LAPASSION Manaus

An innovative educational project for Amazon sustainability

ORGANIZED BY

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Editora Poisson

LATIN AMERICA PRACTICES AND SOFT SKILLS FOR LAPASSION
AN INNOVATION ORIENTED NETWORK
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Dedicatory

Daniel da Silva Nogueira, in memoriam

March 2020 was coming and I was concerned about how foreign students would integrate with the Campus. The English language is still difficult to be overcome in federal institutes that work with international projects. It was then that Daniel appeared, smiling as always, solicitous as usual, saying that it would be a pleasure to work on the project as institutional support for students. Daniel loved music and, because of that, improved his English with almost native pronunciation.

On the first day, he introduced the Campus to students and all sectors that they would need to use. This was Daniel, always willing to do his best, no matter what task they had given him. And he did it with joy. I often saw him with the guitar at Campus events. Daniel was loved by everyone, colleagues and students. Unfortunately, Daniel was another victim of the COVID-19 pandemic and died in January 2021. We dedicate this book to his memory, and in his name, to all colleagues at IFAM who also left for the same reason. Daniel is part of this history and will always be in our memory.

Dr. José Pinheiro de Queiroz Neto

Coordinator of LAPASSION Manaus Project

Instituto Federal de Amazonas (IFAM) / Brazil

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To the students and teachers who participated in the project LAPASSION@Manaus, despite all the difficulties we encountered on the journey.

To the Instituto Federal do Amazonas (IFAM), in the person of the Ex-Rector Antônio Venâncio Castelo Branco (in memorian) and to the Campus Manaus Distrito Industrial (CMDI), in the person of the Director Nivaldo Rodrigues, for receiving the project and giving all the conditions for its success.

To Dr. Carlos Ramos, general coordinator of LAPASSION, who gave the Instituto Federal do Amazonas the opportunity to participate in this important international project.

To the partners of LAPASSION@Manaus edition, who were indispensable in its execution: Instituto Politécnico do Porto (IPP), Tampere University of Applied Science (TAMK), Pontificia Universidad Católica de Chile (PUCC), Instituto Profesional de la Fundación DUOC, Instituto Federal do Maranhão (IFMA), Instituto Federal do Pará (IFPA), Instituto Federal do Amapá (IFAP), Fundação Amazônia Sustentável (FAS), Transire Eletrônicos, Caloi Norte S/A, e Secretaria de Estado do Meio Ambiente (SEMA).

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We would like to thank the European Union's Erasmus+ Programme and the Capacity Building Initiative for Higher Education Institutions managed through the Educational, Audiovisual and Culture Executive Agency (EACEA) for the financial support of the LAPASSION project - Latin America Practices and Soft Skills for an Innovation Oriented Network (project with reference 585687-EPP-1-2017-1-PT-EPPKA2-CBHE-JP and agreement number 2017-3074/001-001).

And, finally, to all those who directly or indirectly contributed to the elaboration of this book. Our sincere thanks.

Preface

I am a person who was born in Brazil, in São Paulo, but went to Portugal very young, in 1978 at the age of 14, where I did my final studies in non-higher education, then the University and after that, a whole professional career in Higher Education since 1986, until I became Vice-President of the Polytechnic Institute of Porto (IPP) between 2010 and 2018. However, our best training is the one we obtained in our first years of life, and in that sense, I owe a lot to the Public Elementary School of Brazil. Being responsible for the Research and Innovation areas and, above all, for the Internationalization area of the IPP, made me feel that this would be an excellent opportunity to return part of everything that Brazil had given me. Thus, during the last decade, I have articulated a very strong relationship with the Federal Institutes of Brazil, this public capillary network that enters deep in Brazil, a network that has transformed Brazil.

The Amazon is a miracle of nature, something unique and huge, and the Federal Institute of Amazonas (IFAM) has been able to turn this huge Amazon into something fairer and closer to the heart. I visited Amazonas in 2015, invited by Rector Antônio Venâncio Castelo Branco, an excellent person who left us in the beginning of 2021 victim of a pandemic that was particularly unfair and severe for Amazonas. I wanted to recognize the importance of Brazil to me with something challenging, modifying, and after Rector Venâncio showed how the lives of people were being transformed, I understood that IFAM should have to be part of this big project. The opportunity came in 2017, when a call came up from projects in the program Capacity Building for Higher Education from the European Erasmus+ Programme. Together, with partners from Portugal, Spain, Finland, Chile and Uruguay we involved 5 Federal Institutes from Brazil, one from each region, with IFAM representing the North region of Brazil. CONIF, the council of all Federal Institutes network was involved as well. José Pinheiro Queiroz Neto was, at that time, Pro-Rector of IFAM, with the areas very close to mine, and he was the person who coordinated all the involvement of IFAM in the application for the Project. This is how the Project LAPASSION (Latin-America Practices and Soft Skills for an

Innovation Oriented Network) came out, a dream of 15 institutions, including IFAM.

LAPASSION consortium has as motivation to create a unique solution to address different problems affecting youth in Higher Education Institutions (HEI), helping students to obtain a better training in terms of innovation, soft skills, and internationalization. This solution was achieved by LAPASSION MP/I (Multidisciplinary Projects/Internships) for students' teams to help them to co-create, and co-develop projects proposed by enterprises and other organizations, or to accelerate innovative ideas in an international context, involving students from several countries. MP/I are implemented by means of teams involving students with different backgrounds, different graduation levels, and from different countries, in order to solve challenges posed by enterprises and organizations. Around 1 million euros was allocated to LAPASSION consortium, namely, to support the mobility of students and professors. I am very proud to coordinate LAPASSION and to contribute to reduce a little bit the debt I have with Brazil.

In 2018 and 2019 we organized 4 editions of LAPASSION projects, one in Chile, one in Uruguay and two in Brazil (Uberaba – Minas Gerais, and São Luís - Maranhão). These projects designed to involve from 24 to 40 students in 4 to 6 teams during 10 presential weeks were so important to tune the methods and practices. But LAPASSION was conceived to be an onsite experience at all.

In 2020 4 editions of LAPASSION were expected, two of them started at the beginning of March, in Manaus and Goiania. LAPASSION@Manaus had started with the general challenge of Social-Environmental technologies for the Amazon Sustainability, with 31 students, including 2 from Polytechnic of Porto IPP - Portugal, 2 from Tampere University of Applied Sciences – TAMK - Finland, 2 from Duoc-UC Chile, 2 from Pontificia Catholic University of Chile, and several from Federal Institutes of Brazil (19 from Amazonas IFAM, 2 from Maranhão IFMA, 1 from Pará IFPA, and 2 from Amapá IFAP). Six students' multidisciplinary teams started to work in the challenges for 10 weeks.

However, in addition to the challenge of finding solutions for the Sustainability of the Amazon, all project participants, Teachers and Students, had

to deal with an additional unexpected challenge. The worldwide covid-19 pandemic took place in Brazil as well, and in the third week of the project LAPASSION@Manaus was converted into an online project. I said that LAPASSION had been designed to be a face-to-face experience, I also referred the miracle the Amazon was, and we can say that to develop LAPASSION@Manaus to the end, in the tenth week, in this emergency situation, having arrived there with projects with the same level of quality as the previous editions of LAPASSION was a real miracle, but a miracle only possible due to the excellent work of the students and the IFAM Teachers and Staff who supported them during all the time. Everyone involved deserves to be congratulated for this success.

We usually say that LAPASSION follows a PBL model, but not a Problem-based Learning or Project-based Learning, but a Passion-based Learning. The students' passion for their projects is the secret to the success of LAPASSION. I do not remember watching any LAPASSION Demo Day, the day of the final presentations of the solutions to the challenges, without the tears of students and teachers. Tears that are a mixture of sadness for the end of a unique and impactful experience for each one, but also of joy for the new friendships that were made, for the world that was discovered and became closer, for the success and pride in the solutions found.

This book is a testimony of what LAPASSION@Manaus was, that breath-taking experience that transformed the lives of many students and teachers and that will certainly have a huge impact on the future of education at the Federal Institute of Amazonas and the other Federal Institutes of Brazil. Thank you all for making this possible and for sharing the experience in this excellent book.

Dr. Carlos Ramos
General Coordinator of LAPASSION Project
Instituto Politécnico do Porto / Portugal

Prologue

Research from academia, in general, should benefit society and for this to occur, technology transfer must take place. Within the scope of the Brazilian Institutes of Science and Technology (ICT), this transfer function is the responsibility of the Technological Innovation Nucleus - NIT. This sector has as one of its competencies the management of the transfer of technology, however, it is necessary to establish management tools that allow the transfer of technology to happen. In this sense, the present study proposed Technology Transfer (TT) processes within the scope of IFAM, to have a systematic view of the process, thus improving the interaction of NIT with researchers and the productive sector. To elaborate the process, a bibliographical review related to the research topic was carried out, interviews with IFAM employees, a survey of TT processes with NIT coordinators, and the National Institutes Innovation Pole at a national level. From the information collected, technology transfer processes were proposed through Licensing, Assignment of industrial property rights, Non-patented and non-patentable TT or know-how, to contribute to the development of technology transfer strategies. within the scope of IFAM.

Having worked over twenty years at Tampere University of Applied Sciences (TAMK) in Finland, I have come to few conclusions of how educational institutions, at all levels, could play an important and significant role in this change in the world of work.

First of all, we must understand that learning as such is an important skill to be trained. It is important now and even more important in the future. We will be married to a technology revolution, where algorithms are our closest colleagues and supporters. At the same time, creativity and a creative mind will be valued highly. As the world of work around us is constantly reshaped, we must have a mindset of a continuous learner. As educators, we are responsible in every possible way fostering our students learning capacity. In this book, we will enlighten through the example of Lapassion Manaus, how learning can become an innovative and emotional moment for both students and coaches.

As learning itself being the skill for the future, I also speak for active learning instead of passive learning. With passive learning, I refer to the traditional "following the lectures and taking the exams" -way. Instead, I have throughout my career developed and supported methods, where students being active participants play the main role and where the teacher gets more guiding and coaching role. Memorizing is not playing the main role. There are many ways to organize possibilities for active learning. In Lapassion projects, we aimed at creativity and team learning in an international context. In these projects, we were looking for different kinds of solutions. There were no right answers, only different suggestions as solutions.

Perhaps the most significant joy of my career has to do with the development of the teacher's role during these years. It has adopted more and more the role of the coach. One of the most important roles of the coach is to create challenging learning moments for the students. That includes systematic reflection and feedback both ways. A good coach also knows how to excavate the best out of the students. It is also important to bush the students towards the unknown and new. This holistic role is, to my mind, the answer for creating and organizing better learning for the new world of work. In the Lapassion project coaches were trained before every challenge. Becoming a good coach is a long process but every small step is important. In general training teachers and coaches in their pedagogical skills is relevant and crucial for all educational institutions.

Traveling around with the Lapassion project has proved to me again one thing: the students all over the world are amazing. They are creative if we just let them. They take responsibility if we just let them. They are our Future.

Dr. Carita Prokki
Director, Continuous Education
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Finland

SUMÁRIO

CHAPTER

01 The LAPASSION@Manaus Project

José Pinheiro de Queiroz-Neto[1]
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1.1 THE LAPASSION PROJECT

According to the World Economic Forum (FORUM, 2018), the ten main skills for work-life in 2022 are:

- Analytical thinking and innovation;
- Active learning and learning strategies;
- Creativity, originality, and initiative;
- Technology design and programming;
- Critical thinking and analysis;
- Complex problem-solving;
- Leadership and social influence;
- Emotional intelligence;
- Reasoning, problem-solving, and ideation;
- Systems analysis and evaluation.

So, it is possible to observe that at least seven of these ten skills are typically soft skills. It just confirms that we need to improve our vocational education to an integral human formation (MEDRADANDA & PALACIOS, 2019).

In 2018, The Instituto Federal de Educação do Amazonas (IFAM) started a partnership with some European, Latin American and Brazilian institutions in a project called "Latin America Practices and Soft Skills for an Innovation Oriented Network (LAPASSION)", under the International Cooperation Agreement 585687-EPP-2017-1-PTEPPKA2-CBHE-JP. The sponsor was the European Union's Erasmus Plus Program. The LAPASSION Project is coordinated by Instituto Politécnico do Porto - IPP, and has as participants a Finnish institution (Tampere University of Applied Science - TAMK), two Spanish institutions (Universidad de Vigo, Universidad de Salamanca), two Chilean institutions (Pontificia Universidad Católica de Chile - PUCC, Instituto Profesional de la Fundación DUOC), two Uruguayan institutions (Universidad de la República Uruguay UDELAR, Universidad Tecnológica del Uruguay - UTEC) and five Brazilian institutions (Institutos Federais do Amazonas - IFAM, do Maranhão - IFMA, de Goiás - IFG, do Triângulo Mineiro - IFTM and Sul-Riograndense - IFsul).

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The LAPASSION provides an international exchange of higher education students, mentored by teachers and partnerships with companies or institutions, called counterparts. The students worked on projects using modern methodologies. Students form working groups from different courses and countries to work for ten weeks and present a solution to a challenge proposed by the counterpart, considering a previously defined theme.

The project is based on a student-centered learning process, where the students act autonomously. The collaborative work in multidisciplinary, multicultural, and multilingual teams created the ideal environment to develop soft skills, like leadership, communication, conflict resolution, empathy, ethics, flexibility, and management teams.

In a brief explanation, LAPASSION is an exchange project, where students meet on 10-week missions to develop soft skills in innovation projects involving partnerships with companies. The missions took place in Latin American partners, and the students moved to a city where they carried out the mission, financed by the project to purchase tickets, accommodation, and food. European partners supported and formed teams from Latin America, which in turn carried out the missions.

The first mission was in Santiago/CL in 2018, where all the planned stages were executed and refined as a model for the other missions. After that, in 2019, we had missions in São Luiz/BR, Uberaba/BR and Montevideo/UG. In the last year, 2020, the missions were in Manaus/BR and Goiânia/BR. The mission in Pelotas/BR was planned to occur in 2020, but due to the pandemic of COVID19, it was suspended.

LAPASSION@Manaus ran from March 2 to May 8, 2010. Considering that Manaus is in the middle of the Amazon Forest, the IFAM team decided to work as the main theme

“Social and Environmental Technologies for the Sustainability of the Amazon.” Then, we invited local institutions and companies to participate as a counterpart, to provide open real-world problems. After some meetings involving our team and the counterparts, we defined challenges for the student teams, according to the central theme of LAPASSION@Manaus and the counterparts' areas of activity, as shown in Table 1.1.

Table 1.1 – Counterparts and challenges.

Counterpart	Team’ challenge
Caloi Norte S/A	Sustainable Bike
Transire Eletrônicos	Low-cost methods in drinking water generation
Eletrocompany (*)	Reuse of electronic devices
Campus Distrito Industrial / IFAM	Efficient environmental management to public institutions
Secretaria de Estado do Meio Ambiente (SEMA)	Insertion of sustainable, productive chains of conservation units in the market
Fundação Amazônia Sustentável (FAS)	Sharing knowledge tool in the schools of the conservation units

(*) Fictitious name. The company didn't authorize the use of name and image.
Source: The authors.

The LAPASSION@Manaus was planned to take place in 10-week classroom activities that involved students from different academic programs, countries, languages, and cultures. However, due to the SARS COV2 pandemic, the last seven weeks of the project were carried out remotely and online. The students were divided into teams, and the teachers acted as coaches.

The student group was formed by 32 students approved for the LAPASSION@Manaus, including foreign, Brazilian, and local (Manaus) students. The diversity of students is both a great challenge and a great opportunity. The main characteristics of the student group are 24 students from Brazil, where 19 students from Manaus(IFAM), two students from Maranhão (IFMA), two students from Amapá (IFPA), one student from Pará (IFPA). Eight international students: 2 students from Finland (TAMK), two students from Portugal (IPP), four students from Chile (2 from DUOC and two from PUC).

Study area: Advertising, Biological Science, Bio-resource Engineering, Computer Engineering, and Medical Instrumentation, Control and Automation Engineering, Design, Design and Innovation Engineering, Electric Engineering, Environment, Industrial Design, Languages, Logistics, Math, Mechanical Engineering, Media and Arts, Nursing, Pedagogy, Software Engineering, Tourism, and Hospitality. Students at the Bachelors and Postgraduate level. Several students are from a technological institution.

The student group was divided into six teams, with each team having at least two or three foreign or Brazilian students and three or four local students (from Manaus). The teams were composed of students from different areas to ensure the multidisciplinary nature of the project.

Seventeen people formed the LAPASSION@Manaus team: three as a coordination board, two as support, and twelve as a coach (two coaches by student team). One of the coaches was a student who participated in the first mission in LAPASSION@Santiago.

1.2. THE PEDAGOGICAL METHODOLOGY.

The LAPASSION project needed dynamism to develop the student's Soft Skills. Simultaneously, it needed focus to obtain in ten weeks the solutions to challenges presented by partnerships with companies and institutions. The main project's goal was to offer a multidisciplinary activity experience to students, where they worked and developed soft skills through a systemic vision for solving real problems. We used Project Based Learning (PBL) concepts, a pedagogical way to develop Soft Skills, and Design Thinking (DT), a successful method to think and develop innovative solutions in an organized and concrete way.

The PBL emerged in 1900 when John Dewey (1859 - 1952) proved that it is possible to “learn by doing” when students are stimulated to think and solve problems through projects and develop themselves physically, emotionally, and intellectually (MASSON et al., 2012). According to Bender (2012), the PBL allows students to work cooperatively to seek solutions to real problems, increasing their involvement in applying their knowledge in meaningful learning. Queiroz-Neto et al. (2015, p. 5) present a proposal of steps for applying the PBL, which we use as steps in LAPASSION@Manaus.

The PBL also defined the concept of mentoring (or coach) used in the project in a student-centered-learning way, considering their acting with autonomy and protagonism in the project. From PBL, we applied the weekly formative evaluations. The groups presented the partial project's evolution and the presentation of the final results, both of them aligned with DT.

Integrated to PBL, The DT assists in structuring the project, organizing the execution of the phase, using research and data analysis techniques to support new ideas with a focus on innovation, and using techniques for testing and validating the results. According to Vianna (et al. 2012), the DT is divided into the ideation, immersion,

and prototyping steps, generating results that feed the next step and lead to the challenge's solution.

The immersion step aims to delimit and deepen the study of proposed problems and the questions that guide it and define the profile of the target public involved. It is still a step that is divided into preliminary and profound immersion. The preliminary immersion is used to map the target audience's initial needs and determine the scope of the problem and, consequently, the scope of the project. In the immersion, there is a deepening of people involved in the problem and its effects. Therefore, interviews, observations, and conversation circles are techniques used in this step. After that, the data are organized, clustered, and combined in a sub-step called analysis and synthesis that guide the creative process of the ideation step.

The ideation step directs the DT creative process. In this step, using the data analysis and synthesis results from the immersion step, the student's team looks for solutions developed to attend to the central problem. The initial solutions can be improved and combined to generate new solutions. In the end, a unique solution is chosen based on a selection using defined criteria and, then, goes to the next step.

The prototyping step is helpful to test quickly, even using simulation or alternative materials. This step maps possible errors and analyses the results as the target audience expectative, as closely as possible with actual conditions. So, it is possible to have feedback for adjustments, research a little bit more, or even adjust the project focus.

The ten weeks of the LAPASSION@Manaus were structured as in the DT steps and PBL concepts. Each student's team received a real-world challenge from partner companies. Using their knowledge, experiences, and cultural diversity, the students could develop innovative and valuable solutions.

When LAPASSION@Manaus started, it was necessary for initial training in the methodologies that happened before the student’s project missions started. The PBL was a well-known methodology for some teachers, but not the DT. Then, we did a two-day workshop to level the concepts, the same understanding, and provide some practical experience.

The first part of PBL training was done by Dr. José Pinheiro Neto, researcher, and PBL specialist, who presented the main concepts and success cases and use of PBL in the LAPASSION@Manaus context. The second part emphasized the mentoring (or coach) necessary for the success of DT/PBL and unusual for teachers involved with Lapassion@Manaus. This part was given by Dr. Tiina Koskiranta, from the University of Applied Science in Tampere (TAMK) of Finland, a partner institution of the LAPASSION project. The DT training was worked in two moments: training to mentors (teachers) and training to students. The training was essential because teachers and students didn’t know or had contact with DT methodology.

The teachers participated in DT training before starting student mentoring. They learned about principles and DT steps. At the end of the training, they experienced developing a small actual project using the DT method. When they went through developing solutions to problems with the same theme as the project that would act as mentors, they realized the most complex points of the process. They were able when mentoring, to better understand the students' doubts.

In the first week of the mission, when the students arrive, after guidelines and presentation of objectives, schedule, and activities project, we start a DT training. Professor Sarah Marcela explained the DT methodology to be used in the project. For

three days, the students studied about DT steps and the results they were supposed to present according to the ten-week schedule for LAPASSION@Manaus.

As you will see throughout this book, The PBL/DT methodology has shown to be a powerful way of engaging students to develop soft skills and problem-solving thinking creatively and innovatively. Also, these methods allow student-centered learning that puts them responsible for their learning, leading them to reflect on their actions and results.

1.3. PROJECT MANAGEMENT.

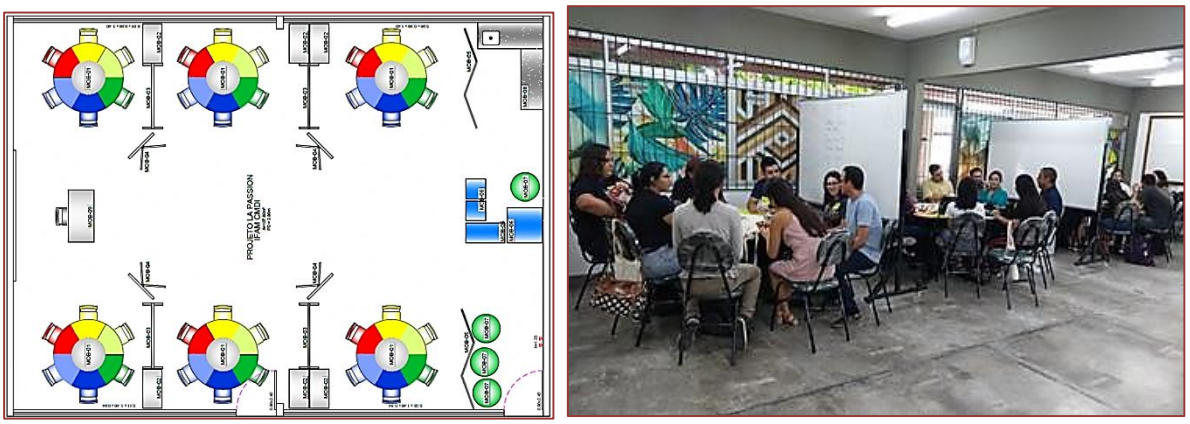
A local management committee was created to support the accomplishment of the actions proposed by the Main Organization Committee of LAPASSION project. The local committee was organized into two workgroups with well-defined attributions. The members of the first workgroup formed the "local coordination," composed of four IFAM teachers and two invited teachers that were responsible for, among other things, providing support to the students, managing the project quality, producing news for publicity, and populating the Manaus LaPassion website. One of the invited teachers was responsible for providing Design Thinking training and coaching. The other invited teacher was responsible for providing services of Portuguese-English translations to support internal and external communication.

The second workgroup was composed of ten teachers, including two teachers of the local coordination. These teachers worked in pairs and were responsible for providing technical guidance in the most diverse areas, such as Control and Automation Engineering, Forestry and Environmental Engineering, Technologies in Advertising Production, Biology, Veterinary Medicine, Computing, and Administration.

The local coordination had the mission of designing and implementing at IFAM campus a workspace that was capable of providing a collaborative learning environment for the development of the project activities. This workspace was proposed to stimulate creativity and ensure the well-being of the students. The inspiration for the workspace layout came from the FabLabs and Makerspaces spread around the world. Specifically, the concepts applied to the construction of the LAPASSION@Manaus workspace were based on YKampus (TAMK), Porto Design Factory (IPP), and Innovation Factory (IFMA). Thus, it was possible to deliver the "Lapassion StudioSpace," an exclusive space at the IFAM campus to build and share knowledge.

The Lapassion StudioSpace was composed of mobile and flexible furniture. The space was furnished with tables, whiteboards, and cabinets that could be easily rolled aside, nested, and stored. In this way, the students could work individually and as a team. Simultaneously, that space could be transformed into an auditorium to hold classes and lectures in a few seconds. Besides, a small space was included in the Lapassion studio space to be a decompression environment. In that space, some ottomans could be used by students to relax and some appliances, such as a fridge, coffee machine, and microwave, to make quick meals. Figure 1.1 shows the project and the built workspace.

Figure 1.1. LAPASSION@Manaus workspace.



Source: The authors.

The LAPASSION@Manaus project was planned to be completed within ten weeks. Each week had a specific theme that was aligned to the phases of Design Thinking methodology. Thus, the weeks were organized in the following way: 1st and 2nd weeks - “Immersion”; 3rd week - “Analysis and Synthesis”; 4th, 5th and 6th weeks: “Ideation”; 7th, 8th, 9th and 10th weeks: “Prototyping and Validation”. Figure 1.2 shows the first week's schedule as an example of the organization.

Figura 1.2. first week's schedule – LAPASSION@Manaus.

<table>
<tr><td></td><td colspan="7">01 WEEK - IMERSION (march)</td></tr>
<tr><td></td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>08:00</td><td rowspan="4">Reception and Institutes presentation</td><td colspan="3" rowspan="4">Design Thinking workshop</td><td rowspan="4">Immersion in the Amazon Forest - Tumbira´s reserve</td><td rowspan="4">Immersion in the Amazon Forest - Tumbira´s reserve</td><td rowspan="4">free day</td></tr>
<tr><td>09:00</td></tr>
<tr><td>10:00</td></tr>
<tr><td>11:00</td></tr>
<tr><td>12:00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>13:00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>14:00</td><td rowspan="3">Schedule , tutors and challenges presentation. Teams division</td><td rowspan="4">get-to-know-each-other dynamic</td><td rowspan="4">Team time.</td><td rowspan="4">Lecture on Manaus, its geography, history and environmental policies.</td><td rowspan="4">Immersion in the Amazon Forest - Tumbira´s reserve</td><td rowspan="4">free time</td><td rowspan="4">free day</td></tr>
<tr><td>15:00</td></tr>
<tr><td>16:00</td></tr>
<tr><td>17:00</td><td rowspan="2">Lecture: overall perspective on the challenges.</td></tr>
<tr><td>18:00</td></tr>
</table>

Source: The authors.

In the first week, there was an official presentation of the students, counterparts, schedule, team composition, challenges, and teachers (tutors/coaches). The students attended a workshop about the Design Thinking methodology. Besides, teachers and students had the opportunity of doing immersion in the Amazon Forest. More specifically, they visited Tumbira's community, where they could experience the Amazon reality and some of the challenges faced by its population.

The second week was dedicated to the students going deeper in understanding their challenges, performing research, and data collection. In the third week, the focus was on the specification of the solution requirements. From the fourth to sixth week, the

teams worked on developing the solutions. In the last four weeks, the students were engaged in the prototyping, tests, and validation of the proposed solutions.

All the project's stages were planned to be carried out with face-to-face interaction. During the first three weeks, the LAPASSION workspace was widely used by the students and their coaches. The last seven weeks of the project were developed in a remote and online way due to the pandemic SARS COV2. A strategy used to perform a continuous follow-up of the work developed by the teams was to demand from them, every week, a 3-minute pitch showing the evolution of their projects, followed by questions and contributions from the other teams and coaches.

Another strategy used to follow the evolution of the team's work was to require each team to create a blog and publish it on the Internet. These blogs were filled weekly with posts that gave a detailed description of the activities performed by them. Each blog had to provide information about the team, its challenge, the partner institution, and the work's progress. All the produced blogs were made available on the LAPASSION@Manaus website.

After ten weeks of hard work, the teams had the mission of presenting the whole process of learning and acknowledgment construction developed during the project. Specifically, the teams had to perform two formal presentations. These presentations took place online using a popular web conference system. The first presentation was aimed at the partner institutions. The second and last presentation was called "DemoDay." The results were shared with the community, including the people who contributed to the successful execution of the project.

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CHAPTER

02 Team 1: Sustainable Bike

Matheus Ben-Hur Ramirez Sapucaia [4]

Vitor Martins Nogueira [5]

Team 1 received the challenge "Sustainable Bicycles" from a bicycle company called Caloi Norte S/A, intending to turn bicycles into more environmentally sustainable products. The group was formed by three students from Brazil, one from Portugal, and one from Chile with different areas of knowledge who met daily to find the best solution to the challenge. Students used innovative teaching methodologies and problem-solving during the project, such as Project-Based Learning (PBL) and Design Thinking (DT), to solve the challenge. By going through the immersion, ideation, and prototyping phases, the group proposed a solution for the problem, the replacement of conventional plastic by renewable bioplastics on parts of children bicycles, thus reducing the use of petroleum-based products and greenhouse gases in the atmosphere.

2.1. THE CHALLENGE AND THE COUNTERPART

The challenge was proposed by a multinational bicycle manufacturer with its production facilities based in Manaus, Brazil. The theme was "Sustainable Bikes." At first, the theme and what was the counterpart were the only information the group had in hands to start working with, so to tackle the problem in the best way possible, direct communication was established with the Department of Product Development of the company, based in São

Paulo, to exchange information regarding the project and to know what the company's goals and aspirations with it are.

The communication between the group and the company was very effective. After each meeting, it was more apparent how this project integrates its aspirations and how their approach to sustainable bikes could be narrowed. The project was starting to be developed by the company, so the group was responsible for kicking it off.

The group was invited to make a tour inside the company installations so all the steps of the bicycle manufacturing could be visualized, from frames welding to the bicycle assemblage and quality control. All the employees showed to be very welcoming and helpful with the project, which came in very well.

After nearly two weeks of immersion into the world of bicycle manufacturing and possibilities of turning bicycles more sustainable, the idea of decreasing the number of polluting materials in the bikes came up, namely plastic materials of children bicycles.

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When visiting the waste center in the manufacturing facility, it was possible to see how the management of the residues takes place, which sort of residues are being recycled, reutilized, or sold as raw material to other industries, and how is the logistic involved in the whole process. From that point on, the project focused on developing plastic alternatives for such bicycle parts to replace the conventional ones properly and would have a less environmental impact.

2.2. THE TEAM

The team was composed of seven people, three of them from Brazil, one from Chile, one from Portugal, and two tutors: Carolina Barbosa (Brazil), a marketing student, Raphaela Goes (Brazil), a software engineer student, Matheus Ben-Hur (Brazil), a mechanical engineer student, Constanza Quezada (Chile), an industrial design student, Vitor Nogueira (Portugal), a biotechnology student and the two tutors, Flávio Soares and Isaac Benchimol, both professors at IFAM.

At the first moment, it took a while for the communication gets flowing between the group. There were some miscommunication issues initially, but the team was already engaged by the end of the day because English was being used as the standard language. All the members got along very well since day one, it was defined a few rules to be followed for a good group dynamic, and that is how it kept going until the last day of work. Figure 2.1 shows the team, including the tutors, in a visit to the Caloi factory.

Right at the first week, it was clear that each other's field of study would be helpful for the project development because looking at the problem from different perspectives when matched would positively contribute to it.

Figure 2.1 Members of group 1 – students and tutors.

Source: The authors.

After one month of the project and ongoing interaction, unfortunately, the project had to be continued online due to the outbreak of COVID-19. Then every international student had to go back to their homes. In the beginning, it wasn't enjoyable once it happened right at a moment when things were getting right. The group felt like it had

just got on a good path for the project development and the experience everyone was having because the project was amazing.

The group managed to keep up – or at least try – with a good work dynamic between the group. There had to be an adaptation to each other's routine, and the time change established routine meetings and tried to use this unexpected and unusual, back then, way of working in our favor.

2.3. THE IMMERSION

The immersion was the first step after the groups received the challenge. The team used research and data collection techniques to find the best opportunities to make bicycles more sustainable, visit the company, and talk to the managers. Mental maps, personas, and elaboration of requirements and parameters for the project were used to increase de creativity and thinking for all ideas and possibilities.

That was the phase where the group spent more time researching the company and the models of manufactured and its parts and types of materials used. Figure 2.2 shows the students in this phase before the COVID pandemic. The initial objective was to collect as much information as possible to show how to achieve the goal of the challenge – making bicycles more sustainable.

It was used mind maps to divide into areas that can be explored, for example, the plastic of the tire wheels, the hydraulic oil of the brakes, the steel or aluminum body, the plastic parts of the bike and packaging, delimiting requirements and parameters needed to carry out the project. The construction of the personas was also a tool explored by the group, with the idea of creating three personas who would be potentially interested in the most sustainable bike.

Figure 2.2 Team at work before COVID pandemic.

Source: The authors.

At the end of the immersion, the group showed greater confidence in the project's progress and application possibilities, making the following steps to brainstorm and construct the positioning matrix more diversified and the objectives to solve the challenge clearer. Due to the large volume of research and data collected, the group's familiarity with the subject increases learning and helps in the next ideation phase.

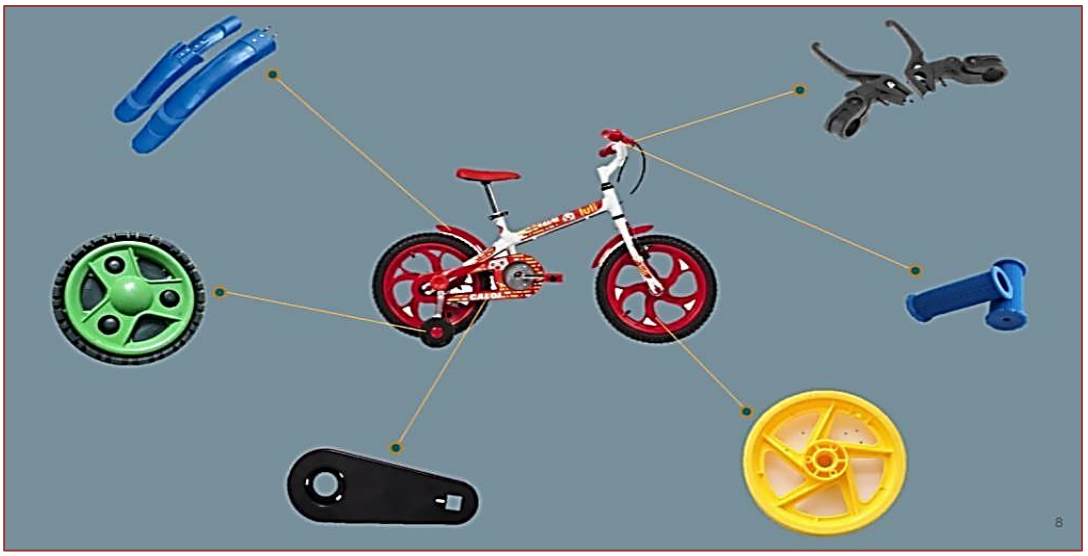
2.4. THE IDEATION

The ideation phase took place on the fourth week of the project when everyone was going online working due to the pandemic. It was challenging to have this change at such a crucial moment of the project, particularly due to the loss of personal contact between the group members, with the city of Manaus and residents, to whom the project was aimed, and this strange new way of working remotely.

At this moment, the project's scope was defined as finding plastic alternatives for some parts of children's bicycles. From that moment on, using the tools of design thinking, namely brainstorming and matrix positioning, the idea started to be shaped.

Firstly, a lot of research was made on material science to understand how conventional plastics are suitable for such applications as bicycle wheels and handlebars (see Figure 2.3), based on their physicochemical properties. The next step was to get equivalent functionality with materials that present less environmental impact in its manufacturing process and its supply chain, subsequently contributing to the mitigation of social-environmental adverse effects of the plastic production chain.

Figure 2.3. Bicycle plastic parts to be explored.



Source: The authors.

The phase of ideation enlightened the way for the resolution of the proposed problem. Following a consolidated phase of immersion, it was essential to develop an accurate and suitable solution. At this point of the Design Thinking methodology, the group is stepping up to the prototyping phase. It will be seen whether the idea developed until then is viable and how it will be closer to how it will look in reality.

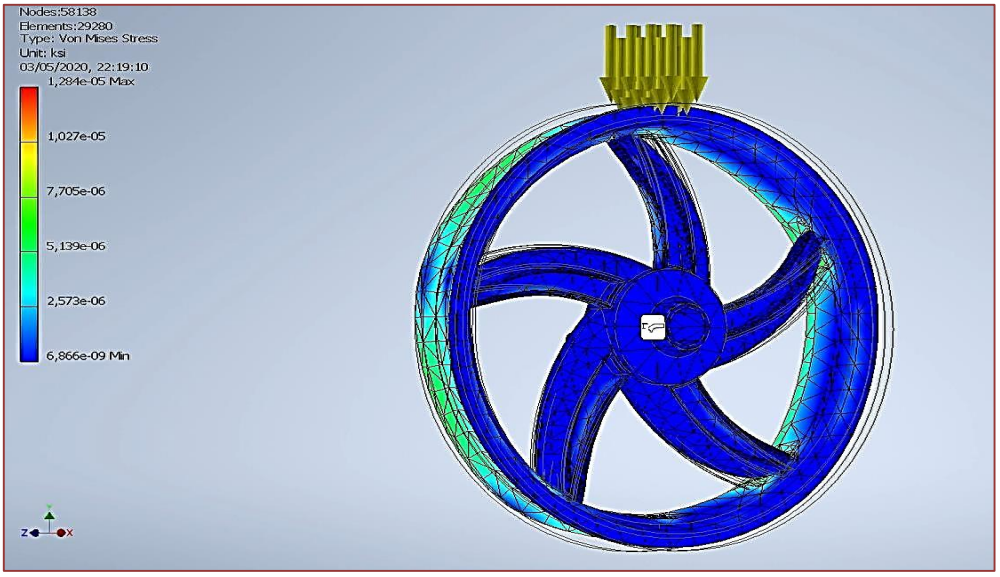
2.5. THE PROTOTYPING

After the ideation and definition of possible materials to be used, the group went on to the prototyping phase of the parts that eco-friendly plastics could replace. Due to the pandemic and limited resources, the group opted to use engineering software to design the parts and simulate the material's behavior when subjected to mechanical efforts.

In the last few weeks, the group started to explore all possibilities of using bicycle parts to make it more sustainable. In contrast, the group was already confined because of the pandemic. Visiting the company's installations was more complex, and there were fewer possibilities to build prototyping.

After surveying the possible materials that can be used and choosing the bicycle parts that bioplastics can replace, prototyping focused on designing the parts and applying physical efforts on the material with properties of the desired bioplastics. All parts were tested using computer simulation to obtain the results closest to reality. Figure 2.4 shows an example.

Figure 2.4. Prototyping of mechanical forces applied on the wheel composed of bioplastic



Source: The authors.

When applying physical molds on some pieces of different shapes and testing the types of bioplastics, it was perceived which material would have the best performance for specific pieces and choose the best application. The tests were carried out on the handlebars and wheels of the children's bicycle, where the three parts were tested with the petroleum-based materials and then with the bioplastics to determine whether the replacement would guarantee the resistance of the parts.

The group was able to use the facilities of IFAM and its laboratories and the support of the group's tutors: Prof. Dr. Flavio and Prof. Dr. Isaac, to perform the material tests and bring results closer to reality in the software simulation. The experience also provided learning in the practice of new technologies and solutions for testing materials and parts.

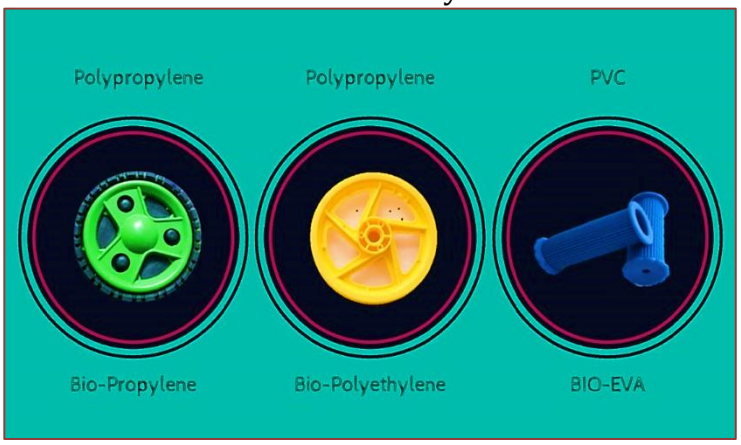
2.6. THE PROJECT'S RESULT

The DemoDay has presented the result of the project in a great online meeting with all teams, staff, counterparts, teachers, and guests. It was not possible to do the presentation face-to-face. However, the presentations were all presented without any problem. The presentation was in pitch format in Portuguese and English, explaining how the work, the problems, the solutions, and the result of the project were carried out.

In this last presentation, the behavior of the parts made with petroleum-based plastics and the renewable sugarcane-based bioplastics were shown. How the replacement could be carried out and how it would make the bicycle manufacturing process more sustainable and less polluting. The group also sought to address the UN Sustainable Development Goals, such as Innovation and Infrastructure, Sustainable Cities and Communities, Responsible Consumption and Production, and Climate Action.

The idea of the project allows other parts to have their raw material modified by materials of a more sustainable and renewable origin, and Brazil has a strong company that produces and manufactures plastics, enabling safe and continuous use. It is expected that the implementation of the project will encourage other companies to exchange the product and contribute even more to the reduction of obtaining carbon and using less polluting plastics. (Figure 2.5).

Figure 2.6. Plastic bicycle parts viable for bioplastic replacement presented on the DemoDay.



Source: The authors.

The Demoday is the most important day of the project. It is a spit on all the challenges and solutions. The group spent a lot of time preparing slides, explanations, and the solution to explain everything in 5 minutes. It was rehearsed to speak and revised the presentation several times until the whole group agreed that he was in the best possible way.

The presentation was more relaxed. Everyone in the group knew the content well and was confident, with the feeling of accomplishment and sharing our best. There are moments of happiness and sadness because the project has come to an end.

2.7. THE LEARNING

It is consensual between all the students involved in the project – the most significant reward everyone had was all the learning acquired during LAPASSION@Manaus. Regarding group 1, it was clear how every member improved his soft skills, particularly when it comes to communication, interpersonal relation, and ideas exposure.

The group used English as the standard language. By the end of the project, there was a significant evolution in all communication levels. It is impressive once this evolution occurred throughout time and was based on practice rather than theory.

Perhaps, as the group was composed of students from different cultures and different studying fields, it felt like there was mutual respect since the beginning. Everybody was open and attentive to what each one had to say. It continued until the end of the project, which probably made it much easier to manage the teamwork dynamics and contribute to the project's positive outcome.

Another exciting aspect was the realization the group had about how one can never work on his own. For instance, when looking at the topic of the project from a superficial point of view, one may say the project is more related to what Vitor or Matheus study, biotechnology, and mechanical engineering, respectively. Although, if only Vitor and Matheus were working on this project, the outcome would have never been of the same quality, which means that distinct fields of science are somehow interlinked. It is of great value to combine such knowledge to achieve something more significant.

The systematic and techniques of the Design Thinking methodology were undoubted of great value for the resolution of the challenge proposed, showing to be practical tools to be carried for project development. Also, the very same methodology seemed to make the process of project development somehow more pleasant. Besides being suitable for the parts involved, it might have a positive effect on the project outcome.

CHAPTER

03 Team 2: Low-cost methods in drinking water generation

Anne Karynne Almeida Castelo Branco[6]
Darléa Araújo de Souza Esteu da Costa [7]
Sarah Feitoza da Silva [8]

As part of the LAPASSION@Manaus, Team II - Transire, lived in ten (10) weeks, using the PBL/ DT methodology, an experience that enabled both the flourishing of skills, cultural exchange, and the development of solutions in the face of the challenge proposed by the counterpart - Instituto Transire.

Following the phases foreseen in the methodology, we divided the activities into immersion, ideation and, prototyping. It started in person but was redesigned, in the early days of Covid 19, to remote mode, online.

In the immersion stage, we learned more about TD, identified the challenge, formulated the problem, and did preliminary research. In the ideation phase, we saw several possibilities. We met with partners/specialists and pivoted a few times to arrive at the best solution. In the prototyping stage, we understand better the legal factors surrounding the project. We arrived at the Minimum Viable Product (MVP). We found a low-cost solution for transforming rainwater into drinking water, with the target audience of the Lago do Catalão Community, located in Amazonas - Brazil.

3.1. THE CHALLENGE AND THE COUNTERPART

The proposal of the LAPASSION@Manaus includes co-design and collaboration in multidisciplinary teams that develop a solution to a challenge from an outsider, called counterpart. The main goal, of course, is to develop students' soft skills. In this context, the coaches participated in training to understand the project and its development and what would be their duties in it to guide the team's actions towards the achievement of the proposed objectives.

The Transire company's vision is "To be an Institute recognized by our customers and the world community for promoting a great diversity of technological and innovative products and services" (INSTITUTO TRANSIRE, 2021). It commits to development, implementation, and continuous improvement, which is not possible without human capital commitment.

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To get to know the proposed challenge and its vision about it better, we were invited for a visit. We know the dependencies of the place, some projects, and research in progress and the products developed; this tour showed us the Institute's strong relationship with the region's sustainability and the innovation developed for this purpose.

Five challenges were proposed based on problems faced by riverside communities. Therefore, our demands would be low-cost solutions with low environmental impact. After analyzing the proposals, the team decided on "Low-cost methods in drinking water generation."

Because of the theme, we brainstormed the problems faced by the communities to obtain drinking water and possible solutions that could be viable, of low cost, and that the residents of the community could reproduce with some ease with instructions. Among the solutions for water purification, proposals have emerged to use moringa powder, sunlight, açaí stone as a type of activated carbon, among others. Next, we will describe the proposals perceived during the visit.

3.2. THE TEAM

The team was of five students. Diversity was a striking feature throughout the project. In addition to not knowing each other, most of the students were in different professional training processes, nationalities, and languages. The language and the initial relationship with strangers was a particular difficulty, but at the same time was an opportunity for the skills to gradually complement each other in the search for a common goal - to solve the challenge proposed by the Transire Institute. Now let's meet the students who were part of the Team:

- Sarah Feitoza, Manaus/Brazil, Logistics student at IFAM/Brazil;
- Martin Sirén, Tampere/Finland, nursing student at TAMK/Finland;
- Lucas Pinheiro, São Luís/Brazil, Electrical Engineering student at IFMA/Brazil;
- Rodrigo Carvalho, Manaus/Brazil, Software Engineering student at IFAM/Brazil;
- Raíza Lucena, Advertising Production student at IFAM/Brazil.
-

The team also had the participation of two coaches, teachers from IFAM, who followed the whole process from the choice of themes to the MVP presentation. The coaches' role was to lead the process, to support students to reach the goal: Anne Karynne Almeida Castelo Branco, Ph.D. in Science Education, and Darlea Araújo de Souza Esteu da Costa, Master in Technological Education.

3.3. THE IMMERSION

After the opening of the Project, held in the IFAM - CMDI auditorium, during the morning of March 2, a tour was held on the Campus to get to know the Institution's premises, as it would be the meeting place for the coming weeks to come. At the beginning of the afternoon, each participant was introduced to his group. In this way, he became part of it. At that moment, the teams had time to get to know each other better, to start conversations in English, to discover a little of the history, skills, and interests of each member.

In the three days that followed, the students were destined to participate in the Design Thinking Workshop, a methodology used throughout the immersion. Through the concepts passed on, we went to practice, and since then, we have simulated the choice of a challenge. This practice contributed a lot to understand better the stages that

we would experience through the method. To close the first week, all participants of LAPASSION@Manaus went to visit the Tumbira sustainable community, where it was possible to immerse themselves in Amazonian biodiversity, to learn more about this unique reality.

Faced the challenge proposed by the Transire Institute and chosen by the group, the low-cost method for generating drinking water, a documentary research was carried out to obtain some basic information. As a result, the team found the main problems for drinking water (contamination, high cost of solutions, little information / education and low accessibility), and the existing optional methods to solve the problem with its positive and negative points (sustainable billboard, solar disinfection, air humidity, water desalination.).

We also created a website/blog to share the logbooks during the Project and share the results. The first contact was made, still in Manaus, in a low-income community, regarding the availability and quality of the local water. However, it was not possible to end the interview due to the degree of danger in the neighborhood.

For the systematic monitoring of the project, weekly meetings were established with all teams - “Feedback Day.” All presentations were in English with a pitch of approximately five minutes. After the presentation, we realized from the coaches' speech that we did a very general survey and could focus more on the Amazon Region.

The following week, we were able to schedule a technical visit to the Instituto Transire. In addition to getting to know the infrastructure, we had time to discuss the proposed challenge. We received the news that the project would continue remotely, through the local coordinator, due to the arrival of the coronavirus in Manaus on March 17. Then, we entered the analysis and synthesis phase, in which we defined the Lago do Catalão community (Figure 3.1) as the target audience. And as the most viable solution to the problem, we focus on rainwater as it is cleaner and easily accessible.

Figure 3.1. Lago do Catalão Community - Amazonas – Brazil

Source: Google Maps (2021).

The following tools were applied to study the problem: insight cards, affinity diagram (contamination, rainwater, low-cost natural methods), and in general, the guiding criteria were decided, which over the weeks have undergone some changes.

3.4. THE IDEATION

Initially, we thought about carrying out the following activities to favor an idea that would support us in solving the problem:

[a] Brainstorming session

From the different points of view, the cultural and intellectual diversity of the participants, several possibilities related to the problem in “Not being able to use the water of the Solimões River as drinking water" were listed.

- tutorial videos on water purification methods;
- educational game of preventive measures;
- application to map regions that had clean water;
- educational booklet of preventive measures;
- the application teaches how to use natural methods for water purification step by step and videos.

[b] Person identification

We interviewed and identified four types of people: an elderly fisherwoman, an eight-year-old child, a woodworker, and a teacher. Thus, we identify their needs and how drinking water impacts their lives.

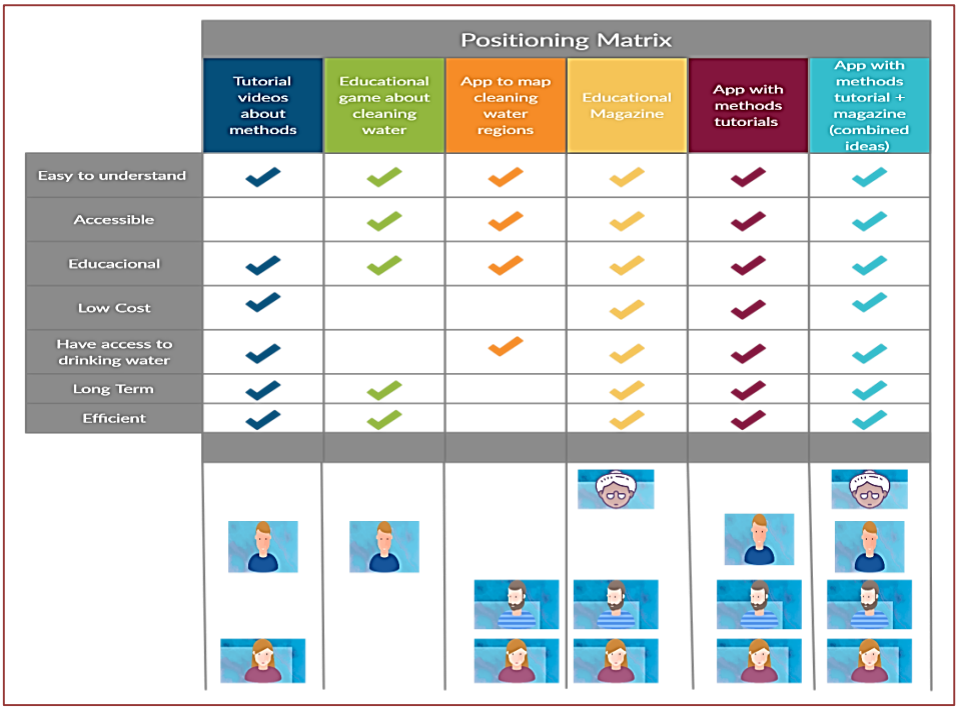
[c] Guiding Criteria

To establish limits to the project, format it, and make its mission clearer, some guiding criteria were identified: easy to understand, accessible, low cost, educational, efficient, and long term. Everybody was having access to drinking water.

[d] Positioning matrix

In this step, we used the “positioning matrix” tool to check concerning the guiding criteria that were most relevant to each identified person, contribute to the decision process, and subsequent prototyping. Figure 3.2 shows the positioning matrix.

Figure 3.2. Positioning Matrix



Source: The authors.

So, the team adjusted the ideas from brainstorming to reach the Minimum Viable Product - MVP, looking for the more efficient that contributed to solving the problem. In this way, the idea chosen by the team was to assemble a direct filtering solution for rainwater.

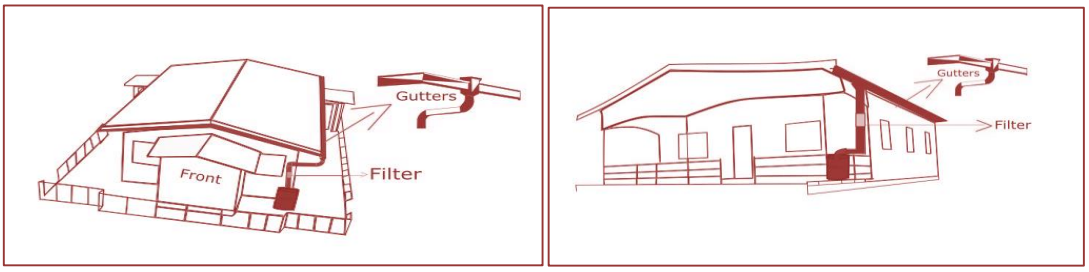
3.5. THE PROTOTYPE

Prototyping was a moment of tension for the group, who found themselves unable to leave the house, unable to hold the meetings in person. Even so, they wanted to present a physical product.

On a new visit to the Transire Institute, we spoke with the Development Director and Designer Engineer for further clarification and specifications. After the meeting, the idea arose that only one of the participants would make the product matrix with the support of the others by video. In contrast, the others followed collaboratively in the creation of a “booklet.”

A filter was designed to purify the rainwater that fell through the gutters of the community's houses. Figure 3.3 shows the exampleof the proposed filter:

Figure 3.3. Filter prototype



Source: The authors.

The filter must have a kit with material to build it and a manual on how to do it. The filter can be placed directly on the gutter to capture rainwater. As coaches, we monitored the execution of the booklet, with educational information on the importance of drinking water, on the usefulness of the filter, ways of maintaining and cleaning the gutter, using home-made materials for water purification, as well as the operation of the product, which was entitled A'calhar

3.6. THE PROJECT'S RESULT

Ten weeks after the start of activities, the results of all efforts were demonstrated through an online presentation to the other groups, coaches, and international and local partners of the Project. Table 3.1 shows a resume of the performed activities.

Table 3.1 - Schedule of activities

Phases	Week	Performed activities
Immersion	01	Setting and training
Immersion	02	Challenge, community interviews Immersion
Immersion	03	Visit the Transire Institute
Ideation	04	Team meeting with coach and guest
Ideation	05	Pivot
Ideation	06	Team meeting with coach and guest
Prototyping	07	Meetings, visit the partner, choose the best idea
Prototyping	08	Product specification and legal issues
Prototyping	09	Execution of the filter and primer
Prototyping	10	Tests and Demoday

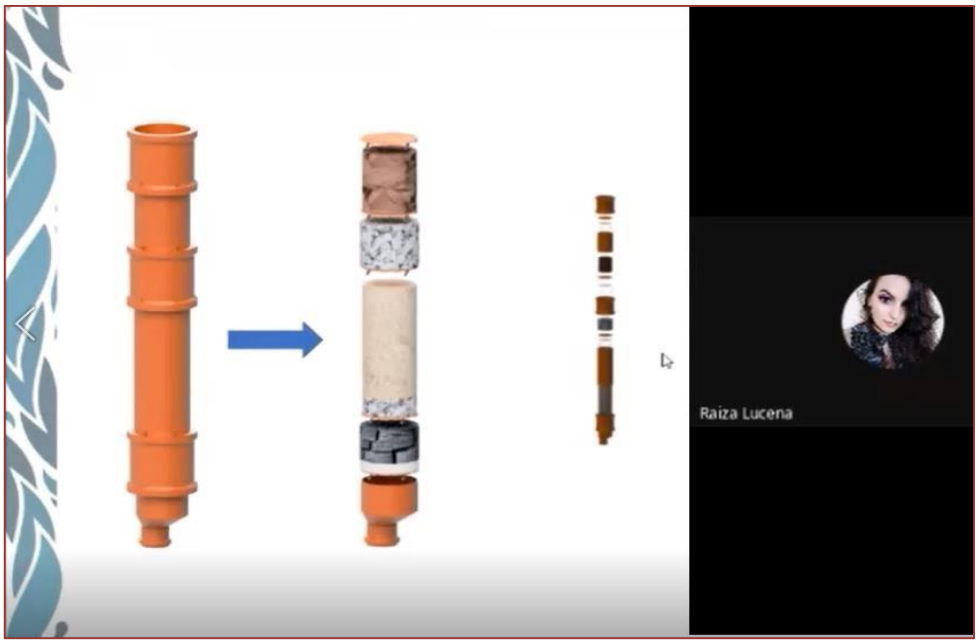
Source: Elaborated by the authors (2021)

Despite all difficulties, the team concludes the A'calhar filter, available to the community by the booklet (Figure 3.4) that teaches them how to build it. The results were shown in a final public presentation called DemoDay (Figure 3.5). All the students were so anxious, and they were delighted with the results. The counterpart Transire made its assessment of the results and be satisfied with the solution. So, mission accomplished.

Figure 3.4. Booklet cover and access QR code

Source: The authors.

Figure 3.5. Demoday presentation



Source: The authors.

3.7. THE LEARNING

We saw students discovering themselves in the process. The nationality barriers were gradually breaking down, even with the return of some young people to their countries of origin. The use of the internet, which seemed threatening, was gradually revealing new skills and possibilities. Each of us found his reason to continue since it was necessary to quarantine in the first weeks due to Covid 19. The virtual calls occupied the space of the colorful room, with an air of coworking, and became habitual. There, we share our knowledge about the Amazon, especially about the Lake Catalan Community, with people from various parts of the world: Finland, Portugal, Chile, Iceland, countries of origin of our students and guests.

Each week, we saw and shared the reality of the Community, not as close as we would have liked or planned, but enough to worry us about finding a solution: transforming rainwater into drinking water. What, in the beginning, presented itself as numbers gradually became people, lives, and needs. Children, young adults, and even the elderly, each with their own needs, extrapolating the experience that each one of us had. It was a great challenge to experience a culture so close and yet so distant from ours. It includes even those who lived in Manaus.

We learn about leadership, collaboration, resilience, problem-solving, creativity, and also about looking to the other with humanity. For some students, the experience of an exchange program without leaving their city or country of origin. For other students, learning to deal with distance, with cultural differences, and the need to understand this Brazilian word called Saudade.

More than skills, we develop our mentalities of the future and our multiple intelligences, so crucial in this moment of paradigm transition that the world is going through. It wasn't about technical knowledge. It was about being a better professional,

being a better human. Besides, we saw how Research and Development could be sustainable and the potential of doing Science in the Amazon.

An immersion like LAPASSION and the almost daily coexistence of the Team made us think, accelerate, create, feel, take care of, and learn from each other. There is no way to enter and leave this experience the same — a competition without losers, in which everyone did their best, with dedication and passion.

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CHAPTER

04 Team 3 - Reuse of electronic devices

Gilbert Breves Martins[9]

Daniel Nascimento-e-Silva[10]

4.1. THE PARTNER AND THE CHALLENGE

The challenge that our team set out to face was the reuse of electronic devices. The selection process took into account the nature of our organizational partner's business, which produces numerous devices. The team decided to direct the LAPASSION@MANAUS theme to the unwanted externalities of consumption as if it were a spotlight illuminating the problem's shadows, which is the difficulty of dealing with electronic waste. This problem is more serious when it occurs in the Amazon region and its enormous diversity.

Before the team met with partner representatives for the first time, it had already realized that finding alternatives to electronic waste would be a challenge with a high probability of being accepted. It immediately sought knowledge and solutions to the problem available to prepare for the meeting. To this end, it had the mentors' support and guidance so that it was clear about the problem and could at least present the scope of possible action and product plan.

Eletrocompany, the global giant in the production of electronic devices, was the project partner. There was an agreement with the partner company from the first contact. Eletrocompany already had an e-waste recycling program, not precisely an effort to reuse and reuse the devices. The partner company would collect its customers' devices and send them to a third-party organization. This organization separated and correctly disposed of the pieces, with only a few of them being reused. The rest were discarded. When the team presented the proposal, the organization's leaders approved it, given the unprecedented nature of facing the exciting challenge of reusing devices considered obsolete, even for purposes other than those produced. Throughout the project's execution, the partner organization provided all the support for the intended objective.

4.2. THE TEAM

Team 3 was composed of Camila Lienlaf, student of Mechanical Civil Engineering at the Pontificia Universidad Católica de Chile; Sara Valavaara, an undergraduate student in Media and Arts at Tampere University of Applied Sciences, Finland; and the Brazilians David dos Santos Costa, a postgraduate student in Environment and its technologies at IFAM, and Amanda Silva, an undergraduate student in Advertising Production, also at

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IFAM. The team was completed by tutors Daniel Nascimento e Silva and Gilbert Breves Martins, professors at the Federal Institute of Amazonas, the institution that housed the project. All communicated in English, with moments of opportunity for foreigners to learn a little Portuguese, mainly the European student. Moreover, in many instances, there was the simultaneous use of phrases with words from the four languages, forming, for example, Portunhol (Portuguese + Spanish) and Spanglish (Spanish + English).

The team members' rapport was surprising. Rather than the growing process taking place, it can be said that it was highly accelerated if it was not immediate. On the second day, at various times, it seemed that those young students had known each other for a long time. Those who saw them work realized that when someone had difficulty expressing what they were thinking, the other person provided the precise or approximate word for that. However, the inhibition to communicate in a language other than his mother tongue was slowly dissolving.

A team that produced such an easy and fast rapport could not present difficulties, a challenge of the magnitude of what they were about to receive. Despite the awareness that the problem would require a lot of their technical, cognitive, and relational knowledge and skills, everyone received the problem with great enthusiasm. And they were immediately ready to do their best to contribute with a solution capable of preserving the Amazon ecosystem. It seems that the will of Brazilian students has multiplied with the unquestionable desire of foreigners to join forces for the arduous journey, but that it was possible to be faced successfully.

4.3. THE IMMERSION

The immersion stage lasted three weeks. The first week consisted of acquiring essential information about the project and its operational dynamics. It also served to acquire rapport between team members and the first contacts of foreigners with the city of Manaus's ecological-socioeconomic reality. The second week focused on applying knowledge and skills to design thinking methodology, which started in the first week. Design thinking was the methodology used to develop the project activities, in consortium with knowledge based on problems. Meetings with the Eletrocompany representative, as shown in Figure 4.1, were crucial to gather helpful information for the project. The third week consolidated the methodology and finalized the first version of the project to be presented to the partner organization.

Figure 4.1. Meeting with Eletrocompany representative

Source: the authors.

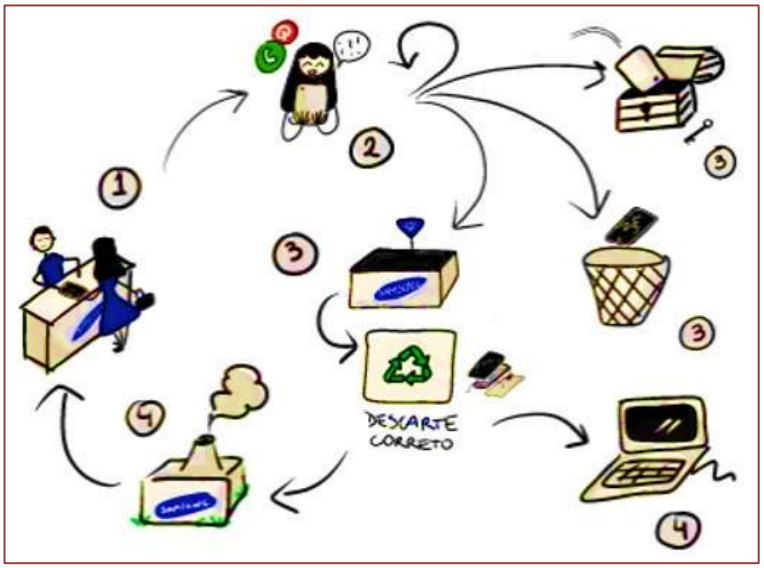
Design thinking is an active methodology. It removes the teacher from the center of attention so that the apprentice students take the lead in the actions. In this sense, tutors and advisors had the fundamental role of motivators and advisers about different aspects of the problem and the team members' solutions. As the team three members had profound skills in transforming ideas into operational courses of action, tutors and advisors' role was greatly facilitated. These skills can be exemplified in different ways of handling and organizing data and information captured from scientific repositories, such as scientific articles and internet pages.

The team's two most striking results in this first phase of immersion were designing the scope and criteria that the solution should present. The scope was linked to the necessary change in the local population's mentality about reuse and reuse. At this first moment, the target audience of the project was not defined. The solution criteria chosen were the economic solution, easy and viable manufacturing, social and environmental impact, attractiveness to the market, resistance, innovation, design, and Eletrocompany partnership. It is clear from the scope and criteria that the team's vision was focused on producing some product, not a service.

4.4. THE IDEATION

The ideation stage lasted three weeks. This period's objective was to realize the concept of a product capable of solving the problem, allowing reusing and reusing electronic devices. The team took the criteria established in the immersion phase to specify the most suitable product's scope further to overcome the team's challenge. To this end, it developed a positioning matrix that resulted in the following solution alternatives: disassembly of devices and sale of parts, use as Arduino electronic devices, reverse delivery service, educational material, remodeling, and advertising campaigns for proper disposal. The accurate analysis defined that the solution would be to use the devices as educational material for Arduino. This solution was following Eletrocompany's environmental practice, shown in Figure 4.2.

Figure 4.2. Life of Eletrocompany's devices in Manaus



Source: the authors.

It was precisely when the ideation phase showed its most promising results that the coronavirus pandemic plagued the world. From the beginning, students and tutors were aware of the enormous health severity that was shaking the world, but even so, the team continued to make efforts to continue the project. Initially isolated in the city of Manaus, Brazilian and international students tried in every way to complete the ideation phase within the allotted time. Unfortunately, the health crisis has worsened further, requiring international students to return to their countries and Brazilians to begin a long social isolation period. But the project has not been discontinued. From here, all activities were developed remotely.

Two great lessons could be seen at this stage. The first was the enormous effort that team members had to continue to develop the solution to the problem of electronic waste in Amazon. Continuous and daily dialogues were held by the available platforms, refining and refining the sought-after solution more and more. The second was the realization that adversity does not matter when you have focus and determination. The focus was the realization that there would be no physical product to solve the problem of disposing of electronic waste, but rather a service. The determination was the great willpower of everyone in determining the most appropriate way for this to happen. The solution would have to motivate both the target audience involved and, above all, the partner organization and the institutions that should be involved.

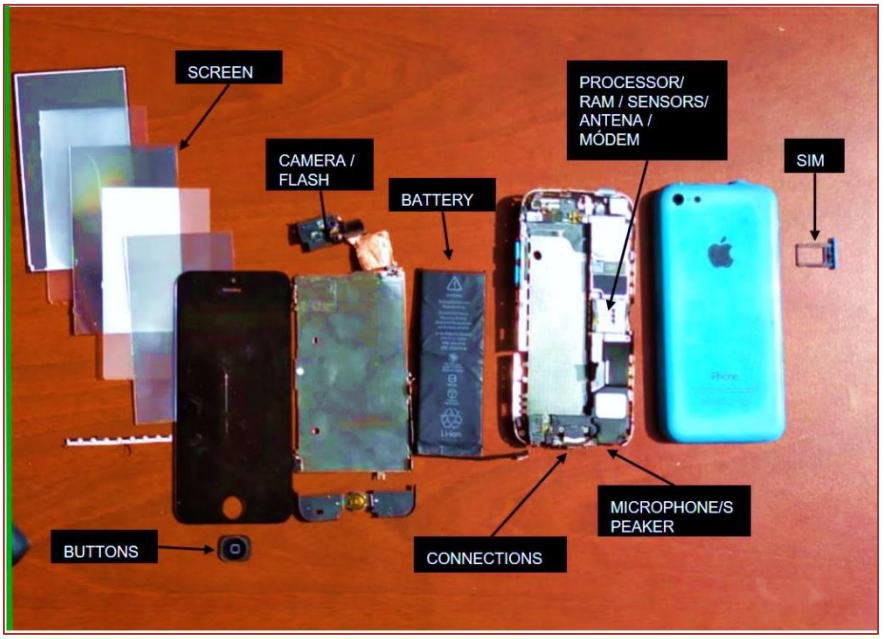
4.5. THE PROTOTYPING

The prototyping stage also lasted three weeks. The solution found focused on the knowledge of what the Arduino does. As a controller, he reads signals, processes information, gives instructions; as an actuator, performs functions, does something in the physical world; and as a sensor, it captures and provides information about its surroundings and environment. The team disassembled a smartphone to understand this device accurately and found that a) the processor and RAM are as good as computers to act as controllers, b) screen, flashlight, speaker, and vibrator can work as actuators, and c) they can function as sensors through proximity and position (magnetometer and GPS), motion, speed and rotation sensors (gyroscope with 3D position and accelerometer), environmental sensors (temperature, humidity, and pressure) and microphone, as shown in Figure 3.

In the search for a solution to the problem, the team never faced any difficulties. Each member took each adversity as an obstacle to be overcome, a situation that could be overcome. The analysis of the solution showed, for example, that they did not find an emulator for Arduino that connected the sensors with the programming of applications and actuators. It was necessary to create one. They also found that they needed to connect more parts with motors that would allow movement. Instead of interpreting this as difficulty, the team members were happy because they realized at that moment that they were innovating.

They were using a recombinant innovation strategy.

Figure 4.3. Electronic device and their components



Source: the authors.

This solution, still in the prototype phase, had four significant advantages: 1) the product is accessible to anyone interested in Arduino, 2) the user does not need an internet connection to the program and test the code, 3) it is not necessary to buy all the sensors separately, and 4) it is easy to use because no one needs to know how to connect each one.

On the other hand, some gaps appeared and needed to be clarified to complete the prototyping. The first was the necessary confirmation from Eletrocompany, a partner company, about having interest and motivation in implementing the solution. The second was institutional support for this correct disposal. The third was related to people's real motivations in the target communities to adapt to this technology type. The fourth was due to the realization that only old smartphones can be used. And the fifth was of a legal order concerning the company Arduíno.

4.6. PROJECT RESULTS

The solution found for the reuse of electronic devices was to use them as teaching resources. The idea was to create the Arduino Club at IFAM (Arduino Club at IFAM). This club would have the mission of offering four different types of extension courses. The first type would be free courses, with a minimum of 8 and a maximum of 40 hours of activities. The second type would be Initial Training (Initial Training) for students looking for qualification, with an activity load equal to or greater than 160 hours. The third type would be Continuing Education to serve all those who already had knowledge and experience in the area and needed to update or deepen knowledge and skills, with a minimum of 40 hours of activities. And the fourth type would be the Improvement Course for mid-level technicians, technologists, and other graduated professionals, with loads of specific activities for their needs.

At DemoDay, the team showed how the IFAM Arduino Club members could learn to build devices from electronic components considered waste and program them to become functional. The students showed that this solution is aimed at helping the daily

life of isolated communities in the Amazon in a sustainable way through the reuse of electronic devices whose destinations would be garbage, with disastrous consequences for the fragile and vibrant Amazon ecosystem. The presentation of DemoDay was made virtually due to the pandemic. Each member of the team participated from the comfort of their home. Figure 4 illustrates this moment.

Figure 4.4. The team project presentation

Source: the authors.

The solution found has every possibility of being operationalized at IFAM. The students and teachers of the various technical training courses at medium and higher institution levels would be the Arduino Club members. Later, with the project's success, the solution could be expanded to other establishments, such as state technical schools and specialized centers for technical and professional training, such as Senai, Senac, and Senar.

Besides, the Arduino Club can transform itself into a product that is ideally demanded and used by its various target audiences so that, while helping to preserve the environment, they allow Amazonian communities to be part of the new reality of industry 4.0.

4.7. THE LEARNING

The great learning that the team 3 had with the development of this project realized its enormous capacity to find solutions to challenging problems in the contemporary world. However, it does not mean that each student and tutor, in isolation, had any doubts about their creative and innovative potential. It was clear from the first moments when they saw each other for the first time and began to interact that each member brought formidable baggage of knowledge and skills. But it is one thing to face problems and adverse situations alone and combine efforts to overcome challenges that depend on others' help. For these cases, it is not enough just the individual potential. It is necessary to have other skills that couple and harmonize individual

potentialities to reach a common goal. They are soft skills of an interrelational nature. This apprenticeship will be carried in your luggage for your whole life.

Nothing more challenging, for example, for each member of any team than to lead and be led. The modern leadership practiced every day of the LAPASSION@Manaus project brought the member who made an effective contribution to the need of that moment. Therefore, one made a leader, one who contributed and was nominated for that role. It was the ability to collaborate that determined who was leading at a given time in the effective practice of situational leadership. While led, the other members seemed to be waiting for their time to collaborate.

For this reason, the practiced communicational scheme was a mixture of technical precision of what should be understood with the loving way of communicating. And this procedure was carried out even in the sporadic moments, with greater possibilities of conflicts. As they were all full of the capacity to learn and relearn, doubts and clarifications were the focal points of communications between students and tutors. They practice equality and communicative solidarity.

Technically, conflicts are almost always the consequence of denying someone's power or authority. A power relationship takes place between individuals with significant influence capacities. As there were no legal authorities in the teams and the ability to influence was not asymmetrical, the number and intensity of conflicts were reduced. When they appeared, they were almost quickly resolved through the clarifications provided by the team members. Therefore, what could be called conflicts were attitudes originating from different and not understood interpretations, which were eliminated with the proper clarification.

Finally, from the point of view of team management, the success achieved showed that the management process was done satisfactorily. The activities were planned correctly, with clear objectives and a properly designed strategy. It facilitated identifying, obtaining, allocating, using, and evaluating the resources needed to carry out each activity. It helped a lot the fact that the communication scheme was horizontal. No one placed himself as superior to his colleague in the practice of situational leadership that motivated the participants to achieve the predicted objectives. When something did not work satisfactorily, the members carried out new planning based on the alleged failure's learning.

CHAPTER

05 Team 4: Ecopoint: a collaborative recycling station to stimulate sustainability

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Paulo Henrique Rocha Aride[14]

This study aimed to assist in disseminating and knowledge of the innovation culture in higher education institutions, aiming to improve and access employability and internationalization, developed in partnership with companies and organizations. It was developed from the execution and participation in the International Project LAPASSION, particularly in LAPASSION@Manaus.

5. 1. THE CHALLENGE AND THE COUNTERPART

The LAPASSION@Manaus brought together students of different nationalities in different groups and counterparts to propose a challenge related to a general theme, "Social and Environmental Technologies for the Amazon Sustainability." As IFAM was the institution that received LAPASSION@Manaus, it proposed the challenge "Efficient Environmental Management to Public Institutions" and acted as the counterpart. During the preparation of the proposed solution to this challenge, sustainability was the way to arrive at a good idea.

Seeking to learn more about how environmental management occurs in the city of Manaus, field research was carried out, which made it possible to identify problems and possible solutions related to the management site, and specific actions aimed at sustainability. Considering environmental problems that Amazon has been suffering for decades and with increasing intensity, non-sustainable management is characterized as a real problem to be faced. Thus, under the law and governmental guidelines, public institutions must obey the criteria for this theme. IFAM, located in this area, has a responsibility to its community, in addition to social responsibility. With this, a proposal was devised that aimed at the engagement of all those involved in institutions. Thus, "Ecopoint" was developed, an informative, creative, and interactive selective collection station, full of technological and visual content.

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5.2. THE TEAM

The team was composed of five students, one from Chile, two from Brazil but outside Manaus, and three local students from Manaus. All of them from different courses. Figure 5.1 shows the team at work.

Figure 5.1: IFAM's team

Source: The authors.

From the Pontifical Catholic University of Chile, Alberto Infante Wilson is a design and innovation engineer passionate about sustainability and the environment. Especially when it comes to problems involving human interaction, he believes in the multi-discipline as a tool for finding integral solutions that could produce a real impact in our societies.

Jamille dos Anjos Miranda, from the Federal Institute of Pará, is a Pedagogy student who lives in the Belém Islands region of Pará. She lives in the countryside, but studies in the city, and even her Course Completion Work discusses this trajectory of students who leave the countryside daily for the city to study.

From the Federal Institute of Amazonas, Lucas Gomes Flores was in the 5th period of Control and Automation Engineering, a student who loves technology and its improvements. He participates in technology fairs and robotics championships. He also offers courses to freshmen students, such as Arduino and electronic instrumentation.

Luzia Emanuelle Valentim, from the Federal Institute of Maranhão, has a degree in Science and Technology, and she works as a mechanic technician. She is a student of Mechanical Engineering. There, she works with researchers in ferrous materials, automotive mechanics, and mechanical manufacturing.

Melyssa Oliveira Gomes, from the Federal Institute of Amazonas, took the 5th period of the degree course in biological sciences. She loves everything that involves a sustainable policy and direct contact with nature; and believes that changes start with small actions and changing people's minds.

5.3. THE IMMERSION

During the first week, academics received guidance. According to a proposal of the Design Thinking (DT) method, they practiced the problem-solving process to familiarize them and act in the ways to be developed in the construction of the project. The project was developed over ten weeks, with the initial two weeks for immersion in the proposed problem.

Designers deep emerge in the problem to search for understanding the context surrounding it through research, interviews, and observations. In this process, the cards of insights are fundamental. It is essential to organize the information according to the theme, the source of collection, and the problem explained at the research time.

For three days, a Design Thinking workshop was developed, where the group learned from conceptual and practical forms how to develop a project from the perspective of this method (Figure 5.2). In this sense, our group worked with the symbolic theme “Safety for students of the CMDI Campus at a bus stop.”

To solve this problem, group 4 developed an alternative that fit the respective criteria: (1) Organize students to go to the bus stop together; (2) Prevent students from missing the bus; (3) Low financial cost; (4) Be collaborative; (5) Allow students to wait for transport safely; (6) Don't consume too much internet.

Thus, it was concluded that making the application collaborative would assist in its purpose so that any user could share information about the vehicle's location by the application itself. Whoever needs to take the X bus must access the application and click on the desired bus. Thus, a chat page would open, where you could ask about your exact location and receive a response from another user.

Figure 5.2 The DT presentation course

Source: The authors.

Therefore, we seek to understand environmental management and sustainability applied in different environments fully. One of these environments was the Reserve Tumbira sustainable community. There, we learned about how the community's inhabitants live, their income sources, and how they live their daily work and study. The residents live off the resources from tourism, such as selling handmade products selling typical food, among other products. The Reserve has two schools: a municipal and a state school. At the state school, students have online classes with teachers who are in the capital due to logistical difficulties for daily access to the community.

The proposed challenge was to develop efficient environmental management for public institutions, based on the FAM itself, Campus Manaus Distrito Industrial (CMDI).

We studied environmental legislation, articles, and guiding documents for sustainable management and visited some institutions to learn how sustainability works in these spaces. During on-site visits, we identify the location where significant actions take place. It aims to raise the awareness of rural and urban communities, engage citizens with the ideas of sustainability, and correct waste disposal. However, we also found places with no specific actions, therefore, lacking comprehensive directions and actions.

The group was decided that it was necessary to research before going to the field. During the data collection process, a visit was made to the Federal University of Amazonas (UFAM). The responsible show as the sustainable management process occurs at the university through projects developed on and off-campus.

A visit was made to the National Institute of Amazonian Research (INPA) to expand our observations on sustainable management. The workers interviewed reported that at INPA they promote the reuse of 60% of the water in the manatee tanks to the turtle lake; the reintroduction of fish in the wild; destination of residues produced by the institute; reuse of newspapers and books from the library; alternative research for the reuse of açaí seeds; use of wood from old buildings within the Institute for other works and use of wood from falling trees; promotion of paper donation (all types) for a recycling cooperative and adoption of the document digitization process. There is also a project to acquire solar plate systems, to reduce electricity consumption.

After the immersion process, we review the collected materials for the subsequent preparation of the weekly presentation. We continue to study the data collected and the possible solutions to delve deeper into the guiding documents of environmental management in public institutions.

On March 16, we faced terrible news about the Coronavirus pandemic. On this day, the first case of the disease in the city of Manaus was confirmed. As agreed, at the beginning of the week, we carried out the planning of the activities. We shared our research and the readings of the laws, rules, and actions developed in other countries related to the subject in question. At this moment, we received the news that as of March 18, the Institute would need to suspend activities due to the coronavirus.

Although the advance of the pandemic has caused unexpected changes such as the early return home of some participants of the LAPASSION Project, among them, a member of group 4, all members were working remotely. So, the most prudent and recommended were to return to their homes because at this moment. Almost nothing was known about the virus. In this sense, the main guidelines for generating ideas were (i) Raising awareness of the people involved, (ii) Low cost, (iii) Educate about environmental importance, (iv) Encourage everyone's participation, (v) Possible to be built in up to 5 weeks, (vi) Easily applicable, and (vii) No internet addiction.

5.4. THE IDEATION

A brainstorm focused on the thematic areas was developed, considering the guidelines in session 5.3. There was a discussion on the elaboration of resources that could work on water reuse, paper recycling, electricity reduction, and other related actions. After the discussions, 12 ideas generated from the brainstorm were selected. To select the most effective ones and evaluate these guidelines was elaborated through the “Matrix of positions” tool, which identifies the most appropriate idea according to the guiding criteria. In this way, the following steps were taken: filter of ideas; criteria score; ideas vs. criteria.

Five ideas were built based on the Institute's Sustainable Logistics Policy - PLS, which were:

1. Meter for the amount of waste, aiming to reduce waste and propose challenges (P.S.L 4.6.2.);
2. Composting device with organic residues that can be used for orchards, vegetable gardens, sale among other possibilities (P.S.L .4.6.2.);
3. Design of tap aerators made with recyclable materials to reduce water consumption (P.S.L 4.5.8.);
4. Recycle station to reduce waste and promote selective collection (P.S.L .4.6.2.);
5. Use of rainwater collection and air conditioning (P.S.L .4.5.5.).

The recycling station was the most viable alternative, and from there, the project's target audience was defined: students, teachers, civil servants, and contractors.

Then, a series of telephone and video calls were conducted. These interviews sought to understand better how management on the IFAM-CMDI campus worked. Our interviewees were teachers, outsourced employees, and representatives of the "Recicla

Manaus Association" responsible for the collection of recyclable materials. Finally, we contacted "Reciclagem do Bem," a project by UFAM students that collects different types of materials for artisans.

The recyclable station was designed to reduce waste and promote selective collection (according to article PLS4.6.2.). For this purpose, it was conceived to promote recycling, providing users with an easy way to apply and raise awareness on this topic (Brazil is the fourth country that produces the most waste).

Although the idea was accepted and the group carried out research on creating an app, it was noted that the subject we were working on does not usually arouse interest in the target audience, so they need to seek strategies to collaborate with students. The idea was to seek ways for students to be active agents in using the application so that they download and use the application. After all, we only download applications when we care.

The station was designed and idealized to contain information about recyclable and non-recyclable, in its front part and a camera to capture the interaction actions between this and the user audience. The capture takes place using a sensor that, when feeling the addition of residues, captures the image and shows it on a screen (monitor or television) to disseminate positive attitudes towards the environment. This monitor or television was designed to remain in circulation on the Campus, showing images and videos with informational messages on sustainability actions and guidelines in a fixed way.

5.5. PROTOTYPING

The research was carried out to determine alternatives for developing the work of sensitization and awareness of the academic community of the importance of recycling and the reduction in the production of waste. It matured our initial idea of selective collection.

The process would work like this: considering that we will have a photographic camera at the front of the station, people who correctly dispose of their waste would have their record done by the machine, triggered by infrared sensors inserted inside the station. This photo would be raffled to be displayed on social media and the IFAM page as an example of good action for the environment. This tool would also be meant to disseminate relevant information on the topic, such as the institution's sustainable logistics plan, among others, that value and encourage respect for nature. With the electronic material made available by IFAM - CMDI (Raspberry Pi 3, Arduino UNO,

Monitor 21" and accessories), we made a 64 GB memory card and camera available, and we started programming.

Thus, based on the observations and definition of the station's components, necessary adjustments were made: removal of the space for glass collection, as it is a material that is not collected at IFAM; we decided that it would be better to put the information at eye level, more visible and apparent to the user; and we have included drawers for collecting small size and weight materials.

We finalized the two manuals, one for use (how to organize, care for and feed the station). And another in the physical part (the types of materials used, proportion of length, width, weight), as the group's intention, was for the project to be built and implemented in any interested institution. We finished the station aesthetic, leaving it with a more functional aspect, as it is self-explanatory, as it contains information on how to deposit the garbage in it. We finished the videos on IFAM's Sustainable Logistics Plan, presenting what this plan is and what its objective is; another on how sustainable habits can help the environment; and one on sustainable practices, giving tips on reuse, suggesting handcrafts as an alternative for the reuse of materials, etc. All of these videos will be broadcast on TV.

The last week was preparing the storytelling to share our project with everyone and presenting it on the web-DemoDay. The idea was to show our product and its importance as if we were selling. So, we elaborate on the following selling point: What are public institutions doing about it? It was precisely our research question. We visited three institutions, made a massive web form, and also informed ourselves about the municipality's environmental legislation through documentary research.

What did we discover? Although there is a concern and awareness about sustainability for the development of the Amazon region. It is not aligned and internalized within the institutions as an example for society daily. Our opportunity? We saw the need to generate a sustainable practice, an action that made care for the environment visible, helping it, specifically in the scope of improving waste management on the IFAM-CMDI campus.

As a solution, we proposed a waste separation station, which can be used to sensitize the academic community about caring for the environment. We identified that a large part of the common waste from IFAM - CMDI that is sent to landfill has materials that can be recycled. With the proposed solution, the institution would effectively comply with Decree No. 5,940 / 2006, which provides for the separation of recyclable waste generated by the public administration, and will comply with guideline 4 of the Sustainable Logistics Plan of IFAM.

6.6. THE PROJECT'S RESULT

The environment has been suffering from various types of aggressions for years due to the human development process. It has been accompanied by society's neglect of the environment in which it lives, which has already had harmful effects on various environments and natural resources. Excessive consumption of these non-renewable natural resources, oil products, and other waste-generating agents causes a large part of environmental pollution, which raises evidence of the relevance of sustainable social and industrial practices (RIBEIRO et al., 2016). Ecological sustainability is the ability of a given population to occupy a limited area to exploit its natural resources without threatening, over time, the ecological integrity of the environment (LIMA; POZZOBON, 2005).

There are important higher education institutions (HEIs) in urban centers, which attract students from the region and other Brazilian states and countries. Consequently, these HEIs are significant generators of solid waste, mainly from meal supply services (canteens and university restaurants), responsible for generating a large portion of recyclable, organic, and tailings waste. These are collected and sent to landfills or landfills (controlled or sanitary), causing contamination of soil and surface and underground water (GONÇALVES et al., 2018) when not separated or reused in the institution itself.

With the study, our students were challenged to propose, precisely, a product or service that would provide a solution to these problems with waste produced by IFAM. During this journey, students were challenged by a significant impact factor: the covid-19 pandemic. We were overwhelmed by the emergence of this virus, and the whole scenario developed over those years. Students and other participants were forced to enter a lockdown to preserve their lives. International students had to return to their countries of origin and nationals, to their states. Unlike the other editions of LAPASSION, this one would be virtual from that moment.

What appeared to be a challenge that could jeopardize the results of the projects was, in fact, an excellent incentive for the teams to participate more actively. Virtual meetings have become daily and, at many times, more than once a day. Contacts between students, coaches, and project participants were more active. The project, specifically, managed to project its proposal virtually. One of the students, with mechanical skills, produced a physical prototype in reduced dimensions.

The Ecopoint is a selective collection station designed to receive the most common types of waste produced by the Federal Institute of Amazonas (IFAM), of which metal, paper, and plastic stand out (Figure 5.3). The differential of this feature is that it encourages the correct disposal in a fun, attractive, and dynamic way. It contains colors, concise information, a monitor, and a camera for the interaction of employees.

Figure 5.3: visual prototype of the recycling station. To your left: front and right to the rear.

Source: The authors.

Its parts and functionalities:

- Sink for cleaning waste, which should be used only when there is a need;
- Bins for each type of material (metal, plastic, and paper);

- Exclusive drawers for depositing straws, lids for pet bottles, and tin rings/seals, as these materials that have little mass are hard of value to cooperatives; therefore, they will be sent to artisans;
- A monitor with a camera to interact with people, thanking them for the good deed and taking pictures of those who correctly dispose of garbage at the station. These photos will be published on a television that will be an external component of the station.
- Ultrasonic sensors in the trash to identify the material deposit and;
- TV, which is not inserted in the station but close to it, publishes good actions captured by the camera and disseminates information on environmental management and sustainability in general, using informal language, commonly used in social networks.

Selective collection differentiates the previously separated residues according to their constitution or composition, which are selected by the generator and made available for collection separately. According to the PNRS, the implementation of the selective collection is an obligation of the municipalities, which must present this practice in the integrated solid waste management plans. The complexity of mixing these wastes makes the recycling process more expensive or unviable, so the generator must separate them by material composition categories, for example, dry recyclable wastes: various metals, paper, cardboard, tetrapak, different plastics, and glass; tailings: non-recyclable bathroom and cleaning waste; and organic waste: food waste and garden waste (MMA, 2020).

6.7. THE LEARNING

Our students were challenged to propose a product or service that would provide a solution to the problem regarding the destination of waste produced by IFAM. During this journey, students were challenged by a significant impact factor: the covid19 pandemic. After a few weeks of exchange, we were overwhelmed by the emergence of the covid virus and the whole scenario. Students and other participants were forced to enter a lockdown to preserve their lives. International students had to return to their countries. They initiated a methodological process of project management virtually. Unlike the other editions of La Passion, this one would be virtual from that moment.

What appeared to be a challenge that could jeopardize the results of the projects was, in fact, an excellent incentive for the teams to participate more actively. Virtual meetings have become daily and, at many times, more than once a day. Contacts between students, coaches, and project participants were more active.

The project, specifically, managed to project its proposal virtually. One of the students, with mechanical skills, produced a physical prototype in reduced dimensions. That helped a lot in several aspects, mainly about the feeling of group work, done by several hands, thus adding the whole team.

When it comes to the feeling of accomplishment, which includes the objectives of the La Passion project and the countless intangible variables that transform the lives of the project participants. Interdisciplinarity requires that we develop human skills such as: communication, leadership, initiative, team spirit, empathy, among others.

At the end of the whole process, perceive the change in each of the participants, as the experience and cultural exchange directly influences the way of thinking about countless human factors. It made it possible for everyone to reformulate their way of thinking and acting. Adapting to each person's rhythms and procedures.

Another point that is important to highlight is the issue of language. In the project, the officially defined language was English. However, it was interesting to notice the curiosity among the participants in learning the native language of others, such as Finnish, Spanish and Portuguese. What became more evident is that language is not a barrier and can be a great tool to stimulate rapprochement between people.

At the end, considering all the challenges that arose, the results were excellent. By having all students and other participants in virtual chat groups, the exchange of messages often only reinforces that one of the main objectives has been achieved: the connection between the members of the groups. They will be connected in building relationships that directly impact managing, thinking, and developing projects.

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CHAPTER

06 Team 5: Insertion of sustainable productive chains of conservation units in the Market

Ana Lúcia Soares Machado[15]

Jucimar Brito de Souza [16]

The first reaction to the invitation to participate in a project of this magnitude was one of concern. After all, we would have a series of challenges, ranging from acting differently with the students, as a coach, to communicating in English. Also, working with students from different areas, different cultures, and not necessarily in our area of expertise. It takes us out of the comfort zone — all to meet the demand of an external partner, that is, something challenging. However, we cannot deny it. It was a unique experience to share with the other colleagues in the LAPASSION@Manaus team, and learning with these young people was remarkable.

6.1. THE CHALLENGE AND THE COUNTERPART

The coordination organized the choice of the partner company. It was motivated by the theme of LAPASSION@Manaus, with a strong bias in the environment. Therefore, our partner was the State Secretariat for the Environment (SEMA). We set up a meeting with the secretary Dr. Eduardo Taveira, and we had a very fruitful conversation. It was clear that SEMA was interested in addressing the problem of small family farmers, from the state's conservation units, of placing their products on the market. It would bring several possibilities to the student team in the secretary's view, and we immediately agreed.

At that meeting, the secretary introduced us to the manager of conservation units, Mr. Kleber Bechara, who became our primary interface with SEMA. From this moment on, we started to discuss several ideas and managed to align them in this challenge: Insertion of sustainable productive chains of conservation units in the Market.

It is essential to understand that Conservation Units (UCs) are natural areas created and protected by the municipal, state, and federal government. UCs are regulated by law No. 9,985/2000, which established the National System of Conservation Units (SNUC). The SEMA is responsible for the management of 42 UCs with a management plan. The total area of these UCs is 18,907,378.34 hectares of legally protected forest, which represents 12.13% of Amazonas state area, dividing it between 34 for sustainable use and 8 for complete protection. (AMAZONAS, 2007).

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In these areas, environmental public policies are more effective, due to the governance environment, in partnership with the traditional resident populations through the implemented Councils. That was the “size” of our challenge.

6.2. THE TEAM

The students were chosen together with the LAPASSION@Manaus team to define all collaborative teams among foreigners, Brazilians, and local students. We tried to have at least one student with knowledge in the environmental area in the team, as it would be essential to have someone with this profile to facilitate communication with SEMA in the area's specific terms and concepts. In the end, the team stayed with the following students, the first being the team coordinator:

- Lucyanna Moura – Environment, IFAM/BR
- Jeniffer Alejandra, Tourism and Hospitality, DUOC/CL
- Ana Carolina Paiva, Mechanical Eng., IFAM/BR
- Vitor Leonardo, Languages, IFAP/BR
- Kennedy Azevedo, Advertising, – IFAM/BR

As you can see, all students are from different areas and places, like a student from Chile, a student from Amapá, and the others from Manaus. Despite the differences, the team has always worked cohesively in the development of activities, as the specific skills of each team member complimented the group's needs. The main characteristic of the team was the diversity of ideas brought from their formative experiences, and the most significant difficulty that we could perceive was the ability to overcome the differences and understand that they were only obstacles to be overcome, not barriers.

From the articulation and individual relationships, it was possible to extract his best because excellence is not perfection. It is only "your best," respecting the limits and difficulties of the moment. Due to the pandemic situation, we had to work in the home office, and some members had to deal with losses in the family and others with anxiety attacks, among others. However, it was handled correctly by the team without significant compromises. Figure 6.1 shows the team and coaches' first meeting in the LAPASSION@Manaus workspace before starting the pandemic. After the pandemic, the meetings were online, and the service was provided through a social network group.

Figure 6.1. First team meeting with coaches.

Source: The authors.

6.3 THE IMMERSION

At this stage, we were still working presently, and the team immerses themselves in the problem to understand its specificities, possibilities of the solutions, material and logistical needs, among others. Of course, it wouldn't be possible to operate in all UCs, so we focused our efforts on the Puranga Conquista Sustainable Development Reserve (RDS) in agreement with SEMA.

The team had already trained in the Design Thinking (DT) method in the first week and already had a good sense of the steps to follow. It was interesting to see the initial excitement at this stage, while the concern to realize how big and complex the problem was.

The strategies for this immersion were a) documentary research provided by SEMA, b) strategic map of the UCs' demands and locations, c) logistical assessment, d) brainstorm.

e) interview with the manager of protected areas, Mr. Kleber Bechara, and f) on-site visit.

All was implemented, except for a visit, due to the lockdown in conservation units in Amazonas at that time.

In this phase, a significant difficulty was using online meeting tools and communication with small producers in their communities in RDS, which were also overcome through dialogue with the unit manager. They created a WhatsApp group between the team, community representatives, and the unit manager. One of the immersion actions can be seen in Figure 6.2, which was the study of the documents provided by SEMA and an analysis of the scenario map concerning small producers in these areas.

Figure 6.2 Immersion in study scenarios of UCs.

Source: The authors.

This immersion showed us that (i) the demands were actual and challenging, (ii) distances were difficult to be assessed, (iii) and contact with the community representatives contributed to the bonding relationship, where the team could feel the pain of the other and find ways to overcome barriers, obstacles and develop a solution. Still, in the immersion phase, the team chose a name and image that could be their

identity since the river is the best way of transport and access to the UCs. The name Canoa was chosen because it is the name in Portuguese of transport way most used by the community, and it allows access to the most remote and rugged access places of the UCs.

6.4. THE IDEATION

The ideation phase went through a comprehensive discussion in the field of possibilities. It was exciting to see the multiple views of the students since they came from different areas. They didn't need much guidance and conducted this phase well, leaving us within an observation mode, mainly regarding the ideas' scope and feasibility and addressing the proposed challenge.

There were several good ideas. At least three of them would have been well accepted by our counterpart. After a joint debate and exchanging ideas with the counterpart, the proposed solution was to create a visual identity for the forest products, sustainable packaging, entrepreneurship courses, and a booklet including basic information and the path to developing entrepreneurs their products. We can see in figure 6.3 an example of a meeting to discuss ideas and suggestions.

Figure 6.3. showing ideas to the challenge

Source: The authors.

6.5. THE PROTOTYPING

During the COVID-19 pandemic, the task of developing the prototype was even more remarkable, as it was not possible to visit the local community to learn about details of the products and the production chain. However, the team divided the tasks according to each one´s skills and always made decisions together. It had a lot of dedication and the support of the counterpart in this interface.

In the end, it was decided that the team would develop two products:

[a] the visual identity for the products, creating a logo and label for the best-selling product in the community. It was a miraculous ointment, which main active ingredient comes from a tree in the forest called Jatobá - Hymenaea courbaril, and;

[b] a booklet with the basic information and necessary steps for forestry entrepreneurs for the development of their products.

The development of the prototype took place with the following steps:

1. Creation of visual identity:

[a] Several designs were presented to the team and the small producers to choose the product's visual identity.

[b] After that, it was necessary to find a partnership to build this visual identity.

2. Building the booklet:

[a] Selection of contents.

[b] All the instruction was writing for the reader to understand quickly.

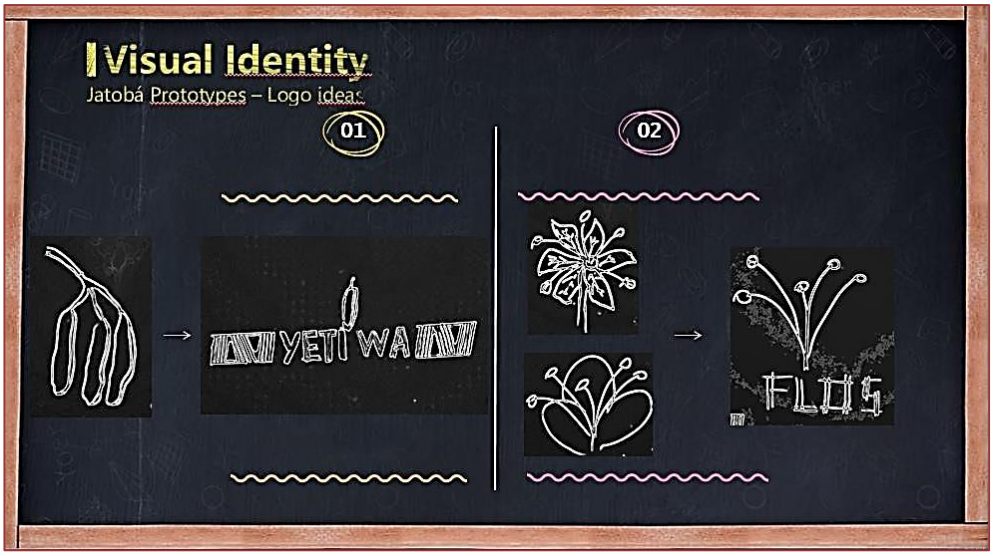
[c] Develop a beautiful visual presentation

[d] Selection of photos.

[e] Final review.

For each stage, the project was informally presented to the counterpart, allowing feedback on the decisions made and possible refinements. In practice, it was not decisive because the UC community and SEMA well accepted the team's proposal and the adjustments. We can see in Figure 6.4 the development phase of the prototype.

Figure 6.4. The prototype development.



Source: The authors.

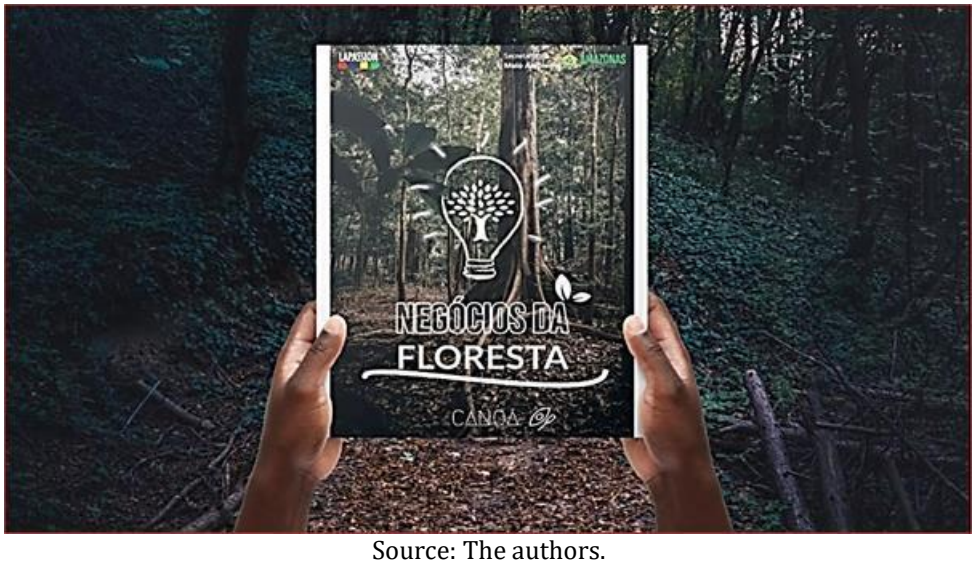
6.6. PROJECT'S RESULT

The challenging last week arrives and the final and public presentation of the project's results, within a counterpart public evaluation. As usual, the students were anxious and very nervous about this final step. The presentation was made in English and then repeated in Portuguese for a three-minute duration. As agreed with the team, the student Ana Carolina made the final presentation with great propriety. Figures 6.5 and 6.6 illustrate the final product in an online format in the DemoDay presentation.

Figure 6.5. Visual Identity on DemoDay.

Source: The authors.

Figure 6.6. The online version of Booklet on DemoDay.



Source: The authors.

The counterpart's evaluation was incredibly positive. The prototype was transformed into a product and distributed to the UCs in Amazonas after the project. The product can be found on the SEMA page, at the link http://meioambiente.am.gov.br/wp-content/uploads/2020/08/NegociosdaFloresta.pdf.

6.7. THE LEARNING

More important than the prototype created in the project, the main goal of LAPASSION@Manaus was to provide for these students the development of soft skills in a networked innovation environment. It should be noted that 70% of LAPASSION@Manaus occurred under the strong influence of the pandemic COVID-19, occurring remotely, and this brought with it the necessity to further develop these skills.

The learning perception that we will describe is subjective and based on the partial evaluations of the project, which take place weekly, in daily monitoring of the work, mainly through the team's social network, and in comparison of the students' attitudes between the first and last week of the project. In general, we can say that the team developed these soft skills:

1. Teamwork;
2. Communication;
3. Resilience;
4. Creativity and innovation;
5. Leadership;
6. Respect, among others.

We are adaptable beings and learners. We can see this in every project, in every meeting, and at every opportunity. Guiding this team was a challenge, but we all grew up, developed unknown or perhaps unimaginable skills. LAPASSION provided this personal and professional growth to the entire team. The keywords perceived throughout the development of this project were resilience and overcoming. The student finishes their project so happy, as shown in Figure 6.7.

Figure 6.7. Demo Day presentation.

Source: The authors.

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CHAPTER

07 Team 6: Sharing knowledge tool in the schools of the Conservation Units

Criscian Kellen Amaro de Oliveira Danielli[17]

Rodrigo de Souza Amaral[18]

7.1 THE PARTNER AND THE CHALLENGE

The challenge addressed in this chapter arose from the partnership between the LAPASSION Project - Manaus Edition and the Foundation for Amazon Sustainability - FAS (Fundação Amazônia Sustentável), a non-profit civil society organization. The FAS was founded in 2008. Its mission is to contribute to the environmental conservation of the Amazon by enhancing standing forests and their biodiversity and improving the quality of life of riverside communities associated with the implementation and dissemination of knowledge on sustainable development. Thus, among the complementary programs implemented by FAS in State Conservation Units, those related to education stand out to improve social indicators in communities in the interior of Amazonas state.

Due to logistical difficulties and poor access to communication, remote communities in the Amazon have low levels in National indicators of educational attainment, suggesting the need for innovative methods and tools to suit the reality of these populations. In this context, and considering the role of FAS in these communities, the partner proposed the theme "Sharing knowledge tool in the schools of the Conservation Units" as a challenge.

The proposed challenge is based on the need to assist teachers and educators in the insertion of regional themes in the classroom, highlighting elements and values of the local culture and proposing solutions for sustainable development. Therefore, the development of data sharing app/tools for leveling knowledge and subsequent scheduling strategy for other remote areas can significantly strengthen the training centers for young people/teenagers in remote areas of the state.

Throughout the project, the technical staff of the partner was available to carry out meetings with Team 6, making possible the appropriate adjustments to the development of the solution within the individual needs and capacities. Besides, FAS promoted a visit to one of its areas of activity to facilitate developing activities linked to the Design Thinking methodology.

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7.2 THE TEAM

Team 6 was composed of five students of different nationalities and academic backgrounds, as shown in Table 7.1.

Table 7.1 The team 6

Student	Country	Institution	Course
1	Brazil	Federal Institute of the Amazonas - IFAM / Brazil	Advertising Production Technology
2	Brazil	Federal Institute of the Amazonas - IFAM / Brazil	Automation and Control Engineering
3	Brazil	Federal Institute of the Amazonas - IFAM / Brazil	Biological Sciences Teaching
4	Brazil	Federal Institute of the Amapá - IFAP / Brazil	Mathematics Teaching
5	Portugal	Superior Institute of Engineering of Porto - ISEP / Portugal	Medical Computing and Instrumentation Engineering

Source: The authors.

The team's heterogeneity was a significant factor in broadening the discussion around the challenge theme. Each student, from his academic, professional and personal experience, contributed and enriched the discussion. This fact guaranteed integration of common interests and identification of the benefits in the existence of different skills to execute the work proposed.

The team was accompanied by two coach teachers (Criscian Danielli and Rodrigo Amaral) from the Instituto Federal do Amazonas - IFAM. They had different academic training, Forest Engineering and Veterinary Medicine, respectively, but both had professional activities in the environmental area, which contributed to coaching. Despite the more significant number of Brazilians on the team and all participants were fluent in the Portuguese language, students were encouraged to communicate in English since this was the official language of the Project.

7.3 IMMERSION

Given the challenge, the students started researching the related problems with the challenge (Figure 7.1). This research helped the team to formulate questions for data collection, as well as to develop appropriate strategic observation. At this early stage, the students seemed uncomfortable as the instructions were not clear enough to direct the next steps. It was the beginning of the deconstruction of the expectation that they should passively wait for the teacher to provide the best direction to be taken.

Faced with the challenge and guidance on Design Thinking, students focused on understanding the problems around the theme and identifying the possible stakeholders involved. After listing all stakeholders impacted, they divided the tasks among the team members. Each student was responsible for collecting the relevant information through active research and interviews with the actors involved.

During the immersion stage, a visit was made to the target site of the challenge, The Tumbira Community, located in the Rio Negro Sustainable Development Reserve, where FAS already carries out other activities. The visit was an essential step in

immersing the problem and the general context of understanding the Amazonian environment, especially for students who are not from the region.

During the visit, the team communicated with the target audience, understanding their needs, knowing the current resources available and the possible difficulties that the environment could provide. The meeting with the FAS technical staff was also significant to understand the challenge presented and the expectations of the Partner Organization.

In this Immersion phase, the guidance and feedback from the coaches are highly relevant to avoid any limitation for the next steps of Design Thinking due to the problems faced and stakeholders identified, and, consequently, do not restrict the creative and innovative process.

In the Analysis and Synthesis phase, students presented and defined the criteria and parameters that guided and determined limits for developing the innovative solution within the scope of the real purpose. Also, they identified the “personas” from the target audience defined earlier, based on the needs raised during the Immersion phase.

At the end of the Immersion phase and the beginning of the Analysis and Synthesis phase, the LaPassion - Manaus Project began to suffer the consequences of the COVID-19 pandemic. Therefore, students from outside the city of Manaus returned to their home cities. Thus, the work dynamics had to be adapted to be carried out remotely. This abrupt change initially scared the students, but they quickly adapted to the new way of working and the necessary adjustments to develop the project. During the pandemic period, the constant contact of the coaches with the team members was essential, encouraging them to continue the stages of the project. The contact was by text messaging applications or in virtual meetings with the team.

Figure 7.1 - Team 6's members during the Immersion steps.

Source: The authors

7.4 IDEATION

In this phase of Design Thinking, the team, after analyzing and synthesizing the data, carried out the creative technique of brainstorming and initially arrived at the definition of three possible solutions: development of a social network, application, a game, or a website. Given all the information collected, criteria and parameters defined, the team strategically analyzed the ideas generated from a positioning matrix (Table 7.2). This tool was handy to evaluate the benefits and challenges of each solution since the students manifested tendencies of choice between one or the other idea. Therefore, using the matrix was possible to evaluate the impacts and the viability of each idea to select only one for the prototyping phase.

Table 7.2- Positioning matrix developed by the Team members

Ideia /criterion	Be a product that is applied And supplied by fas and the Teachers (4pts)	Partial offline capability (2pts)	Intuitive (5pts)	Visually Attractive (3pts)	Easy to share (4pts)	Based on Social innovation (5pts)	According with ONU Sdg's (4pts)	Total
Social network	x	-	x	x	x	x	x	25
Project sharing application	x	x	x	x	x	x	x	27
Educational mobile game	x	x	x	x	-	x	x	23
website	x	-	x	x	x	x	-	21

Source: The authors

When evaluating the positioning matrix, the team defined that the best innovative solution would be a smartphone application that would share sustainable development practices among the communities served by FAS. It is noteworthy that this phase was developed entirely using online tools. Despite adapting the works to this remote form, the students managed to develop the stage productively and enthusiastically with virtual meetings.

7.5 PROTOTYPING

For the development of the prototype, Team 6, in partnership with the FAS technical staff, collectively defined the applicability and content present in the application and its dynamics of use. For this definition process, the coaches' participation was significant as a way of stimulating the team's acute sense of the product's efficiency for the target audience and guiding them on how and where to look for instructions about creating an application with the desired functionality.

During this phase, the team worked hard on the creation of the prototype. It had several meetings with professionals and specialists in the area of application creation. Besides, they used online tools and explanatory videos on the topic, which made it possible to apply in the construction of the final product.

During the prototyping process, the team held several meetings with the technical staff of the Partner Organization to adjust the functionalities of the prototype and demonstrate the evolution of the product. This direct contact with the partner is significant for the team to meet the demand and develop a product suited to reality and expectations.

It is noteworthy that this phase was significantly affected by the restrictions of the pandemic situation and the direct impacts on the psychological condition of all members. On that occasion, the coaches acted strongly in encouraging the team to

continue the work, however, without interfering in the team's constructive process, maintaining the premises of the methodology used in LaPassion.

7.6 THE RESULTS OF THE PROJECT

At the end of this journey of the LAPASSION project, Team 6 developed a smartphone application called SAPOPEMapp (Figure 7.2), a platform with a simple and interactive interface allowing the posting of photos and videos. Using the SAPOPEMapp, the students can execute sustainable thematic challenges proposed by teachers or educators and upload photos and videos of the results to share and interact with other schools in the riverine communities served by FAS.

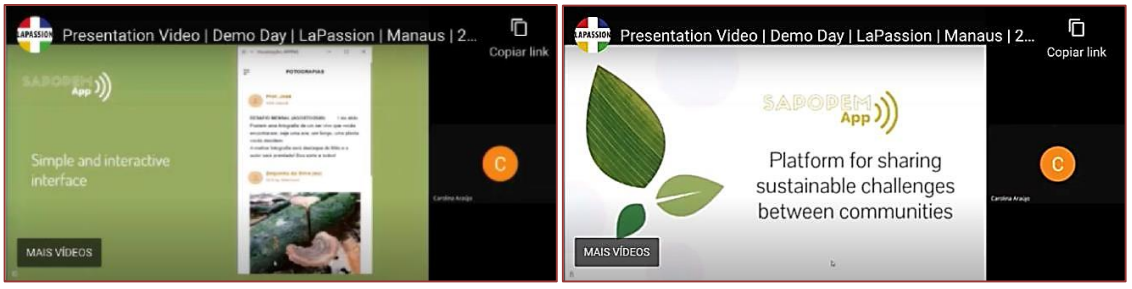
The product was delivered only as a prototype. Its functionality has not been tested due to the restrictions imposed by the pandemic. There was the suspension of classes and the isolation of riverine communities. The product was presented to the board and technical staff of FAS, being received with great enthusiasm and a proposal for future application in the Organization's activities.

Figure 7.2 – SAPOPEMapp logo.

Source: The authors

Likewise, the product was presented at DemoDay (Figure 7.3), a virtual public event to present the results of the LAPASSION@Manaus Project, which was attended by all students and coaches, as well as representatives of partner organizations and educational institutions involved in the Project.

Figure 7.3 – DemoDay presentation



Source: The authors

7.7 LEARNING

The experience of the participating students throughout the process was always challenging and inspiring, considering from the point of view a methodology of an active learning process and teamwork with students of different nationalities in favor of a common solution. In terms of methodology, it was noted that the use of Design Thinking as a LAPASSION approach increased students' confidence in the search for solutions to complex problems, in addition to providing tools that helped to develop different support perspectives for various social and academic skills.

However, it should be noted that the restrictions imposed by the pandemic increased the challenge and made the whole process new for both students and the staff involved. Thus, it was necessary to intensify the meetings between the coaches and the organizing staff to monitor the progress of the project in each team and seek solutions for the unforeseen events that arose during the journey.

Although the experience and social interaction among students, in very heterogeneous conditions of personality, academic and cultural background, are an important point in the process of training students within the scope of LAPASSION@Manaus, the project demonstrated that it was extremely feasible work in a hybrid process, starting in face-toface way and then migrating to remote way. It is noteworthy that the face-to-face interaction in the first weeks was essential for creating links among the members of the group, enabling empathy and companionship during the difficulties imposed during the phase developed in a virtual form.

The experience was challenging and of great learning for coaches, mainly because the project uses methodologies that seek the transition from an education based on passive teaching methodologies to more active learning based on problems. The experience brings to light the possibility of its application on other occasions, whether in the form of extension or teaching projects and within courses. From the point of view of the methodology, it can be said that Design Thinking challenged both the team and the coaches to develop and use knowledge in a playful way, emphasizing behavioral skills and promoting the development of creativity and innovation.

In general, the LAPASSION@Manaus converged with the growing complexity of the worklife and the studendts' skills needs, which have increasingly demanded the development of broad, deep and innovative human capacities related to thinking, feeling and acting.

More information about the Foundation for Amazon Sustainability - FAS can be found at https://fas-amazonia.org/english/. The development process of Team 6 and can be accessed at the blog https://lapassionmao6.wordpress.com/.

CHAPTER

08 The students' mindset change

Emanuelle Lorena Teixeira Chagas[19]

José Pinheiro de Queiroz-Neto[20]

For a long time, professional and technological education has been seen as an education aimed only at training qualified labor for work-life. This misconception continues even today. It is the result of the dual education that has always been present in the Brazilian educational structure: to the elite´s children should be offered a propaedeutic, academic education, capable of educating young people to continue their studies at a higher level; to the workers' children, it is only up to them to learn technical skills that will enable them to do manual work, without the need for reflection about that work.

Overcoming this dual school is the biggest challenge imposed on educators who defend a unitary and a fair school that does not differentiate between manual and intellectual work. It is for a school that manages to educate critical citizens prepared for the world of work and, at the same time, manage to develop their cultural, scientific, and social dimensions, for which we strive. In other words, the integral human education of the students is what we seek to promote when we are faced with initiatives such as LAPASSION@Manaus.

Therefore, professional and technological education, in addition to preparing students for the world of work, should encourage intellectual autonomy and critical thinking to make them a question and reflect on the society in which they are inserted and to make them aware of their responsibility in the fight for the environment, for natural resources, for human rights, against racism, for the defense of diversity and fraternity among people

It is precisely based on this ideology of a school that provides the integral human education of the student that the success of LAPASSION@Manaus can be measured. All the projects were presented on *DemoDay* at the end of the project. Because the pandemic was carried out online. The project website can be accessed at (LAPASSION@Manaus, 2020). There were all phases of the project, participants, links to the projects, final activity report, and other materials prepared during the activities' execution.

At the end of the project, students voluntarily answered a project evaluation questionnaire and participated in online interviews. With these instruments, we obtained responses attesting that the project effectively contributed significantly to the development of soft skills and professional training, highlighting the expansion of intercultural relations, communication in a foreign language, education with a scientific bias, socio-affective development, and citizen education of those students.

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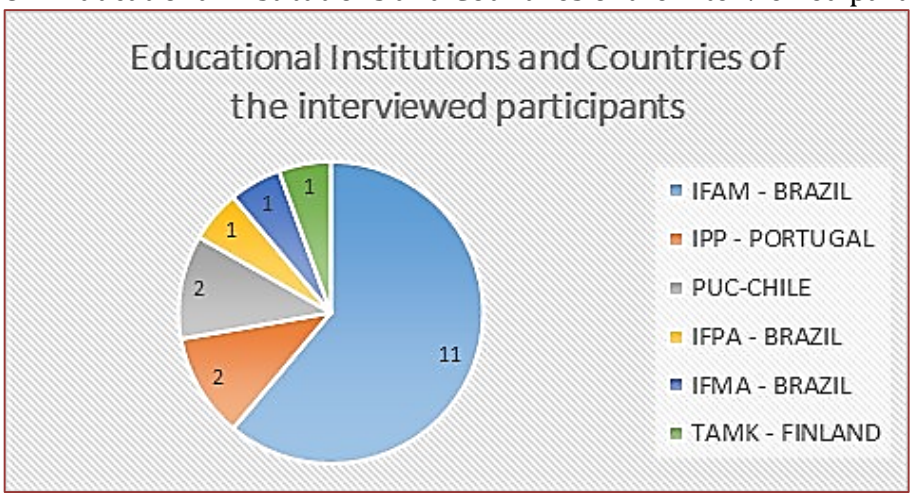
8.1 SUBJECTS AND INVESTIGATIVE RESEARCH PATH

The research with students consisted of two instruments: a questionnaire with closed questions and a semi-structured interview submitted to the Brazilian Ethics Committee on Research with Human Beings (CEPSH), CAAE 27384619.2.0000.0006, having been approved both for the application of the questionnaires and for semi-structured interviews. The group of participants was composed of 12 (twelve) women and 8 (eight) men, with ages ranging from 18 to 28 years old, who came from countries like Chile, Portugal, and Finland, and other states in Brazil. Graphic 8.1 shows the country and the institution of the participants.

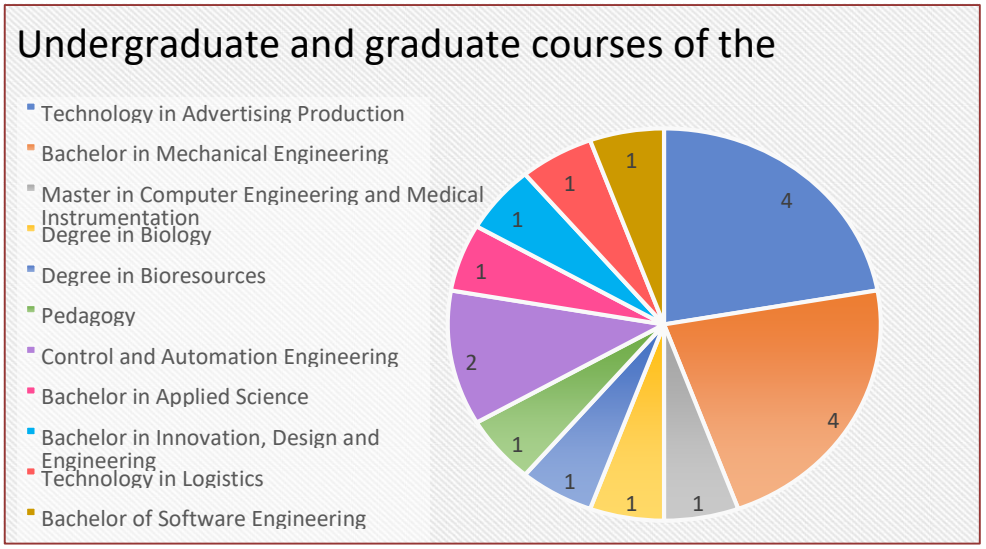
Graphic 8.1. Educational Institutions and Countries of the interviewed participants



Source: The Authors

The interviewees' diversity was related to their places of origin and their undergraduate courses that cover both technological and bachelor's courses and degrees in the most diverse areas of knowledge and the participation of a graduate student. Below, we present Graph 5.2 detailing the undergraduate and graduate courses of the participants:

Graphic 8.2. Undergraduate and graduate courses of the interviewees



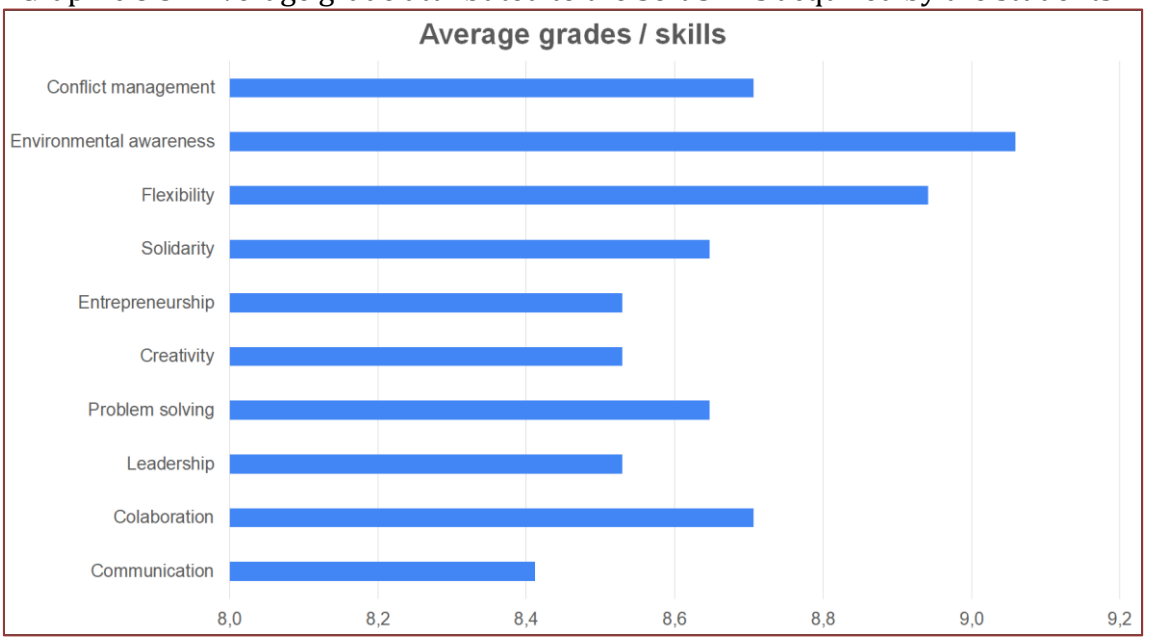
Source: The authors.

8.2 QUANTITATIVE RESULTS

The first instrument consisted of applying a questionnaire to obtain quantitative data regarding the interpersonal skills (soft skills) linked to integral human education and possibly apprehended by the participants, with closed questions on a scale of 1 to 10. The result of the questionnaire is shown in Graphic 8.3 and demonstrates the success in developing these skills in students. The class average of the evaluations was above 8.4, with a maximum score of 9.1. The lowest average grade was obtained in the "communication" skill, which was already an excellent grade, considering that there were students with different native languages (Portuguese, Spanish and Finnish) and that they all needed to communicate in English. Besides, the isolation due to the pandemic may have impaired this immersion in communication.

The "environmental awareness" skill obtained the highest average score, meaning that the theme and the student's immersion in the Tumbira Community made a considerable difference in the first week of the project, even for the local students. They discovered themselves as essential agents in defense of the environment.

Graphic 8.3 - Average grade attributed to the Soft Skills acquired by the students.



Source: The authors.

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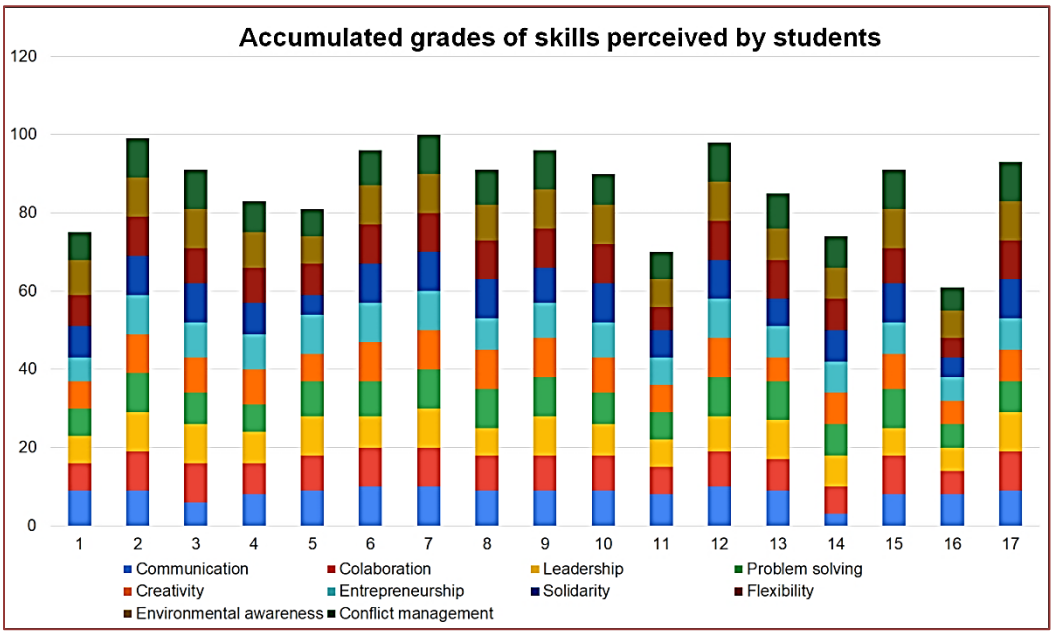
Individually, all the respondent students had a perception of improving soft skills, as shown in Graphic 8.4. We can see that five students had close to 100% success rate, while only three had a perception below 80%.

Graphic 8.4 – Self-perception of the soft skills acquired by each student.



Source: The authors.

The student with the lowest perception of development, in general, indicated a 60% achievement. It means that there is still a need for more individual monitoring, without loss of student autonomy, to check if he had difficulties in developing the project or if he already had a good level of skills and, therefore, had a lesser perception of their use.

8.3 QUALITATIVE RESULTS

The semi-structured interviews were conducted to obtain data for a qualitative research, that is, with the objective of describing and understanding the phenomenon given in its subjective character, from the participants' perspective. Thus, from 13 (thirteen) questions in the interview script, those that could answer the following research question were selected: The activities developed at LAPASSION@Manaus contributed effectively to developing soft skills and, therefore, to the integral human education of participating students?

The analysis, systematization, and interpretation of the answers to the interviews - which we will call the research corpus, from now on - were carried out through Discursive Textual Analysis, a data analysis approach that lies between Content Analysis and Discourse

Analysis, proposed by Moraes and Galiazzi (2016). According to these authors, Textual Discursive Analysis (TDA) can be understood as a process of building understandings in which understandings "emerge" from an iterative sequence of three moments: the deconstruction of texts from the "corpus" (unitarization); the establishment of relations between the unitary elements (categorization); and the emergent capture in which new understandings are communicated and validated (production of metatexts).

Thus, following the TDA cycle, we first worked on the unitarization of the corpus of analysis, namely, interviews with 18 (eighteen) students participating in the project. Initially, the interviews were transcribed, and the subjects were renamed following a

type of code, such as S1, S2, S3 ... Then, the corpus was delimited in only 5 (five) of the 13 (thirteen) questions in the scripted interview since we only chose the most relevant questions to our main research question.

Following the delimitation of the corpus, it was deconstructed entirely, focusing only on excerpts from the interviews about the possible development of the integral human education of the students of LAPASSION@Manaus. With the texts deconstructed, the extracts from them were succinctly rewritten. They had complete meanings in themselves, thus generating the units of meaning, which were coded so that the context in which those lines were spoken was not lost. In Table 8.1, there is an example of how two units of meaning were generated:

Table 8. 1. Table of units of meaning within the TDA approach

TABLE OF UNITS OF MEANING			
RESEARCH PROBLEM: **The activities developed at LAPASSION@Manaus contributed effectively to the development of soft skills and, therefore, to the integral human education of participating students?**			
METHODOLOGICAL INSTRUMENT: **Interview with the students, highlighting only questions 1, 4, 5, 8, and 10 of the interview scripts.**			
IDENTIFICATION OF THE SUBJECT OF THE RESEARCH: **Female, 28 years old, Brazilian, IFAM, undergraduate student in Technology in Advertising Production.** IDENTIFICATION CODE: **S1**			
QUESTIONS TO ANALYSE	**UNITARIZATION (Disassembly of texts)**	**CODING OF THE UNITS OF MEANING**	**UNITS OF MEANING (Rewritten)**
1 - How was it, for you, to have participated in LAPASSION?	"[...] the difference was just that, internationalization. I usually participate in forums, I participate in projects, but always with Brazilian people from my city and that was the difference even [...] I worked during the 10 weeks with people from my group and from other groups, so people from outside, from my country, and from different cultures, it was the best thing. "	S1.1	Interaction with people from different countries and cultures.
	"[...] talking to people from areas similar to mine or not, getting to know these people and working with them actively [...]"	S1.2	Opportunity to work with people from different fields of knowledge.

Source: The authors.

After this process of unitarization, we worked on categorizing units of meaning, which took place through the grouping of these units by the proximity of meanings. Those categories were created with our main question as a starting point - whether the activities developed at LAPASSION@Manaus contributed effectively to the development of the participating students. We ended up generating 13 (thirteen) initial categories, 6 (six) intermediate categories, and 4 (four) final categories, the latter corresponding to four critical dimensions' mindset changing, as shown in Table 8.2.

The categories in Table 8.2 include essential axes for the promotion of an education that prioritizes the development of all the student's potential as an individual in society and a professional inserted in the world of work. That is, they encompass the cultural, professional, scientific, and social dimensions of the student.

Table 8. 2. Table of categories generated by a grouping of units of meaning

	Initial Categories	Intermediate Categories	Final Categories
1.	Interculturality	Internationalization.	Cultural Dimension
2.	International Academic Mobility (Exchange Program).		
3.	Learning and improvement of foreign language skills.		
4.	Development of a project aimed at solving a real problem proposed by a partner organization or company.	Work as an educational principle.	Professional Dimension
5.	Socio-emotional skills necessary for the world of work nowadays (Soft Skills).		
6.	Use of an innovative methodology to solve problems in an empathic and creative way (Design Thinking).		
7.	Carrying out intense research for the development of the project and the creation of the prototype required by partner organizations and companies.	Research as a pedagogical principle.	Scientific Dimension
8.	Construction of interdisciplinary knowledge.	Scientific knowledge.	
9.	Creation of bonds of friendship and a feeling of unity among project participants.	Education for life in a more fraternal and tolerant society.	Social Dimension
10.	Development of feelings of empathy and tolerance towards each other.		
11.	Knowledge of the Amazonian reality.	Education for citizenship aiming at the qualification of critical and responsible citizens for the environment that surrounds them.	
12.	Knowledge of themes and legislation related to the environment and sustainability.		
13.	Development of a critical awareness that implies changes in thinking or behavior concerning to the Amazon and the environment.		

Source: The authors.

8.3.1 CULTURAL DIMENSION

It was found that internationalization was a great advantage. The reason is that, as it was an international project, LAPASSION@Manaus enabled interculturality, academic mobility in the form of an exchange program, and learning and improvement of foreign language skills. Regarding interculturality, the interviewees highlighted that the project allowed them to live and meet people from different countries and states and observe that they have different cultures and worldviews. Consequently, they developed feelings of respect and patience to understand cultural habits and customs different from their own. With this, prejudices and stereotypes were broken since the coexistence between students generated empathy between them, who started to put themselves in the other's place to understand cultural differences. Finally, this intercultural exchange provided knowledge about different fields such as engineering, design, chemistry, and other areas of knowledge such as linguistics, such as the opportunity to perceive lexical differences between Portuguese spoken in Brazil and Portuguese from Portugal.

As for international academic mobility, better known as student exchange, it was noted that Brazilian students and IFAM students stand out here. The project was a unique opportunity to enable a student exchange, meet people from other countries and regions of Brazil, and know their cultural habits without the necessity to leave their city or country. On the other hand, Portuguese, Chilean, and Finnish students highlighted the experience at LAPASSION@Manaus as an essential experience in a foreign country, not only as an exchange program but also as a cultural exchange.

Concerning the third initial category (learning and improvement of foreign language skills), the student's excitement about the opportunity to work, research and make presentations in English, which was the official language of the project, was notorious. It should be noted that none of the participants were native speakers of English, but they all had to use this language to communicate. Thus, this fact corroborated the idea that English is Lingua Franca (Jenkins, 2007), as it is the most used language in interactions between speakers of different mother tongues. Many claimed the improvement of their oral skills and English language proficiency due to the project. A student from IFAM pointed out that LAPASSION@Manaus was a unique opportunity, as it provided him with the practice of the English language, in the form of an immersive program, without even having to leave his city. Chilean students also mentioned the Portuguese language as a foreign language that was learned and improved during the project.

8.3.2 PROFESSIONAL DIMENSION

In this dimension, it was found that one of the principles of professional and technological education was present throughout LAPASSION@Manaus: professional and technological education work as an educational principle. This principle occurs when we note that LAPASSION@Manaus provided students with a project aimed at solving a real problem proposed by a partner organization or company. It promotes the development of socio-emotional skills necessary to the world of work nowadays, soft skills, and led to the use of an innovative methodology to solve problems in an empathetic and creative way, in this case, Design Thinking.

The interviews revealed that the project was an opportunity to apply, in practice and in a professional way, theoretical knowledge built on college and provide an awareness of the social responsibility of the professions that those students intend to exercise in the future. The students had to develop a prototype to solve a real-life problem proposed by organizations and equally authentic organizations. Conversely,

LAPASSION@Manaus also provided knowledge about the environment, which students intend to use in their future professional practice.

Concerning the soft skills developed by the students, the most mentioned were:

Teamwork: taking into account that the participants had to work in teams with people of different nationalities, languages, worldviews, and fields of knowledge; the leadership ability: not as something imposed, but as an involuntary feeling so that in the end, the project works; the ability of a personal organization to meet deadlines; emotional control and the ability to concise academic presentations in public; and, mainly, the skills of flexibility and resilience, due to the pandemic of COVID-19, which, at first, could hinder the work of the teams, but, on the contrary, provided learning and was a reason for overcoming the difficulties.

Concerning design thinking as a methodology to solve real problems, many participants reported that they intend to use the method in their future professional practice and solve day-to-day problems. Also, a student stated that DT learning enabled him to improve his planning and organization skills since the methodology follows well-defined steps.

8.3.3 SCIENTIFIC DIMENSION

We discovered that, through LAPASSION@Manaus, students were able to develop cognitive skills to make field research, documentary research, data collection, and interpretation of theories and legislation to produce social technologies aimed at the sustainability of the Amazon. Besides, they had the opportunity to analyze, relate, criticize, reflect, reject closed ideas, learn, seek solutions, propose alternatives, etc. Finally, it was reported in one of the interviews, that what was researched during the project was being transformed into an article for publication, thus, showing that the project stimulated the students' scientific education.

As for the next intermediate category of this dimension – the scientific knowledge - which in turn encompasses the initial category “Construction of interdisciplinary knowledge,” it was evident that, because the teams were composed of multidisciplinary groups, the students reported they had learned propaedeutic and applicable content from other areas of knowledge different from theirs, as well as from their area. The most cited subjects were forests, trees, soils, chemical substances, technological information tools (blogs), basic marketing concepts, and even advanced knowledge in modeling and simulations.

8.3.4 SOCIAL DIMENSION

Here, in this last dimension, we group the largest number of units of meaning, that is, we gather statements related to an education for life in a more fraternal and tolerant society, as well as referring to an education for citizenship aiming at the development of critical citizens and responsible for the environment that surrounds them, since this kind of discourse was present in most of the speeches of the interviewed participants.

It is worth mentioning that the project provided favorable moments for the development of bonds of friendship and unity and feelings of empathy and respect, taking into account, mainly, the visit and the overnight stay in a community of sustainable development, which allowed students to get closer to each other outside the working laboratory. Also, the students themselves sought to interact at times outside the project, contributing significantly to the teams remaining cohesive and united in a single purpose: to build a sustainable product for the benefit of Amazon.

Nevertheless, the most common speech, and possibly the most impactful among the interviewees, was that LAPASSION@Manaus provided them with the “discovery” of the Amazon - for those who did not reside in the region - and the “rediscovery” of this biome, on the part of those who lived in the northern region of the country, but who did not know the reality of the Amazon in depth. Thus, by promoting a visit to the Tumbira Community - a riverside community located in the Rio Negro Sustainable Development Reserve - the project allowed its participants to get to know the daily life and culture of the Amazonian man, as well as to see the way that this man deals sustainably with nature. Therefore, most of the students mentioned that this visit "opened" their eyes concerning the importance of the Amazon and sustainable actions to conservation its forest.

Furthermore, it was reported by the interviewees that, having to carry out the challenges proposed by the counterparts, focusing on the development of sustainable social technologies for the Amazon, they came into contact with intense literature and legislation about the environment and sustainability, which provided, also, an improved knowledge of the Amazon rainforest and its forms of preservation.

As a consequence of this intense immersion in Amazonian reality and its issues, it was possible to observe the development of a critical conscience on the part of the students, which implied changes in thinking and even in behavior about the Amazon and the environment. This fact was confirmed by the interviewees' statements, who mentioned the increase in awareness about the importance of the forest for the world and not only for the local population.

It was also highlighted that the sustainable way the residents of *Tumbira* treated the environment was inspiring and influenced students to act in a more respectful way towards the forest. By the way, some students who live in Manaus reported that the excursion to that community helped them reinforce their Amazonian identity, starting to value more their own culture, previously unknown or even disowned by them. Last but not least, it was revealed by the interviews that the interaction with Finns, Portuguese, Chileans, and colleagues from other Brazilian regions, allowed the change of habits related to the environment.

If before the project, some students were not concerned with the amount of plastic bags they used to bring from the supermarket, after seeing colleagues refusing such bags in these places, they started to adopt Eco-bags to carry their weekly purchases, and, thus, started to adopt more sustainable attitudes on daily life, avoiding waste and thinking about the conscious consumption of durable goods.

8.4 CONCLUSIONS

Educational practices must involve, in addition to hard skills, relevant aspects for the formation of students' soft skills, necessary to work-life and to a human integral formation. Also, learning processes focused on innovation are necessary for an increasingly competitive environment, in which Amazonas need to enhance their human talents and strengthen the culture and practice of innovation.

In this context, the LAPASSION@Manaus project presented itself as a means by which we could experience, albeit in a self-contained context, a practice in search of excellent training. We chose a theme that led students to a critical reflection on socioenvironmental technologies, the need for awareness about it, and sustainable practices and technologies for their Amazonian reality.

It was imperative to connect students with traditional forest communities, their history and their reality, their traditional knowledge and potential, while at the same

time they stayed in an industrialized city (Manaus) with multinational companies and a reality totally divergent to the region, what allowed a transformative integral human formation.

The results of LAPASSION@Manaus exceeded our expectations, not only for achieving the objectives of developing soft skills in students but also for providing IFAM with the opportunity to experience a project of this magnitude, bringing changes in attitudes managers, teachers, and students. Although in a small group, this is a seed that will certainly take root in the Campus and spread to involve all the academic community with time and new projects. Over time, this can lead to a change in the perspective and reality of professional training on Campus, in the methodologies used in the teaching and learning process, in breaking the paradigm of the teacher who holds all knowledge, in improving the students' autonomy, based on critical thinking and social awareness.

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