

# Students at Dynamicland

Grant report by Toby Schachman

**Grant period:** Jan - Dec, 2018

**Date of report:** Dec 31, 2018

**Grant purpose:**

To explore the potentials of the spatial computing platform being developed at Dynamicland for engaging students (middle school, high school, and university), iterating on the learnability of programming within this system, and hosting classes and community gatherings facilitated by this new medium.

**Project goals and milestones:**

- Field trips from students at the middle school, high school, and college levels with the goal of discovery and awareness.
- Workshops where students dive deeper into the system and create their own projects.
- Longer term projects at the university level resulting in showcased work.
- Hosting open studio hours and community showcase events. Engaging a diverse community.
- Explore installing the technology at additional locations.

## Project Outcomes

Dynamicland is a computer built into a building. People in the space interact with pieces of paper and ordinary physical objects while cameras and computers in the ceiling track the objects and project dynamic visualizations onto them. Dynamic objects can be reprogrammed by pointing a keyboard next to them.

Dynamicland is designed to feel like you are inside of a computer together. It supports conversation and eye contact rather than isolation at separate screens. Because work is visible, people learn by watching each other — the way we learn cooking or dancing. Every dynamic object has its code printed on it. People in the space learn programming via immersion.

Dynamicland's mission is to incubate a humane dynamic medium whose full power is accessible to all people. Dynamicland aims for universal literacy in this dynamic medium, the way today's society aims for universal literacy in the static written medium. We believe this will require fundamentally rethinking status quo computing — its form factor, the way programming is done, and the social structures around computing. We consider this work as part of a decades-long research project.

The purpose of this grant was to explore how the medium we are developing could be used within a classroom of the future, to begin engaging students in the Oakland area in using the medium, and to promote a diverse community around its development so that the computer of the future better reflects humanity as a whole rather than reinforcing existing power structures.

The following progress report is organized based on the goals presented in the grant proposal: facilitating discovery and awareness by hosting high school and university students, developing class materials and curricula at Dynamicland, hosting longer term projects, building a diverse community, and exploring Dynamicland at other locations.





## Discovery and awareness

As we are a new nonprofit organization and the system we are building is so different from traditional computing, one of our main goals of 2018 was to spread awareness of our work within the Oakland educational community.

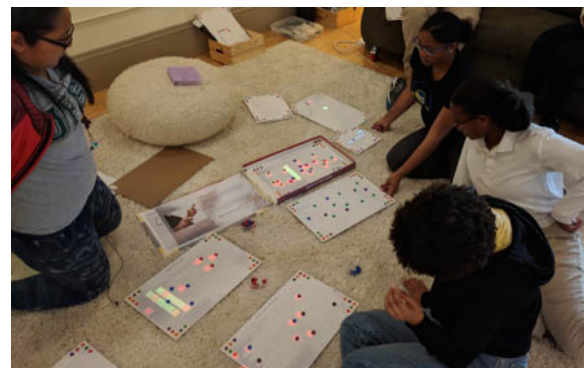
To this end, we hosted eleven field trips over 2018 where students came to the Dynamicland Oakland space, interacted with dynamic media, created their own dynamic media, and discussed the future of computing. Students were extremely engaged during the tours and hands-on activities, as they could combine computing with their other interests such as drawing and music. Teachers were also appreciative in that Dynamicland helped demonstrate the breadth of what the future of computing could be.

Kennan Scott, Oakland high school teacher and now manager of computer science at Oakland Unified School District reported:

*Partnering with Dynamicland gets me juiced because they perfectly integrate Computer Science into MakerEd. Their work is going to push future generations of problem solvers to think creatively for new solutions. My students left the space with a greater appreciation for research and the power of tinkering.*

Additionally, to support awareness within the local community, we hosted tours from other nonprofits to explore partnerships, including the Concord Consortium, the David E Glover Center in East Oakland, Oakland Youth Radio, Code for America, the Chinatown Oakland Public Library, Oakland Kids' First, ScriptED, and the Coliseum College Prep Academy.

Our partnership with the Concord Consortium led to a two-week residency with STEM educator Eli Kosminsky and to our hosting the two-day workshop *Designing 2030: Building the Educational Technology Community of Tomorrow for Design, Interoperability, and Equity*. At this workshop, thirty STEM education professionals convened at Dynamicland to outline educational opportunities and challenges in the context of changing technology.





## Developing class materials and curricula

Every class field trip was a chance to try out new materials to see if we could prompt deeper engagement in the creation of dynamic media via programming and other creative acts (drawing, sculpting, etc).

We developed an hour-long tutorial to introduce programming at Dynamicland. The tutorial is structured as a group activity for four to eight participants. As a warm up, participants make their name light up on a piece of paper to learn the mechanics of pointing the keyboard at a page, editing code, and printing new code. Then there is a group drawing activity where we make board game pieces which we program to behave differently when the pieces are placed next to each other.

We were also interested in using the dynamic medium to support new kinds of discussions. We created a media scrapbooking kit and hosted a class in partnership with California College of the Arts (CCA) class “A Taste of Resistance”. By sequencing cards together, the kit generated code which was able to play sounds and videos. Groups used the kit to create presentations on the theme of the class: food and how it relates to history and political action.



## University-level residencies

To evaluate the usability and generative potential of the computer system we’re developing, we host residencies where we engage outsiders to create new kinds of experiences at Dynamicland. In addition to artist residencies and residencies in partnership with other nonprofits, we hosted two university-level residencies in 2018.



Saloni Dandavate, Ishan Sian, Prabhav Jain, and Kritika Kushwaha, graduate students in design at CCA, built and tested four prototypes on the theme of children, education, and emerging technologies. In particular they were concerned with the effects of digital media consumption on social and emotional development in young children. Towards reimagining the future of socializing, bonding, and learning through technology, they built a group interaction where kids placed tokens to create shapes and learned their names (triangle, quadrilateral, etc), an interactive poster

with videos about the planets, a dynamic popup book about food chains, and a toy that prompts a storytelling activity.

Chelsea Lin, an undergraduate at CCA, developed her thesis project RGB Color Book, a hybrid printed and projected book about color theory and perception. Her project won CCA's Graphic Design Senior Thesis Award.



Both of the above projects were presented at a community showcase event at Dynamicland with over 100 attendees.

## Community development

We are acutely aware that technology reflects the perspectives of the technologists who create it, and that the technology community is severely skewed demographically. In order to better reflect the whole of humanity in the long-term future of computing, we aimed in 2018 to build a diverse community eager to participate in the research and activities at Dynamicland.



Throughout 2018, we hosted weekly community studio hours on Saturdays at Dynamicland. Studio hours were run by and for volunteers. Volunteers formed three working groups: internal organization, education, and outreach. Volunteers helped run classes and community events.

In January we participated in the Afrofuturist podcast which led to several collaborations throughout 2018 with the Afrofuturist community. Afrofuturism is the consideration of the future from a critical and minority perspective. In collaboration with professor Lonny Brooks we hosted the Minority Reports

game jam with 21 undergraduate and graduate students from Cal State East Bay.

In October, we hosted the Radical Learning Gatherings at Dynamicland, two evenings where we invited women and people-of-color educators to share personal learning experiences and inspirations and then imagine together the future of learning. Outcomes of these gatherings were then shared at the Radical Learning Community Showcase in December.

## Other locations

Dynamicland is not a portable experience, as the computer hardware is built into the ceiling of Dynamicland Oakland. Further, as a highly experimental computing platform, it is challenging to support the technology at other locations. However, one goal of 2018 was to begin moving our computing platform out of Dynamicland Oakland.

We installed the first Dynamicland satellite at UCSF's Bionanotechnology lab. We are working closely with professor Shawn Douglas to see how augmenting a biology lab can enable more spontaneous collaboration and learning between researchers and students.

We are also in discussion to augment Powderhouse Studios, a new project-based high school opening in Somerville, MA in 2019, whose values are very aligned with our own.

## Lessons Learned and Next Steps

2018 was challenging for us as we transitioned from being purely a computing research lab to doing research while also building a community around the research and hosting students and partners with their own motivations and constraints.

From doing one-day field trips with high schoolers, we learned that it was easy to engage their interest, but difficult to go deeper into building projects within that time constraint. Further, transportation in Oakland makes it difficult logistically to set up repeated engagements with a group. We did put together a two-day workshop with a group from Leadership Public School in Oakland. During this workshop we went deeper into creation at Dynamicland: first remixing existing projects, and then on the second day, building and presenting new projects in small groups. We are interested in how kids adapt to the medium when they have access over weeks and months and in the future we would like to do more workshops of this kind.

It was much easier to set up deeper engagements at the university level as students have more autonomy. We learned that having a liaison at the partner institution is essential to facilitating collaborations. For example, we presented at the Jacobs Institute for Design Innovation at UC Berkeley and hosted a tour for students specifically to call for projects at Dynamicland, but this did not lead to any engagements. Contrast this with California College for the Arts (CCA) where an undergraduate became a volunteer at Dynamicland. Through this liaison, professors were able to coordinate field trips (we hosted five from CCA in 2018), we were able to recruit playtesters as we developed our intro programming tutorial, and we were able to engage two longer-term residencies at Dynamicland. We've also developed programming with Cal State East Bay through our liaison Dr. Lonny Brooks, a professor there who is also a volunteer at Dynamicland.

Through hosting students and the public at Dynamicland, we learned that interactions involving simple, familiar objects like markers, scissors, and board game tokens are much more approachable than objects that have computing connotations. This is problematic as changing code at Dynamicland still requires typing on a keyboard. In 2019 much of our research will be focused on how to program through other modalities, for example by drawing diagrams or arranging cards.

Finally, we learned that building a community space from scratch and maintaining it is very difficult. Because of this, we will be placing more emphasis in 2019 on how Dynamicland's technology can augment existing communities of learning, for example in our partnership with UCSF. We also learned through our partners that there is significant demand to demonstrate our technology at other locations for specific events. Towards this, we recently created a "popup" for a symposium at the Computer History Museum and in 2019 we will be taking this portable system to other events.