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Funding STEAM Curriculum Development

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Funding STEAM Curriculum Development

by
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Funding STEAM Curriculum Development

An Interactive Qualifying Project
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by
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Report Submitted to:
Professor James Chiarelli
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Marvin Castillo
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ABSTRACT

Panama’s economic success is endangered by economic disparity and an outdated education system. The goal of this project was to improve accessibility to funding opportunities for Fundesteam as well as help the organization increase its marketability so that it can continue to expand their efforts of combating poverty with STEAM education. In order help Fundesteam better report to stakeholders and grantors in order to receive funding, our team created a funding database and updated its website.
ACKNOWLEDGEMENTS

Our team would like to thank our sponsor, Marvin Castillo of Fundesteam. Marvin Castillo and his colleagues at Fundesteam helped guide and formulate our project. Throughout our time working with Fundesteam, Marvin Castillo provided us with vital information for the upgraded website and guidance in analyzing the 3M study. Mr. Castillo was also our initial point of contact in Fundesteam and further, facilitated primary introductions to the rest of his employees. He has played a crucial role in formulating the applicability of our project as well as defining the scope and growth of it throughout our time in Panama. We would also like to thank Mr. Castillo for inviting and allowing us to judge the annual national robotics olympiad that Fundesteam sponsors.

We extend our gratitude to the staff and teachers at Fundesteam who were extremely helpful in guiding our work. Our thanks Pedro Pascual for his help in working with our team to update the website. We would also like to acknowledge the support of Fundesteam’s teachers in their welcoming nature and their help in connecting us to their students; our team appreciates their willingness to distribute the student surveys, which further guided us in obtaining student testimonials. We thank the entire staff at Fundesteam in their hospitality and help in training us to be judges for the national robotics olympiad. Our team thoroughly enjoyed our time working with the members of Fundesteam as they have greatly enhanced our project and appreciation for STEAM education in other countries.

Lastly, we would like to thank our on-site advisor, James Chiarelli, for his continued support and feedback throughout our project. Professor Chiarelli has played a crucial role in connecting us with our sponsors and communicating with Mr. Castillo, while at Worcester Polytechnic Institute and in Panama. Our advisor spent countless hours providing us with
comments and feedback for revisions in both our final paper and presentation. Without Professor Chiarelli’s continuous support and devotion to our project, we would not have achieved the same depth nor structure presented in our final product. We extend our greatest gratitude for his efforts.
EXECUTIVE SUMMARY

Panama has an excellent economy thanks to the Panama Canal. The country’s economic prosperity was brought in by the inflow of wealthy immigrants, the trading power from the canal, and from a strong, banking economy. Although there is much economic success within Panama, its economic growth is endangered by economic disparity and an outdated education system.

Most of the money that enters Panama is condensed in the capital, Panama City, perpetuating a cycle in which those who live in outer cities and provinces are often marginalized and remain in less favorable economic conditions, while those in the capital live more prosperously. This financial divide contributes to the unbalanced distribution of wealth.

In the past few decades, technology has advanced rapidly, creating many new opportunities in STEAM. With its many international businesses, Panama needs professionals within STEAM in order to sustain and grow its economic success. However, Panamanian students are not being prepared for the future of STEAM. This is primarily due to Panama’s public and private school system being very divided. Private schools have extreme prestige and offer a better level of education and facilities in comparison to public schools, which experience high dropout rates and teach an outdated education curriculum that places a heavy emphasis on humanities. The absence of STEAM education in modern day curricula creates an obstacle for Panamanians who cannot afford private school as they are faced with a barrier in any attempt to enter new STEAM careers. Aside from the shear disparity with resources, the physical distance from outer provinces to Panama City provides further difficulty in accessing STEAM education.

The issues of economic disparity and a lackluster education system have led to the creation of Fundesteam, our sponsor, who seeks to improve STEAM education across Panama and spread opportunities to children from lower income backgrounds. Fundesteam is a non-governmental, non-profit organization based in Panama City whose main mission is to combat poverty in Panama through STEAM education. Unfortunately, one of Fundesteam’s major obstacles is obtaining funding to expand and continue operating these programs. In order to reach their project goal of 800,000 children, our main project goal was to improve accessibility to funding opportunities for Fundesteam as well as help the organization market itself better.

We achieved this goal through three main objectives: creating a funding database, conducting a general survey, and upgrading the current website. Prior to the team’s arrival to Panama City, 3M conducted a two weeklong organizational analysis of Fundesteam. At the end of the two weeks, 3M provided Fundesteam with a study and presentation of their observations of the organization as well as recommendations for further success. Our team used 3M’s study to structure our work and guide us in accomplishing the project goal and objectives.

For the funding database, Fundesteam gave us a clear idea of the type of database they required and the information they wanted to include within it. We created the most informative and concise one for their purpose. All potential opportunities were compiled in an Excel sheet. With 3M’s analysis, they provided Fundesteam with an excel sheet that contained a list of 66 potential donors for the organization. Our team utilized this existing sheet by creating sub sheets within the document listing “Donors”, “Grants”, and “Possible Partnerships”. Each sheet was
enhanced with more opportunities that were found on Pivot and Foundation Directory Online. Each sheet contains columns that lists the grantor, donor or partner, a link to the grantor’s, donor’s, or partner’s website with more information, a synopsis of each entry, and all necessary contact information. All grant opportunities have an additional column that lists any special requirements Fundesteam must meet or do before applying for the opportunity. The final database contained information for 42 donors, 28 grant opportunities, and 14 possible partnerships.

In order to understand and present the work Fundesteam has done and its importance, our team administered written surveys to current Fundesteam students to understand the work Fundesteam has done so far and the impact they have made. These survey responses were incorporated into their website to further improve their marketability through emphasizing their mission. The initial plan to survey World Robotics Olympiad (WRO) participants and trained Fundesteam teachers in addition to the students who attend programs at Fundesteam proved not to be possible. Since Fundesteam has trained teachers at over 50 schools all over Panama, contacting and communicating each school would have been extremely difficult. We could not survey WRO participants because Fundesteam did not have any contact information for the teams.

Our final survey was given to students between ages 10 and 17 who attended day and after school programs at Fundesteam. We received 13 responses from the survey and all respondents were between the ages of 10 and 15. Of the 13 responses, only two provided any meaningful responses that could be potentially used on the website.

For quantitative student data, the team received access to results from a past survey conducted by the Pan American Development Fund (PADF), which was taken by 1616 students in 6th through 12th grade who attend schools that Fundesteam worked with. The survey was developed by a team of researchers at North Carolina State University to act as a tool for measuring student attitudes towards STEM. The survey contained four sections: Mathematics, Science, Technology, and 21st century skills. Students marked whether they were in total agreement, agreement, neither disagreement nor agreement, disagreement, or total disagreement of the statement provided. The team quantitatively analyzed this data by computing mean composite scores for the math, science, and technology sections. Fundesteam students displayed the most confidence on the statements in the technology section, which could be attributed to their focus on robotics and engineering.

Fundesteam’s website required various improvements in order to portray Fundesteam in a desirable manner to potential donors as well as attract many new visitors that can expand their outreach and further enhance the importance of their message. Their website could contain more written content in addition to better graphics that illustrate the organization’s mission and vision of changing the poverty equation in Panama with STEAM education. Although the website contained some information about their work and who they are, there was little information about the impact they have and are trying to make, which is only communicated in their mission statement and vision.

Fundesteam’s website had issues with proper display of their organization’s methods, scale and overall success of the robotics curriculums they were implementing. The website also
had an overuse of generic content, the color scheme didn’t match the organization’s logo, the
font used on the website was inconsistent, and the CSS (Cascading Style Sheet) was
unnecessarily long and caused loading issues for the website.

To address these issues, our team made many basic fixes to the CSS by removing
unnecessary code, changing colors, and making the styling consistent. To solve the content
issues, any content that did not address anything meaningful was removed or replaced with
information specific to Fundesteam, which was given by the sponsor. This included swapping
out most of the stock images with photos taken at events or partner schools participating in
STEAM activities organized by Fundesteam. Sections detailing quantitative data from the PADF
survey and testimonials from the team’s survey were also added to provide evidence for the
effectiveness of the program. Additionally, links to media about Fundesteam, such as journal
articles and videos were placed in the website as well. Each of these components contributed to
improving the appearance of Fundesteam to donors as having a clear goal and record of success
are vital.

Lastly, our sponsor asked our team to produce a contact list of websites in Panama with
the heaviest web traffic, some websites of interest our sponsor, and a few online blogs related to
tech and education. This was with the purpose of launching a small-scale marketing campaign
aiming to spread and increase awareness of Fundesteam, as well as STEAM, among their target
audience.

Final Recommendations

Based on the recommendations provided to Fundesteam by 3M and our team’s
observations while working with Fundesteam, mainly Marvin Castillo, the organization’s CEO,
we generated some recommendations that would help Fundesteam beyond the work we were
able to accomplish during our time in Panama. Funding STEAM curriculum development goes
beyond updating a website and applying to funding opportunities.

First, we recommend that Fundesteam clearly define roles within the organization.
Defined, structured roles would mainstream Fundesteam operations, improve the organization
and improve interactions between employees. Work distribution could be evenly distributed and
Fundesteam’s reach would increase significantly.

Second, we recommend that Fundesteam have better reporting to stakeholders. In
order to find and maintain a pool of regular donors, Fundesteam would be required to report to
them regularly and update the donors on their actions and results. This recommendation ties into
our previous recommendation since this would mean a staff member should be tasked with
record keeping, and delivery and presentation of data.

Third, Fundesteam should align the organization with the Ministry of Education in
Panama. Both organizations share similar missions and passion to achieve their visions, which
should be enough to encourage cooperation. Alignment to the Ministry of Education would give
Fundesteam a bigger and better platform to find support of any kind.
Fourth, Fundesteam needs to increase and improve their social media presence. Producing content highlighting the effects of STEAM around the world and showcasing similar successful projects around the world could allow Fundesteam to establish its relevance both with average users as well as stakeholders. It would allow them to maintain their relevance in the focus of its intended audience while also making it easier for them to gain attention, which could result in a momentum that could introduce them to more investors and supporters.

Fifth, Fundesteam should clarify their relationship to PanamaSTEM. Fundesteam has a dependent relationship between PanamaSTEM. The informal relationship between the two organizations is hurting Fundesteam by encouraging their lack of clear structure, making the organization fully dependent on PanamaSTEM, keeping Fundesteam from developing a clear identity.

Lastly, we recommend that Fundesteam offer connections to after school or internship programs to their high school participants. If Fundesteam wants to make sure that children have the necessary resources to achieve their goals within STEAM, then they should provide counselling and aid to children that want to attend college. Connecting them to internships, summer camps and proper guidance can be a definitive factor that ensures their attendance to college.

Ultimately, all objectives of the project were met and thus the goal of the project was achieved. The general survey, while proving to not be as helpful as we initially hoped, provided two quotes that Fundesteam could use on their website. The funding database proved to be much easier to tackle than anticipated because 3M provided Fundesteam with a starting ground, an Excel sheet of 66 potential donors, where they could further build and add funding opportunities easily. Although updating the website proved to be the most difficult task of the entire project, an improved website was developed. The main deliverables our team formulated for Fundesteam at the end of our time in Panama were a funding database and an upgraded website, as well as a secondary deliverable being the list of high trafficking websites in Panama and online blogs related to STEAM.
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CHAPTER 1: INTRODUCTION

Panama has a thriving economy thanks to the Panama Canal, its busy port, and international companies and their shipping activities. The country’s economic prosperity was brought, in part, by the inflow of wealthy immigrants from Venezuela, the trading power from the canal, and from a growing financial services sector. However, this economic success is endangered by economic inequality and an outdated education system.

Nearly half of Panama’s population resides in the country’s capital, Panama City. Figure 1.1 below shows Panama’s population distribution, which contains the highest density within the capital at 203.9 people per km$^2$, while the next most populated province only contains 71.1 people per km$^2$ (Erazo, et. al, 2015). This dispersion of the population produces great economic disparity between those who live in the capital and individuals who live in outer cities and provinces. Majority of the wealth that enters Panama is condensed in the capital, thus perpetuating a cycle in which Panamanians within the capital become more prosperous while people outside the city are often marginalized, remaining in less favorable economic conditions. This financial divide results in more people moving into the capital, which further exacerbates the unbalanced distribution of wealth.
Although Panama is home to many excellent private schools, its public-school system does not share the same prestige. Public schools experience high dropout rates and contain poor facilities due to a lack of resources. Moreover, they have remained unchanged, despite needing reform, due to complex disputes between the teachers’ union and the Ministry of Education. (Lee, 2016; Scholaro, 2018).

In the past few decades, technology has advanced rapidly, creating many new opportunities in STEAM (education in the areas of Science, Technology, Engineering, Arts, and Mathematics). Especially with its many international businesses, Panama needs engineers, computer scientists, actuarial mathematicians, and many other professionals in STEAM fields in order to sustain its economic success. Panamanian students, however, are not being prepared for these opportunities. This is because Panama has yet to embrace STEAM, the curriculum, and benefits of a STEAM education. One of the issues with Panama’s public schools is their outdated
curricula, which traditionally places a heavy emphasis on the humanities. 60% of students have not been effectively taught the mathematics skills they need in 3rd, 6th and 9th grade (Fundesteam, 2019, slide 2). Figure 1.2 below shows the distribution of course material in various areas of cognitive thinking with mathematics containing the least percentage of lessons. Leaving out STEAM education makes it very difficult for Panamanians who cannot afford private school to pursue new STEAM careers. Moreover, it is even more difficult for those outside of Panama City to reach the economic success of those within the city.

Figure 1.2: Percent of lessons administered to improve memorization, understanding of procedures, ability to formulate connections, and mathematics in Panamanian and Costa Rican schools for 3rd and 7th grades (Carnoy, Luschei, Marshall & Sorto, 2009).

Technologies, such as computer labs, are only just starting to be introduced into the classroom. The issues of economic disparity and a lackluster education system have led to the creation of organizations, such as Fundesteam, our sponsor, which seek to improve STEAM education and to spread opportunities to children from lower income backgrounds. Fundesteam is a non-governmental, non-profit organization based in Panama City. Its primary mission is to
combat poverty in Panama through the promotion of STEAM education. However, one of Fundesteam’s major obstacles is obtaining funding to expand and continue operating these programs.

This project was intended to improve accessibility to funding opportunities for Fundesteam as well as market the organization better, in order to achieve its current goal of reaching 800,000 children. The first component of the project concerned finding prospective funding opportunities. A database was created, containing various STEAM and educational grants, donors and partnerships available within the Americas as well as globally. The second component was to make Fundesteam more marketable to potential funders through updating their website to house all aspects of what the organization does daily, and to show the quantitative and qualitative impact they have made throughout the country. Both components will improve the overall marketability and accessibility of Fundesteam to stakeholders.
CHAPTER 2: BACKGROUND

Improving Panama’s education system can lead to an improvement in the entire country’s economic development. Fundesteam’s mission to increase their awareness nationwide will be an important stepping-stone toward improving Panama’s education system. Providing access to STEAM education for disadvantaged children in Panama will significantly improve their ability to exploit opportunities in growing STEAM fields. In this chapter we will discuss the STEAM education and the work Fundesteam is doing to improve it, as well as funding opportunities and website design.

STEAM Education

Importance of STEAM Education

STEAM is an acronym for Science, Technology, Engineering, Art and Mathematics. SMET (Science, Mathematics, Engineering and Technology) was an initiative originally designed by the National Science Foundation as a way to provide students with “critical thinking skills that would make them creative problem solvers and ultimately more marketable in the workforce” (White, 2014). The overall idea was that students who possess a SMET education would be able to lead lives of greater opportunity if they continued their studies in their field and well into post-secondary education (White, 2014). It was eventually renamed to STEM and, more recently, STEAM as art and design were added.

As society progresses, technology follows. With each generation, new products and services are created that not only improve livelihoods but also build economies. Due to this continually evolving future of technology, it is imperative that STEAM education begins at a young age because “innovation [...] depends on a solid knowledge base in the STEM areas”
STEM fields are among the fastest growing in the workforce and this trend is likely to carry on into the future; most jobs will likely require a basic understanding of STEM concepts (Eberle, 2010). Figure 2.1 below displays the immense growth STEM fields have experienced in the past ten years, further emphasizing the need for cultivating STEM ideas early in younger generations.

![Figure 2.1: Projected growth of STEM careers in relation to all other occupations from 2010-2020 (Fayer, Lacey & Watson, 2017).](image)

STEAM Education in the United States

The current president of the United States, as well as his former, have made sure that a great emphasis is put on the vitality of STEAM Education. Most importantly, they have put great emphasis on educating our youth with a STEAM model from an early age because of where the future is headed (The White House, 2017). More than $200 million has been invested in “high quality” STEAM education (U.S. Department of Education, 2018). Moreover, the country hopes
to improve equality within the STEM field by promoting it to more females as well as to minorities (The White House, 2017). There are a variety of STEM-based programs nationwide that try to do so such as Girls Who Code, STEM for Kids, and ID Tech summer camps.

Additionally, the past and current administration are trying to increase the number of well-educated STEAM teachers and professors in schools nationwide, so children can receive an adequate STEAM education. In 2013, the Obama administration created a five-year plan for STEAM education that laid out his administration’s goals for improving STEAM education. A few of those goals were to make STEAM a higher priority in education through the Department of Education and have the National Science Foundation increase their programs in order to increase the retention rate of STEAM undergraduates (Obama White House Archives, 2013).

STEAM Education in Panama

The Panamanian education system has been described as one of the most poorly performing in the world because it has remained unchanged for over 30 years (Scholaro, 2018). As education level increases, the curriculum mainly focuses on humanities (Scholaro, 2018). This static curriculum can be attributed to structural issues within the education system. Any attempts to modify the curriculum have caused a dispute between the teachers’ union and the federal government creating deadlock. This issue has prevented the necessary improvements to the currently outdated general education. Further, the conflict creates a divide in Panama’s education system between public and private schools as private schools have no problem updating curricula. Moreover, those who attend private schools receive “a head-start in life” (Scholaro, 2018). STEAM education is practically non-existent within Panamanian schools. Introducing a STEAM education curriculum, through the teachers, into Panama’s education
system would not only improve the quality of education students would have, it would prepare them for the technologically driven future.

**Fundesteam**

*Mission Statement and Vision*

Fundesteam is a non-governmental, non-profit organization founded and based in Panama with the goal of fighting poverty through improved education. The organization focuses on enabling children of low-income families to receive STEAM education to eventually work in better and higher paid jobs, thereby changing the poverty equation in Panama. Currently, Fundesteam promotes STEAM by creating robotics labs and curricula, as well as training teachers in schools so they can introduce children to these fields to further present it as an option they can pursue in their successive education. This combined with exercising the children’s problem solving and leadership skills allows them to empower future generations.

*What They Have Done So Far*

Through collaboration with Panama STEM, which is the representative of Lego education in Panama, Cable Onda, a private internet provider company, and EXPLORA, a center of Arts and Sciences, Fundesteam has provided 50 schools, some private and some public, with robotics labs and a robotics education program. With the addition of these labs, Fundesteam also trains the schools’ teachers by showing them how to properly use the equipment and how to teach the education program to the students. In addition to creating these school programs, Fundesteam also hosts day and after school programs for children, starting as young as three years old, which teaches them the fundamentals of mechanics to general robotics concepts.
Fundesteam has also assembled and prepared the group that has represented the delegation of Panama in the World Robotics Olympiad (WRO) since 2014. In addition, they organize more regular and local robotics Olympiads in order to reach more students that do not get the opportunity to go to the WRO.

**Funding for Nonprofits**

Grant Types and Availability

There are multiple types of grants for a variety of purposes and organizations. The most flexible type available for nonprofits are General Operating grants, which are not allocated to specific projects, enabling nonprofits to cover the price of salaries, ongoing projects, and other operational expenses (IDC, 2017). These grants usually range from $50,000 to $100,000 (IDC, 2017). Operational grants are the most flexible, however, are difficult to get as the foundations that provide them require intense investigations to prevent abuse of the spending freedom. It is much more common to receive grants for specific programs. These grants are offered more frequently and cover the expenses of a given project, but not the operating costs of the organization (IDC, 2017). This can be an issue if a nonprofit does not already have money to cover operational costs. For a nonprofit that already has its operational costs covered, these grants are a much more effective way to create and expand projects.

**Funding Opportunities in Panama**

For an organization like Fundesteam, the most prevalent funding sources are the various world organizations with goals aligning with Fundesteam’s mission, such as UNESCO and ISEA. Within Panama, there is also La Secretaría Nacional de Ciencia, Tecnología e Innovación (SENACYT). SENACYT is the government organization responsible for the promotion of
science and technology. Its mission statement, while not targeted at youth, is very similar to Fundesteam’s (SENACYT, n.d.). These organizations offer a variety of large grants for nonprofits running educational programs.

There are also more specific grants such as those offered by the Society of Photo-Optical Instrumentation Engineers (SPIE). This organization provides funding to projects seeking to increase awareness of photonics and optics (SPIE, 2019). Provided that Fundesteam is willing to create new programs with specific curriculum such as optics education, grants such as these are effective for expanding or creating specific projects. Additionally, many large companies sponsor STEAM activities. Partnering with tech companies allows for some additional funding in exchange for marketing. There are many options such as Dell, Uber, and Samsung to reach out to.

Fundesteam’s Current Funding

Fundesteam currently receives funding from the private sector, local governments, and donations. According to its website, Fundesteam has raised $380,000 out of $1,800,000 (Fundesteam, 2019). In addition, Fundesteam has a partnership with the Pan American Development Foundation (PADF) to train teachers to lead STEAM activities for their students (PADF, n.d.). These funds allow the organization to operate its current programs. Taking advantage of more funding options available to Panamanian STEAM organizations would allow Fundesteam to expand to reach more children. They have also worked with well-known international companies such as 3M, Ford, and Boeing as well as with those in Panama such as Fundacion Eleta and Banesco Contigo (Fundesteam, 2019, slide 13).
Presenting to Stakeholders

Website Design

Due to the fast paced nature of our world as well as our increased usage of the internet, website design is an imperative part of running a successful nonprofit. As of 2014, 87% of American adults aged 18 or older are Internet users (Chiu, 2016).

As for Fundesteam’s current website design, it contains all the relevant components of their organization, such as a mission statement, some projects, and the overall importance of STEAM education. However, there are some discrepancies within the format of certain portions within the website. For example, the general aura of the website conveys a more dismal image as there are many pictures of impoverished children who seem to have little hope. Although this is an important aspect of their organization as they do indeed target lower income areas, Fundesteam ultimately surrounds around bettering STEM education; rather than appearing more as a non-profit, Fundesteam’s website contains more components geared towards a charity’s platform. Concise, simplistic, and clear content is necessary in any successful nonprofit organization as these components strengthen the website’s presence as well as message.

Fundesteam’s Website

One of the issues with Fundesteam’s website is the mission statement versus the organization’s vision, which are slightly varied, proving somewhat difficult to understand for potential stakeholders. Through an improved website design that contains a more cohesive design and flow between connecting parts of the organization, Fundesteam will be further marketable and user friendly. Moreover, their website lists several of their projects, mostly WRO teams, but does not include some of their other initiatives, such as their work with teachers and schools. It is important to not only discuss projects, but also how they demonstrate the
organization’s effort to fulfil their mission. Robotics competitions and the WRO are great achievements that should be highlighted, but they are the results of their main actions and thus should not be the website’s main focus. Additionally, a stronger message regarding the importance of STEAM education is necessary to connect the mission to its vision, and further strengthen the presence of Fundesteam. Each of these components will ultimately enhance the organization’s appeal and marketability to potential stakeholders and donors.
CHAPTER 3: METHODS

The main goal Fundesteam tasked us with is to help the organization market itself better in order to receive funding as well as help them find more funding opportunities in order to develop and expand. In order to achieve this goal, we developed three main project objectives:

1. **Create a funding database.** Fundesteam gave us a clear idea of the type of database they want and what information they want included within it. Our task was to create the most informative and concise database for their purpose.

2. **Conduct a general survey to understand the impact of Fundesteam.** In order to understand and present the work Fundesteam has done and its importance, we intended to conduct surveys with current Fundesteam students as well as trained teachers to gain a general idea of Fundesteam’s work along with the impact they have made, and incorporate it into their website.

3. **Upgrading their website.** Giving their website a makeover that portrays Fundesteam in the image they desire as well as attract many new visitors that could hopefully spread the word on the importance of their organization.

**Research Existing Funding Databases**

The primary source for funding opportunities is funding databases. Through the Gordon Library at WPI, our team had access to Pivot and Foundation Directory Online, two research databases for this purpose. The databases use advanced searches to look through various grant opportunities from a variety of grantors. This can be narrowed to international STEM grants. Both databases provide all the information necessary to apply for grants, including the grantor’s contact information, deadlines, application requirements, and all necessary components for
applying. The main disadvantage of using such databases is that they are targeted at American non-profits. There are many grants listed that are offered internationally, however there are not many Panamanian grantors or grants offered to Panamanian organizations.

In order to effectively track funding opportunities discovered by the team through research, the options were compiled in an Excel sheet. Each entry contained the name of the grant and the contact information of the person in charge of managing the grant or whomever oversees accepting applications. This included phone numbers, emails, and websites. Relevant information to the grant was included such as the application deadline, eligibility requirements, and other general information.

**Conduct a General Survey**

In order to gain a greater understanding of Fundesteam’s work and impact, our team conducted a written survey in Spanish to students aged 10 to 17 who regularly attend Fundesteam for educational programs. Additionally, we want to interview trained teachers who teach programs at Fundesteam.

Surveying these groups generated pertinent data pertaining to the effect of Fundesteam on individuals. The data were further statistically analyzed as well as formulated into graphs, which can be added to the website and increase marketability to potential stakeholders. In addition, specific quotes from survey informants will be added to the website to add a sense of Fundesteam’s message.

A few elements that may present challenges within the surveys is the amount of reach and accessibility our team will have in contacting our target groups. Since the students are currently enrolled in the Fundesteam education programs, data regarding their population were easier to obtain.
In addition to the written survey we conducted, an online survey was conducted by PADF (The Pan American Development Foundation) on students attending Fundesteam schools. The survey was administered to two groups: students in grades 4\textsuperscript{th} and 5\textsuperscript{th}, and students in grades between 6\textsuperscript{th} and 12\textsuperscript{th} grade. It gauged the students’ interests and feelings on Mathematics, Science, Engineering, Technology. It also asked students whether they feel they would use STEM outside of school, in their daily life, and if they would pursue a career in that field.

**Create an Upgraded Website**

As of now, Fundesteam’s website appears better suited to a charity and reads very much like a brochure. We would like to add to and change some aspects of their website in order to portray Fundesteam more as the organization that it is, a non-profit STEAM organization aiming to make significant changes in Panamanian education and social structure. At present, their website could contain more information and better graphics to illustrate this. They have a generous amount of content informing readers about who they are and the work that they do, however, their site does not contain information regarding the impact that they have made and are trying to make, which is only written in their mission statement and vision.

The main issue with Fundesteam’s website is they do not accurately show the visitor all that they do in Panama. Fundesteam employs programs at schools, educates and trains teachers on robotics, and provides the school with all the equipment and curriculum required to properly teach robotics and other STEM concepts. Additionally, Fundesteam hosts day and after school robotics classes and programs. Although this is not clearly shown on their website, such
programs are integral parts of the organization’s efforts. Changes need to be made to the website to include the aspects of Fundesteam that show what it is about.

We would also add quotes from student and WRO participants, and the teachers who have been trained concerning the impact Fundesteam has made on them as individuals and/or to their quality of education. These quotes would come from the general survey we want to conduct with the aforementioned group of people. A third possible addition would be to add various data, graphs and statistics to visually show the viewer the change Fundesteam has made within Panama. Since Fundesteam has made a presentation showing some statistics that illustrate changes they have made and the number of students and schools they have reached, we would like these elements to be included. An example of a graph we would like to include is the number of students entering STEAM fields after joining Fundesteam’s programs versus how many individuals would have gone into STEAM careers prior to participating in Fundesteam. Fundesteam also has thousands of survey responses from the survey conducted by the PADF in Fundesteam schools; these responses can yield further data and charts to show the positive change Fundesteam has made regarding STEAM education.

Lastly, we would be to improve the display of monetary donations. Presently, they have a section on their page where one can donate and it shows their goal, the amount they have earned thus far, and the percentage achieved of the overall goal. We would like to create a real-time way of displaying the flow of donations to viewers, as it would make the page more interactive and show visitors that donations are accepted on an ongoing basis.

The main limitation and challenge with proposing all these changes is that our sponsor may not want to make them. Some ideas are very idealistic, such as the idea of including charts
and graphs as our sponsor may not have quantitative data to construct these. Ultimately, we would like for Fundesteam’s website to embody the passion that its founder has for the organization.

CHAPTER 4: FINDINGS AND ANALYSIS

Upon meeting with Marvin Castillo, the founder and CEO of our sponsor, Fundesteam, our team learned that our project would not be all like what we initially planned. Before our arrival to Panama City, 3M conducted a two-week-long organizational analysis of Fundesteam. At the end of the two weeks, 3M provided Fundesteam with a study and presentation of what they analyzed and their recommendations for organization for continued success. Our team used those recommendations as a guide to how we would accomplish our project goal and objectives.

3M Study of Fundesteam

3M provided Fundesteam with a SWOT (Strengths, Weaknesses, Opportunities and Threats) Analysis (3M, 2019, slide 11) (Appendix D). A SWOT analysis is a planning technique that is used to identify internal and external factors - strengths, weaknesses, opportunities, and threats - that affect the viability of a project, organization or company (Grant, 2019). 3M based their SWOT analysis of Fundesteam on interviews and materials provided to them by Fundesteam (3M, 2019, slide 9). Some of the strengths observed by 3M analysts was that Marvin Castillo, Fundesteam’s CEO, was very well connected with educators and is passionate about the work he does for Fundesteam (3M, 2019, slide 12) Because of this passion, Fundesteam has a very clear vision for its future goals and objectives (3M, 2019, slide 12). Additionally, the
STEAM curriculum Fundesteam has implemented into schools has been well received by students (3M, 2019, slide 12).

Weaknesses observed by 3M were ones our team hoped to strengthen for the organization. A main weakness observed is that Fundesteam has a very clear lack of money and personnel resources (3M, 2019, slide 13). Because of this lack of resources, the organization has no clear strategy, target audience, social media presence, operational processes, nor strong board of directors (3M, 2019, slides 13-15). These issues exist as the entire organization is placed on Marvin’s shoulders.

Some opportunities seen by 3M are Fundesteam’s lack of competitors, and the organization’s ability to be able to connect its participants and students to careers in Panama (3M, 2019, slides 16-17).

Lastly, a significant threat found within Fundesteam was the organization’s lack of funds and dependency on Panama STEM, an organization with which Fundesteam currently shares its location and from which it receives 60% of its funds from (3M, 2019, slide 18). Another critical threat is that stakeholders are not interested in improving STEAM in Panama because Fundesteam has done a poor job in distributing financial reports and results to their stakeholders (3M, 2019, slide 19).

Based on all the great amount of information reported from 3M, Fundesteam gave our team much material to work with. The majority of what was observed by 3M aligned with the project our team planned to formulate for Fundesteam. The two main objectives of our project were to create a funding database and to update Fundesteam’s website. Both objectives, as well as our third objective to conduct a survey amongst Fundesteam students, worked to help solve
Fundesteam’s issue of lack of financial resources, social media presence, unclear strategy, and poor reporting to stakeholders.

Creating the Funding Database

For the funding database, all potential opportunities were compiled in an Excel sheet. With 3M’s analysis, they provided Fundesteam with an Excel sheet that contained a list of 66 potential donors for the organization. Our team utilized this existing sheet by creating sub sheets with the document listing “Donors”, “Grants”, and “Possible Partnerships” (Appendix D). Each sheet has columns that list the grantor, a link to the grantor’s website with more information, a synopsis of the grantor, and all the contact information for the grantor. All grant opportunities have an additional column that lists any special requirements Fundesteam must meet or do before applying for the opportunity (Appendix E). The 66 donors given to Fundesteam were organized into those categories. 19 of the donors in the list given to Fundesteam were those that are strictly US based or do not fund organizations in Latin America or Panama, or fund STEAM and robotics education. Consequently, Pivot and Foundation Directory Online were used to find more funding for Fundesteam to consider. Ultimately, the database contained information for 42 donors, 28 grant opportunities, and 14 possible partnerships. Our team also reached out to WPI’s Office of Foundation and Corporate Philanthropy to give Fundesteam any advice that would be helpful in their grant application process.

Initially our team thought it would be helpful to reach out to Panamanian STEM organizations to ask and learn about Panamanian grants since the amount of grants offered within Panama were limited, and from those that existed, Fundesteam had already received support. However, we found it to be unnecessary for our project since 3M had provided us with a good
starting ground from which we could look for international and local grant opportunities. Additionally, the calendar we had hoped to create to go along with the database proved to be unnecessary as well, since almost all the grant opportunities found had year-round application dates. Of those that had specific application dates (8 out of 28 opportunities), there was no concrete date as to when the application would open or be due, only date ranges. So, making a calendar to track all upcoming grant opportunities was ultimately not necessary.

**Collecting Survey Data**

With the survey we conducted, we wanted to target students that would be most helpful in providing us with impactful statements on Fundesteam’s impact from the children’s perspectives. Our final survey (Appendix A) had less and different questions than our initial survey because we realized students would not want to give long, detailed, or meaningful responses to an open-ended survey as there would be less guidance to the questions. We administered our written survey to students from ages 10 to 17 who attended day and after school programs at Fundesteam. We learned from the teachers that there were only 8 students within that age range who attended programs there. However, we received 13 responses from the survey and all respondents were between the ages of 10 and 15. Of the 13 responses, only five gave our team permission to use their survey responses on the website. From those five, only two provided meaningful responses and quotes (i.e., not a yes or no answer) that could be potentially used on the website (Appendix B). The written survey proved to be less successful as we had initially hoped it would be.

The initial plan to survey WRO participants and trained Fundesteam teachers in addition to the students who attend programs at Fundesteam proved to be more difficult than we had
anticipated. Since Fundesteam has trained teachers at over 50 schools all over Panama, reaching out to each school would have been extremely difficult, especially since we would have to give the survey in person. Additionally, it was not easy to interview the teachers who worked at Fundesteam as they did not have the time to be interviewed or were too shy. However, we were able to receive some meaningful quotes from some staff on the impact Fundesteam has made on their life (Appendix G). We could not survey WRO participants because Fundesteam did not have any contact information for the teams, therefore limiting the number of students we could ultimately survey.

While the survey conducted by the team gathered testimonials, it did not generate any quantitative data. For this, the team received access to results from a past survey conducted by the Panamerican Development Fund which was taken by 1616 students in 6th through 12th grade at schools Fundesteam was working with. The survey was developed by a team of researchers at North Carolina State University to act as a tool for measuring student attitudes towards STEM and was found to have a Cronbach's alpha value of 0.83, a measure of internal consistency. It was also translated from English to Spanish (Farber et. al., 2013).

The survey had four sections: Mathematics, Science, Technology, and 21st century skills. Each question provided a statement, such as “Creo que puedo tener éxito en una carrera relacionada con la Ingeniería.” (Appendix C). (I believe that I can have success in a career related to engineering.). Students then marked whether they were in total agreement, agreement, neither disagreement nor agreement, disagreement, or total disagreement. One of the ways the team analyzed this data was by computing mean composite scores for the math, science, and technology sections. Table 4.1 shows the mean composite scores for these three sections.
Fundesteam students had the most confidence on the statements in the technology section which could be attributed to their focus on robotics and engineering.

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<th>PADF Survey</th>
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<td>Science</td>
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<tr>
<td>Technology</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Table 4.1: Composite Scores for Math, Science, and Technology Sections of Survey

The team also visualized this data by creating graphs using individual questions. These provide a concise way of showing Fundesteam’s effect on students. Because the key takeaway from these graphs was intended to be the ratio of agreement to disagreement, it was determined that pie charts were the best graph type for this purpose. Figures 4.1, 4.2 and 4.3 show the results from some of the more relevant questions asked to students.
Figure 4.1: Percentage of students who agree that they can be successful in an engineering career.

Figure 4.2: Percentage of students who agree that they can make changes when things do not go as planned.
Reworking Fundesteam’s Website

For the website, there were various things that needed to be tackled in order to update it with the recommendations from 3M and other improvements the team thought was needed. The largest issue was a lack of specificity and clarity. After reading through the original website, the only information the team could gather was that Fundesteam was a nongovernmental organization that worked to improve STEAM education in Panama and had a robotics team that competed in WRO. Besides this, their methods, scale, and overall success was either missing or not communicated clearly. Their ongoing program to equip schools with STEAM labs - one of Fundesteam’s primary goals - was included in a small area labeled “Organizing Donations”, making it easy to miss.
Contributing to this lack of clarity was an overuse of generic content. The first thing that can be seen on the website is the text “Changing the Education, Changing the Life of Our Kids” overlaid on a photo of a rural classroom. Despite being the first thing a viewer sees on the website, there is no indication of a STEAM focus. This issue is repeated in other areas such as the mission and vision statements. Additionally, most of the photos are stock images. While they are high quality images on their own, they do not convey any significant message about the organization. None of the images on the site are explicitly STEAM related activities, such as programming or building robots. Visual imagery is often far more powerful than text, but it can’t be used to its full effect without images specifically of Fundesteam and its activities.

Finally, the CSS (Cascading Style Sheet), the code used to change the look of the content on a website, has some issues. The website’s color scheme of red orange does not match Fundesteam’s official color scheme which uses primarily blue (Appendix F). The font in the website is not consistent either (Appendix F). There are some places with all capital letters, some in different colors, and others in different font styles (Appendix F). The main style sheet also causes loading problems as it is approximately 6800 lines long. This, combined with the use of in-line styles, make the website difficult to edit.

To address these issues, the team first made many basic fixes to the CSS by removing unnecessary code, changing the colors, and making the styling consistent. To solve the content issues, content that did not address anything meaningful was removed or replaced with something that told the viewer specific information about Fundesteam. This included swapping out most of the stock images with photos taken at events or partner schools of students participating in STEAM activities made possible by Fundesteam (Appendix F). Sections detailing quantitative data from the PADF survey and testimonials from the team’s survey were
also added to provide evidence for the effectiveness of the program (Appendix F). For this same reason, links to media about Fundesteam, such as journal articles and videos, are also provided (Appendix F). These all contribute to improving the appearance of Fundesteam to donors for which having a clear goal and record of success are vital.

Judging the National Robotics Olympiad

Close to the end of our project we assisted our sponsor with a robotics competition. Since Fundesteam has partnered with the Lego ambassador in Panama they organize and run the yearly WRO qualifying competition. Fundesteam organizes all aspects of the tournament from the venue and the date to the sponsors and the judges. Since they were short staffed the week of the competition, they trained us (the team) as judges and assigned us to one of the four categories available. This turned out to be a great insight into Fundesteam. We gained first-hand knowledge of how Fundesteam operates when it’s met with a challenge and got a better idea of the role each staff member serves. The competition is also the final step of the process that Fundesteam has designed for the schools with which it collaborates, starting with selecting a school and donating the robotics lab, ending with showcasing what they learned in the competition, and finally, taking the best team to the World Robotics Olympiad (WRO). This was one of the few branches of Fundestem’s operations where our sponsor delegated a great amount of the work. He was completely aware of his limits regarding his knowledge of WRO and World Educational Robot (WER) competitions and thus focused on the logistics of the event, while delegating the actual judging and competition side of it to his staff. This made clear that our sponsor is more than willing to delegate work as long as it doesn’t involve an executive aspect of Fundesteam.
Judging for the robotics competition also allowed us to see how learning robotics affects children’s lives and ignites passion for STEAM within them.

**Finding Marketing Outlets**

Lastly, our sponsor had a side task for us to pursue. One of them was to produce a contact list of potential online marketing outlets. This was with the purpose of launching a small-scale marketing campaign aiming to spread and increase awareness of Fundesteam among their target audience. Upon request we produced a short list containing a list of websites in Panama with the heaviest web traffic, some websites of interest Marvin suggested, and a few online blogs related to tech and education. A few of the sites had actual instructions on how to buy marketing space, however, most of them simply had a contact that could be reached. This task was also a confirmation that our sponsor sees equal value in marketing to potential investors and marketing to anyone interested in the subject. Fundesteam hopes to be within the focus of relevant conversation and to be able to attract potential investors by being present on related websites or by word of mouth.
CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

Based on the recommendations provided to Fundesteam by 3M and the structure of Fundesteam our team has observed while working with our sponsor, mainly Marvin Castillo, we have generated some recommendations that would help Fundesteam beyond what we were able to do during our time in Panama. Funding STEAM curriculum development goes far beyond updating a website and applying to funding opportunities.

Recommendations

Recommendation 1: Clearly define organizational structure and roles.

One of the main problems threatening Fundesteam’s operations and survival is the unclear and disorganized internal structure. The organization was created more than two years ago, yet there are no clear and specific roles. There are staff members who help with odds and ends, but other than the teachers, everyone has broad and unspecified responsibilities which is a recipe for forgotten tasks and short term, unsuccessful projects. Marvin Castillo claimed that this is because of Fundesteam’s financial situation; the organization operates on a month to month mentality, where they must find funding to avoid sinking. The organization does not have the time or resources to restructure itself, but defined, structured roles would mainstream Fundesteam operations, improve the organization and improve interactions between employees. Work distribution could be evenly distributed and Fundesteam’s reach would increase significantly.
Recommendation 2: Better reporting to stakeholders.

Fundesteam’s “paycheck to paycheck” style of operating is another problem that holds the organization back. NGO’s (Non-Governmental Organizations) depend on grants and aid, but this doesn’t mean that this is the only way to fund themselves. One of our main misunderstandings before arriving in Panama was why Fundesteam only focused on winning private grants and why the organization didn’t align with the Ministry of Education (MEDUCA). Our team thought that Fundesteam would be better suited for regular donors rather than applying for constant grants. Most of their donors are one-time givers and do not provide regular donations and we see this as a missed opportunity.

Our team recommends finding a small pool of regular investors while at the same time finding grants to expand rather than solely relying on grants and big donations. This would allow Fundesteam to focus on their expansion and to follow up on their active projects. Concentrating their efforts on this would allow Fundesteam to ensure the effects of their projects are as desired and that those effects can be reported back to the investors. This would then put the spotlight on them and thus attract more support and money, ensuring their survival and capacity to fulfill their mission and vision statements.

In order to find and maintain a pool of regular donors, Fundesteam would be required to report to them regularly and update the donors on their actions and results. This would mean that Fundesteam would need to have regular and organized record keeping. This recommendation ties into the previous recommendation since this would mean a staff member should be tasked with record keeping, and delivery and presentation of data. This data should also be tailored to their
stakeholder’s interests, which would most likely be individuals and groups who hold important positions in education in Panama.

**Recommendation 3: Align Fundesteam with MEDUCA.**

The government’s shaky record regarding the management of education projects and the fear of making Fundesteam an organization dependent on politics or even the bureaucratic problems that would distract the organization are reasons why Fundesteam cannot secure funding from the Ministry of Education (MEDUCA). The reasons make perfect sense. However, an economic alliance isn’t the only option that Fundesteam has when working with the Ministry of Education. The robotics competition we attended revealed that cooperation between the two entities is not only possible but also beneficial for both.

Both organizations share similar missions and even though the road through which they aim to achieve their mission might not be the same, the fact that they both share a main goal and passion to achieve their visions should be enough to encourage cooperation. Promoting STEAM education and opportunities within this field should be an easy pitch for Fundesteam to sell to the Ministry of Education, affording Fundesteam a bigger and better platform to find support of any kind.

**Recommendation 4: Increase social media presence.**

By now it is unnecessary to stress how important social media presence is for any type of entity seeking brand recognition and aiming to spread an important message or feeling. After a few days of observing Fundesteam’s Instagram and Twitter accounts, it is clear that there is no one in charge of managing the accounts. Fundesteam’s Twitter account consists of tweets
retweeted from Marvin’s account, and none written by or from the organization itself. This has resulted in inconsistent content being shared. We understand an NGO dedicated to improving STEAM education in Panama won’t be the next big influencer with widespread online reach. However, social media is extremely successful at creating communities of people and organizations with shared interests.

Producing content highlighting the effects of STEAM around the world and showcasing similar successful projects around the world could allow Fundesteam to establish its relevance with both average users as well as stakeholders. It would allow them to maintain their relevance in the focus of its intended audience while also making it easier for them to gain attention, which could result in a momentum that could introduce them to more investors and supporters.

Assigning one or various staff members to take care of social media, or even hiring a student to run the social media pages, would allow Fundesteam’s accounts to produce better, and more consistent and relevant content that their followers would actually want to receive. This would also allow the staff member in charge of social media to apply marketing strategies that require follow up and not just one or a few posts.

**Recommendation 5: Clarify Fundesteam’s relationship with PanamaSTEM.**

Fundesteam has a dependent relationship with PanamaSTEM, which is a separate organization that serves as the ambassador of Lego robotics in Panama. The organization shares a very similar goal with Fundesteam. They also want to ignite interest in STEM through robotics competitions and classes. However, because PanamaSTEM is a franchise, they are a separate entity, but they also team up with Fundesteam to organize Robotics competition and train the delegation that competes in the World Robotics Olympiad (WRO).
Fundesteam’s lack of clear identity can be observed through its old website. The section of the website “Our Success Stories” has several entries of the WRO teams, but has no mention of donating robotics labs or training teachers. It’s true that the process that Fundesteam uses with schools culminates with showing its progress in robotics competitions, but that isn’t the organization’s end goal. The robotics competitions are more like markers that are meant to show the effectiveness of Fundesteam’s process. These competitions should not be seen as their main operation. By distancing themselves from PanamaSTEM, Fundesteam can create a clear identity that can be used to market themselves and improve their image towards stakeholders, providing the organization with the independence it needs without having to cut ties with PanamaSTEM, which is a valuable ally.

Recommendation 6: Connect students to internships/summer/after school opportunities.

Fundesteam’s goal is to change the poverty cycle in Panama by giving low income family children the resources needed to pursue a career within STEAM. Right now, Fundesteam concentrates mainly on sparking interest by exposing children to education and activities within STEAM. However, their only action towards making sure they aren’t discouraged to go to college after their exposure is asking them if they’re attending college and making them consider their options. This is a problem because children can be discouraged as easily as they are encouraged. If Fundesteam wants to make sure that children have the necessary resources to achieve their goals within STEAM, then they should provide counseling and aid to children that want to attend college. Connecting them to internships, summer camps and proper guidance can be a definitive factor that instills a goal of college attendance.
The best way to achieve this would be to train teachers to fulfill these roles when considering Fundesteam’s limited resources and staff. By training the teachers to guide and help children connect with educational institutions that can sponsor and help them reach higher education, Fundesteam can address half of the solution that they have proposed.

Final Conclusions

At the start of this project, our goal was to improve Fundesteam’s accessibility to funding opportunities for Fundesteam as well as market the organization better so that they can be more accessible to potential donors in order to develop and expand. To meet that goal, our main project objectives were to create a funding database, conduct a general survey, and to update Fundesteam’s current website. All objectives of the project were met and thus the goal of the project was achieved. The general survey, while proving to be not as helpful as we had hoped, provided two student quotes that Fundesteam could use on their website. These quotes provide an authentic show of Fundesteam’s work and impact on children’s STEAM education in Panama. The funding database proved much easier to tackle than initially thought; 3M provided Fundesteam with a starting ground, which was an Excel sheet containing 66 potential donors, where they could build and add funding opportunities with ease. Updating the website proved to be the most difficult task of the entire project. The source code for the website was much more complicated than expected as it was much more elaborate than it needed to be and lengthy with over 6000 lines of CSS. The content for the website was much harder to receive from our sponsor and the time constraints leading up to the completion of the website provided a few obstacles. In the end, our team produced a website that was indeed much better than the initial website, however, the changes were not to the extent as was initially hoped.
Ultimately, the two main deliverables we created for our sponsor Marvin Castillo and Fundesteam were a funding database, complete with potential donors, partnerships and grant opportunities, as well as an improved website that houses content that accurately portrays all of the impactful work Fundesteam does and has done throughout Panama. In addition to our two main project components, the secondary deliverable for Fundesteam is the list of bloggers and high trafficking websites, which Fundesteam can further use for advertising purposes and enhance their outreach. Each of these components will improve Fundesteam’s growth on a long term scale and These two accomplishments, along with the recommendations from our team as well as from 3M and the list of bloggers and websites, will give Fundesteam the tools they need for long term success, and continued growth and development.
REFERENCES


APPENDIX A: WRITTEN STUDENT SURVEY

Opening Statement of Survey

This is a survey so that we can better understand the impact of Fundesteam on the lives of the students they serve. Please answer the questions by extending your answers. The more you write, the better for us. The answers are completely private but if you authorize, it we can use your response on the website.

Written Student Survey in Spanish

Nombre:
Edad:
1. ¿Nos da permiso de utilizar su respuesta en el sitio web? Si no las respuestas se mantienen completamente anónimas y su información es privada.
2. ¿Cuántos años has venido a Fundesteam?
3. ¿Ya estabas interesado en ciencia y tecnología antes de empezar a venir a Fundesteam?
4. ¿Cómo ha impactado tu vida venir a Fundesteam?
5. ¿Planeas estudiar estudiando ciencias y tecnología después de graduarse del colegio?
6. ¿Tus padres y/o guardianes estudiaron ciencia y tecnología?

Written Student Survey in English

Name:
Age:
1. Do you give us permission to use your response on the website? If not, the answers remain completely anonymous and your information is private.
2. How many years have you attended Fundesteam?
3. Were you already interested in science and technology before you started coming to Fundesteam?
4. How has your life been impacted by coming to Fundesteam?
5. Do you plan to study science and technology after graduating from high school?
6. Did your parents and guardians study science and technology?
APPENDIX B: WRITTEN SURVEY RESPONSES

Question: How has your life been impacted by coming to Fundesteam?

Oliver la Cayo, 13

“E aprendido python y electrónica que me ayuda a ser más interesante.”
(“I have learned python and electronics which help me to be more interesting.”)

Santiago Swarckopf, 15

“Me e sentido más relajado y con más ganas de seguir aprendiendo este mundo.”
(“I’ve felt more relaxed and motivated to learn more of this [STEAM] fascinating world.”)
APPENDIX C: SNIPPETS OF SURVEY CONDUCTED BY THE PADF ON FUNDESTEAM SCHOOLS

Survey Questions about Mathematics

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<th>De acuerdo</th>
<th>Totally De acuerdo</th>
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<tbody>
<tr>
<td>Matemática es mi peor materia.</td>
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<tr>
<td>Consideraría elegir una carrera en la que se use la matemática.</td>
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<tr>
<td>Matemática me resulta difícil.</td>
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<tr>
<td>Soy de los estudiantes que les va bien en Matemática.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>En la mayoría de las materias me va bien, pero Matemática me cuesta un poco.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sé que podría hacer ejercicios avanzados de Matemática.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Suelo obtener buenas calificaciones en Matemática.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soy bueno/buena en Matemática.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Survey Questions about Science

<table>
<thead>
<tr>
<th>Question</th>
<th>Totalmente en desacuerdo</th>
<th>En desacuerdo</th>
<th>Ni de acuerdo ni en desacuerdo</th>
<th>De acuerdo</th>
<th>Totalmente De acuerdo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Me siento seguro/segura cuando estudio Ciencias.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consideraría estudiar una carrera relacionada con la ciencia.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Espero usar la ciencia cuando me gradúe de la escuela.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Tener conocimientos sobre Ciencias me ayudará a tener un trabajo.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Necesitaré la ciencia para trabajar en el futuro.</td>
<td></td>
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</tr>
<tr>
<td>Sé que puedo tener un buen desempeño en Ciencias.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>La ciencia será importante para mi vida profesional.</td>
<td></td>
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</tr>
</tbody>
</table>
### Survey Questions about Technology

<table>
<thead>
<tr>
<th></th>
<th>Totalmente en desacuerdo</th>
<th>En desacuerdo</th>
<th>Ni de acuerdo ni en desacuerdo</th>
<th>De acuerdo</th>
<th>Totalmente De acuerdo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Me gusta imaginarme creando productos nuevos.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Si aprendo sobre ingeniería, podré mejorar las cosas que la gente usa todos los días.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soy bueno/buena para construir y arreglar cosas.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Me interesa saber qué es lo que hace que las máquinas funcionen.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>El diseño de productos o estructuras será importante para mi futuro trabajo.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Me interesa saber cómo funciona la electrónica.</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
**Survey Questions about 21st Century Skills**

<table>
<thead>
<tr>
<th>Question</th>
<th>Aligned Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estoy seguro/segura de que puedo guiar a otras personas para que logren un objetivo.</td>
<td></td>
</tr>
<tr>
<td>Estoy seguro/segura de que puedo motivar a otras personas para que saquen lo mejor de sí.</td>
<td></td>
</tr>
<tr>
<td>Estoy seguro/segura de que puedo realizar un trabajo de alta calidad.</td>
<td></td>
</tr>
<tr>
<td>Estoy seguro/segura de que puedo respetar las diferencias que existen entre mis compañeros.</td>
<td></td>
</tr>
<tr>
<td>Estoy seguro/segura de que puedo ayudar a mis compañeros.</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX D: SWOT ANALYSIS GENERATED BY 3M

SWOT Analysis

**STRENGTHS**
1. Marvin (CEO) is well connected.
2. Marvin (CEO) is very passionate.
3. Clear vision about FUNDESTEAM goals and objectives.
4. FUNDESTEAM content by Fundesteam is well prepared.

**WEAKNESSES**
1. Limited time from Marvin to perform key operations.
2. No clear action plan.
3. Lack of clear target audience: Demographics, Geographic, Ethnicity, others.
4. Weak board of directors.
5. Weak reporting to stakeholders.
6. Weak connections, but formal alliances.
7. No effective presence in social media.
8. Lack of formal operational processes: staffing, budget management, and job descriptions.
9. Clarify the relationship between FUNDESTEAM and Panama - FUNDESTEAM to future institutional donators.
10. Out of Scope -> Staff member and 10 retention.
11. Out of Scope -> Not strong culture of measuring the effectiveness [tracking on the Impact of the programs].
12. Out of Scope -> High operational cost (building needs).

**OPPORTUNITIES**
1. No competition in Panama.
2. Effect of STEM on children with Autism.
3. Out of Scope -> Promotion of STEM in private schools.
4. Connect to Panama workforce needs.
5. Connect to Panama University careers.
7. Full dependency on Panama STEM (50% of US$).
8. Out of Scope -> STEAM can compete directly with current and other full-fee programs (3M TALI).
10. Transferrable education practices (STEM education must be aligned with the MEDICAL).
11. Teachers’ demographics and geographical constraints.
12. Out of Scope -> Competitors are growing.
13. Out of Scope -> Marvin’s management style is perceived not good by non-high people.
15. Impeded understanding on the importance of investing in the current state of STEM in Panama.

**THREATS**
1. Fundesteam
APPENDIX E: FUNDING DATABASE

Main Excel Sheet

<table>
<thead>
<tr>
<th>Title</th>
<th>Category</th>
<th>Grant Title</th>
<th>Focus Area</th>
<th>Profile</th>
<th>Source of Funding</th>
<th>Notes</th>
<th>Contact Name</th>
<th>Phone</th>
<th>Email</th>
<th>Created by</th>
</tr>
</thead>
<tbody>
<tr>
<td>The American Institute for Foreign Study (Arkansas)</td>
<td>Corporate</td>
<td>Peace Corps Education and Exchange Programs</td>
<td>Education and Exchange Programs</td>
<td>USA</td>
<td>Partnership Possible</td>
<td>No direct contact</td>
<td><a href="mailto:afi@afis.org">afi@afis.org</a></td>
<td>Stearns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AICU-JPF (American Institute for Cultural Understanding-Japan Peace Foundation)</td>
<td>Public Agency</td>
<td>Supporting Innovation in Education</td>
<td>Public Agency - Technology</td>
<td>USA</td>
<td>No source specified</td>
<td>No direct contact</td>
<td>786-961-7120</td>
<td>Shari Y. Akimoto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Student Exchange Program (ISEP)</td>
<td>Nonprofit</td>
<td>Technology Education</td>
<td>Public Agency - Technology</td>
<td>USA</td>
<td>No source specified</td>
<td>No direct contact</td>
<td>786-961-7120</td>
<td>Brian S. Akimoto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAMPUS (Center for Advanced Medical and Psychological Research)</td>
<td>Corporate</td>
<td>Supporting Education</td>
<td>Public Agency - Health</td>
<td>USA</td>
<td>No source specified</td>
<td>No direct contact</td>
<td>786-961-7120</td>
<td>Brian S. Akimoto</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Grant Opportunities Sheet

<table>
<thead>
<tr>
<th>Title</th>
<th>Category</th>
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<td>USA</td>
<td>No source specified</td>
<td>No direct contact</td>
<td>786-961-7120</td>
<td>Brian S. Akimoto</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

44
APPENDIX F: FUNDESTEAM’S WEBSITE

Before Improvements
OUR MISSION
TO CHANGE LIVES
Promote and develop educational programs that incite interest in the sciences, technology, engineering, arts and mathematics in the minds of children and youth through innovation, collaboration and problem solving, breaking the cycle of poverty and changing the lives of thousands of children as well as the future of our country.

OUR VISION
TOGETHER WE CAN MAKE IT
With your help we can change the equation of poverty in Panama, eliminating the circle where limited access to 21st century education does not allow children from lower income families to prepare for well-paying jobs in the future.

HOW DO WE DO IT?

PROMOTING S.T.E.A.M.
The programs we support spark passion for innovation in STEAMs in the minds of children and youth.

EMPOWERING A GENERATION
Develop a structured thinking in problem solving as well as a spirit of leadership.

COMPETING INTERNATIONALLY
Organizing competitions so that children from all over the country celebrate their knowledge and can represent Panama internationally.

ORGANIZING DONATIONS
Equipping public schools with STEAM laboratories, which allow children to learn Programming, Robotics, Mathematics, etc.

OUR IMPACT

61 STUDENTS PARTicipate in INTERNATIONAL COMPETITIONS

1000+ STUDENTS COMPETING AT NATIONAL LEVEL SINCE 2014

$208,500 IN DONATIONS
After Improvements
OUR VISION
TOGETHER WE CAN MAKE IT

With your help we can change the equation of poverty in Panama, breaking the cycle where limited access to 21st century education does not allow children from lower income families to prepare for well-paying jobs in the future.

OUR PROCESS

FIRST CONTACT
Public schools make the first move by contacting Fundstream either through their website, an email, a phone call, or by attending one of the many events that Fundstream hosts. The school is then required to provide some background information and submit Fundstream’s database.

CASE ASSESSMENT AND PLANNING
With the information given by the school, Fundstream's team analyses the social reality that the school and the community seek to change and the needs that are necessarily fulfilled there.

This step is one of the most important in Fundstream's model, which is paired with finding either public or private funding that can cover 75% of the costs needed to help the school. Fundstream has several alliances and deals with investors that help raise and ensure necessary funds for new beneficiaries.

Because of the bureaucratic, legal, and administrative steps required to cover these expenses, this step usually takes between 30 to 45 days.

During this fast-paced adolescence, presenting the project, discussing previously benefited schools, and raising resources and visibility are key activities taking place.

After covering 75% of all those expenses, Fundstream then presents the contract and the calendar for the rest of the project to the authorities, and the implementation process can begin.

DELIVERY OF RESOURCES NECESSARY FOR THE PROJECT
A preliminary act is held in all schools with the beneficiaries, the local community, and Fundstream. The purpose of this event is to highlight the importance of the project that is about to be implemented and to motivate everyone involved.

These events include the selection lab and the new curriculum that must be incorporated, focused heavily on STEAM.

IMPORTATION OF APTITUDE TESTS TO STUDENTS
An aptitude test is held to record each student's strengths and use this information to guide them towards a specialization where their skills can be showcased and allow them to take full advantage of their developments.
TRAINING EDUCATORS

A training program of three days is imparted by at least 15 educators. The course is meant to prepare educators to brief the new members of the team on various aspects of programming, but rather not recite anything they haven’t covered before. A quiz is given both before and after the course to make sure that the educators have really absorbed the knowledge and are ready to teach the content.

FOLLOW UP

Three or more educators are selected to run ongoing training sessions so they can acquire more in-depth knowledge of TKIP and the programs offered. It is essential that all educators understand that the program is what they are teaching, and don’t depend on the educators whenever they find something they know. This is what we mean by something they haven’t seen before.

ROBOTICS COMPETITIONS

This is the ultimate test of the skills, because of their relationship with robotics competition, TKIP is the host of the qualifying competition for the world robotics olympiads. Students are selected and other smaller robotics competitions through the exams to measure the level of success of their projects in schools. Through a series of tests, passion and skills, the students are assessed in the project they are planning to do in their school, and they are also encouraged to investigate the areas with similar interests.

The competition is open to all qualified teams and provides them through a series of tasks to ensure a great performance in the WRO, so they can move on to the next level and also to motivate the teams to keep on working hard on their projects and realize that their projects are actually going somewhere.
WHY IS IT IMPORTANT TO DEVELOP CSR PROJECTS FOCUSED ON STEAM?

Investing in STEAM as part of your Corporate Social Responsibility (CSR) program not only has a social impact, but in the medium term it allows you to increase your ROI by investing directly in the formation of the country’s Human Resource.

- **BETTER STUDENTS**
  It helps us raise the level of knowledge and critical thinking of our students.
  - DONATE NOW

- **BETTER PROFESSIONALS**
  It provides an urgent need to increase the level of professionals in the sciences, including medicine and the health care sciences.
  - DONATE NOW

- **INCREASED COMPETITIVENESS**
  Improves the competitiveness of companies by increasing the level of mathematical knowledge and solving problems of students' future employees.
  - DONATE NOW

OUR IMPACT

- **61**
  Students taken to international competitions

- **1000+**
  Students competing at national level since 2016

- **$208,500**
  In donations

SURVEY OF STUDENTS AT PARTNER SCHOOLS
Based on a survey of 5629 students conducted by the Hermetic Development Foundation

- **90%**
  Plan on going to college
OUR HISTORY

The National Foundation for the Development of STEAM was created after participating for the first time in the World Robotics Olympiad in St. Petersburg, Russia in 2014. The Panamanian Delegation suffered a terrible defeat by ranking second to last in the standings table against more than 85 countries and 78,000 boys and girls. This experience caused FUNDESTEAM to be created in 2016 to structure projects focused on the implementation of STEM-STEAM: Education in Science, Technology, Engineering, Arts, and Mathematics. Using methods such as project-based learning (PBIL), challenges (ABM), Problems (ABP), Engineering Design, Design Thinking, and Gamification as tools we help the kids develop skills that are in high demand in the 21st century. All FUNDESTEAM projects are focused on the development of an educational quality in students and educators of public schools located in communities with high rates of violence and social threats. Thus, acts to promote social and economic development that benefits a comprehensive development of the country.
OUR SUCCESS STORIES

WRO RUSSIA 2014
In November 2014, we sent our first team to the World Robotics Olympiad held in Stariy Orsha. A group of parents became the first to believe in Panama and our children, supporting the first two teams representing Panama participating in the World Robot Olympiad.

WRO QATAR 2015
In September 2015, we held the first National Robot Olympiad (WRO) Panama 2015, achieving the participation of 120 national teams. In this edition, children and youths from 7 to 18 years old competed, achieving the classification of 4 teams that went to represent us in the International Olympiad organized in the month of November in Qatar.

WRO INDIA 2016
Our second National Robotics Olympiad was held at the City of Knowledge with the participation of more than 400 children distributed in three categories and 24 teams. Five teams classified at which it contributed to represent us at the World Robot Olympiad in New Delhi, India. We achieved an excellent participation by playing at number 32 worldwide of a total of more than 20 thousand teams.

WRO COSTA RICA 2017
For the first time, the international final of the World Robot Olympiad was held in America. In November, we traveled to San José, Costa Rica, for the WRO 2017.

WRO 2018 THAILAND & WER 2018 SHANGHAI

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WHAT PEOPLE HAVE TO SAY ABOUT FUNDSTEAM

"I HAVE LEARNED PYTHON AND ELECTRONICS, WHICH HELP ME BE MORE INTERESTING."  
- MONIKA, STUDENT 12

"FUNDSTEAM HAS CHANGED MY LIFE. SEE THE FACE OF TEACHERS AT THE TIME OF THE TRAINING, SEE HOW THEY CAN TRANSFORM THEIR CLASSES."  
- J. F. SANCHEZ, FUNDSTEAM TEACHER

"I'VE FELT MORE RELAXED AND MOTIVATED TO LEARN MORE OF THIS FASCINATING WORLD."  
- SANTIAGO SANCHEZ, STUDENT 15

IN THE NEWS

"LA ROBÓTICA LLEGÓ A TRES ESCUELAS EMERGUES WOUNAAN"  
- EL EQUO

"SE LEVANTA ROBÓTICA A NIÑOS DE EL CHORRILLO"  
- INFORMALISM

"EQUIPO DE COMUNICACIÓN PARTICIPA EN SEMINARIO SOBRE ROBÓTICA E INFORMACIÓN"  
- TELA RECREATIVA

"IMPLEMENTARÁN LA ROBÓTICA EDUCATIVA EN ESCUELAS PRIMARIAS OFICIALES"  
- EL AÑO

PHOTOS

CONTACT US

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Ciudad, Panama City

info@fundsteam.com  
+507 357-0779  
+507 6578-7882

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APPENDIX G: FUNDESTEAM TEACHER AND STAFF TESTIMONIALS

Alexander Caceres

“FUNDESTEAM has changed my life, see the face of the teachers at the time of the training, see how they can transform their classes, how they can apply different learning strategies such as, project-based learning (ABP), challenges (ABR), problems (ABP), Engineering Design, Design Thinking, and Gamification, generates a happiness and a smile in the children, falling in love with the classes and eliminating comments like “teacher I want to leave” and changing them to “teacher we can stay”. That change in boys and girls who once were only in the street playing in violent or vulnerable communities now strives to want to continue in school and learn more and more about STEM-STEAM areas. It is pure motivation for students and it is something I had never witnessed.”

Lutfi Garzon

“FUNDESTEAM is one of the organizations that best executes its goals, and one of its main goals is to take STEAM to more and more schools nationwide, I think we have achieved it step by step regardless of the limited support we have received. The progress and development of the students and educators who have been participating in the projects is an experience that has changed their lives. Before the existence of this program there was no opportunity for these students and educators to learn and develop their knowledge. A generation with new challenges is coming and FUNDESTEAM is opening the way for future generations to come to the professional field.”

Victor Rodriguez

“I have been able to witness the change in the lives of thousands of boys, girls and teachers who, thanks to these STEM-STEAM Education implementation projects, have been able to benefit and take another step forward in the progress of their academic and professional development. I am impressed that boys and girls from communities where they hardly have the opportunities to emerge as professionals in STEM areas, nowadays they are doing it with the greatest ease thanks to these projects.”

* Above statements are included by permission of the respondents.