

Entrepreneurial Technology Learning: Beyond the Traditional Technology Classroom, An Exploration of the Rockettech Program and Model

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It is very popular right now in education to talk about the development of “21st century skills.” However, in our increasingly standardized environment it becomes challenging to emphasize creativity, collaboration, flexible thinking, and the development of innovative ideas, which are widely recognized as being important, 21st century-type skills. We believe that technology classrooms can provide a flexible platform for more open-ended, design-based learning experiences in ways that other, more traditionally structured classes cannot. In particular, these very things can be accomplished when one incorporates an entrepreneurial mindset. The Aspen Youth Entrepreneurship Strategy Group defines an entrepreneurial mindset as: “A critical mix of success-oriented attitudes of initiative, intelligent risk-taking, collaboration, and opportunity recognition” (2008). Researcher Yong Zhao wrote an entire book about the importance of developing this kind of mindset in students and he argues that when entrepreneurial spirit is missing in schools it is a detriment to education as a whole. Zhao states, “The lack of entrepreneurial spirit is a result of an educational tradition that has been focused on producing employees who are taught to look for jobs and wait for orders” (2012). It is not enough to just tell students about entrepreneurial thinking or to have them see examples of other students who have created innovative platforms for their work. Ideally, one provides an environment where students are able to really engage with and develop their own ideas and apply their skills.

Entrepreneurship can appear in many formats within a traditional educational structure, but technology classes can provide an excellent avenue for exploration. Students often have a natural interest in further exploring the applications of technology, be it visual software, game engines, coding languages, or video editing. When given the opportunity to delve more deeply and really utilize these technologies in ways that are applicable to their everyday lives, and to their future careers, students may engage more fully and push the boundaries of their learning. When done well, students can learn about technology while simultaneously applying their skills to actual problems and projects within their communities.

In this paper, we introduce the reader to a program known as Rockettech. It is a combination class and club, at the high school level, that runs as a fully functional technology business. Students pitch clients, take legitimate jobs from within their community, produce work for actual paying customers, and use the funds they earn to further support their club. We will discuss the structure of the Rockettech program, things to consider when implementing a business model such as this, and the challenges and growth opportunities inherent in a program such as this. This article is a combination of research done by not-for-profit learning and education organization, foundry10, reflections on the program by the Rockettech instructor, Mark Suter, and comments from the student participants.

Program Structure

Rockettech was officially founded in the summer of 2013 within Pandora-Gilboa High School (Pandora, OH) as a way to give students a chance to test their skills in the real world. Students wanted to do more than just work on mock projects and simulations. The club being “founded” was nothing official, it was the instructor saying “Let’s brand our tech club and treat it like a small business.” The instructor and a group of five students agreed to take a few initial steps to explore what might be involved. The thought was that even if the business side didn’t work out, it would be a great opportunity for learning. Through this collaboration, a plan was created to nurture the club, complete with marketing, sales, team meetings, and business cards.

The objective of Rockettech is to provide opportunities for students and local organizations to engage in mutually beneficial relationships through web and multimedia design services. Students learn real world skills and earn the funds to run the club through donations, while the local organizations receive quality services they already needed. This not only builds a sense of community between the school and the businesses, but provides students the opportunity to be seen as young professionals and to experience working with adult professionals in a variety of fields.

A typical week in the Rockettech program is one class period a day for five days. The only prerequisite to the class is a signature from the instructor, earned through a brief conversation, so students know what will be expected of them so as to ensure they are willing to work in an environment that has an actual

monetary impact on businesses and the club. Rockettech operates in a democratic, informal structure where teacher and students work together to further a common goal. There is structure but it is more like a small company. The instructor assumes a variety of different roles, as needed, but primarily serves to support and further student understanding and skill development. The students take on clients and function as employees within the business. There are identified student leaders (elected President, Treasurer, etc.) who run the club more like a business with weekly meetings, called roundtables, than a traditional school club. It is vital to the functioning of the club that there be open, honest and consistent communication between the instructor and the students, as well as between the students themselves, and which the roundtables help facilitate.

In order to further the sense of control and impact students have on the direction of Rockettech, the instructor provides “decision points” that involve two or three related key directional topics for students to debate and discuss. These decision points allow students to help craft the vision of the club, without overwhelming them with generic open ended questions such as, “What direction should we take this club?”

As an example of a highly entrepreneurial decision point: During a lunch-time Rockettech meeting, the instructor described, with visuals, two directions that the club could go. The first was vertical, which meant they should focus on earning more money, gaining more members, and attracting higher profile clients. The second was horizontal, which meant reaching out to neighboring districts and counties in attempt to assist them with implementing their own entrepreneurial club. The goal of this direction is to philanthropically impact more students and allow Rockettech members to be “ambassadors” that act as the point of contact in the other schools’ clubs for consult. To aide the group’s decision making, they consulted with Dr. Yong Zhao of the University of Oregon, a nationally recognized expert on entrepreneurialism in school. Dr. Zhao suggested the club focus on growing vertically because the horizontal growth will naturally occur along the way.

Through the discussion of decision points, the instructor models the types of questions that an entrepreneur might consider. The facilitation of the discussion also allows students to work with and brainstorm together as various options are considered.

Projects are assigned to a “project lead” by the instructor. Initially, business projects were acquired through the instructor’s community network. The club also did some pro-bono work for local non-profits to help build their skill and develop their reputation. As Rockettech became more of a known quantity in the community, business has steadily increased. Students are given the chance to be a project lead for a real client by the instructor based on a number of readiness factors. These include the skills demonstrated in simulations, verbal and written communication ability, and open conversation between the instructor and student on how ready the student is to be a project lead. Students demonstrate an acute awareness of their own level of readiness or unreadiness, taking the responsibility to do professional work very seriously, even if it means not getting a project lead role. This contributes to the open dialogue on skill development and professionalism as well.

During the roundtables, students update the group on their progress in the projects they lead, including struggles, and what they plan to accomplish this week. The group and instructor give feedback and support. This method of unpacking the previous week provides students the chance to identify what they’ve learned, and get help pinpointing where their struggles actually lie. This aids the instructor in scaffolding the situation for individual students and to keep them on the attainable side of what they can learn. In conjunction with the instructor’s guidance students often begin pursuing new solutions and acquiring additional skills they now know they need in order to make progress.

The objective of the weekly roundtables is not just to “check in” and verify the student is still working. The objectives provide a chance for regular assessment and adjustment, and to openly identify the professional skills at play (e.g., leadership, networking, creative problem solving, time management, and meta communication during client meetings). Students often benefit from the perspective of the instructor to help identify what skills they need right now and why they are beneficial to the project. During the

roundtable, the instructor has a chance to point out to the entire class what skills a certain student will be working on and why. It is not a blaming or a bragging, but a chance to build off the mutual trust of the instructor and student and to highlight the priorities and progress of various projects. The students trust that the instructor is ultimately helping, and trusts that fellow students (they sometimes call each other “colleagues”) won’t ridicule them and are there to help. It is critical during the roundtable for the instructor to know individual students on a high enough level to determine how each responds to criticism in front of their peers. Some critiques are saved by the instructor until a private meeting with students that warrant it. The instructor openly states that one purpose of the roundtable is to help identify our strengths and weaknesses both as individuals and as a club. Probing questions and demonstration of vulnerability on the instructor’s part are used to facilitate open dialogue. For instance, in a recent roundtable the instructor modeled this by saying, “How do you all think we’re doing in terms of professionally designed websites? I know my own teacher site doesn’t do a good job of using contrast on hyperlink colors, so I need to work on that. It’s just not professional yet.” Through conversations such as this, the instructor is able to model reflection and honest assessment of a technological issue.

Jobs in the club last varying lengths of time depending on the complexity of work. Often, students are able to handle a job on their own, but if the scope of work requires more assistance, they have the flexibility to work with one another. This flexibility and openness to student voice is a piece of the program structure that is critical to its success. In interviews with the students, they repeatedly identified their ability to speak up, articulate their thinking, and use their own voice when interacting with adults as some of the major benefits of the program. In addition to their clients, students from Rockettech have presented to local government, at conferences, and regularly made phone calls with external adults. These may seem like basic skills, but it can be intimidating as a 10th grader to be calling a client at a local business regarding a website job. Students regularly referenced that it wasn’t just technological skills they were learning, equally important to them were the people skills they were both learning and refining. In fact, students explained that talking through work and ideas with clients were some of the most challenging, but also valuable, interactions they’ve had.

Model for Success

When considering implementing a model such as this, it is important to consider how one builds the initial momentum of the program. Trust is key, both within the community of clients and amongst the team. To appeal to businesses that were wary of allowing high school students to create materials that represent their public image, Rockettech created a “no-risk” approach that gave the business a chance to back out without penalty. In this approach, there is a donation pledge form that serves loosely as a contract. This form guarantees the professionalism of the client experience with Rockettech as requisite for the club to receive the full donation amount. To be considered professional, the websites, videos, and other materials must meet industry standards and any other mutually agreed upon expectations like timelines. If all of the conditions are met, the business is expected to make the full donation amount. If not, the business can either walk away without penalty, or allow revisions to be made on the project. Feedback is gathered by the student on whether or not client expectations are being met throughout the life of a project. Check-ins with the business are also performed by the instructor, sometimes without student knowledge, to give them a chance to disclose concerns they may not openly express directly to the student. This aids the instructor in scaffolding situations to benefit the student at their current level, as most clients are eager to help the student, even in this discreet way. Clients are encouraged to treat the student as they would any other private contractor, giving genuine praise when warranted, and not withholding frustrations they may have with results.

Introducing students to the idea of business networking was a very powerful learning experience. Students seemed to understand, both implicitly and explicitly, that the people they were meeting and the ways in which they were interacting with current clients would have a substantial impact on future projects and clients. Students understood that creating quality work early on would help build a network of clients that would draw in even more projects. The initial push to build this network was in the form of a ten

minute presentation to the county chamber of commerce where there was immediate exposure to multiple business leaders. Two businesses initially signed up, with more trickling in over ensuing months.

Although building trust initially is important, Rockettech instituted some additional safeguards to help ensure the positive development of the client/student relationship. The client is under no obligation to keep working with Rockettech, or a particular student, if they are not happy with the progress or results. This is communicated early and often, allowing the business to “save face” if they want to back out. Even though there is always a mutually agreed upon timeline for the projects, clients are often willing to extend the timeline in order to give the student a chance to improve the product through multiple iterations. Clients have expressed interest in not only getting a quality product, but in helping a student develop their skills and network.

The timeline portion is worth mentioning in more depth. During foundry10's interviews with students it was repeatedly referenced by the group that these weren't arbitrary deadlines in a class, these were actual business people who were waiting for products. Students found this type of deadline invigorating and an important tool to help them develop macro-level project management skills. The students saw the strength of being able to communicate effectively in a work environment, to set-up and meet deadlines and the ability to manage the scope of the project as highly transferable and relevant skills for higher education and future work.

As with any business, a feedback cycle is an essential piece of the program's success. Reflection and debriefing are important learning opportunities both on the individual and the group level. Students are particularly receptive to hearing about the challenges of other students because very often they will encounter similar challenges within their own projects. The student serving as a project lead is given feedback 3-4 times a week from the instructor and peers in the form of constructive criticism. This feedback is often not planned, and occurs most often when a student asks the instructor directly, “What do you think of this so far?” Students show an internal motivation to perform at a high level, and are asking for the constructive criticism. At this point, the instructor will call over 2-3 other students to get their input, which requires defending their views in the context of industry standards. This type of conversation reiterates the importance of industry standards to the quality of the program. Constructive criticism is also offered for student/client interactions, including emails, phone calls, and in-person meetings. Students have stated that pre-conversations addressing any uncertainties with the instructor prior to the client interactions reduces their anxiety; as does post-interaction shared reflection. Throughout this series of feedback and improvements, the instructor provides guidance to the student. This guidance ranges from as-needed software training to professional communication tips and role-play practice. Feedback is also given to the other students regarding the quality of their comments to peers. It is not acceptable to say “It's good.”, or “I don't like it.”, they must defend their position.

Students also invite clients in to get updates and feedback on their projects. This feedback is from the client directly to the student, which students cited as their greatest source of anxiety and fear, but also as one of the reasons they remain motivated to perform at such a high level. Evaluation in this form allows students to improve their skills and previous work through multiple iterations of this process. It also enables students to revisit previous areas of skill development so they can hone them over time.

Student, Teacher and Community Challenges and Growth

During qualitative interviews administered throughout the year, students expressed concerns about different projects and problems they were facing. Sometimes these pertained to challenging situations with clients, other times technical hurdles and still others were more about the inherent difficulties of project management. Throughout the year, students referenced a developing sense of efficacy and that “the problem could be worked through or solved.” When interviewed, they would often elaborate on the types of thinking and problem solving they engaged in to overcome challenges or hurdles.

One thing the students took very seriously was establishing themselves as credible, knowledgeable service providers. Since they often came to Rockettech with limited experience interacting with adults in a professional way, there was initially some nervousness about establishing rapport with clients. Here are examples of some of the concerns students discussed:

"My first fears were if I was going to get the job done as professionally as they (clients) wanted it. My second fears were if they would judge me for my mistakes. I knew that I was in the REAL world now, and people didn't want to messed up work. "

"When working on my projects with clients I have fears of disapproval from the client(ie work not good enough, not enough communication). I also do not particularly enjoy talking on the phone, a critical part of the project."

"My main concern was actually communicating with the client. As a student I was never put in a situation where I had to talk with a client and it was rather nerve wracking having to just jump into it."

"I don't want to disappoint the client. I don't know all areas of work that we do as well as video...that freaks me out."

Of greater relevance than their initial concerns, though, is how students resolved them. Often, this was a combination of practice, discussion with the instructor, and sharing amongst the group members. The role of the instructor was not to provide all of the answers to the student's concerns, but to help guide them to thinking through reasonable approaches. Here are some sample student reflections on how they overcame these challenges:

"Encouragement from peers and an awesome director! There is no other way to get over your fears, but to face them. You really can't do anything but fix your mistakes, and be upfront about them with the client."

"Practice makes perfect. I feel that if I continue doing projects and remain successful these fears could disappear all together."

"I got over the fear of communicating by simply jumping in and taking the risk. You always have the fear of failure and I think that is the thing that drove me to keep going."

"If I have to, I ask Suter. I've also asked my parents for advice before. I tend to just work through those thoughts and prove myself wrong."

Even though students had some initial anxiety about interacting with clients, one student told us, "95% of my time is spent doing the actual work for the project." This is where the design of the club really shines. Student learning is directly applied in this real-world environment. They are learning a particular technological skill and immediately utilizing it in a tangible way. When they hit stumbling blocks, it isn't something they are figuring out for a unit test, it is something they need to figure out to complete a job and create a functioning website or a video that another entity can use for business purposes.

In terms of the instructor, the challenges in running a club such as this manifest in a few different ways. Running a program like Rockettech takes time, both the instructor's and the students'. To carry on activities like a small startup business, situations will arise where the schedules of clients do not line up with the class period the project managing student is in tech class. Students may need to miss class time in other subject areas to occasionally meet with clients. Although this is a common occurrence for students who participate in high school athletics, it may not be quite as common for student participants in a technology program. Ideally, the instructor would be able to consult with other teachers to determine which students may miss a particular class periods. It is helpful to also set-up a strict academic standard

to mutually ensure the success of the student in their coursework but also in the opportunities presented by the club. For example, the instructor, student, and cooperating teacher could use prerequisites like:

1. Student carries at least an A- in the class to be missed, and at least a B in all other classes.
2. Student requests permission on a standardized form, "Get Out Of Class" (GOOC), that are filed and tracked to know how many classes are missed, and for what reasons. The form also provides a way for the cooperating teacher to express concerns or compliments on the student's handling of missed class.

The instructor of a program like this will need to rely on their rapport with other teachers and meet with them informally throughout the year. During these interactions, the instructor should find ways to best minimize the impact of specific students' absences. This creates a mutual trust that the instructor won't unnecessarily remove students from classes, and the cooperating teachers won't refuse occasional absences.

The instructor of a program like this may also have concerns regarding support from administrators. Administrators may have concerns over missed seat time for students that leave a class to work with a client. They also have the school's reputation to consider. When we interviewed administrators they expressed strong support for the ideas of a club like this but discussed how they also have to consider the impact that potential negative interactions with a community business might have. It is important both for the club, and the school, that a club like this be managed well and have a rock-solid reputation within the community. Since the club may function as an independent entity within the school setting, this may be a new thing for administrators to consider. How does a program like this fit within an ASB structure? How does this model of financing itself fit within the traditional school structure? Open communication and a solid foundation of trust between teacher and administration is vitally important. Grounding the club design in research and being able to continually update the administration on the positive benefits of applied learning is helpful in both developing and maintaining that relationship.

Community involvement is an important aspect to the club both internally and externally. The skills students learn, both technical and soft, are applied to other aspects of their lives. Their surrounding communities feel this growth in the quality of the work the students provide. The overall growth in students' voices, development in soft skills, and exposure to real world dynamics allow the students to witness, first-hand, how much they can improve their communities. Students also begin to develop a larger understanding of their potential roles within their communities and greater society. For instance, the Rockettech program put together a Mock Car Crash event for their school. This event helped raise awareness of the consequences of texting while driving to more than just the students. It also showed attendees the skills the students are capable of presenting to events around the community.

Schools and communities are often trying to find meaningful ways to intersect and interact with one another. In addition to providing valuable work for the community, programs such as Rockettech provide natural opportunities for students to get out and share what the school community is doing. This benefits not only the club, but the school community at large as more connections to the school environment are formed and community members discover additional, positive ways to intersect with schools.

Concluding Thoughts

Often when we consider technology programs, we think about the coding, the computer science, and the acquisition of skills to that students will function effectively in future careers. All of these things are important, but if we solely focus on these components, we miss the creativity, the ingenuity, the social aspects and the business acumen that can emerge from a more entrepreneurial approach to technology. Why simulate "real world" learning when it is possible to create it, hand in hand with students, and let them experience it for themselves?

Building community through technology, enabling students to develop the confidence and ability to interact successfully with adult clients, all while further honing technological skills in the process is a winning combination. When students in the Rockettech program were asked what they learned, one of the first things cited by all students was communication. Whether it was learning how to shake hands and look someone in the eye, communicating over the phone, engaging in collaborative dialogue about the direction of a project, or talking with a local city council, the students felt the exposure and opportunity to continually develop their communication skills was one of the greatest assets of this program. They also talked about discovering their ability to research and learn new things in order to solve problems; self-managed and self-regulated learning was an essential component of their success in the program.

Of course, it is important that students be exposed to technology and develop fluency with a variety of mediums. However, we also hope that technology instructors begin to expand their thinking about what it might mean to immerse students in technological learning. Incorporating entrepreneurial elements into a school setting can really extend and expand student learning, well beyond the classroom. It is our hope that by sharing some of the structural elements present in a successful entrepreneurial technology club we can inspire others to consider the ways in which they might expand their own programs.