all of the folded lines.



I couldn't see all the lines, so this was my attempt to follow some pattern,

Making Tofu

This project is in the planning stage:

I love food, and I love to eat tofu once and a while. I saw a video of how tofu was made and thought I could do that. Looking it up I realize that it is very similar to making cheese, but with soy milk. I made two decision one to make homemade soy milk. and to make my own tofu press. I understand the basic of the of making soy milk and cheese and the reasoning behind each step. The raw soy milk

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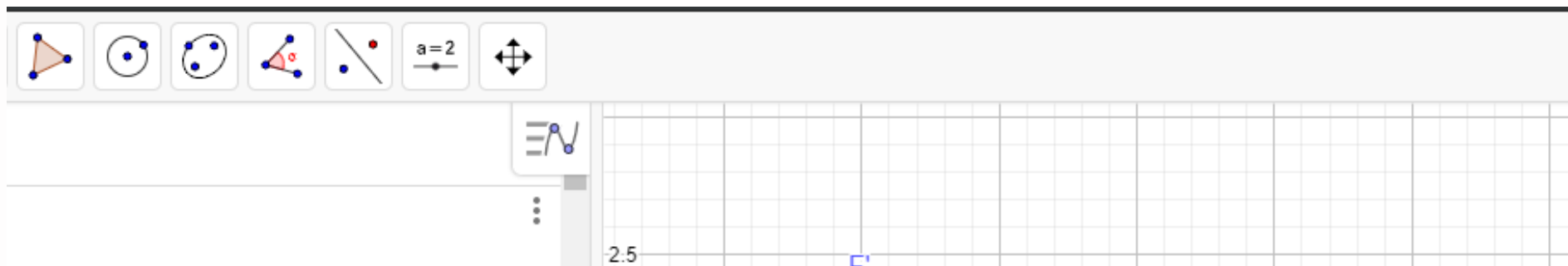
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adding a chemical that clumps the protein together, before straining and pressing it.

I'm decided to make the tofu press because I saw what it [looked like](#), and decided that I could do that with a laser cutter or some other cutting tool. I know that I should probably add some finish to it, but I need to research how to finish and polish off wooden so I can use it in cooking applications.

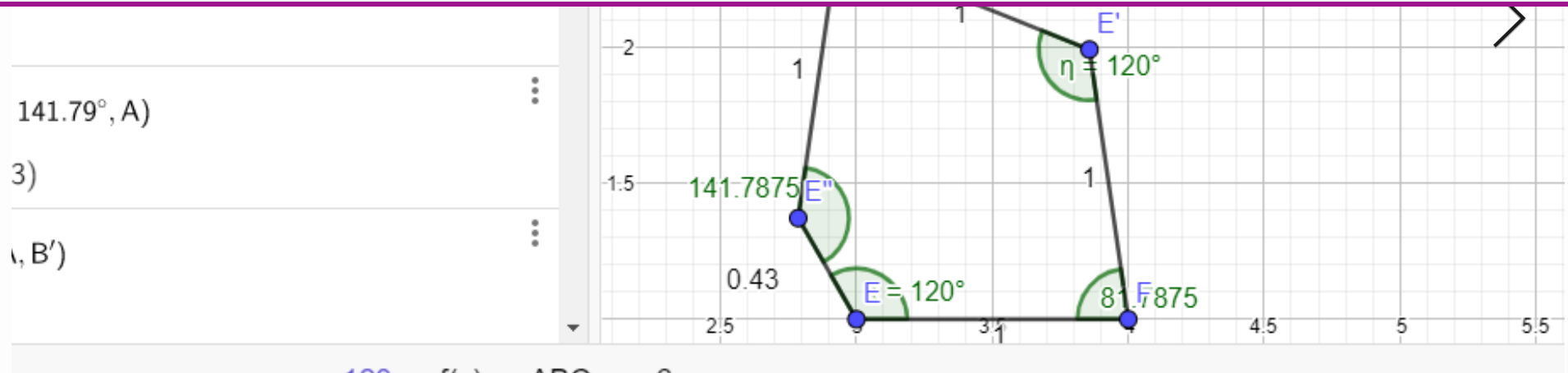
Tessellating Pentagons

Working with MathHappens, one of the projects that I took on was to create all [15 tessellating pentagons](#). Regular pentagons don't tessellate, so there are these proportions that help create these tessellations. The project was something that MathHappen created before but only through a CorelDraw. That is how first approached this project. The first one I attempted to make was the 15th tessellation because that one had many details about how to create it. I tried to develop it on CorelDraw first and succeeded, but then realize that there was a more efficient way to create them. I started to use GeoGebra. This was a perfect tool because it allows easy adjustments to values and something that I could save and use later on CorelDraw. I have created 13 out of the 15. A lot of the design for this was guessing and checking what values worked and meet the requirements. Then it changed to having set values for some of the parts and developing something that worked with those values. The next math trick I used was to use the principle of squeeze theorem to figure out the exact value to make the tessellation. I would input value and then decided if I need to decrease it or increase it depending on the situation. There are some angle values that are to the ten thousandth place. The next tool I used was the circle tool from GeoGebra. That allowed me to have constant length but allowed me to adjust my angles. I haven't designed many of them on CorelDraw yet, but working other coworkers, they have created some cool designs with the tessellation.



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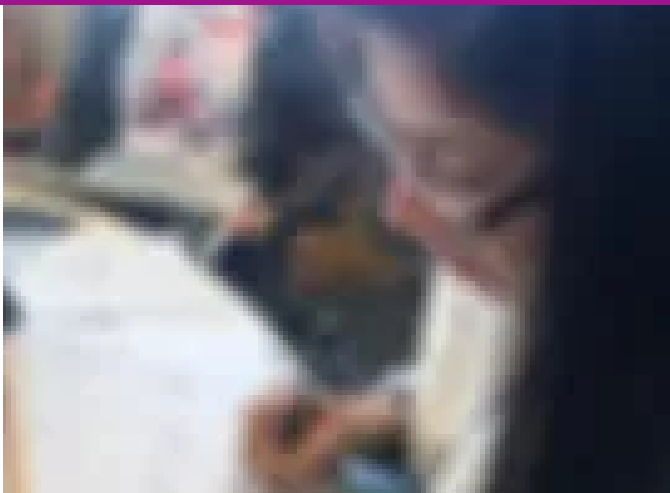
Stamp and programming

At one of the maker events, I got to make a stamp, and make a scratch program. What I liked about this project was the fact that it was a little bit different from my usual areas, because it involved more arts and craft. I got to learn how to use carving tools, Audacity to edit audio clips, and how to convert Youtube videos to MP3 files. I learned many tools from this project, and it was a great one that challenged me to be creative on how to interpret the goal. "Create an audio track talking about someone who influences the STEM field." My girlfriend and I choose to focus on Jackie Chan because he is an animal rights activities, but a philanthropist about making sure children have a chance for education. We both are big fans of Jackie, and I wanted to do something we both liked. We decided to make our stamp a panda because Jackie loves pandas. The whole activity was great, and I learned a lot from the project. Sadly I could not save my scratch file to share.

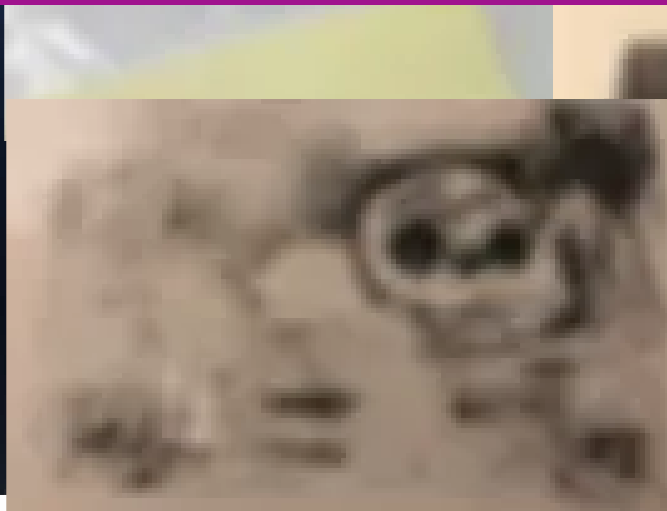
[Link to youtube to Mp3](#)

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Our attempts to draw a panda



The stamp and what it looked like on a piece of paper.

My White Whale- Wanting to redesign an exhibit



This project is still in progress and one that I want to finish. I saw this in New Orleans, and realize how this WW2 device work. Working with MathHappen. got me to realize I could recreate this or add some simple things to

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My goal is to recreate this display and add my own elements to it. One of the elements I wanted to add is some figuring that could be held or adjusted so guess could see the increments of distance increase as the angle increased. The second element is a small display explaining the math behind it, and the physic behind mirrors that make this work. I've talked this out with a fellow maker, and we still aren't sure what would be the best way to display the physic part of it, there was talk about using a laser pointer, but I felt that if the laser pointer was opened then children will point at each other eyes. So the way I want to display the physic is up for decision, but I have a general idea of displaying the math. It will happen by having different triangles and explanation of how to calculate a side length given an angle and another side length.

My current game plan is:

1. To finish out a proof of concept to confirm my math and recreate the display.
2. Find a way to explain the physic aspect of the display.
3. Scale up the display from a proof of concept.
4. Write a proposal asking to add these elements to the museum so that the display could be more interactive.