

# Social changes through your own reality: A project-based learning experience

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## ABSTRACT

Área 21 is a creative lab and a methodology that aims to develop 21st-century skills while experiencing and learning new technologies in a project-based learning journey. The project is designed to students between 14 and 17 years old, who live in socially vulnerable situations, in São Paulo city. It is funded by private corporations via government agencies, inside two nonprofit social institutes, Ana Rosa Institute, and CEAP Pedreira, and provides informal education in an alternative school shift, once a week, during a whole semester. From an android app to a anti-theft device, their solutions are amazing and come from their own experience and context, facilitated by the design thinking process, maker culture and 21st-century skills.

## Keywords

Maker culture, design thinking, non-formal educational spaces, socio-emotional abilities, 21st-century skills

## 2. DESCRIPTION

### 2.1 Description of your setting

Nowadays we are living in a new manufacturing revolution, the digital fabrication, where atoms, information, bits, genetic codes, amateur networks, and experimentation-thirsty experts mingle to give way to their imagination by building almost anything through manufacturing tools digital. This phenomenon is called the fourth industrial revolution.

Digital manufacturing tools are becoming more and more accessible to everyday people. With the price of a medium smartphone, one can buy a 3D printer. It is also possible to go in any free digital manufacturing lab and use these tools to convert ideas into physical products. A new form of production that is still in the training phase and which can compete with traditional production models is becoming more potent. With this new revolution, comes an arising demand, the need to empower people to use these tools in an entertaining way and offer co-creation tools to boost their creativity. More than that, fabrication labs can be a wonderful environment for the educational process, for an education that liberates, that creates autonomous individuals (Freire, 1968, 1996).

Faced with this scenario, emerges Area 21 Project, that is a Creativity Lab where socially vulnerable teenagers, between 14 and 17 years old, live a 3 level journey. The first level of this journey is the Tutorial level, with ludic activities, in which they have their first contact with digital fabrication technologies, understanding all that is possible to be done at Area 21. In order to be a more softly welcome, they receive mission cards, each one designed to embrace a specified technique (e.g. our lab needs to connect with creativity labs around the universe, so they have to think and design a spaceship and a space launch platform to make this travel possible. This mission is focused in using Inkscape, Tinkercad with 3D modeling techniques, laser cutting, and 3D printing). To help students independently solve their missions, we have produced over 32 tutorial videos to teach the use of different techniques and digital manufacturing machines, needed to complete the missions. After 3 tutorial missions, each student has learned 3 different technologies and can move forward to the next level.

In the External Mission level, the youngsters learn various techniques of creativity and problem-solving. It is when students are able to face a real-world problem from their community. At this point of the journey, they have worked with a variety of tools and can now use these repertoires to create, as a group, a solution to a giving question concerning their community or society. This year the theme brought by us was “hate speech”, so they have to come up with a solution using their new repertoire and with new creativity techniques learned through this process (e.g. brainstorm and other design thinking techniques).

After that, comes the last level of Area 21's journey, the Final Mission Level, that is our focus in this submission. We present students with the Millenium Development Goals established by the United Nations and other broader themes that are in highlight during the process. Now they have to, based on the themes, determine their group's driving challenge question, which will lead their work for the next 6 classes in a more independent and free level. Also, students work on a design thinking process to refine their questions, came up to solutions, to a hands-on maker culture construction of a better-established prototype, culminating in the "Mostra Área 21" exhibit, an event in which they show their projects to specialists and to their families and community.

Area 21 Project exists in Ana Rosa Social Institute, a place that works in an alternative school shift and attends children and teenagers between 0 and 17 years old in social vulnerability according to IVPS (São Paulo Index of Social Vulnerability). Ana Rosa

Institute is divided among three centers, Center of Childhood Education (CEI), Center for Children and Teenagers (CCA) and Center for Youth (CJ), Area 21 Project attend young of CJ, between 14 and 17 years old.

The learners of Area 21 are us (Educators) and especially the young from CJ since we understand that Area 21 is a journey built together. The young ones that participate with us are socially underprivileged, mostly living in slums and peripheral communities. All of them receives government aid and studies in public schools all around a South São Paulo region, called Butantã. Most of them are black, some from the LGBTQIA+ community, boys and girls who suffer all kinds of prejudice and hate speech in their daily lives.

To know more about Área 21 Project, check out what the young who participated in the journey has to say: <https://www.youtube.com/watch?v=80A-NwvklIs&t=2s>.

Wanna know who inspires us in our educational quest? Just listen to a little bit of what Paulo Freire has to say: [https://www.youtube.com/watch?time\\_continue=136&v=aFWjnkFypFA](https://www.youtube.com/watch?time_continue=136&v=aFWjnkFypFA).

Interested in the Project-Based Learning process? Check this briefing about it: <https://www.youtube.com/watch?v=LMCZvGesRz8>.

## 2.2 Description of the educational experience

The Area 21 journey, that we participate much proudly, is an amazing travel through education, freedom of speech, visibility, maker culture, love, and respect. We have 3 major guides on this journey, ABILITIES THAT WE CULTIVATE (Creativity; Communication; Collaboration and Cooperation; Critical Thinking and Self-efficacy), MAKER CULTURE (Learning; Supporting; Sharing; Having fun; Doing; Changing; Making mistakes and Participating) and TECHNICAL SKILLS (Programming and Arduino, Vectorial Drawing, Lasercutting, Vinyl Cutting, Flat Press, 3D Printing and Modeling, Photo, Video and Virtual Reality).

Our focus now is to share our experience with the young in their Final Mission. As described above, they pass through 6 class experiencing design thinking process (Images 1 and 2) to deal with problems of their daily lives, something that bothers them or even personal issues like homosexuality, racism, police oppression, political questions and other topics that come up in their minds and repertoire.

During this process, they generate a challenge question, that consists of an action to solve the problem, the problem itself and the audience that they want to achieve (e.g. How we can fight back police oppression in young black people from peripheral communities? In this case, fight back is the action, police oppression the problem and young black people from peripheral communities the audience). After that, they use design thinking techniques to generate their solution to the challenge question they made. Their solutions can be, for instance, an app to map and register the police oppression they suffer or a board game to generate critical thinking in early childhood. Their solutions are amazing, well-settled prototypes and have great potential to become real products or services.

To end their journey, they show their projects in an Exhibit called “Mostra Área 21”, where specialists from different areas help and give feedback to their work.

The Final Mission is the true representation of the young who participate in this journey, they create and deal with every problem and situation that appears in this level, from deal with a failure in the construction of the product, to choose what are the best slides to present in the Exhibit. This level is a picture of “why we do this?”, it’s a glimpse of what these young suffer in their lives, of what bothers them and of what they want to change in the world, in their world. It’s all constructed by them, we only facilitate their process. In the end, we have the result of what a little bit of opportunity, creativity, and access to technology can do.

**Images 1 and 2. Young learners experiencing brainstorm, a design thinking process technique (Image 2). Organized ideas in the of brainstorm (Image 3).**



### 3. CONCLUSION

#### 3.1 Results

Besides our perspective in this Final Mission Level, we accessed what were the young thoughts about the whole journey, via a technique called Madlib, that consists of a guided letter that the young ones fill with their opinions about the journey, good points and bad points, and what were their challenges. We have a overview of these answers (Image 3), basically, we turn a qualitative questionnaire and turned into quantitative data, by counting how many times they cited attributes and feelings that we want to achieve with the journey.

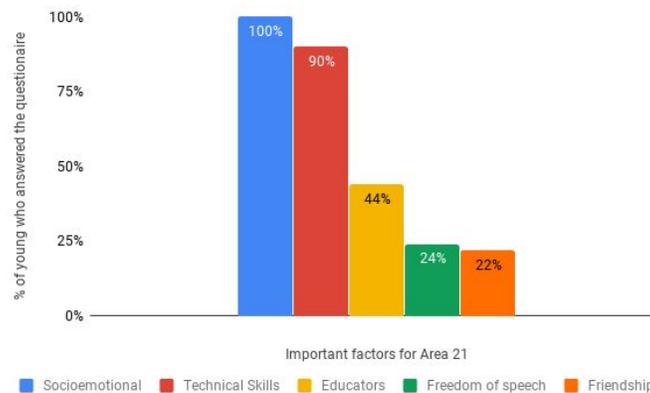
Beyond graphs and numbers, our experience as educators was amazing. We lived a truly mutual learning experience, every project of each one of the groups required a different technique, a different perspective, and a different approach to deal with the young thoughts, references and life experiences.

We had a illiterate young this semester, for example, who lived the whole process. He worked on the streets and had a different view for the social problem that his group wanted to attend. So, by his way, he contributed to the project, by drawing, creating, having insights and sharing them with his groups. It's a different way to learn, to think about problems that young can have a totally different perspective. And how to deal with these different perspectives at once? We really don't know, but we know that giving space, freedom of speech and thoughts, opportunities and conditions these underprivileged youngsters can really change the world.

Despite all the good experience that we had, there are some questions to talk about and change in the journey for the next year. For example, now it's only a one-semester experience, in 2019 we'll make a year experience with Area 21. Probably we'll enlarge the Final Mission experience, giving the young opportunities to learn how to write a formal project, to structure a better prototype and to show their ideas and inventions in science fairs or companies who can invest in their projects.

In all this experience that we had, a lot of projects have a great potential to become real products or services, for example, the police oppression app mentioned above, a board game to bring critical thinking to childhood, a toy art to facilitate the communication between parents and sons, classrooms or even workplace. We also had a game, called Unity, about feminism and genre identity, that was prospected by a game producer company here in Brazil, we are accompanying to see what happen next with the youngsters who produced the game, but still, what happens after Area 21 is a challenge for us.

**Image 3. Important factors for Area 21 success. 100% of young who answered our Madlib experienced at least one socioemotional skill, 90% learned at least one technical skill, 44% highlighted the importance of the educators, 24% felt the liberty to talk and share ideas and 22% said that is a good place to make new friends**



#### 3.2 Broader Value

With this experience as educators in a new project involving digital fabrication lab and constructivist educational approaches, we can share an amazing journey with the FabLearn community. First, by understanding how to learn and build together with the young ones, then how to adapt projects and learning process taking into account the learner references, life experience, and reality. By doing this, we can empower and take the best of each young who adventures through this journey.

We often met young ones with low self-esteem and discredited in their own capacity and ideas. An important lesson to leave here for FabLearn community is to not give up on anyone, every mind, every thought, and every young learner has an incredible potential to change the world around him, we only have to make them believe.

A digital fabrication environment is a rich place to develop a liberating education, that can build an autonomous individual. We only have to give a opportunity for those who didn't have and continue to bring amazing people to work towards this objective.

**Image 4. Youngers having fun building together**



### **3.3 Relevance to Theme**

The young ones who lived the Area 21 journey, especially Final Mission Level, face an everyday social challenge in their lives, so Maker Education can give them a whole new perspective to change their own reality.

## **4. BIOS**

**Fernando Puertas** - Biologist, Master in Ecology and educator for ten years, has interest for non formal spaces of education, innovation and technologies. Nowadays works as an creativity educator in Area 21 Project in Ana Rosa Social Institute in São Paulo, Brazil. Fernando will present the project in poster session.

**Edison Cabeza** - Product Designer and Master in Design. Has interests in: culture creator, DIY, Open Design, free design, innovation, codesign and digital manufacturing. Activist for autonomous fabrication, design for everyone, maker culture and free design. Is a creativity educator in Area 21 Project,, training young people in 21st century skills, creativity, creative culture and digital manufacturing technologies.

**Eduardo Lobo** - creative educator, innovation consultant and producer of artistic experiences. Graduated in Design from the State University of Pará - UEPA and Post Graduate in Strategic Design by the European Institute of Design - IED São Paulo.

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