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A Case Study: STEM Girl Project | By Fanuel Muindi

Recently, a Tanzania based organization called Hope for Children in Adversity started a new project called STEM Girl Project in Tanzania. This project seeks to *"empower girls with the necessary skills and competencies to meet the technology demands of national development in a technological age"*. The project provides support for school fees, education materials, transport, and uniforms to economically disadvantaged girls who have done well in STEM subjects. The goal of this case study is to provide a summary analysis of the STEM Girl Project. Our analysis so far suggests that the project is poised for continued growth through greater articulation of its mission statement, collection and sharing of impact data, exploration of collaboration opportunities, and sharing plans for the future.

Introduction

In today's global economy, it is now common knowledge that a workforce trained in science, technology, engineering and mathematics (STEM) is well recognized to be an important driver of growth. However, beyond elevating a country's level of scientific and technological advancement, we believe the core of STEM education lies in teaching not *what* to think, but *how* to think. Our group believes that inquiry based learning needs to be nurtured from an early stage of learning and must continue through to university education and beyond. The usual problem of limited funding – among other things – makes it difficult to train, recruit and keep qualified science teachers, maintain well-equipped classrooms and laboratories, and also provide sponsorship to a greater number of low-income students interested in science and engineering subjects. Realizing the importance of STEM, stakeholders across countries have made varying degrees of commitments to STEM education. The initiatives vary in scope, size, type, target populations and funding sources. Given the fragmented landscape of STEM programs – likely to be the case in Tanzania as well – coordination between stakeholders (e.g., government, higher education, industry, etc.) is essential. As we have published previously, it is unclear what level of coordination exists between STEM initiatives both within and outside developing countries (1). Stakeholders must work together if they are to make significant progress towards improving access to quality science education for all.

In the 2015 State of Education in Africa Report by the Africa-America Institute, primary education across Africa was given a B+ grade (2). The report cited increases in student enrollments in schools across Africa as a positive. However, secondary education was given a C grade due to the lack access to a secondary education with many students being forced to travel long distances to go to school (2). According to the UNESCO Institute of Statistics (UIS), the 2012 primary to secondary transition rate in Tanzania was 58.93% for males and 53.9% for females (3). It is evident that more must be done in Tanzania to ensure that this rate gets to the high levels that Kenya – a neighboring country – has reached.

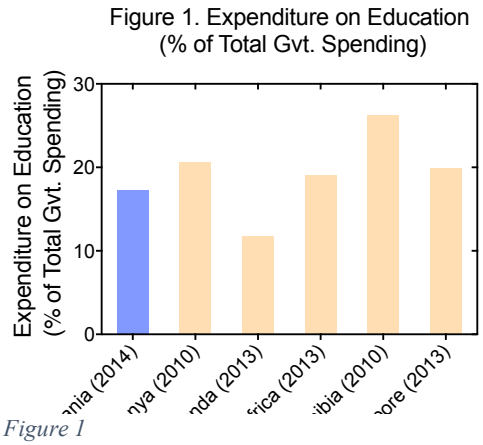

Figure 1

Investment on education is important for governments. With limited budgets, developing countries are faced with tough decisions when it comes to allocating funds for important education, healthcare and so forth. In 2014, Tanzania's total expenditure on education as a percentage of total government expenditure was a reasonable 17.3% (Figure 1) (World DataBank) (4). This is very encouraging that Tanzania's government continues to place a large focus on education. Of course, what is more important is how the funds were spent and whether students were actually impacted at the end of the day. Numbers from 2014 show that Tanzania was spending almost 50% of the education budget on primary education and only spent 18% on secondary education (4).

Recently, a Tanzania based organization called Hope for Children in Adversity started a new project called STEM Girl Project in Tanzania. According to the organization, this project seeks to "empower girls with the necessary skills and competencies to meet the technology demands of national development in a technological age". The modus operandi for the project is to provide support for school fees, education materials, transport, and uniforms to economically disadvantaged girls who have done well in STEM subjects. The parent organization and the STEM Girl project have been operating for 3 years and 1.5 years respectively. The goal of this report is to provide a summary analysis of the STEM Girl Project. The case study will provide feedback and suggestions on project's structure, goals, strategy, and several other important components. The hope is that the project can use the feedback to make STEM Girl a success for the long term.

Methods: Our Approach

We took a multipronged approach to acquiring and analyzing multiple data points to enable us to examine the STEM Girl Project. We sent out a survey to the organization to enable us to conduct an internal review. We also conducted an external review using data from the organization's website (publications, reports, media, etc.) and any other data we were able to find online. We examined the organization's clarification of the problem they are currently trying to address, the strategies being used so far to solve this problem, the type of data (if any) that is routinely collected, how success is measured, and some of the main challenges for the initiative.

Results and Discussion

(1) The mission statement

This is perhaps one of the most important aspects of any initiative. There are many resources online detailing what makes a good mission statement. In fact, there are so many resources that one could reasonably argue that it is difficult to find what is actually useful and applicable to an organization when it comes to writing mission statements. Our experience designing our own mission statement for our STEM group has taught us that one of critical elements of writing mission statements is that you don't stop working on it. In general, it is essential that organizations look at their mission statements almost at a daily basis and ask some of these questions: How can we improve the mission statement? Should the statement be more specific? Is the mission statement inspiring? Does the statement provide guidance on what our priorities are? Are people able to quickly understand and easily remember our organization's statement? The danger here of course is that you may end up writing a long mission statement which also does not work.

In a basic search of some of the top 50 mission statement from the top 100 non-profits as ranked by the website Top Nonprofits (5), they found that the average length of the top 50 organizations they identified was only 15.3 words with the shortest and longest containing 2 and 235 words respectively. There is clearly a distribution and one source that contributes to the variance comes from the diversity of what organizations actually do. However, we agree with Top Nonprofits that good mission statements are ***clear, memorable, and concise*** (5). This is particularly true for science education initiatives wherever they are in the world. A good mission statement needs to communicate its message clearly, memorably, and concisely.

For the STEM Girl Project, the stated primary focus of the project is “to empower girls with necessary skills and competencies to meet the technology demands of national development in a technological age understanding that there is a link between science, technology and development.” The *what* is to ‘empower with skills and competencies’ and the *who* refers to the ‘girls’. Even though the *how* is not very clear from the provided statement, we think that the information (from the website) can be combined to create a foundational mission statement which can continue to improve over time. We suggest that the following statement be considered further:

MISSION STATEMENT

“The mission of the STEM Girl Project is to empower girls to learn skills in science and technology by providing financial support to economically disadvantaged girls with an interest in STEM subjects.”

At this juncture, it is critical you present the rationale behind the problem you are attempting to solve.

THE PROBLEM

“In Tanzania motivation to pursue science subjects for girls is low. Science is perceived as a hard subject and women are generally discouraged from taking science subjects. The performance for girls in mathematics and science subjects on Tanzania’s national examinations during the past five years has, in most cases, been below than that of boys. On the other end, science teaching and learning are pursued theoretically without doing practical for students. It is not surprising to find that a science textbook is shared by 10 or more students in a class, and moreover, most laboratories generally do not have access to the necessary resources.

After stating the problem, it is necessary to expand on what it means to invest in girls’ education as a strategy to solve the problem. The statement below on the website is sufficient. It can be labeled under “Our Approach”:

OUR APPROACH

“We believe that a young girl’s success hinges upon her access to choices and to resources. If she is able to choose to go to school, she will then be more apt to learn a skill, become employed, spend her income on her family, invest her savings, act in her own best interests, and benefit from her own achievements. We provide education support (school fees, education materials, transport, uniforms) to vulnerable girls who have done well in STEM subjects but are economically disadvantaged and do not have the means to continue with their studies.”

Such a structured layout makes it very easy for website viewers to quickly understand the what, who and how for the STEM Girl Project. This structure needs to be reflected on the website so that it is easy to locate.

(2) Website and Promotion

As the initial point of contact for almost all visitors, it is essential to have a website that is easy follow. Although the current website is sufficient, we believe it can be improved to further help articulate what it is that the STEM Girl Project does. As mentioned previously, it is important to have a logical structure that is easy to follow.

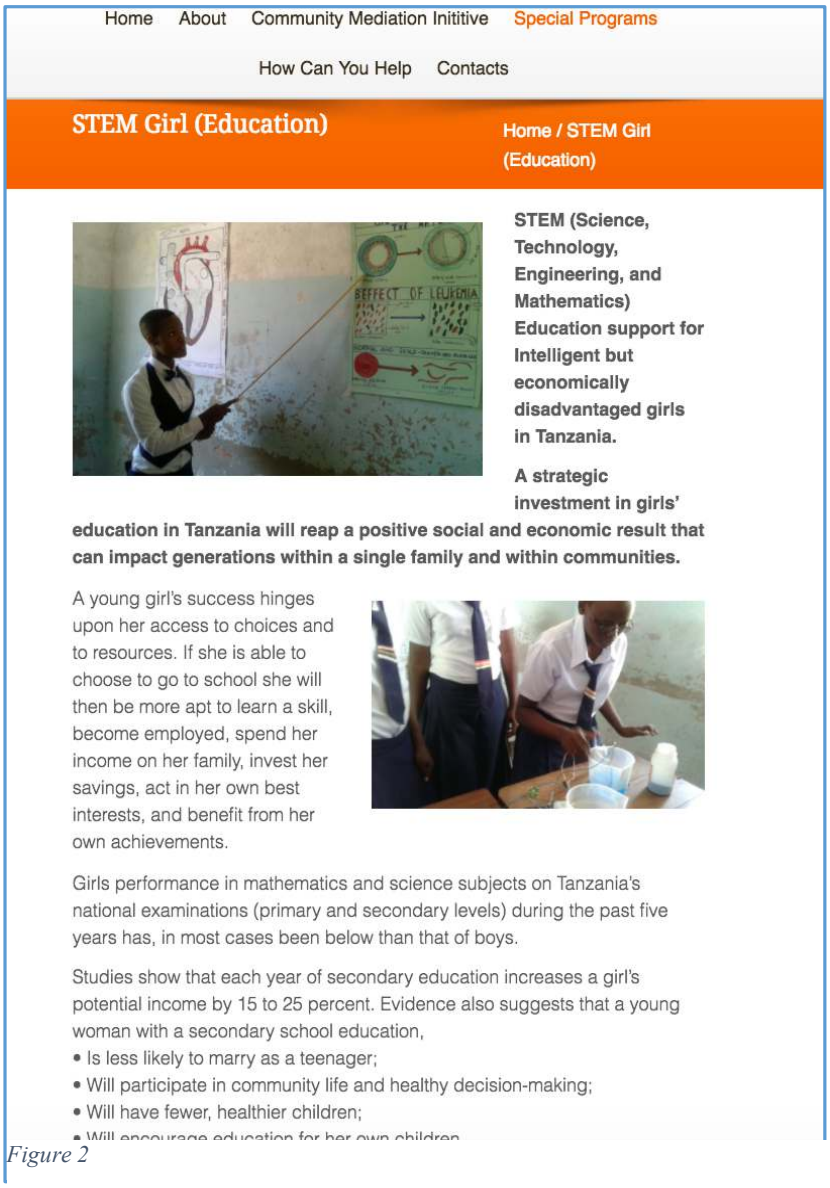

Figure 2

We suggest the following foundational order for the website:

(1) State your mission statement
(2) State the problem
(3) State the approach

Make sure to have the appropriate headings and subheadings on your page so that it is easy to know what is what. With this core structure, additional information (photos, etc.) can be added as required You may elect to also include an inspiring story about the power of science education to make a difference in Tanzania.

A well-designed page layout is critical. There is no need to create additional pages in-order to accommodate some of the changes we are suggesting. We think you can utilize the single page you have for the STEM Girl Initiative to showcase all the necessary information.

Missing from the current webpage is information regarding your impact so far (we will discuss this further soon). It is important to state the progress so far. What has the project been able to accomplish so far? The support of 8 girls at Tanner Girls Secondary School (TGSS) is something you can certainly mention. You may even share information for one

or two (no more) of the girls with their permission. This is important for your fundraising efforts. Donors and grant agencies need to be able to see the progress the project has made so far especially since the it has been operating for roughly 1.5 years.

(3) Assessing Impact

The key element here is to assess whether your interventions are making a difference. Has the financial support the project has provided made a difference? It is important to think about the outcomes. Important 3 questions to consider:

(1) What are the outcomes to measure?
(2) How will you measure the outcomes??
(3) When will you measure outcomes and for how long?

Determining the outcomes to measure (Question 1) is critical. Like many projects, it is likely that there is a long of outcomes to measure. As such, prioritizing outcomes to analyze – as a function of need – is important due to your organization's limited resources and also time. As indicated in the survey you completed, student performance is something that is important to measure. Given that student performance encompasses a large domain, a strategy needs to be in place to focus on one or two dimensions. Will the project use tests from TGSS? If not, will the project administer its own tests (Question 2)? If so, how often and what will be assessed specifically (Question 3)? Who will design the tests? It is important to test student knowledgebase but there needs to be a plan in place to collect such information. We strongly suggest the project work with the school to use data from existing class tests in order to minimize interruption on student learning if you administer your own tests.

Of course, assessing the direct impact of current interventions on students provide additional data that could be useful to assess. The question here is *how does the intervention impact the student*? Does the financial support increase student attendance at school? What about class engagement? How has the financial support impacted students' confidence towards science subjects? How has the support impacted what students plan to study at university? It is important to have a foundational strategy in place to collect such data. For this, survey instruments are powerful mediums that can provide direct feedback from students at different time points. Critical here is survey design and determining how and when to administer the surveys. This will depend a lot on policies that are in place at TGSS. We also think being able to administer surveys to those students that are not receiving support from the project (but are in the same class) may provide some useful comparison data. Once collected, some of the impact data must be shared on the website for visitors to see. This can be done through publicly annual reports or publishing stand-alone figures with data showcasing your progress so far.

Keeping track of students once they leave the school presents a challenge. The key question here is: *What is the outcome of the students that received support from your organization*? How many were able to secure places at universities? What did they end up studying at university? What employment did they secure post university? These questions rely on having a detailed system to keep track of students. With today's high penetrance of technology, we believe that this important task is now more possible for organizations. By student email addresses, Facebook accounts, and even Twitter

accounts, it is more possible to track students with multiple avenues. It is also important to build an internal database which is regularly updated with student information as they proceed through their education.

Discussion

Consistent Message

Initiatives like the STEM Girl Project are important for Tanzania and the rest of Africa. Such initiatives bring to light the importance of involving young women in STEM training. The focus on providing financial support to economically disadvantaged girls with an interest in STEM subjects makes sense. However, is financial support alone sufficient? We think that formally identifying the STEM Girl Project as a fully-fledged program that supports economically disadvantaged girls is something that is needed at this point. The message needs to be consistent as to whether STEM Girl is a project, initiative, or program. Under the identification as a program, we think that it may become possible to present a formal support structure for the girls that are supported. We believe that having a formal structure (as shown in Figure 3) will be essential for the future of the program in becoming more than just a financial support mechanism. Under a program, it becomes possible to develop the many elements that typically go into a program. These include excursions, student cohort meetings, special visits by local scientists, tutoring, and many other important elements that are typical for a program. As illustrated by Figure 3, the support for school fees, education material, transport, and uniforms are elements that can be supported within one arm of the program. It is important that visitors to the website are able to visualize the structure of the STEM Girl project with the help of a diagram similar to Figure 3. We also believe the program identification will provide a special identity that students will be able to easily identify with. Of course, the change we are suggesting (thinking and acting as a program) requires a deeper look at your mission statement and also your values. Where do you see the project in 10-15 years? What is important for the project? These are important questions to consider as you continue to grow.

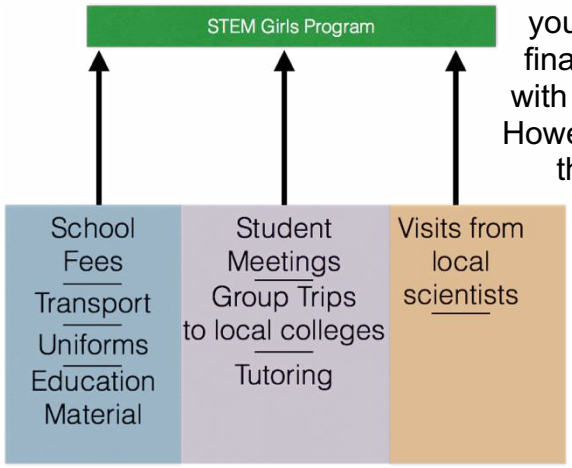

Figure 3

Collaboration & Funding

Finding funding to effectively run programs is a major challenge for many organizations. Although, funding limits the ability to support a greater number of low-income students in addition to running many of the activities, we think that collaborating with other STEM programs with similar goals may provide additional capacity to do more with less. One such organization is Projekt Inspire (6) which is also based in Dar Es Salaam. The organization runs a program called Inspire STEM which – according to their website – is a 'sustainable project that aims at mainstreaming the project based learning and integrated learning to complement the formal secondary schools' science and mathematics curriculum' (6). The program's focus on project based learning provides an avenue for secondary students to learn beyond theory. We believe that interacting with

this organization may prove beneficial to both organizations. A collaboration may provide STEM Girl students exposure to project based learning that Projekt Inspire is utilizing. We believe that such a collaboration will also benefit the Inspire STEM program since it will add another partner school to their portfolio. We strongly suggest that STEM Girl explores the growing list of STEM Initiatives across Africa and Tanzania (7).

Of course, we are only highlighting one potential collaboration. It is likely that there are other programs that are operating around Dar Es Salaam. It is essential that STEM Girl seek them out and ascertain whether there is an opportunity for a collaboration. In general, we believe that through collaborations, programs are able to make a bigger impact in the communities they serve.

We believe that the STEM Girl Project is an initiative that must continue to grow. Young women need to have access to quality education and exposure in science. One of the key elements that the STEM Girl Project is expanding is **ACCESS.** Providing access is the key to education in science in the future. With continuous drive for improvement through internal analysis, we believe that there is a high probability for the STEM Girl Project to have a lasting impact on the local community it serves. For now, it is important to think globally but act locally. It is important to take the necessary time to grow and to do so at a steady pace.

References

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(2) State of Education in Africa Report 2015. The Africa-America Institute. http://www.aaionline.org/wp-content/uploads/2015/09/AAI-SOE-report-2015-final.pdf

(3) UNESCO Institute for Statistics (UIS). http://uis.unesco.org/

(4) World DataBank. http://databank.worldbank.org/data/home.aspx

(5) Top Nonprofits. https://topnonprofits.com/examples/nonprofit-mission-statements

(6) ProjektInspire. http://projektinspire.co.tz

(7) List of organizations engaged in STEM education across Africa. Wikipedia https://en.wikipedia.org/wiki/List_of_organizations_engaged_in_STEM_education_across_Africa

Additional Resources

UNESCO CAMPS
http://en.unesco.org/news/unesco-inspires-girls-kenya-embrace-science-and-engineering-through-scientific-camps-excellence