

SOCIAL BUSINESS PLAN AND PUBLISHING PROPOSAL FOR GLOBAL TOOLKIT

A Major Qualifying Project submitted to the faculty of
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Abstract

In this project I examined the potential success for Global Toolkit, a social venture to create real world learning modules that make project-based learning accessible in the classroom through simulation. A portion of sales revenue will go back into the communities, where the projects were based. The first module is Global Toolkit: Morocco. I developed a business plan for the venture and a publishing proposal. I then used these products to determine criteria under which Global Toolkit would be successful.

Acknowledgements



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Executive Summary

Advances in technology, communication, and transportation have made the world increasingly connected. Companies and individuals alike can have a surprising international impact, and affairs across the globe can have a significant impact on them. Students entering the professional world are being greeted with growing expectations and challenges. Project-based learning is a way for students to apply their learning beyond the classroom, which integrates theoretical understanding with a challenging problem addressing—or simulating—real-world context and impact. It has been demonstrated that this kind of learning develops skills beyond the subject matter, in disciplines such as teamwork, leadership, problem-solving, and interdisciplinary thinking (Heinricher, et al. 2013).

Worcester Polytechnic Institute is well known for its project-based education. However, there are limitations to sending students to project centers throughout the world. “Global Toolkit” is an initiative at Worcester Polytechnic Institute of Professors Rob Krueger and Kris Boudreau, with five students completing their Interactive Qualifying Project. Global Toolkit seeks to bring the world to the classroom for global thinking and project-based learning. The enterprise will develop learning modules, which are interactive resources that integrate electronic readings and activities with classroom discussions and learning. All modules are based on real-world projects from different parts of the world.

Global Toolkit wants to be a benefit to communities where it develops these learning modules. It will be established as a social enterprise, where a portion of the earnings will go to further projects in these communities, while the rest will go towards developing future learning modules. Social enterprise, which can come in a variety of forms, uses business as a vehicle for

social benefit. A business model of social entrepreneurship is a growing trend, which some believe will cease to be its own entity, and rather become an integral part of business planning (Chaaban 2015).

As Global Toolkit is seeking to become established within the university, my project goal was to evaluate its potential success as a social business. More specifically, my objectives were:

- To develop a social enterprise structure that best fits Global Toolkit's market;
- To identify a project with Global Toolkit: Morocco's partnering organization as the beneficiary of the product;
- To determine the steps that would need to be taken for Global Toolkit: Morocco to be published and brought to market.
- To compose a business plan and publishing proposal based on research.

In order to accomplish this, I had to gain an understanding of the market for Global Toolkit, identify a potential ownership structure and specific beneficiary project, understand the process required for Global Toolkit to be published, and provide Global Toolkit with a social business plan and publishing proposal so that it can move forward.

Among many social enterprise models, I needed to define one that would be financially sustainable and that could be applied for communities with future learning modules. Using an organizational support model would allow Global Toolkit to provide donations to projects in each community they work with, and is flexible enough to be modified based on the beneficiary's project, or the amount that Global Toolkit is able to offer the community. As a part of WPI, I also determined that Global Toolkit should be a part of the Global Impact Lab in the university's upcoming Foisie Innovation Studio.

Global Toolkit: Morocco would be benefitting its partner in Morocco, Dar Si Hmad. However, I wanted to identify a specific project that Global Toolkit could work with, to make

impact more quantifiable and would coincide with the other purposes of the learning module. The mobile education program (water school) perfectly coincided with the goals of Global Toolkit, furthering STEM education for underrepresented groups and directly benefitting the communities in Ait Baamrane. Finally, I learned that we would need to create a publishing proposal and determined that Pearson Education would be our targeted publishing partner.

After creating a business plan for Global Toolkit, I have concluded that it has potential to be a successful venture. To move forward, I recommend that the following steps be taken:

1. Establish the social venture as a part of the Global Impact Lab at Worcester Polytechnic Institute
2. Negotiate a deal with a publishing company
3. Select a specific community partner for each module to benefit from sales
4. Produce a new module each year
5. Seek out funding from foundations and government grants

Global Toolkit must first focus on the publication of its first module, Global Toolkit: Morocco.

Once this has been introduced to the market, they can then focus on developing new modules in new places, gathering feedback from customers so that it can continuously improve through new and existing modules. Global Toolkit has the potential to be a great resource for students of various disciplines to learn to draw connections between STEM education and global impact.

This project examines the potential for Global Toolkit as a social business, but includes lessons that can be applied to the evaluation of other social business ideas. It provides an example of a social business plan as well as comparison of social enterprise models, and an illustration of the considerations and challenges for social business planning, particularly within a university.

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1 Introduction

Global Toolkit launched through the inspiration of professors Rob Krueger and Kris Boudreau. Both shared an interest in drawing more underrepresented minority students into STEM education, particularly at Worcester Polytechnic Institute. In order to do this, they wanted to put technical education into a more contextualized form, which could be both more attractive and more accessible to the demographics they hoped to reach.

Previously, Professor Boudreau had developed classroom module surrounding water and sanitation controversies in Worcester of the 1890's. This module included taking on the perspective of various characters in nineteenth-century Worcester, taking into consideration technical and human factors for an engineering challenge. This kind of multi-disciplinary approach later would serve as a model for Global Toolkit to contextualize STEM with a real-world situation, where human and other factors must be taken into consideration.

Global Toolkit began to take shape when Krueger and Boudreau decided to take the game-based learning model that the Worcester module used and leverage student experiences with the Interactive Qualifying Project (IQP), to help others become inspired by STEM learning. By using a project experience like the IQP, the multifaceted considerations of an engineering challenge give the problem context. They also wanted to give underrepresented groups the opportunity to learn from global experience, without the burden of travel if they were financially, physically, or otherwise unable to do so. The

professors decided to launch development for Global Toolkit with the collaboration of a student team.

However, as they began to invest in the idea, Professors Krueger and Boudreau wanted to make sure that Global Toolkit would be feasible as a venture integrated with WPI. Alongside of the IQP team, which focused on development of the pilot module Global Toolkit: Morocco, I was given the task to evaluate the ways that Global Toolkit could sustainably and successfully fulfill its mission, primarily through a social business plan. In order to do this, my project required four main objectives: to develop a social enterprise structure that best fits Global Toolkit's market, to identify a project with Global Toolkit: Morocco's partnering organization as the beneficiary of the product to determine the steps that would need to be taken for Global Toolkit: Morocco to be published and brought to market, and to compose a business plan and publishing proposal based on research. I was then able to make recommendations based on my findings to Professor Krueger and Professor Boudreau, taking another step towards Global Toolkit achieving impact in the classroom and around the globe.

2 Background

2.1 Context

“Global Toolkit” is an initiative at Worcester Polytechnic Institute of Professors Rob Krueger and Kris Boudreau, with five students completing their Interactive Qualifying Project. The enterprise will develop learning modules, which are interactive resources that integrate electronic readings and activities with classroom discussions and learning. All modules are based on real-world projects throughout the globe. A portion of the earnings will go to further projects in these communities, while the rest will go towards developing future learning modules.

Through each of these aspects, the outcomes of enterprise demonstrate the goals of WPI’s educational approach: expanding the reach of benefits that come through project-based learning, promoting STEM education for all demographics, and emphasizing global impact (Worcester Polytechnic Institute 2013). Project-based learning has become a hallmark of the WPI model, teaching students of all majors not only the theoretical skills necessary for their field, but also the application beyond the classroom, working with team members of other disciplines. Global Toolkit develops some of the same skills through project-based learning through simulation.

2.2 Project Based Learning

2.2.1 What is Project Based Learning?

Project Based Learning is “a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an engaging and complex question, problem, or challenge” (Buck Institute for Education

n.d., n.p.). Although it has been growing in popularity primarily in the last several years, the project-based approach to education can be defined more broadly, and has been a method of learning for many years. In 1921, Kilpatrick gave a definition of project-based learning as “any kind of variety of life experience which is in fact dominated by a dominating purpose” (Kilpatrick 1921). For our purposes, project-based learning integrates theoretical understanding with a challenging problem addressing—or simulating—real-world context and impact. The students must navigate research, decision-making, and reflection throughout the project.

2.2.2 Worcester Polytechnic Institute and Project-Based Learning

Worcester Polytechnic Institute’s educational structure, or the *WPI Plan*, has integrated project-based learning as a central part of the curriculum since 1970, combining classroom learning with application in real-world problems that they may encounter beyond their education. The plan includes two projects: the Interactive Qualifying Project, where students work on teams across disciplines on a challenge that “presents an issue at the intersection of science, technology, and culture, and emphasizes the need to learn about how technology affects societal values and structures” (Worcester Polytechnic Institute 2013). The Major Qualifying Project presents students with the opportunity to apply their learning as they would in their professional future, with challenges related to their major field (Worcester Polytechnic Institute 2013). WPI’s Global Projects Program augments these experiences, with over 40 off-campus project centers on six continents. Over the last 45 years, WPI has established a reputation as a leader in project-based education. The Princeton Review recognizes it as a top school in

Career Placement, Study Abroad, Internship Opportunities, and return on investment (Princeton Review 2015).

Alumni of WPI have reported that these projects helped them to be better prepared for their careers, developing skills in teamwork, problem solving, and professional communication (Worcester Polytechnic Institute 2013). More specifically, surveys of WPI alumni who participated in project-based learning reported that from this experience, they feel more developed in professional preparation, thoughtfulness and openness, personal character, expanded opportunities, enjoyment of travel, enrichment, business and industry insight, connection with a community, and “real world” experiences (Heinricher, et al. 2013).

2.2.3 Benefits and Limitations of Project-Based Learning

As demonstrated by alumni of the WPI projects, students who participate in project-based learning are empowered with skills that they continue to apply throughout their careers. These students often rate their confidence in abilities higher than those who do not. This approach to learning puts students at the center of the lesson, encouraging more comprehensive understanding of the material and of their capabilities (Pawson, et al. 2006). It has also been demonstrated that project-based learning, particularly with global impact, engages demographics that are underrepresented in STEM. Women, who hold only 24% of jobs in STEM fields (Beede, et al. 2011), notably evaluate themselves more impacted by project-based learning than men—particularly in areas of cultural understanding and respect, leadership, teamwork, and project management (Vaz, et al. 2013).

Although studies and institutions have demonstrated that project-based learning experiences have been extremely positive, there are challenges that come with the implementation of this style of education. It requires more extensive preparation to give students the opportunity to experience a suitable project, which has a realistic scope yet is sufficiently challenging. This learning is more complex than educational styles, with team dynamics and external factors having an affect on outcomes, and less clear-cut assessment of success (Pawson, et al. 2006). Moreover, participation through off-campus project centers, particularly in an international setting, requires a broad network of partners and sponsors to be feasible, with extensive preparation for students at the university and in the host communities. Institutions like WPI continue to develop programs centered on project-based learning, organizing their schedules and requirements around this structure. Application at other higher-education institutions, if it were even possible, would take years of development before it could be implemented.

Even at institutions where project-based learning is a part of the academic structure, participation in an off-campus project is not always feasible. Health or financial concerns may inhibit students from leaving campus to complete a project, or commitments such as jobs or sports may be obstacles. How, then, can the benefits of project-based learning, particularly in an international context, be applied in the classroom?

2.3 From the “Real World” to the Classroom (and Back): Educational Simulations

Although it may not be possible for all institutions to send their students abroad—or even down the street—to participate in off-campus projects, the experience can be

replicated in the classroom through educational simulations. Educational simulations are methods of teaching, particularly concepts that are highly interpersonal or interactive, that provide training through experience. Simulations, like projects, require a deeper understanding of the material than memorization of concepts. Students develop knowledge that enhances understanding of scientific approaches, such as the importance of relationships among variables and of predicting outcomes through models. They also learn reflection and communication through engaging in discussion necessary to navigate the simulation, applying previous knowledge to new situations, and seeing concepts in action (Carleton College 2015). For example, a student can learn about factors that influence climate change conceptually. However, using a simulation such as the Dynamic Integrated Climate Change (DICE) Model, they can simulate climate change through control of variables like current consumption, investment, and greenhouse gas reduction (Blecha 2012). For modeling global impact and cultural understanding, simulation teaches students cultural considerations and social constructs that influence the global workplace.

Using simulations and role-playing for the purpose of education provides several benefits (Creative Teaching Suite 2011):

- *Logistics*: Dangers or logistical problems that come with real-life encounters are alleviated by simulations (i.e., aviation students using flight simulators vs. real planes)
- *Reflection*: Simulations can be paused, questioned, discussed, processed, and reflected upon, which are all important aspects of learning. In a real life situation actions must be taken and decisions made in real time, and reflection often comes later, if at all.
- *Engagement*: role-playing and simulations provide an opportunity for interaction and involvement, engaging students in multiple ways. This gives

students an opportunity to provide feedback and feel a deeper connection to the material, often making them feel more motivated to participate and learn.

- *Empowerment*: this kind of education gives students responsibility in the success of what they are learning and applying, empowering them in various skills of problem solving, perspective taking, and communication.

2.4 The Global Toolkit

The Global Toolkit is a social enterprise whose mission is to develop learning modules that simulate international development projects, requiring students to apply skills in STEAM (science, technology, engineering, arts and mathematics), problem solving, communication, and cultural understanding. The modules pair traditional STEAM education with the application to a global problem. This kind of contextualized STEM makes technical learning more attractive, particularly to students in demographics that are underrepresented in STEM fields. This also gives students who are already interested in technical learning the opportunity to see ways that their skillset can be applied to real-world challenges in the future, and allows them to see an “engineering problem” as something more interdisciplinary and multifaceted.

2.4.1 Module Development as a Learning Experience

Learning modules are developed in a collaboration of WPI students, professors, and partnering organizations in host communities. This gives students working on the module’s development the opportunity to go beyond theoretical education in their own project, and to provide insight for what students may look for in a quality learning experience. Global Toolkit student developers also have the opportunity to travel to the communities that the module is based on, to gather data and learn about the community and partnering organization.

These students are under the supervision of Global Toolkit's managing professors, Rob Krueger of the Social Science & Policy Studies department, and Kris Boudreau, Associate Dean of Humanities and Arts at WPI. Both professors have advised dozens of global projects, and Professor Boudreau has developed role-playing educational simulations exploring historic Worcester. They also collaborate with professors and students in other students, such as Interactive Media and Game Development, to create modules that are quality in both content and construction.

2.4.2 Global Impact through Material and Process

Global Toolkit hopes to develop students that are world-changers, and so throughout each step of participation students have the opportunity to see their impact on the world. A portion of the earnings will go towards their community partners, whose projects are simulated in the learning module and who provide support and connection to the community. These donations will go towards other initiatives in the community that corroborate with Global Toolkit's goals.

2.5 Social Enterprise: A Brief Overview

2.5.1 What is Social Enterprise?

Social enterprise, which can come in a variety of forms, uses business as a vehicle for social benefit. The Harvard Business School defines social entrepreneurship as “the pursuit of an opportunity to create pattern-breaking social change regardless of the resources you currently control; whether for profit, nonprofit, or public sector” (Grossman 2013). For this project, the social enterprise will be a business that both

generates money going back into the company, to cover costs of publication and distribution, and supports social change in local communities.

According to Alexander Osterwalder, author of *Business Model Generation*, the world used to have a clear divide between giving and taking, the for-profit and the non-profit. However, there is a growing trend for ventures that want to “do well,” but also want to “do good” (Osterwalder 2009). These ventures combine goals of profit potential and social impact potential as “conscientious entrepreneurs.”

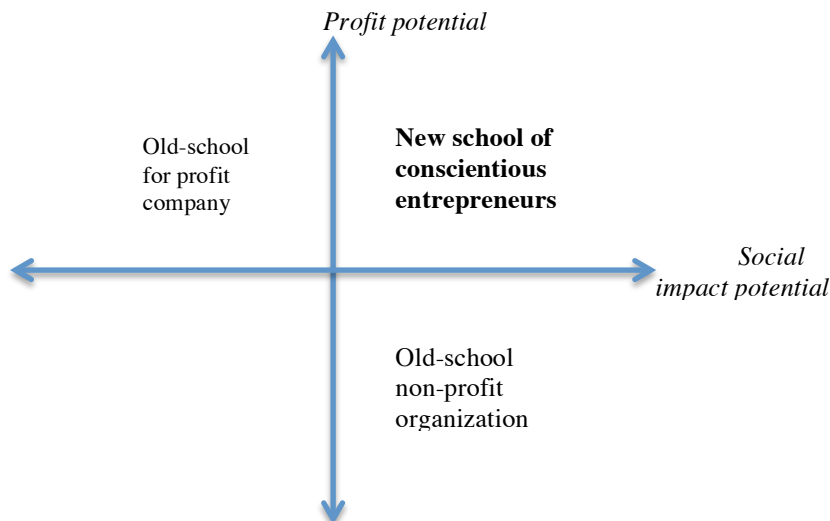


FIGURE 1: THE NEW SCHOOL OF "CONSCIENTIOUS ENTREPRENEURS"

2.5.2 Social Business Models

With such a broad definition, there are various ways for entrepreneurs to approach their social business. Some of the most common models of social enterprise are outlined in the diagram in Appendix A (MaRS Discovery District 2009). Global Toolkit will follow the organizational support model of social enterprise, funding social programs in the communities through the sales of learning modules. Although the community

initiatives will go along with the ideals of Global Toolkit, the business activities and social activities are separate.

2.5.3 Social Business Plan

The social business plan varies from standard business plans in several ways. A social venture has a “double bottom line” of both social and financial return on investment. The social enterprise ideally can quantify the social impact, which determines success of goals. Its target market includes not only customers, but also beneficiaries (Little n.d.).

The social business plan for Global Toolkit follows a model used by the Global Social Venture Competition (GSVC), created by MBA students of the Haas Business School at the University of California, Berkley. GSVC “empowers the next generation of social entrepreneurs...to transform their ideas into ventures that address the world’s most pressing challenges” (Global Social Venture Competition 2015). The business plan includes an Executive Summary, Social Business Opportunity, Theory of Change, Sustainable Business Model, and Social Impact Plan.

2.5.3.1 Theory of Change

Theory of Change is a method of conceptualizing and mapping a desired goal in a particular context. “It is focused in particular on mapping out or ‘filling in’ what has been described as the ‘missing middle’ between what a program or initiative does (its activities or interventions) and how these lead to desired goals being achieved” (Center for Theory of Change 2013). Creating a Theory of Change for Global Toolkit provides insight into the overall goal and objectives, and steps that must be taken in order to achieve those.

2.6 The First Module- Global Toolkit: Morocco

The first Global Toolkit learning module being developed is Global Toolkit: Morocco, which will serve as a pilot for future modules. The learning module will integrate STEM skills such as computation, basic programming, and engineering principles as well as critical thinking and perspective taking. Activities developing these skills will be juxtaposed with a backdrop of a real-world situation, modeled after the community of the Ait Baamrane region, near Sidi Ifni in Southwest Morocco. Beyond the STEM challenges given in the game, there are added social and cultural challenge components, as there would be in a real-world project situation.

2.6.1 Fog Water Collection in Ait Baamrane

Global Toolkit: Morocco will follow the fog-collection project in the community of Sidi Ifni. The non-government organization Dar Si Hmad has created the largest fog-collection and distribution system in the world, providing potable water to over 400 Berber households in the Ait Baamrane region and surrounding communities. This region faces water scarcity, yet fog surrounds the area over 6 months a year. The fog nets and solar-powered pumps are an ecologically friendly method for these communities to access water. The system continues to develop with user-friendly ways for women, who are the “traditional water-guardians,” to manage the system, and improved nets that will withstand the strong winds.

The implementation of this project required skills to handle technical and cultural challenges. The technicalities of creating the water-catchment system, improving it, and developing technology of “fog phones” for management were supplemented by social

challenges, such as convincing the community members that fog water was safe to drink, and designing an acceptable role for women to manage the system (Dar Si Hmad 2015). In Global Toolkit, students will navigate Dar Si Hmad's fog water project through classroom and computer activities, and will be faced with some of the same technical and cultural challenges to engage all aspects of project-based learning.

2.6.2 Dar Si Hmad

Dar Si Hmad is the community partner and beneficiary of Global Toolkit: Morocco. This organization “promotes local culture and creates sustainable initiatives through education, the integration and use of scientific ingenuity with the communities of Southwest Morocco” (Dar Si Hmad 2015). Dar Si Hmad achieves its mission through various projects: collecting water through an innovative fog harvesting system, providing education through an ethnographic school and mobile education program, and enhancing professional development of Moroccan students through their RISE initiative.

2.6.3 The Water School

Donations will be given to Dar Si Hmad's Water School, a mobile education initiative in the communities surrounding Ait Baamrane. The school is a two-week program that teaches children ages 7-14 where students learn about water issues in their community and beyond, as a vehicle to discovering the natural world in new ways. The students learn about water cycles, critical issues of water access in their communities and other parts of the world, best practices for utilizing water resources, and water sustainability along with other ecological challenges. The ultimate goal of these lessons is empowering members of communities with limited water access to best utilize, and even

improve, their living conditions (Dar Si Hmad 2015). Global Toolkit's donations would go towards science supplies that are critical for the Water School: microscopes, magnifying glasses, scales, and planting tools, as well as saplings and plants, so that students can get the most out of their experience through scientific exploration and application.

2.7 Summary

Project-based learning allows students to apply their learning in a simulated or real experience. There are various benefits to project-based learning for students of all disciplines, including improved confidence, teamwork, and cultural understanding. Project-based learning also engages underrepresented minorities in STEM, and may provide further benefits for these groups. At Worcester Polytechnic Institute, project-based learning is central to the educational structure, and a large network of global partners allows the university to send students to project centers throughout the world. However, it is difficult for students at other universities to engage in a project-based learning experience, particularly on a global scale.

Global Toolkit is a collaboration of WPI students and professors to bring global project learning into the classroom. These learning modules simulate a project, teaching STEM contextualized with cultural and social considerations. Global Toolkit is a social enterprise, using business as a vehicle for social benefit. Social enterprise is a broad and growing approach to entrepreneurship, which some believe will fundamentally change the landscape of business structure. The first Global Toolkit module, Global Toolkit: Morocco, follows Dar Si Hmad's fog harvesting project in the Ait Baamrane region of

Morocco. Some of the revenues from Global Toolkit: Morocco's will be given to Dar Si Hmad's Water School, furthering the venture's goal of STEM learning for underrepresented minorities.

3 Methodology

The main goal of this project is to examine potential of the learning module series “Global Toolkit” as a successful social enterprise. I identified four main research objectives in order to achieve this goal, which will be explained further in the rest of this chapter. These research objectives were:

- To develop a social enterprise structure that best fits Global Toolkit’s market;
- To identify a project with Global Toolkit: Morocco’s partnering organization as the beneficiary of the product;
- To determine the steps that would need to be taken for Global Toolkit: Morocco to be published and brought to market.
- To compose a business plan and publishing proposal based on research

3.1 Developing a social enterprise structure that best fits Global Toolkit’s market

As I began to determine best social venture approach for Global Toolkit, I had to evaluate what had (or had not) worked in other cases, and what our options would be. This included not only defining a social enterprise method that the venture could model after, but also evaluating the market and ownership structure.

3.1.1 Identifying and researching the market for Global Toolkit

One of the challenges of this project was that the product was in development alongside of, the business plan. At the beginning of the project, the product was going to be a game that was mainly, if not entirely, web-based. My first step was to research social-impact games. I began with creating a catalog of educational simulations (which can be seen in Appendix B) through Games for Change and other social impact game sources, from which allowed me to explore some of the consistencies and differences between the many social impact games that are offered. I then chose a few to evaluate

more closely, identifying strengths and weaknesses and distinguishing qualities that would be important for our product. Over time the team decided that the product would be more effective as a “learning module”, a computer-based resource with an online component in addition to classroom activities, which can be customized for the needs of a specific course. This decision caused the market research to shift from social impact games to electronic learning materials. This helped me to pinpoint a more specific market for our product and to distinguish Global Toolkit from social impact games as an educational resource.

3.1.2 Researching social enterprise models

There are many different ways that a venture can integrate social benefit into what they do, so it was important to research existing social enterprise models to select the most feasible options for Global Toolkit. This included online research of social enterprise theory, such as Harvard Business School’s social enterprise planning. These allowed me to learn the structure behind different approaches. I also spent time looking at several examples of successful social ventures. Many demonstrated how different enterprise models can be implemented, such as TOMS “one for one” concept. Others social enterprise examples helped with other areas, such as the Oxfam Hunger Banquet, which gave us ideas for classroom components of a learning resource. Some major considerations for a model were having a system that was:

- Applicable in various communities (since the modules would go beyond Morocco), and
- Financially sustainable, as Global Toolkit would also be putting money into new module development.

Once this was done, I narrowed down a few options of social enterprise models that I thought could work for Global Toolkit, and proposed them to the project team and advisors so that they could choose the social enterprise model that would be the best fit.

3.1.3 Defining potential ownership structure

As a result of its close connections with Worcester Polytechnic Institute, I had to consider the type of social venture that Global Toolkit should be, within or outside of the university. We knew that there would be student teams participating in future module development, that key management would be from Worcester Polytechnic Institute, and that the university's wide network of global connections would provide opportunities for future project simulations. We quickly decided that Global Toolkit should be somehow integrated with the university. Establishing an institute was one option; I interviewed one of the directors of another on-campus institute to see what kind of budgeting, reporting, and management this would require. I also talked to faculty involved in the planning for the Foisie Innovation Studio to learn about institutes and initiatives that would be a part of the Studio, and if Global Toolkit could be a good fit within any of these.

3.2 Identifying the Global Toolkit beneficiary

Although it had already been established that the first learning module would be based on a community project in Morocco with the partnership of the non-government organization Dar Si Hmad (DSH), it was crucial to decide on a specific initiative that would serve as the beneficiary for Global Toolkit.

3.2.1 Research and interviews with Dar Si Hmad

Global Toolkit's management had already identified an organization to work with in Morocco for its first module. The organization would serve as a connection for student research in Morocco, an initiative for project simulation, and a beneficiary for the eventual product sales. For me, it was important to learn about DSH so that we could identify the best way for Global Toolkit to be a long-term benefit for the organization. In order to learn more about the organization and the logistics of donating to Dar Si Hmad through its American affiliate, Tifawin Institute, I interviewed Leslie Dodson, the organization's American representative. She provided information about Dar Si Hmad's initiatives and the ways that Global Toolkit could be a beneficial partner for the organization from their perspective.

3.3 Determining future steps for Global Toolkit: Morocco to be published and brought to market

Although this project is evaluating the feasibility of a potential venture, it was important for me to research the process that Global Toolkit would need to go through in order to publish its first learning module, Global Toolkit: Morocco.

3.3.1 Interview with publishing company

I had the privilege of an interview with Wyatt Wade and Julian Wade at Davis Publications in Worcester. This interview was a great resource, as I was just beginning to learn about the publishing industry. Professor Krueger and I pitched the Global Toolkit idea, and we discussed the unique challenges of electronic learning resources and higher education. Both had very good recommendations on the way that we should develop our publishing proposal and market our product.

3.3.2 Research of higher education publishers and publishing proposals

After getting some direction at Davis Publications about the kind of publishing company we should be pitching to, I researched the publication requirements for higher education online resources of several publishing houses. Wyatt Wade had recommended Pearson as a good fit for the goals of our product, so I specifically focused on the components they look for in a publishing proposal. I then worked with the team to create a plan for completing the proposal, which would integrate many of the samples that they were developing with concepts for the finished product.

3.4 Creating the business plan and publishing proposal

Once I had learned about the market, model, beneficiary project, and publishing process for Global Toolkit, I was able to compile my findings for future use of Global Toolkit. The first compilation was the social business plan, which included analysis of the opportunity, market, social value, financial prospects, operations, etc. The second document, the publishing proposal, was collaboration between myself and the other team members to present material for a publishing company to evaluate.

3.5 Summary

In order to evaluate the feasibility of Global Toolkit as an enterprise, I needed to determine the social business structure, beneficiary, and publishing process for the venture, and use this information for a business plan and publishing proposal. Each of these steps required research, interviews, and evaluation of information. To determine a social enterprise structure, I had to define the market, social business model, and ownership for the venture. Although I already knew that Dar Si Hmad would be our

beneficiary for Global Toolkit: Morocco, I needed to identify a specific way that we could help Dar Si Hmad, and a system that would be applicable for future modules. To explore the publishing process, I conducted interviews with a local publisher to learn about the industry and the procedure of finding a publisher, and conducted research of publishing companies that could accommodate Global Toolkit. Once I had gathered all of this information, I was able to develop a potential business plan and publishing proposal for Global Toolkit.

5 Findings & Analysis

5.1 Enterprise Structure

5.1.1 Social Enterprise Model

As I researched social business models, I saw that there are many ways to approach social entrepreneurship. In order to choose a model that would work for this project, I had to consider the applicability and financial sustainability of our system for Global Toolkit: Morocco for future modules. For Global Toolkit: Morocco, I already knew that our beneficiary would be Dar Si Hmad and the community of Ait Baamrane. However, the structure that we established would need to be applicable for other communities, since new modules will be developed in other parts of the world with other partnering organizations. I concluded that the best social enterprise model would be organizational support, providing donations to Dar Si Hmad (or another respective partnering organization) for a specific project that would benefit the community where the module is based.

5.1.2 Ownership Structure

I knew that Global Toolkit would be closely connected with WPI, but where it fit within the university had to be defined. Initially, we considered making Global Toolkit an institute within the university. When I talked to Diane Strong, one of the directors of the university's Health Delivery Institute, I learned that an institute within WPI is an organizational structure with a designated purpose. The institute needs a director, must report to senior administration, and should not cost the university to run. In these parameters, I concluded that Global Toolkit would fit better as a part an existing organizational structure than as an institute of its own. In further discussion with Leslie

Dodson and Professor Boudreau, the Foisie Innovation Studio, currently being developed at WPI, will have a Global Impact Lab, which will possibly include an Institute for Game-Based Learning. We agreed that this would be a good place for Global Toolkit to access the resources it needs and be an asset to the institute and the university.

5.2 Beneficiary Project for Global Toolkit: Morocco

Global Toolkit really has two main “beneficiary” purposes: giving back to communities around which modules are developed, as well as engaging underrepresented minorities with STEM education. I knew that the beneficiary for Global Toolkit would need to be a project that aligned with both of these goals. Although it had already been established that for Global Toolkit: Morocco a portion of sales revenue would be given to Dar Si Hmad, I wanted to identify a specific project as a beneficiary.

Dar Si Hmad has five main initiatives within its organization: fog harvesting, the ethnographic school, the mobile education program (water school), girls e-learning and the RISE program. Knowing that we wanted the beneficiary to be something associated with the material in the learning module, I narrowed down options for a beneficiary project to fog harvesting and the water school. However, fog harvesting, which is the project that the module simulates, had already been established in the Ait Baamrane region of Morocco. It was very important that the project we chose would be a benefit to the community where students and professors had gathered video, photos, interviews, and other information which they were using to develop the module.

Moreover, the beneficiary should somehow tie in with the other purpose of Global Toolkit. The mobile education program (water school) teaches children about science,

particularly ecology and local environmental concerns of water conservation. This tied in very well with STEM education for underrepresented groups. When I met with Leslie Dodson, we were able to identify a specific way that Global Toolkit could give to the water school, covering the costs of science supplies like microscopes, scales, and saplings to plant. This gave me a specific beneficiary goal and cost, so we could know how many water school programs we could provide with supplies with our sales revenue.

5.3 Publishing Process

Although students and professors at WPI are developing Global Toolkit, it can provide opportunities for students at other universities to participate in project-based learning. In order to reach these students, however, Global Toolkit needs to be published as a learning resource. Before this could happen, Global Toolkit would need to find a publisher and come to an agreement on their partnership.

When I interviewed the president and vice president at Davis Publications, I learned the importance of finding a publisher that understood and specialized in the kind of learning resource. Davis, for example, specializes in art textbooks for elementary and secondary school. Beyond the subject matter, there is a significant difference between publishing for higher education and publishing for elementary or high school, as the way that learning materials are used and accessed are different. I also learned about the application process for publishing: creating a proposal with information and examples, and then submitting this to publishers. If interested, the publisher would collaborate with Global Toolkit to create a finished product, and would give a royalty of sales to Global

Toolkit. The publisher, I learned, would also be the one who produces, distributes, and markets the product—as the author, Global Toolkit primarily supplies the manuscript.

Based on these findings, I researched publishing companies that specialized in higher education electronic learning resources. Pearson Education is a well-known publishing company, producing resources for K-12 as well as higher education. They have a department for international, electronic resources for university-level students, and we concluded that this could be a good fit for Global Toolkit, if we can partner with them. This gave us a target publisher, so that we could create our publishing proposal based on their specifications.

5.4 Summary

Among many social enterprise models, I needed to define one that would be financially sustainable and that could be applied for communities with future learning modules. Using an organizational support model would allow Global Toolkit to provide donations to projects in each community they work with, and is flexible enough to be modified based on the beneficiary's project, or the amount that Global Toolkit is able to offer the community. As a part of WPI, I also determined that Global Toolkit should be a part of the Global Impact Lab in the university's upcoming Foisie Innovation Studio.

Global Toolkit: Morocco would be benefitting its partner in Morocco, Dar Si Hmad. However, I wanted to identify a specific project that Global Toolkit could work with, to make impact more quantifiable and would coincide with the other purposes of the learning module. The mobile education program (water school) perfectly coincided with the goals of Global Toolkit, furthering STEM education for underrepresented

groups and directly benefitting the communities in Ait Baamrane. Finally, I learned that we would need to create a publishing proposal and determined that Pearson Education would be our targeted publishing partner.

6 Recommendations and Conclusion

6.1 Recommendations

Based on the research and business plan, I would recommend that the management of Global Toolkit should take the following steps.

6.1.1 Establish the social venture as a part of the Global Impact Lab at Worcester Polytechnic Institute

I would recommend that Global Toolkit be established as an entity within the Global Impact Lab at WPI Foisie Innovation Studio, where it can access the university's extensive global network for community partners and student resources without needing to establish a new institute within the university. This will also give Global Toolkit the opportunity to easily connect with students for both development and use of modules. The management should provide opportunities for teams of students to develop new modules as a project experience where they can travel to communities for fieldwork and apply their own STEM skills to creating material for learning modules. The Foisie Innovation Studio is still in its design phase, so until it is fully established, Global Toolkit can continue to develop learning modules with student project teams as it has done with Global Toolkit: Morocco.

6.1.2 Negotiate a deal with a publishing company

When the sample product and proposal is ready, I would recommend that Global Toolkit then send a publishing proposal to Pearson Education. As alternatives in case the proposal with Pearson is not successful, they should also send it to several other publishing companies. If a publisher is interested in the proposal, Global Toolkit management should go to the publisher to pitch the product and negotiate a publishing

agreement. The publishing agreement should have stipulations for Global Toolkit to receive a percentage of the earnings from module sales as a royalty. Ideally, this would be 10% or greater. The publisher will hopefully distribute over 1,000 copies of the module.

6.1.3 Select a specific community partner for each module to benefit from sales

Each community should directly benefit from the modules developed in their area. This will maintain good relationships with each community, but it will also allow students who purchase the learning module to directly participate in global impact. I would recommend that for Global Toolkit: Morocco, the beneficiary should be Dar Si Hmad's mobile education program. Money will go towards purchasing science supplies such as microscopes, scales, planting tools, and saplings. This will tie in well with Global Toolkit's goals of furthering STEM education for underrepresented groups. I would recommend that each Global Toolkit module donate 20% of its royalties to the beneficiaries, however this could be increased or decreased depending on the needs of the beneficiary. With each beneficiary, Global Toolkit should create a contract establishing the purpose of donations and the accountability structure of the beneficiary's use of the funds.

6.1.4 Produce a new module each year

In order to maintain momentum for learning modules and meet costs, I would recommend that Global Toolkit should aim to produce a new learning module each year. As the first products enter the market, management may see that certain demographics, courses, or universities are particularly suitable for Global Toolkit materials. Global

Toolkit can then better customize modules for their market (i.e., having a learning module geared specifically towards challenges in environmental issues). Creating a diverse, growing product line will allow customers to find a module that is the best fit for them, or continue to learn from new modules as they enter the market.

6.1.5 Seek out funding from foundations and government grants

One way that Global Toolkit has, and should continue to, covered expenses through seeking grant funding, particularly for the development of new modules. External funding could alleviate student travel, platform development, or even community donations. Global Toolkit should seek grants from the Engineering Information Foundation (current sponsor), the Teagle Foundation, the American Association of Colleges and Universities, or government funding.

6.2 Conclusion

This project allowed me to explore the potential of an exciting new social venture, and to consider the implications of decisions for beneficiaries, publishers, and campus partners. I have concluded that Global Toolkit has the potential to be a great resource for students of various disciplines to learn to draw connections between STEM education and global impact. Its project-based approach can equip students with skills that they can apply in their future academic, professional, and civic endeavors. Making global impact an integral part of each aspect, including purchase of the learning module, will engage students in new ways. Global Toolkit could change the way that students and educators alike view project-based learning.

From this project, the professors and students working to establish Global Toolkit as a part of Worcester Polytechnic Institute can gain insight on the process of publishing the first learning module, and on establishing Global Toolkit as a part of WPI that can continue to produce new modules. Ultimately, I hope that this business plan and publishing proposal will enable Global Toolkit to benefit the community of Ait Baamrane, as well as other communities where modules are developed, and students who are able to experience global project learning through this learning resource.

As Global Toolkit continues to develop, or if principles from this project are applied for another social enterprise, both expected and unforeseen challenges may arise. What does a relationship between a publisher and a social venture look like? How easy is it to apply the model between Global Toolkit: Morocco and Dar Si Hmad to other communities? Students or others may be able to benefit from my work if they are hoping to create a social business, particularly as a part of a university. There are many ways to approach social business planning, but perhaps this project could provide an example for a future initiative.

7 WPI Learning Reflection

One of the first classes that I took was Great Problems Seminar: the World's Water.

I was shocked to learn that 1 out of 10 people do not have access to adequate, potable water. We learned about the biological, economic, and social implications of this in different parts of the world, as well as various solutions that have been tried. I continued to be interested in and fascinated by the water crisis long after the class ended.

The following year, I completed my Humanities and Arts requirement in Ifrane, Morocco. Although we spent the majority of our time at Al Akhawayn University, we were able to travel throughout the country on weekend trips. It was here that I was able to see a clear imbalance of water access in a country where it is a significant problem. The country itself is so full of contrasts--even geographically, you can find desert and lush forest within a few hours of driving. This made the water crisis in Morocco especially fascinating: I would go from the town of Ifrane, where sprinklers ran nearly-constantly (some of which were basically simply spraying the street), to the city of Erfoud, an oasis town in the Sahara where water was carefully managed. My time there gave me a deep love for the country, and my interest in its cultural and environmental paradoxes never faded.

It was not until my sophomore year, when I returned from Morocco, that I entered the School of Business at WPI. I had been double majoring in International Studies and Environmental Studies, but I had become intrigued with companies that were being the "world changers" that I wanted to be, but running as for-profit companies rather than struggling charities. I decided to take BUS1010 to see if I would like studying business. It

was in this course that I realized how well business principles tie into humanitarian work. Too many nonprofits fail because of their lack of marketing or finance skills, and too many “handouts” are wasted because they are given no value in the perception of beneficiaries. I really enjoyed the course and the concept of social enterprise, and decided to see if I could customize a Management major concentrating in Social Entrepreneurship.

Since then, I have taken several classes in entrepreneurship and business that have helped me develop skills that were instrumental in this project. In the early stages of the project, I used the Business Model Canvas, which I had learned in ETR3910: Recognizing and Evaluating New Venture Opportunities, to conceptualize my ideas on the value, partnerships, and activities required for Global Toolkit. ETR3920: Planning and Launching New Ventures, went through many aspects of the business plan. Although I had already submitted a draft of the plan when I took the class, it helped me to refine my ideas and gain a better understanding to refine my social business plan. BUS3010: Creating Value through Innovation, taught me to conceptualize the ways that an innovative product or service (like Global Toolkit) can meet the needs of customers, and BUS4030: Achieving Strategic Effectiveness, helped me to turn this value into a message that could be marketed to publishers, students and professors who may use Global Toolkit, and the WPI community. I am very grateful to all of the professors and students who have taught me so much, and made it possible for me to successfully complete this project.

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9 Appendices

9.1 Appendix A: Social Business Models

(MaRS Discovery District 2009)

Business model	How it works	Examples	Key success factors
Entrepreneur support	Sells business support to its target population	Microfinance organizations, consulting or tech support	Appropriate training for the entrepreneur
Market intermediary	Provide services to clients to help them access markets	Supply cooperatives like fair trade, agriculture, and handicraft organizations	Low start-up costs, allows clients to stay and work in their community
Employment	Provide employment opportunity and job training to clients and then sells its products or services on the open market	Disabilities or youth organizations providing work opportunities in landscape, cafes, printing, or other business	Job training appropriateness and commercial viability
Free-for-service	Selling social services directly to clients or a third-party player	Membership organizations, museums, and clinics	Establishing the appropriate fee structure vis a vis the benefits
Low-income client	Similar to fee-for-service in terms of offering services to clients but focuses on providing access to those who couldn't otherwise afford it	Healthcare (prescriptions, eyeglasses), utility programs	Creative distribution systems, lower production and marketing costs, high operating efficiencies
Cooperative	Provides members with benefits through collective services	Bulk purchasing, collective bargaining (union), agricultural coops, credit unions	Members have common interests/needs, are key stakeholders, and investors
Market linkage	Facilitates trade relationships between clients and the external market	Import-export, market research, and broker services	Does not sell clients' products but connects clients to markets
Service subsidization	Sells products or services to an external market to help fund other social programs. This model is integrated with the non-profit organization; the business activities and social programs overlap	Consulting, counseling, employment training, leasing, printing services, and so forth	Can leverage tangible assets (buildings, land, employees) or intangible (expertise, methodologies, or relationships)
Organizational support	Similar to service subsidization, but applying the external model; business activities are separate from social programs	Similar to service subsidization—implement any type of business that leverages assets	Similar to service subsidization

9.2 Appendix B: Catalog of Educational Simulations

Google Treks

- <https://www.google.com/maps/about/behind-the-scenes/streetview/treks/>
- Amazing visualization of a space

Serious Educational Games

<http://www.onlinecolleges.net/50-great-sites-for-serious-educational-games/>

1. EVE Online
 1. <http://www.eveonline.com/>
2. Informatist (Business)
 1. <http://www.informatist.net/Login.aspx>
 2. FREE
 3. Online game, competing against other players
 4. Guides explain how it works before you
3. Innov8 (Business/Entrepreneurship)
4. PowerUp (Students, Environment)
 1. <http://www.powerupthegame.org/>
 2. Special features for impaired players
5. Betwixt Folly and Fate: Students, History
 1. http://www.history.org/history/teaching/dayinthelife/interact_role.cfm
 2. Accompanying video
 3. Choose a character, each has tasks, interactions, activities
6. A Force More Powerful: social work, tactics
 1. <http://www.aforcemorepowerful.org/game/index.php>
7. HumanSim: health care
 1. <http://www.humansim.com/>
 2. provides virtual training for emergency surgeries
8. Foldit: health care, research
 1. <http://fold.it/portal/info/science>
 2. disease research (HIV, Alzheimers, etc) by “puzzles” protein folding
9. FreeRice

1. <http://freerice.com/#/english-vocabulary/1470>
 2. for each correct answer, they donate 10 grains of rice through World Food Programme
10. Third World Farmer
1. <http://3rdworldfarmer.com/About.html>
 2. Exposes players to the unpredictability and hardship of this lifestyle
11. Darfur is Dying
1. <http://www.darfurisdying.com/>
 2. Life in a Refugee camp
12. Stop Disasters
1. <http://www.stopdisastersgame.org/en/home.html>
 2. Prevent natural disasters, game is different every time
13. McDonald's video game
1. <http://www.mcvideogame.com/index-eng.html>
 2. Ironic game explaining the corruption of the company
14. Karma Tycoon
1. <http://www.karmatycoon.com/>
 2. Build a social enterprise
15. A Tale in the Desert VI
1. <http://www.atitd.com/>
 2. Community development in Ancient Egypt
16. World Without Oil
1. <http://www.worldwithouthoil.org/start.aspx>
 2. Simulation of oil crisis to highlight unhealthy oil dependency
17. Peacemaker
1. <http://www.peacemakergame.com/>
 2. Create peace in the Middle East
18. Democracy 2
1. <http://positech.co.uk/democracy2/index.html>
 2. Run for president and deal with issues such as crime, debt, unemployment, etc.

Oxfam Hunger Banquet

- <http://washingtonseminarcenter.org/wordpress/wp-content/uploads/2013/01/SWK442BowenHungerBanquetPlanning.pdf>
- toolkit available online
- comparable to World Vision 30 Hour Famine (<http://www.30hourfamine.org/>)
- Interactive, some character development
- Good process: explanation, experience, discussion

Edward Kennedy Institute for the US Senate

- <https://www.emkinstitute.org/sim>
- Senator in Training, Senate Immersion Module, Young Leaders Network
- Immersion Module: middle and high school students, 2.5 hours, free for MA schools
- Prep and follow up curriculum

9.3 Appendix C: Social Business Plan



Social Business Plan 2015

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1 Executive Summary

Global Toolkit is a nonprofit venture within Worcester Polytechnic Institute's Institute for Game Based Learning, resulting from the collaboration of professors and students of Worcester Polytechnic Institute (WPI). Global Toolkit partners with local organizations in the communities where modules are based, to add firsthand perspectives on the processes, challenges, and successes that result from applying STEAM skills to a global challenge. These organizations will also receive a portion of Global Toolkit's earnings from sales of the learning module, so that they can continue development work in their communities. Global Toolkit is already developing its first module, Global Toolkit: Morocco. This will serve as a model for future learning modules. Global Toolkit's community engagement and social impact also hopes to serve as a model for other educational resources promoting change.

Every module that is sold will divide its profits in two ways:

- Overhead/development costs for the institution and future Global Toolkit modules, including a scholarship fund for students to participate in projects gathering information in global communities for new modules.
- Donation to an organization to benefit the community where the module is based
 - For Global Toolkit: Morocco, money will go to the Tifawin Institute, to be given to Dar Si Hmad, a non-profit organization focused on education and development in Southwest Morocco, for students in their Water School for science supplies

Global Toolkit is appropriate for higher-education students in any major. In fact, having students from multiple disciplines in the same class while using Global Toolkit would allow for a more enriching experience, approaching a problem from various perspectives and better simulating a project in the professional world. It can be customized to fit a specific course or discipline (for example, a physics course could choose more activities that apply these skills). The standard version of the learning module will give a broad view of STEAM applied towards global impact. The science, engineering, and mathematics activities, in particular, are geared towards students at any skill level in these fields to develop their interests. For this reason, it may be better used in an introductory course for engineering, science, or math. Introductory courses, often taken by underclassmen, are also a great opportunity for students to explore their interests and develop their awareness of a career path. Global Toolkit brings together various STEAM fields and applications while demonstrating their global impact in the real world.

Global Toolkit is appropriate for higher-education students in any major. In fact, having students from multiple disciplines in the same class while using Global Toolkit would allow for a more enriching experience, approaching a problem from various perspectives and better simulating a project in the professional world. Particularly, we recommend Global Toolkit: Morocco as a good fit for any of courses in these categories:

- [Introductory Engineering Design](#)
- [International Development](#)
- [Environmental Science / Studies](#)

- Public Participation

For its first module, Global Toolkit is targeting a market of college freshman interested in a course that integrates global impact with STEAM education (approximately 658,00 students). It is expected that market will expand as new modules are developed geared towards more specific, higher-level disciplines.

Global Toolkit will be integrated with WPI's Foisie Innovation Studio, a part of the Institute for Game Based learning and the Global Impact Lab. It will require three key partnerships

- Worcester Polytechnic Institute, for ownership and a network of global project centers to connect with community partners. WPI students will also be an integral part of Global Toolkit, participating in new module development through projects and employment opportunities.
- Community organizations, for project simulation and connections with communities throughout the globe. These organizations will also be long-term beneficiaries, receiving donations from sales of the module for further development in the communities.
- Publisher, for distribution and marketing of the module. Global Toolkit will partner with a publisher, giving them rights to manufacture and distribute learning modules in exchange for a negotiated royalty.

Global Toolkit will require a \$39,000 investment for startup (see table below).

This business plan examines two financial scenarios, where the publisher sells 1,000 and

5,000 Global Toolkit modules, respectively. With the assumption of modules selling for \$50 with a 10% royalty going to Global Toolkit, the venture is profitable with the sale of \$5,000. However, the pace of Global Toolkit developing new modules controls a significant portion of expenses for the venture. If there are not enough sales to sustain the estimated expenses, Global Toolkit can delay development of new modules or seek out external funding such as grants.

2 Social Business Opportunity

Worcester Polytechnic Institute's project-based approach to STEAM (science, technology, arts, and mathematics) education has afforded opportunities for its students to see their learning applied to real-world challenges throughout the globe. Particularly, WPI's Interactive Qualifying Project (IQP), which students complete in their junior year, is the collaboration of students from various majors on an interdisciplinary problem. Many of these projects are completed at one of WPI's global project centers. This project-based model coincides with the university's motto "Lehr und Kunst," or "Theory and Practice."

These projects help students develop crucial skills that they will apply in their careers following graduation—working on teams, critical thinking, perspective taking, and cultural understanding. For 40 years, WPI has demonstrated that project-based learning is a successful model in education. However, not all students are able to travel across the world to complete an off-campus project. For some students, academic or extracurricular commitments prevent them from participating in a global project.

Financial restraints are also an obstacle. Beyond WPI, students at other universities are

not afforded the same structure that is built around project-based education. Global Toolkit, a series of interactive learning modules based on real-world projects throughout the globe, will develop the same skills that are targeted through participation in a global project.

Global Toolkit equips students with the problem solving and STEAM skills they need to be prepared to apply engineering solutions to interdisciplinary, global challenges of the present and future. Global Toolkit is based on the belief that students in STEM fields, social sciences, and liberal arts will be challenged with interdisciplinary, global challenges. In an increasingly globalized world, these problems will affect, and are worth the attention of, students and professionals—even those who are not local to these problems¹.

Global Toolkit is designed to engage students from multiple disciplinary backgrounds to develop their skills in STEAM literacy, cultural understanding, teamwork, methodical problem solving, and communication so that they are able to navigate interdisciplinary challenges.

- It is designed to stand as a standard four-year college course, or as a supplement to an existing course, with a customizable duration from two days to a full semester

¹ http://papers.ssrn.com/sol3/papers.cfm?abstract_id=989565

- It integrates computer-based and classroom-based education with activities and material that engage and develop students in multiple ways
- It allows students to work together in teams to discuss and solve engineering problems through in-class activities
- It promotes independent thinking with engineering and social considerations through outside-class activities and reflection

Use of Global Toolkit is appropriate for STEM students as well as those studying the liberal arts. Cross-disciplinary literacy programs are becoming more popular, as foundations, such as the Kern Entrepreneurial Engineering Network, foster support in light of the growing demand for this kind of learning. The Network proposes a mission “to graduate engineers with an entrepreneurial mindset so they can create personal, economic, and societal value through a lifetime of meaningful work.”²A study of the Association of American Colleges and Universities (AAC&U) studied the skills and knowledge required in today’s workplace. They concluded that Tstudents need an interdisciplinary skill set combining innovative thinking, problem solving and teamwork skills, and applied learning--particularly in a global setting.

- 92% say innovation is essential

²<http://www.keennetwork.org/about-keen>

- 93% say that, “a demonstrated capacity to think critically, communicate clearly, and solve complex problems is more important than [a candidate’s] undergraduate major.”
- More than 90% emphasize ethical judgment and integrity, intercultural skills, and capacity for continued learning³

In their publication “Engineers of 2020”, the National Academy of Engineering emphasized the importance of global impact and understanding in STEM education: “Consideration of social issues is central to engineering... Attention to intellectual property, project management, multilingual influences and cultural diversity, moral/religious repercussions, global/international impacts, national security, and cost-benefit constraints will continue to drive engineering practice.”⁴

Liberal arts education is also a catalyst for meaningful change, but can be strengthened by integrating other disciplines such as STEM literacy. The Teagle Foundation is just one organization promoting cross-disciplinary integration in liberal arts education, which seeks to improve teaching in the arts and sciences and to address sustainability and accountability for university education⁵.

Despite this increasing market demand for students entering the workforce with skills not only in technology and innovation or liberal arts education, but also in problem

³ https://www.aacu.org/sites/default/files/files/LEAP/2013_EmployerSurvey.pdf

⁴ <http://www.nap.edu/read/10999/chapter/1>

⁵ <http://www.teaglefoundation.org/About/Mission-and-Vision>

solving, cultural understanding, and project management, many educational institutions have not yet been able to develop programs that integrate development of all skills mentioned. Global Toolkit: Morocco will engage students in these disciplines, and may generate further interest in STEM learning for underrepresented groups as they see the societal impact that engineering skills can have throughout the world. On the other hand, students who have already expressed interest in STEM will be able to see the way that they can apply these skills to the most challenging issues that our world is facing.

3 Theory of Change

Global Toolkit is an initiative of students and educators seeking to see STEAM fields benefit communities worldwide, partnering with organizations that have enacted lasting change through STEM innovations to bring project experiences into the classrooms of higher education. Global Toolkit is a tool to attract underrepresented groups to STEAM learning, with a goal of equipping them with problem solving and STEM skills, so that they are prepared to apply appropriate engineering solutions to global challenges. A sought outcome is that students gain technical literacy and interest in pursuing future study in these fields, as well as developing (through practice) cultural awareness, skills in communication and teamwork, and interdisciplinary thinking when approaching complex problems.

In order to achieve these, Global Toolkit integrates exercises in cultural context, project simulation, engineering challenges, presentations and discussions. These exercises are based on a real-world project that has been done in the community being discussed. Beyond the training and understanding from the curriculum, students are able

to participate in tangible change with donations going back into the organizations and communities their module is based around, and towards a scholarship fund for students to participate in interdisciplinary global projects.

Goal: Students equipped with problem solving and STEAM skills such that they are prepared to apply engineering solutions to interdisciplinary, global challenges of the present and future

- **Assumption A:** Students becoming young professionals increasingly require interdisciplinary skills in their careers in order to be successful
- **Assumption B:** In an increasingly globalized world, these “global” challenges are affecting industry worldwide, and are worth the attention of students and professionals even who are not local to the problem
- **Assumption C:** STEM skills can be instrumental for solving global challenges

Outcome 1: STEM literacy and interest in further education/development of skills

- **Assumption D:** Students would gain introductory knowledge that could foster interest for future study in specific STEM skills

Outcome 2: Cultural awareness, communication/team skills, and interdisciplinary approach to problem solving

- **Assumption E:** Exposure to other cultures can increase understanding of other perspectives and cultural worldviews

- **Assumption F:** Practice of team-based learning, communication and interdisciplinary thinking can increase facility to these effects

Outcome 3: Understanding and perception of opportunities to apply learning to global challenges through projects

Outcome 4: Benefits to the communities that serve as settings for Global Toolkit resources

- **Assumption G:** Partnering organizations can continue to serve communities, with students participating in that work through financial donation as part of Global Toolkit's structure

3.1 Theory of Change Map

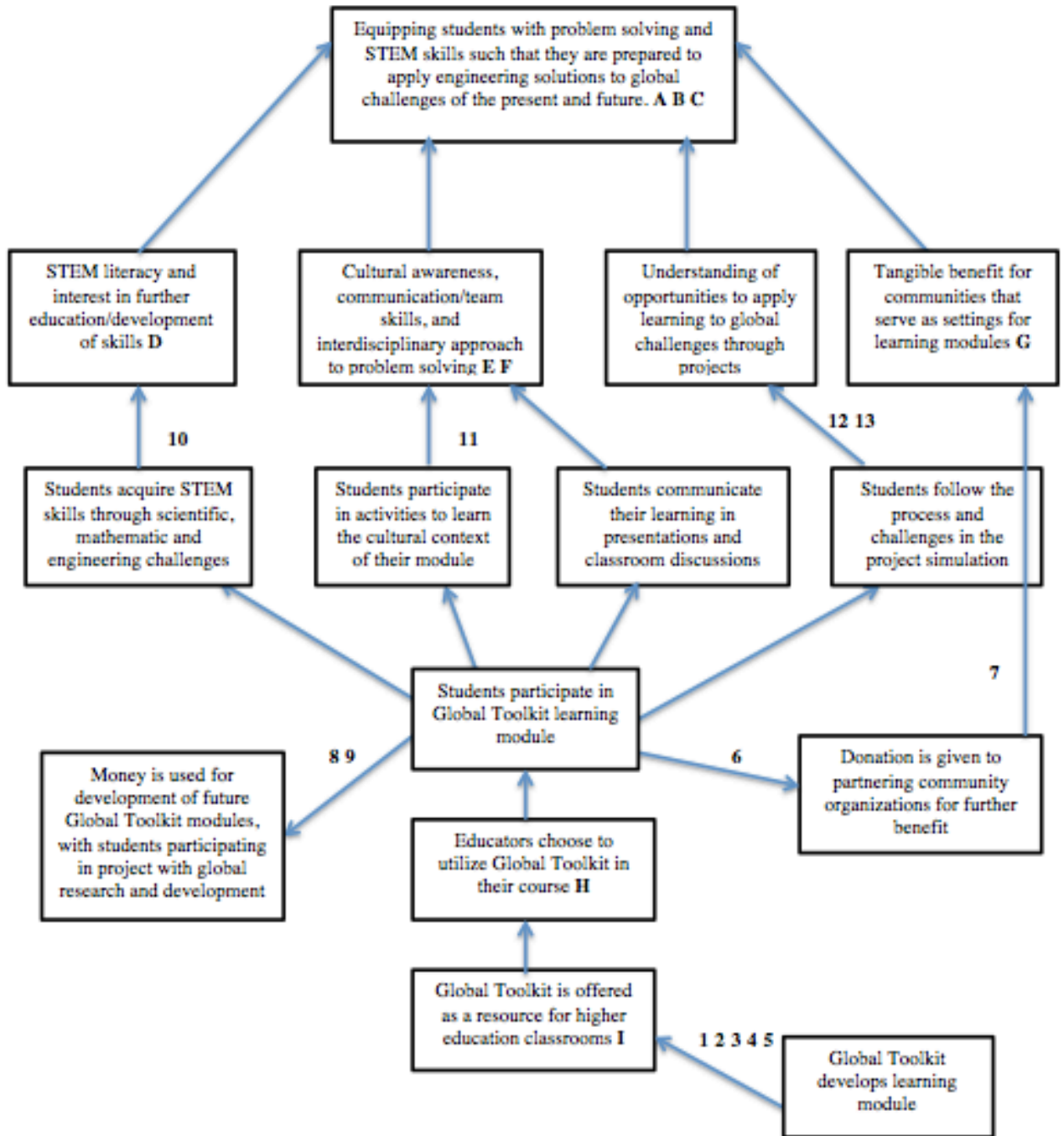


FIGURE 2: THEORY OF CHANGE MAP

3.2 Further assumptions:

- **Assumption H:** Educators must decide whether/how the learning module applies to their specific educational goals and customize the module to their needs, which may affect the outcomes for students
- **Assumption I:** Publisher will come to an agreement with Global Toolkit, where they will have rights to produce, distribute, and market the learning module, and a portion of the earnings will be given as a royalty to Global Toolkit

3.3 Indicators

Outcome 1: STEM literacy and interest in further education/development of skills

Indicator: pursuit of further education in STEM and development fields

Population: students who have completed a Global Toolkit program

Threshold: 75% enrollment in another class in STEM-related field

Outcome 2: Cultural awareness, communication/team skills, and interdisciplinary approach to problem solving

Indicator: successful application of these abilities

Population: students who have completed a Global Toolkit program

Threshold: grades (80% and up) indicating understanding of these skills

Outcome 3: Understanding and perception of opportunities to apply learning to global challenges through projects

Indicator: participation in projects applying engineering to global problems

Population: students who have completed a Global Toolkit program

Threshold: expressed interest (75%) and participation (50%) in internships, careers or other project opportunities

Outcome 4: Benefits for the communities that serve as settings for Global Toolkit resources

Indicator: community projects funded by Global Toolkit earnings

Population: communities and partnering organizations

Threshold: documentation of community projects/benefits through annual report, including media (photos and video) to be passed on to students and educators

3.4 Identifying Interventions

1. Partnership with a local organization which has initiated community benefit projects through WPI network of global project centers
2. Travel to community for gathering data, interviews, media
3. Developing materials for learning module through collaboration of students, Global Toolkit management, and partnering organization
4. Sending game manuscript, sample activities, and sample programming to publisher
5. Collaboration with publisher for final product ready for launch
6. Identifying needs of the community through partnering organization and selection of project for donation

7. Gathering reports from the organization of what has been done with donation money
8. Deciding on number of students needed (and skills required) for new module
9. Application for student participation in the project—students hear through IQP fair
10. Testing the understanding of students through tests/learning checks
11. Testing the understanding of students through application and reflection assignments
12. Survey of students career interests before/after completing the module
13. Presenting opportunities (career/internship, projects, volunteer, etc.) for students to consider

4 IV. Sustainable Business Model

4.1 Social Value Proposition

4.1.1 Environmental assessment: trends in the industry, region, public policy, technology

Advances in technology, communication, and transportation have made the world increasingly connected. Companies and individuals alike can have a surprising international impact, and affairs across the globe can have a significant impact on them. Students entering the professional world are being greeted with growing expectations and challenges. Companies on the forefront of technological innovation are looking for

students with not only technical skills, but also skills in problem solving, teamwork, entrepreneurship, and the ability to think globally⁶.

The industry for e-book publishing (most similar to Global Toolkit's product) has been thriving for the last five years. This industry is comprised 33.8% by educational material. Projected growth of 3.4% annually between 2015 and 2020 is slowing due to a decreasing sense of novelty in the industry⁷. However, in comparison to other e-books, higher education textbooks are considered less volatile due to more consistent demand⁸.

4.1.2 “Problem” and “pain” that is being addressed

Educational institutions are setting goals of developing their programs beyond the technological, emphasizing development of societal and interdisciplinary skills for students as they enter the professional world. One approach to do this is giving students the opportunity to practice this, by participating in a project that requires their technical skillsets but is also interdisciplinary, complex, and addresses a real-world challenge. Worcester Polytechnic Institute (WPI) is renowned for its STEM education, global impact, and project-based education, ranked highly by the Princeton Review for study

⁶ https://www.aacu.org/sites/default/files/files/LEAP/2013_EmployerSurvey.pdf

⁷ <http://clients1.ibisworld.com.ezproxy.wpi.edu/reports/us/industry/ataglance.aspx?entid=4579>

⁸ <http://clients1.ibisworld.com.ezproxy.wpi.edu/reports/us/industry/operatingconditions.aspx?entid=4579>

abroad programs, career placement, and return on investment⁹. Having over 40 project centers around the world, the university's term schedule and project-based system fosters an environment where STEM skills can be not only learned, but also applied towards global impact. However, the skills that WPI students gain from this education is difficult to replicate at other universities without the same structure.

Although studies and institutions have demonstrated that project-based learning experiences have been extremely positive, there are challenges that come with the implementation of this style of education. It requires more extensive preparation to give students the opportunity to experience a suitable project, which has a realistic scope yet is sufficiently challenging. This learning is more complex than educational styles, with team dynamics and external factors having an affect on outcomes, and less clear-cut assessment of success (Pawson, et al. 2006). Moreover, participation through off-campus project centers, particularly in an international setting, requires a broad network of partners and sponsors to be feasible, with extensive preparation for students at the university and in the host communities. Institutions like WPI continue to develop programs centered on project-based learning, organizing their schedules and requirements around this structure. Application at other higher-education institutions, if it were even possible, would take years of development before it could be implemented.

⁹ <http://www.princetonreview.com/schools/1023881/college/worcester-polytechnic-institute>

Even at institutions where project-based learning is a part of the academic structure, participation in an off-campus project is not always feasible. Health or financial concerns may inhibit students from leaving campus to complete a project, or commitments such as jobs or sports may be obstacles. How, then, can the benefits of project-based learning, particularly in an international context, be applied in the classroom?

4.1.3 Unique product or service benefits

Global Toolkit will develop learning modules that will bring project-based learning from across the globe into the classroom. It sets itself apart by marrying STEAM education with global application. Partnering with organizations that have accomplished a project furthering community development, Global Toolkit engages students in activities that develop their skills in STEM, liberal arts, and social sciences while introducing them to the technical and ideological challenges that one might encounter while completing a project abroad. This integration of cross-disciplinary learning comes “ahead of the curve” of a shift in the changing approach to higher education.

4.1.4 Continuous innovation and learning

As the company grows, Global Toolkit will continue to both create new modules and update existing ones. The modules are designed to teach relevant skills in the context of relevant problems (for example, Global Toolkit: Morocco is in the context of water accessibility problems). If and when problems arise that are not addressed in other modules, Global Toolkit can integrate these challenges in new or existing modules.

Similarly, modules can be adapted to address skills that are demonstrated to be necessary for students entering the professional sector in our rapidly developing world.

4.1.5 Sustainable competitive analysis

With a trend towards interdisciplinary, international, and project-based learning in higher education, within a few years there may be other organizations that seek to employ similar methods to integrate STEAM skills and global challenges. Global Toolkit has a competitive advantage, however, in three ways. First, Global Toolkit's connection with WPI, already renowned for project-based and global learning as a part of STEAM education, offers a network of project centers throughout the world where new Global Toolkit modules can be developed. Second, Global Toolkit distinguishes itself with global impact and tangible change being integral even to the education process, by giving students the opportunity to connect with a real community through participating in the program.

4.1.6 Value chain and network that is better than current offerings

Even in its development, Global Toolkit brings together cultural and technical challenges with global impact. A team of students, primarily those representing underrepresented demographics in STEM fields, develops the material and concepts for a learning module. They do fieldwork in the community where their module is based, immersing themselves in the culture and seeing firsthand the project that will be simulated. They create cultural and social activities for the module based on stories of real people in the community, and even on their own challenges of working cross-culturally.

Starting with the basis of WPI’s 40+ project centers, Global Toolkit already has a strong network of potential partnerships, giving them an advantage over competitors. As Global Toolkit creates more modules, it will continue to forge new relationships with community organizations throughout the world. These relationships will be strengthened by a partnership that outlasts module development or initial introduction to market—as long as a module based in a community is being sold, Global Toolkit will be giving donations to their community partner in that region.

4.2 Service Beneficiaries Value Creation Plan

4.2.1 Beneficiaries

The first beneficiaries of Global Toolkit are the students who use the learning modules. They are able to increase their STEM literacy, but also their problem-solving and communication skills, as well as their understanding of stakeholder perspectives and cultural mindsets. However, their opportunity to have positive global impact goes beyond a classroom activity or simulation. Global Toolkit creates partnerships with organizations in the communities that the modules simulate. These local partners work closely with the students and key management throughout the development process, and their work in the community is an integral part of the students’ learning.

For Global Toolkit: Morocco, the module was based on Ait Baamrane, a rural community in the southwest region. The local partner was Dar Si Hmad, a non-governmental organization that “promotes local culture and creates sustainable initiatives through education, the integration and use of scientific ingenuity with the communities of Southwest Morocco”^[i] Dar Si Hmad’s initiatives include a fog harvesting for water

access, an ethnographic school, mobile education program, and career development for youth. The fog-harvesting project is a central part of the Global Toolkit: Morocco module.

4.2.2 Customer profile and target market

The module itself is geared towards university-level students, either in STEM or development fields. However, the marketing of Global Toolkit must be mainly geared towards professors, since they are the ones who will be selecting the learning module as a material for their course. There are thousands of universities in the United States offering students the opportunity to study in these fields. Global Toolkit should first target universities that have expressed interest and support in similar initiatives--such as the Association of Independent Technological Universities (AITU), or the Association of American Colleges and Universities (AAC&U).

The market for Global Toolkit would be primarily college freshman interested in a course that integrates global impact and STEAM. As a sample, WPI's Great Problems Seminar is a project-based course that explores global challenges, offered to first year student. According to Sarah Miles, Senior Analyst in WPI Enrollment Management, 24% of the freshman class Worcester Polytechnic Institute enrolls in the university's Great Problems Seminar¹⁰. In 2015, there were 10,966,000 undergraduate students enrolled in American colleges and universities¹¹. If one quarter of these students are freshman, there

¹⁰ Personal communication, December 02 2015

¹¹ http://nces.ed.gov/programs/digest/d14/tables/dt14_105.20.asp?current=yes

is a market of 2,741,000 students, where 24% of them would be interested in the product. In this case, there are approximately 658,000 students who would be interested in a learning resource like Global Toolkit.

4.2.3 Intimate relationship building

For each learning module, a community development project like Dar Si Hmad's Water School will receive a portion of the revenues from their local Global Toolkit. This creates a lasting connection between the educators and students using Global Toolkit, and the members of the community they are learning about. Students are able to participate in tangible impact right as their Global Toolkit experience begins, and their connection to this impact grows as they learn more through stories, videos, and simulations. Students and professors who have used a learning module can receive email updates with pictures and stories of how their Global Toolkit module benefitted the community.

Moreover, Global Toolkit can continue to learn from students and professors as it develops new modules. Customers can send feedback to Global Toolkit with suggestions on improvements to activities, integration of new subjects for learning modules, or even ideas for future modules. Global Toolkit may produce more modules in the future still based on real-world projects, but more focused on a specific subject (such as developing skills in mathematics, physics, or computer programming).

4.2.4 Unique product/service features

There are few higher education resources that integrate interdisciplinary learning and global impact, and even fewer based on real-world projects. One of Global Toolkits distinguishing features, however, is this strong connection that is created between

students and a community, which is followed through by tangible difference through donations to the Water School.

The module itself is computer-based. When they purchase the module, students are given login access. Instructors have their own login, where they are able to see the work of students, and are also provided with materials for classroom activities.



FIGURE 3: HOMEPAGE FOR GLOBAL TOOLKIT: MOROCCO

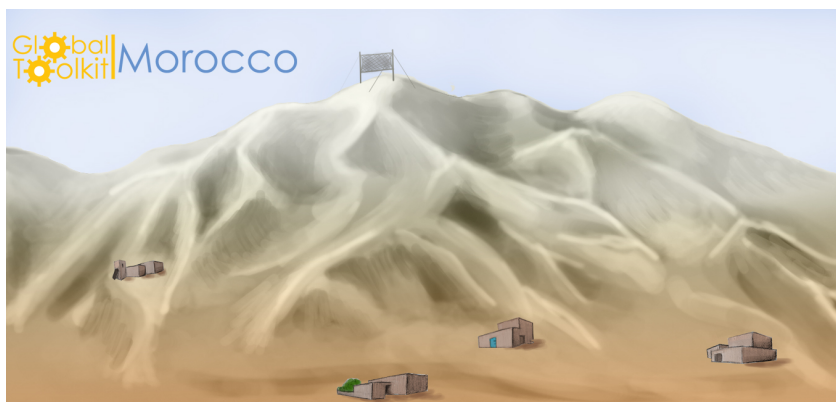


FIGURE 4: NAVIGATION PAGE FOR GLOBAL TOOLKIT: MOROCCO

The activities in Global Toolkit will integrate STEM activities with the context of the fog-harvesting project in Ait Baamrane. For example, students must complete an activity connecting fog nets with homes in the communities using physics equations. Activities focused on social and cultural understanding will be present as well. Visual novel activities follow the stories of characters affected by the fog water project. Together, these activities give students the opportunity to see a STEM project in a multifaceted, global context with various implications.



FIGURE 5: A CHARACTER IN ONE OF THE VISUAL NOVEL ACTIVITIES



FIGURE 6: A CHARACTER USES A "FOG PHONE" IN A VISUAL NOVEL ACTIVITY

4.2.5 Sustainable competitive advantage and competitor profile

Main competitors for Global Toolkit would be more traditional textbooks in STEM and development. Until Global Toolkit has established a strong reputation as a learning resource, these competitors have an advantage of being established resources that institutions, professors, and students are aware of and rely upon. Among other simulation products, most STEM simulations are geared towards K12 education, with higher education simulations being overwhelmingly focused on business practice. There are few resources that integrate multiple disciplines, especially with the cohesiveness of a project-based model. Global Toolkit also has the advantage of Worcester Polytechnic Institute's reputation as a leader in STEM, project-based learning, and global impact.

Product	Key Features	Disadvantages
Global Toolkit	<ul style="list-style-type: none">-Based on real-world global projects-Sales make donation to communities-WPI reputation as a leader in project learning	<ul style="list-style-type: none">-New material without established reputation
Cesim ¹²	<ul style="list-style-type: none">-Wide variety of options: simulations in business, hospitality, and global challenges-Opportunity for corporate partnerships-Multiple languages	<ul style="list-style-type: none">-Lacks social value of connection with communities-Focused primarily on business simulation vs. STEM learning
"Sustainable Engineering"	<ul style="list-style-type: none">-Evaluating environmental and societal	<ul style="list-style-type: none">-No project-based or

¹² <http://sim.cesim.com/>

(Prentice Hall) ¹³	impacts of engineering designs -Incorporates case studies, industry perspectives, and engineering design skills	simulation component -Lacks social value of connection with communities -Scope limited to engineering design
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4.2.6 Promotion of the service and distribution strategy

Global Toolkit will partner with a publishing company that will manufacture, promote, and distribute learning modules. This will require Global Toolkit visiting the publisher and coming to an agreement on the terms of the partnership, such as the percentage of royalties that Global Toolkit will receive. Global Toolkit directors and student teams must develop a “manuscript” of the learning resource, as well as a proposal for publishers to review. They will then contact potential publishers, and may visit publishing houses to pitch their idea and/or negotiate an agreement.

4.2.7 Pricing structure including gross margin and potential to breakeven

The learning module will be sold at a price of \$50 per students, which grants them access to all online and in-class materials for the product. The cost of developing Global Toolkit: Morocco is approximately \$14,000, which would require 2,800 modules to be sold in order to breakeven, if Global Toolkit receives a 10% royalty.

¹³ <http://www.textbooks.com/Sustainable-Engineering-12-Edition/9780132756549/David-T-Allen.php>

4.3 Management Team Infrastructure

4.3.1 Key Management Team

Robert Krueger and Kris Boudreau of Worcester Polytechnic Institute will be the key management for Global Toolkit. Krueger is the director of WPI's Environmental & Sustainability Studies program, specializing in urban sustainability, regions, policy mobility, and comparative policy analysis. He is a co-chair for the US Environmental Protection Agency (EPA)'s Environmental Justice Working group, and has published articles in many prestigious internationally peer-reviewed journals. He was also co-editor of the book *The Sustainable Development Paradox*. Boudreau is the Associate Dean of the Humanities and Arts program at WPI, as well as a professor in literature, writing, Great Problems Seminars, and has advised on Interactive Qualifying Projects. She has previously developed role-playing simulations based on water access in historic Worcester.

These key managers have collaborated with professors and students across various disciplines in the planning and development of Global Toolkit: Morocco. Student participation in the development of Global Toolkit modules is an enriching experience for the students, and enhances the quality and usability of the module. These students play a key role in gathering data, translating it into lesson material, and conceptualizing concepts and activities for the module. For each module that Global Toolkit develops, there will be a team of students working with Professor Krueger, Professor Boudreau, and contacts from the partnering organization.

4.3.2 Ownership and Reporting Structure

Global Toolkit will be a part of the Institute for Game-Based Learning, housed in the Global Impact Lab in the Foisie Innovation Studio. As a part of the Game-Based Learning Institute, the institute will receive royalties earned from the sales of learning modules, with some of the money covering administrative costs. As long as the content and mission are perceived as aligning with the institute's goals, this will be a benefit for the institute (and the Social Impact Lab) to demonstrate ways that activity learning is being implemented.

The organizational structure of Global Toolkit will include an advising board, management, and two departments. The advising board is outlined below, including advisors from key partnerships: WPI, community organizations, and publishing. The first department, Learning Module Development, will include IQP and MQP project students, who develop the content for modules. This position would not be paid unless students worked beyond the scope or timeline of their projects to develop a learning module. However, Global Toolkit would cover expenses such as travel for research in communities for project students. This department would also include 1-2 interface developers, within or outside of WPI, to create the structure for the game to be used online (publisher would complete web development).

In the second department, Community Partnerships, there would be a manager of partnerships. This person would be in charge of maintaining communication with partnering organizations, assessing the use of Global Toolkit funding for community initiatives, and identifying partners in new communities. This department would also

include a communications worker, who would work primarily with the community partners to gather materials (photo, video, written) communicating the impact for beneficiaries of Global Toolkit. This could be used either by Global Toolkit or the publisher for promotional material. Finally, the publishing manager would deal with communication with the publisher for existing and developing modules.

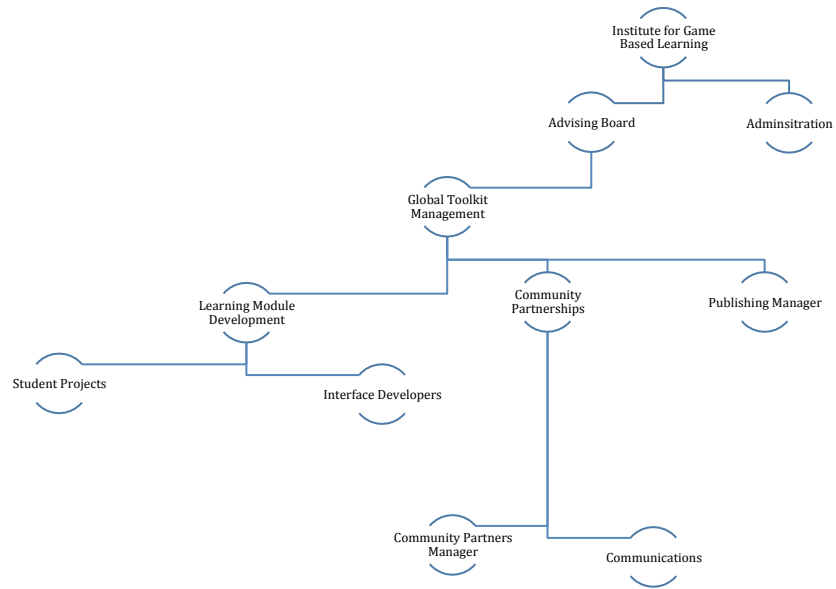


FIGURE 7: ORGANIZATIONAL STRUCTURE FOR GLOBAL TOOLKIT

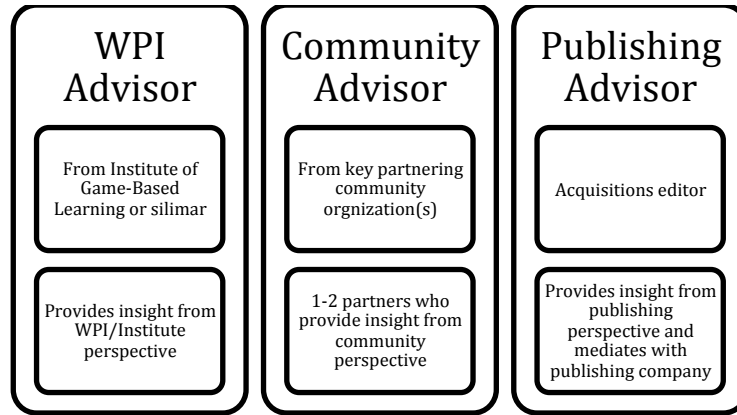


FIGURE 8: KEY ROLES FOR GLOBAL TOOLKIT ADVISING BOARD

4.3.3 Legal Structure and Accountability

Global Toolkit will be accountable to Worcester Polytechnic Institute and the institute or center that it is a part of, potentially the Global Impact Lab and/or Institute for Game-Based Learning. Moreover, within Global Toolkit there will be accountability for the organizational partners to use donations for intended purposes. The Community Partners Manager will be responsible for this, gathering information from partners through verbal or written reports. Donations will be earmarked for their specific purposes in the community.

4.3.4 Key Stakeholders and Strategic Partnerships

Key partners and stakeholders with Global Toolkit are:

- **Local organizations:** As previously mentioned, the development of each module requires a close partnership with a local organization working towards community development in the area. Partnerships with organizations like Dar Si Hmad will allow Global Toolkit to develop a module that accurately depicts a real-world project. The organization can provide insight into the processes and challenges of

the project's development, as well as connections with members of the local community.

- **Publishing:** Although Global Toolkit will conceptualize, plan, and develop the framework; learning modules will be produced, distributed, and marketed by the publisher. Global Toolkit will collaborate with the publishing company to finalize a version of the learning module that is conducive to the goals of both the publisher and Global Toolkit, and will create an agreement with a publishing company where the company has rights to produce and distribute the module material, and Global Toolkit will receive a royalty of the revenues gained by sales.
- **Worcester Polytechnic Institute:** WPI will provide framework and administration for Global Toolkit, through the Global Impact Lab that will be a part of WPI's Foisie Innovation Studio. Alternately, Global Toolkit could be an aspect of the Center for Project-Based Learning. Students who develop new learning modules with Global Toolkit will also be students at Worcester Polytechnic Institute. Development of new modules may constitute these students' Interactive Qualifying Projects (IQPs) or Major Qualifying Projects (MQPs), depending on the specialization of work that they are doing. Students who participate in the development of modules, or who work for Global Toolkit to develop the interface, will be involved and invested in the success of the venture. Global Toolkit will be accountable to WPI through the Global Impact

Lab/Center for Project-Based Learning for using royalties received (that are not given to the community organization) to develop new learning modules.

4.3.5 Employee Needs, Skills and Passion

Global Toolkit will require employees (and volunteer/student project workers) who have the same skills that the learning module emphasizes: interdisciplinary thinking, technical skills, and passion for being “world-changers.” Student teams who are developing the modules should come from multiple disciplines and be independent thinkers. Interface developers should be proficient in computer programming and web developing, preferably with previous experience. The community partners’ manager should have experience working with non-profit organizations and have skills in accounting. The communications worker should have strong writing and media capabilities. The publishing manager may be the acquisition editor from the publishing company.

4.4 Operations Plan

4.4.1 Operating Structure, Processes, Policies and Procedures

Global Toolkit aims to produce one learning module every year following the operation process shown below. The publisher will update Global Toolkit with new editions and technological advances, with the collaboration and assistance of a Global Toolkit team, where necessary.

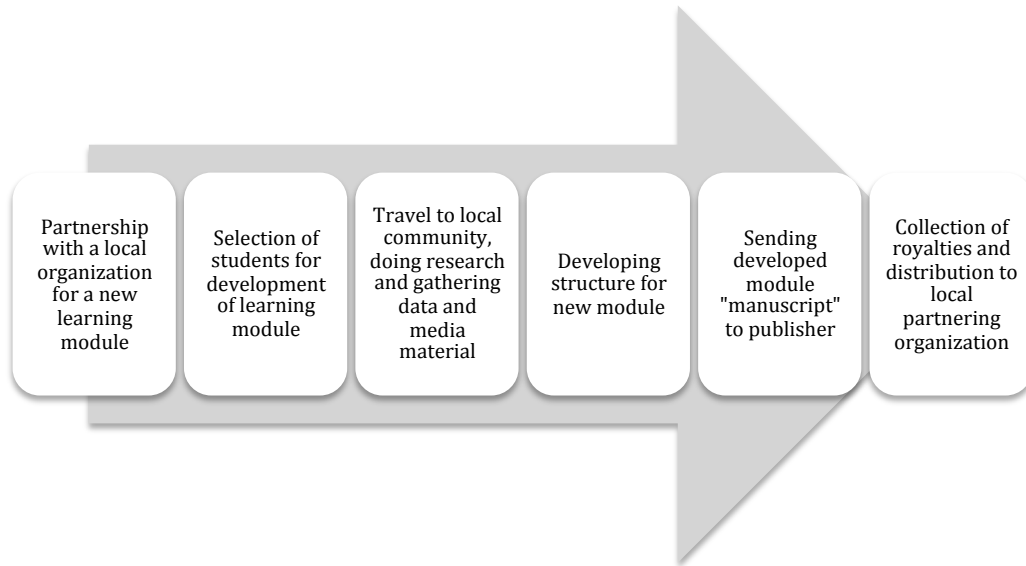


FIGURE 9: OVERVIEW OF GLOBAL TOOLKIT OPERATIONS

4.4.2 Operations Flowchart

The operations plan for Global Toolkit is broken down into to processes: new module development and existing module maintenance. These are outlined in the following flowcharts.

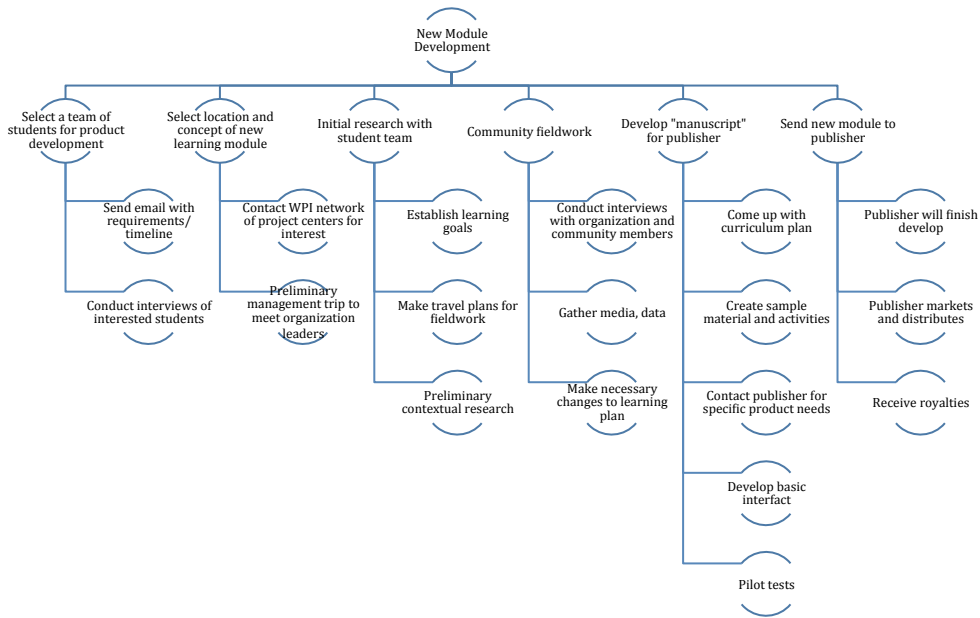


FIGURE 10: OPERATIONS FOR NEW MODULE DEVELOPMENT

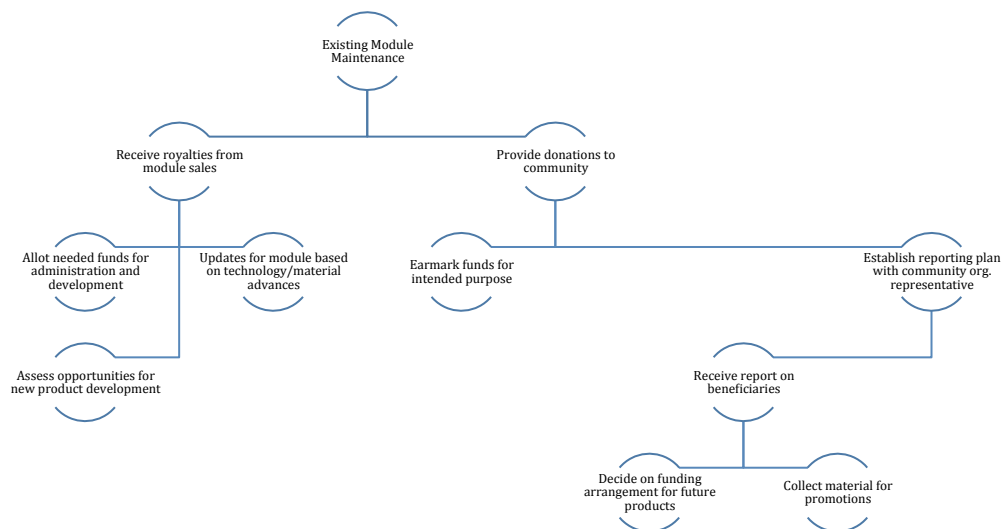


FIGURE 11: OPERATIONS FOR EXISTING MODULE MAINTENANCE

4.4.3 Milestones to Launch Operations

Task/Milestone	Who	Est. Date
Partner with publishing company	Management	February 2016
Launching first module	Publisher	August 2016
Obtaining first customer	Publisher	August 2016
Reaching breakeven	Global Toolkit	January 2017
Choose project/location for new module	Management	January 2017
Student project for second module	Students	March 2017
Water School in Morocco	Dar Si Hmad	June/July 2017
Research fieldwork for second module	Students, management and partners	July 2017
Second module goes to publishing	Students, management, and publisher	December 2017

FIGURE 12: MILESTONES AND TIMELINE

4.5 Sustainable Financial Plan

4.5.1 Overview of the Financial Information

Students spend, on average, over \$600 on textbooks each year¹⁴. Global Toolkit is differentiated from print textbooks in that it utilizes online and classroom components, but it should have a comparable cost to textbooks or other course materials. The prices of course materials vary greatly, but Global Toolkit seeks a price-point of \$50 for a student

¹⁴ <https://www.nacs.org/toolsresources/cmip/faq/textbooks.aspx>

to access all electronic and classroom materials that they would need to take the course. This makes Global Toolkit very affordable in comparison with many other learning resources.

4.5.2 Initial investment required

In order to develop the first learning toolkit module to the point that it could be sent to a publisher, Global Toolkit has incurred the following startup expenses:

- **Travel:** the total travel expense for students and professors to do fieldwork in Morocco was \$23,000. The Engineering Information Foundation provided \$17,000 to cover the costs of student travel.
- **Platform Development:** A PhD student at WPI developed of the back-end platform for the learning module, with a total cost of \$8,000.

4.5.2.1 Startup Requirements

Startup Expenses	
Travel	\$23,000
Platform Development	\$8,000
Total Startup Expenses	\$31,000
Startup Assets	
Cash (Grants, not used for travel)	\$8,000
Total Startup Assets	\$8,000
Total Investment	\$39,000

4.5.3 Funding Sources

Global Toolkit has received a grant of \$25,000 from the Engineering Information Foundation, which covered the expenses for the team of five students developing the module to travel to Morocco for interviews and fieldwork (\$17,000), as well as preliminary development. Global Toolkit would anticipate applying for the same or similar grants in the future, and receiving \$15,000-\$30,000 in funding for the development of new modules. Worcester Polytechnic Institute has also provided \$6,000 in funding to cover management travel expenses.

4.5.4 Sales Forecasts

The publisher will ultimately decide the number of learning modules that it circulates and sells. Global Toolkit bases its financial statements on two sales forecasts scenarios. In the first scenario, a learning module sells 1,000 copies in its first year on the market (a 0.15% share of the estimated market). In the second scenario, a learning module sells 5,000 copies (a 0.75% share of the market). For both scenarios, in the following year, as its reputation becomes more established, sales have a 15% growth rate. In the years following, they have a 5% growth rate. We assume that this is consistent for each module.

4.5.5 Profit Potential/Ability to Breakeven

The pro forma financial statements, including profit and loss and cash flow, are given below. There is a set of financial statements for each scenario of sales forecasts. There is potential for profit in Scenario 2, where the publisher sells 5,000 modules, within the assumptions given. If sales are below this benchmark, Global Toolkit can

offset costs by delaying the production of future modules or applying for more external funding.

4.5.5.1 Assumptions

The financial statements are based on these assumptions:

- Global Toolkit seeks an agreement with the publisher to receive a 10% royalty
- The publisher sells 1,000 (Scenario A) or 5,000 copies (Scenario B) of a module in its first year on the market
- In the second year that a module is on the market, sales grow at a rate of 15%; in years following, sales grow at a rate of 5%
- All modules are sold at a price of \$50 each
- One new module is published at the beginning of each year
- Grant funding stays consistent for each year
- Research & Development costs for creating new modules are the same for each new module, and R&D for maintaining existing modules are 25% of creation costs
- Community Donations are 20% of the earnings from each module
- Royalties from sales are received within the year that they are incurred
- Exemption from taxes as a part of Worcester Polytechnic Institute

4.5.5.2 Scenario 1 Sales Forecast

Sales Forecast				
Unit Sales		Year 1	Year 2	Year 3
Global Toolkit: Morocco		1,000	1150	1207.5
Global Toolkit: Module 2		0	1000	1150
Global Toolkit: Module 3		0	0	1000
Sales (Royalty)		Year 1	Year 2	Year 3
Global Toolkit: Morocco	\$	5,000.00	\$ 5,750.00	\$ 6,037.50
Global Toolkit: Module 2	\$	-	\$ 5,000.00	\$ 5,750.00
Global Toolkit: Module 3	\$	-	\$ -	\$ 5,000.00
Subtotal (Sales)	\$	5,000.00	\$ 10,750.00	\$ 16,787.50
Estimated Gross Profit	\$	5,000.00	\$ 10,750.00	\$ 16,787.50

4.5.5.3 Scenario 1 Profit and Loss

Pro Forma Profit and Loss	Year 1	Year 2	Year 3
Sales	\$ 5,000.00	\$ 10,750.00	\$ 16,787.50
Direct Cost of Sales	\$ -	\$ -	\$ -
Other Costs of Sales	\$ -	\$ -	\$ -
Total Cost of Sales	\$ -	\$ -	\$ -
Gross Profit	\$ 5,000.00	\$ 10,750.00	\$ 16,787.50
Gross Margin %	100.00%	100.00%	100.00%
Expenses			
Payroll	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00
Marketing/Promotion	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00
Research & Development	\$ 31,000.00	\$ 38,750.00	\$ 46,500.00
Travel	\$ 23,000.00	\$ 28,750.00	\$ 34,500.00
Platform Development	\$ 8,000.00	\$ 10,000.00	\$ 12,000.00
Other	\$ -	\$ -	\$ -
Total Operating Expense	\$ 33,000.00	\$ 40,750.00	\$ 48,500.00
Profit Before Interest & Taxes	-\$ 28,000.00	-\$ 30,000.00	-\$ 31,712.50
EBITDA	\$ -	\$ -	\$ -
Interest Expense	\$ -	\$ -	\$ -
Taxes Incurred	\$ -	\$ -	\$ -
Other Income			
Foundation Grant Funding	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00
Government Grant Funding	\$ -	\$ -	\$ -
Other Contributions	\$ -	\$ -	\$ -
Total Other Income	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00
Other Expense			
Community Donations	\$ 1,000.00	\$ 2,150.00	\$ 3,357.50
Total Other Expense	\$ 1,000.00	\$ 2,150.00	\$ 3,357.50
Net Other Income	\$ 24,000.00	\$ 22,850.00	\$ 21,642.50
Net Profit	-\$ 4,000.00	-\$ 7,150.00	-\$ 10,070.00
Net Profit/Sales	-80%	-67%	-60%

4.5.5.4 Scenario 1 Cash Flow

Pro Forma Cash Flow	Year 1	Year 2	Year 3
Cash Received			
Cash from Operations			
Cash Sales	\$ 5,000.00	\$ 10,750.00	\$ 16,787.50
Cash Receivables	\$ -	\$ -	\$ -
Subtotal Cash from Operations	\$ 5,000.00	\$ 10,750.00	\$ 16,787.50
Additional Cash received			
Foundation Grants Received	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00
Government Grants Received	\$ -	\$ -	\$ -
Other Contributions	\$ -	\$ -	\$ -
Subtotal Cash Received	\$ 30,000.00	\$ 35,750.00	\$ 41,787.50
Expenditures	Year 1	Year 2	Year 3
Expenditures from Operations			
Cash Spending	\$ 33,000.00	\$ 40,750.00	\$ 48,500.00
Bill Payments	\$ -	\$ -	\$ -
Subtotal Spent on Operations	\$ 33,000.00	\$ 40,750.00	\$ 48,500.00
Additional Cash Spent			
Community Donations	\$ 1,000.00	\$ 2,150.00	\$ 3,357.50
Purchase of Assets	\$ -	\$ -	\$ -
Subtotal Cash Spent	\$ 34,000.00	\$ 42,900.00	\$ 51,857.50
Net Cash Flow	-\$ 4,000.00	-\$ 7,150.00	-\$ 10,070.00
Beginning Cash Balance	\$ 8,000.00	\$ -	-\$ 15,150.00
Ending Cash Balance	\$ -	-\$ 15,150.00	-\$ 25,220.00

4.5.5.5 Scenario 2 Sales Forecast

Sales Forecast				
Unit Sales	Year 1	Year 2	Year 3	
Global Toolkit: Morocco	5,000	5750	6037.5	
Global Toolkit: Module 2	0	5,000	5750	
Global Toolkit: Module 3	0	0	5,000	
Sales (Royalty)				
	Year 1	Year 2	Year 3	
Global Toolkit: Morocco	\$ 25,000.00	\$ 28,750.00	\$ 30,187.50	
Global Toolkit: Module 2	\$ -	\$ 25,000.00	\$ 28,750.00	
Global Toolkit: Module 3	\$ -	\$ -	\$ 25,000.00	
Subtotal (Sales)	\$ 25,000.00	\$ 53,750.00	\$ 83,937.50	
Estimated Gross Profit				
	\$ 25,000.00	\$ 53,750.00	\$ 83,937.50	

4.5.5.6 Scenario 2 Profit and Loss

Pro Forma Profit and Loss	Year 1	Year 2	Year 3
Sales	\$ 25,000.00	\$ 53,750.00	\$ 83,937.50
Direct Cost of Sales	\$ -	\$ -	\$ -
Other Costs of Sales	\$ -	\$ -	\$ -
Total Cost of Sales	\$ -	\$ -	\$ -
Gross Profit	\$ 25,000.00	\$ 53,750.00	\$ 83,937.50
Gross Margin %	100.00%	100.00%	100.00%
Expenses			
Payroll	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00
Marketing/Promotion	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00
Research & Development	\$ 31,000.00	\$ 38,750.00	\$ 46,500.00
Travel	\$ 23,000.00	\$ 28,750.00	\$ 34,500.00
Platform Development	\$ 8,000.00	\$ 10,000.00	\$ 12,000.00
Other	\$ -	\$ -	\$ -
Total Operating Expense	\$ 33,000.00	\$ 40,750.00	\$ 48,500.00
Profit Before Interest & Taxes	-\$ 8,000.00	\$ 13,000.00	\$ 35,437.50
EBITDA	\$ -	\$ -	\$ -
Interest Expense	\$ -	\$ -	\$ -
Taxes Incurred	\$ -	\$ -	\$ -
Other Income			
Foundation Grant Funding	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00
Government Grant Funding	\$ -	\$ -	\$ -
Other Contributions	\$ -	\$ -	\$ -
Total Other Income	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00
Other Expense			
Community Donations	\$ 5,000.00	\$ 10,750.00	\$ 16,787.50
Total Other Expense	\$ 5,000.00	\$ 10,750.00	\$ 16,787.50
Net Other Income	\$ 20,000.00	\$ 14,250.00	\$ 8,212.50
Net Profit	\$ 12,000.00	\$ 27,250.00	\$ 43,650.00
Net Profit/Sales	48%	51%	52%

4.5.5.7 Scenario 2 Cash Flow

Pro Forma Cash Flow			
	Year 1	Year 2	Year 3
Cash Received			
Cash from Operations			
Cash Sales	\$ 25,000.00	\$ 53,750.00	\$ 83,937.50
Cash Receivables	\$ -	\$ -	\$ -
Subtotal Cash from Operations	\$ 25,000.00	\$ 53,750.00	\$ 83,937.50
Additional Cash received			
Foundation Grants Received	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00
Government Grants Received	\$ -	\$ -	\$ -
Other Contributions	\$ -	\$ -	\$ -
Subtotal Cash Received	\$ 50,000.00	\$ 78,750.00	\$ 108,937.50
Expenditures			
Expenditures from Operations			
Cash Spending	\$ 33,000.00	\$ 40,750.00	\$ 48,500.00
Bill Payments	\$ -	\$ -	\$ -
Subtotal Spent on Operations	\$ 33,000.00	\$ 40,750.00	\$ 48,500.00
Additional Cash Spent			
Community Donations	\$ 5,000.00	\$ 10,750.00	\$ 16,787.50
Purchase of Assets	\$ -	\$ -	\$ -
Subtotal Cash Spent	\$ 38,000.00	\$ 51,500.00	\$ 65,287.50
Net Cash Flow	\$ 12,000.00	\$ 27,250.00	\$ 43,650.00
Beginning Cash Balance	\$ 8,000.00	\$ -	\$ 19,250.00
Ending Cash Balance	\$ -	\$ 19,250.00	\$ 62,900.00

4.6 Galvanizing Resource Model

WPI has a broad network of strong partnerships throughout the globe through its Global Projects Program. Connections with local organizations will likely be fostered with organizations that have served as partners or sponsors with WPI project centers, or with relevant connections that they may have. As more modules are created and awareness about Global Toolkit's work is increased, a stronger network of partnering organizations can be developed. WPI students and educators will also be collaborating on module development, making the institute's information and human resources indispensable to the success of Global Toolkit. Global Toolkit also has the support of several grant foundations.

In the communities where Global Toolkit works, beneficiaries will be empowered for community engagement where they live. They will be able to continue to strengthen and develop their community and beyond. For example, Dar Si Hmad's Water School provides education on ecological principles and sustainable use of resources. Through the support of Global Toolkit, children who participate in the Water School can go on to teach peers and family members about conservation, and may grow up to work in environmental or community development sectors.

5 Social Impact Plan

Global Toolkit is based on the belief that cross-disciplinary learning and global impact should be an integral part of higher education, even when a student cannot participate in an international project. Beneficiaries of Global Toolkit will be the students

who participate in the learning modules, and the communities that the modules are based on.

Within these communities, the impacts could go far beyond the direct benefits they receive from the funding of Global Toolkit sales. Particularly in educational initiatives like Dar Si Hmad’s water school, Global Toolkit seeks to promote STEAM education in communities as well. Moreover, children and students who see the way that engineering has helped their community through the involvement of Global Toolkit may become inspired towards pursuing careers as scientists, mathematicians, and engineers.

Beyond the communities directly involved, Global Toolkit has the potential to revolutionize the way that students, particularly from underrepresented groups, approach and perceive STEAM education. Marrying the technical concepts with a context of global challenges will engage students from across various disciplines in an entirely different way. Hopefully, one of the beneficial impacts of Global Toolkit in the educational community will be reaching underrepresented groups in STEM learning, and influencing students to become a generation of STEAM-educated professionals who are conscious and engaged in global problems.

Meeting the goals of Global Toolkit may be quantified in a few ways. One may assume that the number of students who use Global Toolkit would be one way to measure its success; however there are other indicators, as shown in the Theory of Change.

Action →	Leads to →	Meeting Objective	Goal
Enrollment in another class in a STEM-related	Pursuit of further education in STEM and development	STEM literacy and interest in further education and	75%

field	fields	development of these skills	
Grades above 85% on assessments in Global Toolkit	Indicated understanding and successful application of abilities learned	Cultural awareness, communication/team skills, and interdisciplinary approach to problem solving	90%
Expressed interest in internships, careers or other project opportunities	Participation in projects applying engineering to global Problems	Understanding and perception of opportunities to apply learning to global challenges through projects	60%
Documentation of community projects/benefits	Community projects funded (in part) by Global Toolkit donations	Benefits for the communities that serve as settings for Global Toolkit resources	10 Water School sessions (community dependent)
At least 30% of each Global Toolkit class from an underrepresented group	Underrepresented demographics participating in Global Toolkit, becoming interested in further STEM education	Attracting demographics which are underrepresented in STEM fields, creating a more well-rounded balance in these industries	40%

FIGURE 13: INDICATORS OF SUCCESS

9.4 Appendix D: Publishing Proposal

1 Statement of Aims

Education in STEM (science, technology, engineering and mathematics) skills have grown in significance, particularly over the past decade. “In the technological age we live in, STEM-based fields are crucial for a successful future” (Science Pioneers, 2012). However, it is also becoming apparent that **STEM knowledge alone is not sufficient** for the societal and global challenges of today, and industries in various disciplines are seeking professionals with technological skill paired with understanding of social and cultural context in order to find solutions to interdisciplinary problems.

Worcester Polytechnic Institute (WPI) is renowned for its STEM education, global impact, and project-based education, ranked highly by the Princeton Review for study abroad programs, career placement, and return on investment. Having over 40 project centers around the world, the university’s term schedule and project-based system fosters an environment where STEM skills can be not only learned, but applied towards global impact. However, the skills that WPI students gain from this education is difficult to replicate at other universities without the same structure.

Global Toolkit: Morocco is the first learning module developed by WPI students as a way to bring STEM and project-based learning from across the globe and into the classroom. Based on a real-world project in southwest Morocco, students will experience the cultural, social, and engineering challenges of projects completed by the NGO Dar Si Hmad. Students will experience the cultural and social issues that influenced the

solutions to challenges that Dar Si Hmad has faced in the community of Sidi Ifni, using both STEM and humanitarian thinking in order to solve the problems successfully. Failure to consider the social and humanistic aspects of these problems will result in unsuccessful or incomplete solutions, allowing students to improve their critical thinking, application of STEM, working in interdisciplinary teams, and cultural understanding.

Global Toolkit is:

- Designed to stand as a standard four-year college course, or as a supplement to an existing course, with a customizable duration from two days to a full semester
- Integrating computer-based and classroom-based education with activities and material that engage and develop students in multiple ways
- Allowing students to work together in teams to discuss and solve engineering problems through in-class activities
- Promoting independent thinking with engineering and social considerations through outside-class activities and reflection

2 Analysis of Competition

Use of Global Toolkit is appropriate for STEM students as well as those studying the liberal arts. Cross-disciplinary literacy programs are becoming the norm, as foundations foster support in light of the growing demand for this kind of learning. The Kern Entrepreneurial Engineering Network, proposes a mission “to graduate engineers with an entrepreneurial mindset so they can create personal, economic, and societal value through

a lifetime of meaningful work.”¹⁵ A study of the Association of American Colleges and Universities (AAC&U) studied the skills and knowledge required in today’s workplace, with conclusions that students need an interdisciplinary skill set combining innovative thinking, problem solving and teamwork skills, and applied learning--particularly in a global setting.

- 92% say innovation is essential
- 93% say that “a demonstrated capacity to think critically, communicate clearly, and solve complex problems is more important than [a candidate’s] undergraduate major.”
- More than 90% emphasize ethical judgment and integrity, intercultural skills, and capacity for continued learning¹⁶

In their publication “Engineers of 2020”, the National Academy of Engineering emphasized the importance of global impact and understanding in STEM education: *“Consideration of social issues is central to engineering.. Attention to intellectual property, project management, multilingual influences and cultural diversity, moral/religious repercussions, global/international impacts, national security, and cost-benefit constraints will continue to drive engineering practice.”*¹⁷

¹⁵ Keen: About Keen <http://www.keennetwork.org/about-keen>

¹⁶ [It Takes More than a Major: Employer Priorities for College Learning and Student Success](#). 2013. Washington, DC: Association of American Colleges and Universities and Hart Research Associates.

¹⁷ National Academy of Engineering, (2004). *The Engineer of 2020: Visions of Engineering in the New Century*. National Academies Press, Washington DC, p27.

Liberal arts education is also a catalyst for meaningful change, but can be strengthened by integrating other disciplines such as STEM literacy. The Teagle Foundation is just one promoting cross-disciplinary integration in liberal arts education. *“Our aim is to serve as a catalyst for the improvement of teaching and learning in the arts and sciences while addressing issues of financial sustainability and accountability in higher education.”*¹⁸

There is increasing market demand for students entering the workforce with skills not only in technology and innovation or liberal arts education, but also in problem solving, cultural understanding, and project management. Many educational institutions have not yet been able to develop programs that integrate development of all skills mentioned. Global Impact: Morocco will engage students in these disciplines, and may generate further interest in STEM learning for underrepresented groups as they see the societal impact that engineering skills can have throughout the world. On the other hand, students who have already expressed interest in STEM will be able to see the way that they can apply these skills to the most challenging issues that our world is facing.

3 Target Audience

Global Toolkit is appropriate for higher-education students in any major. In fact, having students from multiple disciplines in the same class while using Global Toolkit

¹⁸ The Teagle Foundation: Mission and Strategy <http://www.teaglefoundation.org/About/Mission-and-Vision>

would allow for a more enriching experience, approaching a problem from various perspectives and better simulating a project in the professional world.

Global Toolkit can be customized to fit a specific course or discipline (for example, a physics course could choose more activities that apply these skills). The standard version of the learning module will give a broad view of STEAM applied towards global impact. The science, engineering, and mathematics activities, in particular, are geared towards students at any skill level in these fields to develop their interests. For this reason, it may be better used in an introductory course for engineering, science, or math. Introductory courses, often taken by underclassmen, are also a great opportunity for students to explore their interests and develop their awareness of a career path. Global Toolkit brings together various STEAM fields and applications while demonstrating their global impact in the real world.

Particularly, we recommend Global Toolkit: Morocco as a good fit for any of courses in these categories:

- Introductory Engineering Design
- International Development
- Environmental Science / Studies
- Public Participation