CONTACT INFORMATION

Name: Ryan Moreno, Ph.D.

Title: Administration / Play Make Share Fab Lab Manager

Personal social media: Haven’t followed or been followed and haven’t posted anything but my personal twitter handle is @engineeringplay

ORGANIZATION

Organization Name: REM Learning Center

Organization website: http://remlearningcenter.com

Organization social media links:
http://facebook.com/remlearningcenter
@remlearningctr
https://plus.google.com/+REMLearningCenter
@playmakeshare
https://plus.google.com/106022286151057479717
Blog and/or site most related to programming, making:
http://remlearningcenter.com/playmakeshare
http://playmakesharestudio.remlc.com
@playmakeshare
https://plus.google.com/106022286151057479717

Location and identifier (rural, urban, suburban): Suburban Miami, Fla.

Is your space and/or elements of your programming mobile? Elaborate, if necessary.
Although our school has a dedicated makerspace, it is by no means the only environment where our program supports learning through making. The space simply serves as an incubator of examples, which inform teachers, families, and the greater community to the potential that playing, making, and sharing have for creating quality creative early learning experiences. In this sense a portion of our program is mobile. We are constantly engaging with our community, whether through family events, teacher trainings, conferences, community events, and Maker Faires, where we do our best to replicate the environment created within our space and its potential for inspiring learning.

Target audience(s):
Play Make Share
   Studio: Children ages 4 to 9 years old
   Fab Lab: Teachers and families

Annual Budget (Indicate if public or not public):
The space itself, excluding time from school staff for managing and facilitating, has a budget of approximately $1500 yearly. This includes craft materials ($750 - pompoms, feathers, popsicle sticks, paints and markers, hot glue, etc.), recyclables ($100 - items from recycle center charged by the pound), building materials ($300 - wood, plastics, etc.), electronic components ($150 - led lights, batteries, motors, copper tape, etc.), and Fab Lab consumables ($200 - ShopBot/CNC bit replacements, blade for craft cutter, plastics for 3D printer).

Percentage free and reduced lunch served (if known): Approximately 20%

Access: Select and elaborate, if needed. (i.e. Open to public? Age restricted?)
Access to the Play Make Share Studio and Fab Lab is limited to the school’s students (ages 4 to 9 years), families, and staff. The only exception to this is during public events or trainings.
Tell us about your organization. What distinguishes you from others?
The Play Make Share program is a part of REM Learning Center, a NAEYC-accredited school, which has over 30 years of experience providing quality early childhood education to children in Miami Dade County. Every child (ages 4 to 9 years) has access to and is engaged with the Play Make Share Studio space as part of the curriculum throughout the school year. In this way we have come to see Play Make Share Studio time as analogous to playground time for our students.

Outdoor play is essential for child development, and the equipment needed for this experience requires its own space (space to run, equipment to climb on). In the same way children need safe creative learning environments with time and space for their imaginations to run, and nontraditional equipment to construct knowledge, explore designed systems, facilitate a tinkering disposition, and provide a sense of maker empowerment.

The studio space is designed to be developmentally appropriate and with child safety in mind. A low teacher-student ratio is maintained, which allows children to have access to tools they may not be given access to at home or in a typical early childhood classroom. In addition to this, we have a fully functional School Fab Lab, where teachers and families can get exposure to some of the latest digital technologies and tools. These tools greatly reduce the barriers between imagination and aesthetically pleasing creative expression. This empowers teachers to create content for their classrooms and families to feel comfortable engaging in the creative meaningful projects.

**MAKING AND CORE VALUES**

What is your mission statement?
Our makerspace is in a continual process of learning how to best facilitate making in an early childhood setting. For this reason the mission statement is really in the name. We believe that lifelong learning happens when you Play Make and Share. We are investigating how the integration of methods such as design thinking, systems thinking, computational thinking, play, making, and tinkering within both formal and informal learning environments can be used to introduce 21st-century skills and inspire a lifelong love of learning at an early age.

Play Make Share provides a safe environment where children engage in a balance between creative PLAY and guided PLAY; are introduced to real tools that empower them to MAKE and extend play; and have opportunities to SHARE their creations and experiences, while receiving feedback (peers, family, community).
What does it mean to “make” in your space/organization?
Any act which involves the use of mind, body, and material. In Play Make Share children are empowered to construct knowledge through play, and empowered to “make” artifacts, toys, and contraptions that are meaningful to themselves and/or extends and enhances the stories which naturally evolve from their play. In this way making is any representation of their exploration of ideas that they share with others and build knowledge. Making may be a simple drawing, or a complex 3D structure of diverse materials hot glued together, with moving parts.

How does the above relate (or not relate) to your core values?
One of Play Make Share’s core values is to inspire a mindset that learning is a multidisciplinary, lifelong, enjoyable process. By making, through a variety of forms, tools, and materials, children can be empowered to change their environment and see how different disciplines come together.

What forms of making (all creative endeavors) occur?
When one walks into the Play Make Share Studio, they will see many forms of making. Students have proudly left behind some of their creations to share with others and help inspire future creations. Making can be as simple as a one-dimensional designed plan (drawn representation of what the child is planning on making); to a two-dimensional mermaid made of movable cardboard pieces and hot-glued yarn and shells; to a three-dimensional battleship created from repurposed radio and other electronic parts. Making can also take the form of programming a robot through a maze; designing a snowflake on an open source program that will later be laser cut for the child to further decorate; designing a small sculpture or trinket that will be 3D printed; or creating an abstract piece from a diversity of materials hot-glued and nailed onto a wooden board. At times making involves natural materials (wood, paper, cork), electronics (motors, batteries, LED lights, PC boards, etc.), crafts (pompoms, feathers, popsicle sticks, etc.), or a combination of all the above.

Are you influenced by any particular pedagogies (approaches to learning)?
Because we are a makerspace within a school, and our Play Make Share Program is integrated into the school’s curriculum, this question has two layers. As a makerspace we are influenced and informed by the exciting developments and latest research being done at the intersection of making and learning. Currently, the closest, more established learning approach which we are influenced by would have to be Papert’s theory of constructionism, one where, while engaged in play, children learn “by constructing knowledge through the act of making something shareable” (Martinez & Stager, 2013, p.21).
In this spirit of constructionism, our learning environment is designed to solicit playful exploration, encourage teamwork, and provide access to the use of tools and technologies that facilitate creative expression, empowering the child to extend the concepts being explored during creative play into a material form so that it can be shared with others and used to construct knowledge.


As a school, our approach to learning is and always has been a hybrid one that seeks a balance between helping each individual child gain a solid developmentally appropriate academic foundation, while inspiring a lifelong love of learning. Each child enters the school with unique perspectives and challenges. Our objective is to assist the child along their learning journey by providing a hands-on, creative, social, playful, and developmentally appropriate environment.

As a base, we use the *The Creative Curriculum for Preschool Objectives for Development & Learning* developed by Teaching Strategies. This translates the latest research in all areas of child development into a set of objectives teachers can use to make observations, take note of each individual child’s development, and track their classroom’s progress over time. When it comes to how these objectives are achieved in the classroom on a daily basis, we understand that there is no one who will know their students better than the teacher that interacts with them and their family. Therefore, we empower our teachers with materials, space, tools, training, equipment, and support. This results in a flexible learning environment tailored to amplify children’s strengths and scaffold learning through play and creative experiences that are meaningful to them.

Although children show progress across all developmental domains (language, writing, math, science, etc.), emphasis is placed more on the processes of learning (learning skill sets, understanding content in depth, experiencing learning as an enjoyable process) and creative thinking skills rather than the outcome of their work (what the final product looks like, or how they perform on assessments). We also understand that the child’s family is their first teacher. Therefore, it is important that in this transition to a more formal learning environment families are informed, engaged, and involved as we work together to develop society’s most valuable resource, children.
What are some good examples of especially powerful/ambitious/successful making experiences?
As we navigate through what making in an early childhood school setting can look like, we have found ourselves continuously trying to strike a balance between scaffolded activities and open projects. Both approaches have aspects we consider as successful/powerful making. Creating classroom furniture with the children is one example of what we would call a successful scaffolded making activity. We work alongside children (ages 4 to 9) to design and make their own chairs for the Play Make Share Studio. A crucial element is removed from the classroom (a designed system) that many of the students take for granted, “there will be something to sit on”. To make this system function again for themselves and other classmates, they need to make chairs. They first look closely at the components which make up a chair, and as a group design a chair for the space using an open source chair as the foundation.

It’s an experience with a tangible result, where children are introduced to new tools while making a contribution to a system that will be used by others on a daily basis. Experiences like this one are complemented by “Open Creation” sessions, where teachers play alongside children as they are empowered to work on personal projects. These projects can change daily or continue for an extended time, depending on the child’s goals and sense of completion. The only scaffolding done in this instance is that we ask the children to share what they would like to make and what materials and tools they would initially use to work toward their goal.

GOALS

What are the goals of the programming and experiences provided?
To solicit playful exploration, encourage teamwork, and provide access to the use of tools and technologies. To facilitate creative expression, empowering the child to extend the concepts being explored during creative play into material form. To share this with others and use it to construct knowledge.

How do your environment, tools, and materials reflect these goals?
Play Make Share provides a safe environment with a diversity of materials, where children and educators engage in a balance between creative PLAY and guided PLAY; are introduced to real tools that empower them to MAKE and expand their creative play; and are encouraged to SHARE their creations and experiences, while receiving feedback (peers, family, community).
How do you know when you've met your goals? What are your metrics of success?
One of the biggest challenges we have been grappling with is finding which methods and/or measures can be used to validly and reliably measure progress in young children’s creative thinking, problem solving, and making skills. How can we capture and communicate the learning that takes place to other educators? Although we have not yet found a satisfactory metric of success for capturing thinking and internal problem solving methods, we have begun to see a pattern in terms of making skills. When it relates to guided projects, the child’s ability to complete the project serves as one metric for measuring success. On the other hand, when it relates to open creations, success is measured by the child’s ability to come up with an idea, communicate a plan, represent their ideas through a tangible object or creative form, and then share them with others (peers and adults). Success is defined as the creator’s sense of empowerment, and satisfaction in adequately representing to others their ideas or creations.

We have also been able to measure the success of children's knowledge and use of tools as they begin to name specific tools, describe their use, and manipulate the tools more independently. At times they even show or explain to others how to correctly use the tools.

We can measure successful teamwork when children work together on a project, sharing ideas and making compromises to ensure that everyone is represented.

When children come into the space excited to “make” something new, or continue working on an extended project, we know we have been successful at inspiring a love for learning and making. When a child demonstrates a genuine smile or jumps up upon completing a creation or challenging task, we know they feel a true sense of empowerment and accomplishment.

We have seen growth in children’s sense of self, competence, and ability to share their ideas with others. We have seen an increase in the complexity of their “open creations.” Children's ability to communicate an initial concept or plan what is needed before engaging in a project has also increased.

What are your plans and hopes for the future of your space and programming?
A successful Play Make Share program would be one that achieves a few things. The first is that children have left the school with a lifelong love of what learning truly is. The second is that all of our teachers would be proficient with Fab Lab tools, creating and developing educational content, and playing alongside children who are using tools to extend their creative play. The third is that this model would serve as a catalyst and inform educators, especially those in early childhood, to bring making into their communities.
We hope to see growth and improved results over time in the following skills: fine motor (cutting, glueing, drawing), problem solving (understanding sequence and progression), communication (sharing creations with peers and adults); social skills (sharing, taking turns, collaborating); emotional competence (patience, perseverance with challenging task, empathy); creativity and design (physical representation of their mental models using tools).

**TOOLS**

**What are your most frequently used and commonly available tools?**
The hot glue gun has been the most useful, sought-after, and versatile tool for all ages. For children, using the hot glue gun is a transformative experience: pompoms, feathers, and any other material can be hot glued and transformed into anything from wings to passengers. Scissors would probably be a close second, followed by screwdrivers and hammers.

**List special tools that require supervision, training, and/or certification**
Given the age group we work with, supervision is usually required with all tools until the child has gained sufficient experience to work with it safely. The tools that children are usually capable of working with independently, within small groups of 4-to-1 ratio, are hot glue guns, hammers, screwdrivers, and scissors. The use of other tools are supervised, and used on a one-to-one ratio, such as the electric screwdriver, drill press, electric sander, and soldering iron.

The 3D printer is set up and operated by a trained adult. It is kept in the Studio for children to see the fabrication process of an object one of them has created. This is also true of the craft cutter.

The laser cutter and ShopBot are only used by adults who have been trained by the Fab Lab Manager and have shown competence by creating a project from start to finish under supervision but without assistance.

**What are the favorite tools?**
The hot glue gun has been the most useful, sought-after, and versatile tool for all ages. For children, using the hot glue guns has been a transformative experience: pompoms, feathers, and any other material can be easily hot glued and transformed into anything.

**Are there any tools that go largely unused, or that are no longer provided? Reasons?**
No.
What are some of the most popular, and frequently used materials?
The most popular and used materials are a diversity of craft materials, usually found in typical early childhood education classrooms, such as pompons, feathers, foam shapes, pipe cleaners, yarn, popsicle sticks, and all color and size paper. Markers, crayons, and paint are used to decorate most projects/creations. Some of the most popular building materials are cardboard, wood, and paper. Paper cups and coffee filters are favorites for use with the wind tubes.

What are some of your most interesting/unexpected materials?
Cardboard lids from pizza boxes. Every Friday is Pizza Day around here, so needless to say we have an abundance of leftover cardboard (the tops anyway). Since we order from Domino’s, they have fun artistic designs on one side. Here are two examples of things the children have made with some open ended laser cut outs from the pizza boxes: https://plus.google.com/106022286151057479717/posts/Bi98gANR1tR
https://plus.google.com/106022286151057479717/posts/jJGAXjVm2p

We don't use any parts that have grease, cheese, or tomato stains on them. Aside from the fire hazard, it makes it difficult for the children to color/draw on. It saves at least most of them from ending up in the garbage, and serves as a free, abundant prototyping material. We cut off the tops so they are readily available in the space. That way we avoid anyone bringing in a stained one and sticking it in there without supervision. Another advantage of this is that you have a standard size stock that will allow people to quickly layout and prototype their work.

What are the most continually reused materials? Most consumed?
The most reused materials are motors, alligator clips, and LED lights. The most consumed materials are hot glue, craft materials (pompoms, feathers, pipe cleaners, foam shapes), and cardboard.

Share any specific or general sources for materials.
We get most of the typical craft materials from Discount School Supplies. We try to get families to donate their old and broken electronics and toys for take-apart activities. Some materials, such as corks, bottle caps, and other odd items, we buy from our local recycle center or from waste we generate ourselves. Other materials like cardboard tubes are collected from local printing companies, carpet dealers, and architectural firms.
COLLABORATION

What are some of the institutions and organizations that are sources of inspiration, support, and influence?
Inspiration and Influence: MIT Media Lab (High Low Tech Lab, Lifelong Kindergarten Group, Center for Bits and Atoms), The Fab Lab at School program at Stanford’s TLT Laboratory, Harvard Project Zero’s Agency By Design, Exploratorium’s Tinkering Studio, Maker Education Initiative, Gerver Tully Brightworks School, Makeshop of Children’s Museum of Pittsburgh, The Nueva School’s Innovation Labs.

Describe any local, national, and global partnerships and collaborations.
Actively participating in the Miami Mini Maker Faire from its beginning in 2013 helped us connect and collaborate with other organizations advocating for making in the community. We have developed an ongoing partnership with the Patricia and Phillip Frost Museum of Science, collaborating on community events. We collaborated with other leading early childhood Maker Educators on the 2014 Making Possibilities Workshop by holding a workshop on Making and Young Children. We reviewed a set of Maker Ed-related ECE activities being developed for the Knock Knock Children’s Museum opening in Louisiana.

Through our participation as semi-finalists in the Ashoka and Lego Foundation’s Re-Imagine Learning Challenge, we were able to advocate for making on a global level as a potential avenue for changing the way the world learns. We also were able to make connections with the Institute for Self Active Education and FLAEYC Play Committee. This led to a collaboration with a diverse group of early childhood educators to organize a workshop where we each presented our approach to The Imagination Foundation’s Global Cardboard Challenge and how it relates to Creative Play at the 2014 FLAEYC Conference in Orlando, Florida.

SPACES AND ENVIRONMENT

In what places does making happen in your organization?
Everywhere.

How are the spaces, tools, and materials organized?
Tables have a dry-erase top for drawing, documenting, and visualizing thinking. Tables are easily movable, allowing for group discussions or stations as needed for tasks. Shelves and wind tubes are located at the perimeters of the classroom, allowing for more open and flexible space in the middle of the classroom. Extension cords are retractable from the ceiling, minimizing tripping hazards.
Pictures of children making and tinkering are represented throughout the room, cabinets, bulletin boards, and most are at eye level. Samples of children's creations are also represented throughout the space.

ALL materials are ACCESSIBLE at all times. A diversity of materials (sizes, colors, textures) is organized in bins/containers in low shelves. While some tools (hammer, screwdrivers, hot glue guns) are easily and readily available for children to use, other tools require some adult assistance (soldering iron, drill press, electric drill/screwdriver, saw).

**How large is the space(s) where making happens?**
Approximately 1000 sq. feet, if you include the Studio space and Fab Lab

**Please describe how your site and makerspace(s) are staffed, including numbers of full and part-time staff and volunteers.**
The staff in Play Make Share consist of school employees, both administrators and teachers that have dedicated their time to the program, as well as a part-time Fab Lab Manager and one to two part-time facilitators.

**First impressions of space(s):**
Ideally, when participants first enter the Play Make Share Studio, they see a colorful, inviting environment. They hear children eagerly engaged in a variety of making, and the hum of wind tubes in the background. They feel inspired by others’ creations. They experience the opportunity to freely represent their ideas through a variety of materials and tools. They leave with a sense of empowerment and personal satisfaction.

**Describe your approaches and priorities in creating environments for making/learning.**
The priorities for our space are to solicit playful exploration, encourage teamwork, and provide access to/introduce the use of tools and technologies. To facilitate creative expression, empowering the child to extend the concepts being explored during creative play into material form. To share this with others and use it to construct knowledge.

**PROGRAMMING**

**Describe the kinds of programming offered.**
In school, family events, teacher trainings, public engagement.
How did your space and programming get started?
We had been integrating what would be called S.T.E.A.M. experiences through mobile classroom projects since 2006. Projects included leading children through the construction of photo canister/antacid rockets out of toilet paper rolls and construction paper. We would discuss the phenomena and have them decorate each rocket before launch. Another activity as a simple introduction to circuits consisted of alligator clip wires, light bulbs, DC batteries, and a group activity involving M&Ms as electrons.

While participating in the G1G1 release of the XO laptop by the One Laptop Per Child organization for our kindergarten and 1st grade classroom during late 2007, we were introduced to the constructionist theory developed by Papert. At that time, we began some initial exploration of how this model could be integrated with our younger students. However, it wasn’t until after a series of "inspiring experiences," the first of which was attending the first World Maker Faire in New York in 2010 and researching the material being generated by the making in education discussion at NYSCI. Another was seeing how places like the MIT High Low Tech Lab and Exploratorium were integrating technology with materials and techniques that many teachers were already comfortable using, but which had novel properties and empowering creative outcomes (e.g., copper tape, conductive paints, and threads).

We began to slowly but eagerly incorporate some of the innovative technology embedded projects into our mobile classroom activities and teacher trainings (e.g., interactive hand puppets from greeting cards, squishy circuits, paper circuits). However, we quickly noticed that a studio-type environment would be ideal to get children fully engaged and focused in making through play. In addition a school Makerspace/Fab Lab, similar to the ones being created in high schools and hackerspaces at the time, would help expose our teachers and families to the democratization of tools that were facilitating the low barrier to entry development of quality creative content.

During the 2012–2013 school year, we began our journey through a combination of personal investment, debt, and donations. We transformed what was once a classroom, and at the time served as our school library, into the Play Make Share Studio. An adjacent storage room would now serve as the Play Make Share Fab Lab. We began using the space regularly with students during the summer of 2013. Although we found out about Maker Corps after the application deadline, the material that the Maker Education Initiative was sharing during the spring and summer of 2013 was a great source of inspiration. Other sources which informed our development also became available during this period. These included the Learning Creative Learning Course offered by the MIT Media Lab, the Fab Lab at School program being developed at Stanford, Harvard Project Zero’s Agency By Design
group and books like *Invent to Learn* by Silvia Martinez and Gary Stager, and *Design, Make, Play* by Margaret Honey and David E. Kanter.

To give back locally we helped sponsor the first Miami Mini Maker Faire in November 2013, and helped coordinate local maker leaders to apply for Maker Corps in 2014. Since then Play Make Share has been exploring and using non-conventional tools for an ECE school and classroom (screwdrivers, hammers, hot glue guns, laser cutter, CNC Mill, 3D printer). We have been empowering students, teachers, and our community by engaging them in experiences centered around creative play and hands-on making activities.

**How do you decide on/design/make possible the space and components of the program?**

When circumstances allow, we engage in weekly discussions on what took place within the space and where we see areas for improvement. During these discussions teachers are encouraged to make suggestions for content and contribute material.

**How has your environment and program evolved? What has worked well, and why? What has changed? What could still be improved?**

When we first began designing the space we kept some of the original classroom areas. Our thought was that we would create a hybrid classroom makerspace environment so that the children would feel like the space was an extension of the classroom. However we quickly realized that children began to use the materials in those areas during their creative play, rather than making things to extend their play. Once we realized this, we made a conscious decision to remove as many items as we could that were not either raw materials, tools, or creative residue (items that have been made and left behind by students and teachers). One area that we are looking to improve upon is how can the space be designed to encourage more long-term creative projects during open creation time.

**EQUITY AND ACCESSIBILITY**

**Are there segments of the population that you hope to serve better?**

Teachers from other schools and families with children of varied age range in our immediate community.

**What strategies do you employ to help increase the accessibility of your space/program to all learners?**

Maintaining a low teacher-student ratio is one strategy which allows us to remain attentive and respond to individual student needs and build upon interests. Providing an environment that is non-gender-specific and consciously seeks to reduce gender-specific ideas some children may bring with them (my dad uses that, my mom has one of those).
What has worked well? What has been the greatest challenge?
Worked well: Building interest and engagement from the children and families.
Challenges: Building teacher confidence in Fab Lab tool use and fully embracing a “maker mindset.”