Lessons Learned from Launching and Advising a Student-run Technology Consulting Venture

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Abstract

Information Systems (IS) instructors are continually searching for new and innovative ways to engage students in authentic experiences that mimic the real-world. Previous research asserts that graduates are more prepared when they have hands-on learning opportunities that are linked to real external clients. Unfortunately, real-world projects can either be too small for a particular course, or more often extend beyond the academic calendar limitations set on courses. While many institutions offer internship opportunities or student organizations for students to practice their skills, no curricular opportunities exist for students to run their own Information Technology (IT) consulting business. A private liberal arts institution piloted a course, through the generosity of the Coleman Foundation, to infuse entrepreneurship into the IS discipline; a subject lacking in many IS curricula. The course evolved into one of 14 student-run ventures on campus and is a going concern with over $15,000 in revenue to-date. Students are coached by a faculty advisor, manage the financial statements, run marketing campaigns, and engage in technical projects. Student consultants work on a variety of projects including, but not limited to web design, system analysis and implementation, and database management. The following paper represents the journey over the last four years to build a student-run, entrepreneurship-infused, technology consulting business model and venture, whereby students work *on the business* and *in the business*, concurrently, to support previous real-world projects from the classroom and seek additional client work.

Keywords: entrepreneurship, student-run venture, real-world, consulting, pedagogy

1. INTRODUCTION

It has been previously researched, practiced, and promoted that information systems (IS) programs produce more prepared graduates when they are engaged in hands-on learning opportunities (Abbassi & King, 2007). Furthermore, research also supports the engagement of external clients and real-world projects as effective means of engaging students in course content (Connelly & Begg, 2006). Even though real-world projects add value to the external client, there isn't always a support mechanism in place to resolve defects, make feature enhancements, or support the deliverable following implementation. In addition, real-world projects are typically bound by the academic calendar, which the real-world does not adhere to normally (Podeschi, 2016). These issues can be addressed through the infusion of entrepreneurship into the IS discipline. While entrepreneurship can often be found integrated into the business school, there is little evidence to suggest that it is being infused into IS (Pardede, 2015). However, IS programs within the business school are prime candidates for this marriage between IS and entrepreneurship. It has been cited that student-run venture experiences and collaboration outside of their disciplines helps students gain additional experience and increases

their knowledge and confidence (Morris, Kuratko, and Cornwall, 2013).

In spring 2016, a course entitled Technology Ventures was piloted to build a feasibility plan for a student-run IT consulting company following independent study work by two junior IS majors who formulated the idea. The course was funded through a grant from the Coleman Foundation, which was administered by the university's Center for Entrepreneurship. The IS faculty, designated as a Coleman Faculty Fellow, used the elective course for students to build the business model for how the consulting venture would operate. The student-run venture and one-credit course, Millikin University Performance Consulting, was officially launched in fall 2016 with six students, all of whom where IS majors. Students, through this for-credit experience, identify potential clients, enumerate requirements, provide estimates of work and cost, complete the work, and produce detailed documentation for knowledge transfer to the next group of students. Students utilize the Scrum agile methodology for organizing their work, are responsible for maintaining accounting records, managing performance metrics, engage in marketing and recruiting, and report to an advisory board. To date, the course has enrolled 36 distinct students (as the course can be taken multiple times), performed work for over 15 unique clients, and earned over $15,000 in revenue. The venture is now open to students from other disciplines in addition to IS majors to foster cross-discipline collaboration.

This paper provides a summary of the literature related to entrepreneurship in technical disciplines as well as real-world projects and its pedagogical implications. In addition, the course/student-run venture design will be shared along with student outcomes from performance evaluation data. Finally, recommendations and pitfalls will be shared for those interested in implementing a student-run venture at their home institutions. This research is important to IS educators who are seeking new real-world opportunities for their students, and are interested in using this example as a framework for their own development.

2. REVIEW OF LITERATURE

Entrepreneurship

Entrepreneurship definitions vary across the landscape and have evolved over time from a popular phrase to a practiced discipline in higher education. Schumpeter defined entrepreneurs as those who are innovators who implement change within markets through the carrying out of new combinations (i.e. "creative destruction") (1965). Peter Drucker saw entrepreneurship as the process for creating new resources or leveraging existing resources to create value (1970). Timmons considers entrepreneurship to be about creating something new where nothing existed before without regard for resources (1985). Babson College, known worldwide for its entrepreneurship-focused education, views entrepreneurship as a way of thinking, reasoning, and acting that is opportunity obsessed, holistic in approach, and leadership balanced (Montoya, 2010). Entrepreneurship researchers across time agree that the process involves the marshaling of resources to exploit new opportunities and is not constrained to the notion that entrepreneurship is simply owning one's own business.

Entrepreneurship can be seen as a mindset and is at the intersection of the perceived ability to achieve what is possible and future goals that involve change and innovation. The entrepreneurial mindset can be seen in seven specific characteristics: 1) passionately seek new opportunities; 2) look for the change to profit from change and disruption in the way business is done; 3) create entirely new business models; 4) pursue opportunities with enormous discipline; 5) pursue only the best opportunities; 6) focus on execution; and 7) create and sustain networks of relationships (Morris, Kuratko, & Colvin, 2011). With a discipline that can be practiced and is interdisciplinary and not necessarily constrained to a specific domain, it provides an ideal canvas for integrating into the technical realm.

With its rise in popularity, the study of entrepreneurship has evolved and can often be found woven into the modern business school. "Entrepreneurship education has grown dramatically, as reflected in the increased student enrollment, formal entrepreneurship centers, intercollegiate business plan competitions, new entrepreneurship curricula and programs, and endowed chairs and professorships" (USDC, 2013, p. 6). While its study has crept into the IS and engineering fields, there is little evidence to suggest that it is being taught in tandem with technical skill development (Pardede, 2015). As such, IS programs housed within business schools are particularly poised to meet this gap through the intentional integration of entrepreneurship into IS courses. While future employers continue to seek new graduates, who

have the appropriate technical skills and ability to work in teams, 16.9% of respondents desire employees to have entrepreneurial skills, according to the National Association of Colleges and Employers survey (2018). Pardede noticed the intersection between information technology (IT) students and entrepreneurship as many graduates go on to work for small- to medium-sized companies; many of them startup companies in the technology industry (2015). Unfortunately, it is rare to find a school that teaches specialized entrepreneurship education for IS students (Read, Derrick, & Ligon, 2014), and is most often found in the general business curriculum (Morris, Kuratko, and Cornwall, 2013).

There are, however, a few prominent examples of entrepreneurship being woven into IS programs. An early example included the development of a dial-up internet service provider at Boise State University (Minch & Tabor, 2007). Lang and Babb provide an argument and a framework for integrating entrepreneurship into IS curricula using Lean Startup and Scrum methodologies (2015). Faculty in Cal Poly Pomona built a student-run data center to run cloud applications for education (Hwang, Pike, & Mandon, 2016), and Frydenberg re-imagined the IS tutoring lab into a tech startup (2013). Others have developed specific elective courses focused on technology entrepreneurship (Jones & Liu, 2017). In business schools, there are a few examples of capstone/strategy courses being branded as student-run consulting companies (Robinson, Sherwood, & DePaolo, 2010; Ward, 2016). Yet, there are not examples of student-run consulting ventures that live in IS curricula.

Student-run Ventures

Student-run ventures differ from student-owned businesses or other tech startups initiated by students. Student-run ventures are formally owned by the university, can be profit-motivated or socially minded, and can be either co-curricular or integrated into a for-credit course. The advantages of integrating the venture into a course are a predicted stream of students, more structure, defined roles, documented processes, and more predictable outcomes (Morris, Kuratko, & Cornwall, 2013). Disadvantages of student-run ventures operating as part of a course include: insulation from true market forces and additional administrative overhead by faculty (Morris, Kuratko, & Cornwall, 2013). Millikin University, the author's institution, describes student-run ventures as "faculty led" and "student driven" with a definition of being learning laboratories as a course grounded in an academic discipline. At the time of writing, Millikin University has 14 student-run ventures embedded into courses across campus in theatre, art, music, physics, history, journalism, English, athletic training, business, and IS.

Real-world Projects

Real-world projects typically involve working with a client in the community or on campus to solve a particular business problem. Often, the project involves a not-for-profit organization or a smaller company that lack the technical expertise on staff (Schuldt, 1991). In some instances, especially with not-for-profit organizations, the project acts as a service learning component to develop the intentional act of giving back to the community (Chuang & Chen, 2013; Saulnier, 2005). Academic/industry partnerships through real-world projects and other means to ensure that what is taught in the classroom meets market demands and it provides other organizations with resources not normally available to them (Abbassi & King, 2007; Watson & Huber, 2000). The organization gains value from the student deliverable and the students gain practical experience that goes well beyond a structured lab exercise where the answers are predefined.

There are several examples from peer-reviewed research on the pedagogical value of real-world projects in the IS discipline (Abrahams, 2010; Helwig, 2006; Podeschi, 2016; Vaz & Quinn, 2014). Those pursuing degrees in technical fields rely on concepts and techniques, but employers find students more valuable when they have real-world experience (Chuang & Chen, 2013). Engaging in real-world projects allows students to practice both technical and non-technical skills. The National Association of Colleges and Employers found in their most recent employer survey that the top three attributes employers are seeking are written communication skills, problem-solving skills, and the ability to work in a team (2018). See Table 1. Providing a platform (student-run venture) for students to build technical and non-technical skills through real-world projects adds immense value to their educational experience and prepares them for a competitive job market.

3. COURSE DESIGN

The course was originally conceived by two IS students as an independent study project related to IS and entrepreneurship. The two students saw the student-run venture as a way to sustain client

projects completed in previous IS classes, and a way to provide additional real-world experience to students in preparation for the job market. The Coleman Foundation had previously been funding this faculty member for infusing entrepreneurship into IS, and this student-led idea provided the basis for extending that fellowship, with training and financial support, to build the student-run IT consulting venture.

The student-run venture was designed as a one-credit course that could be taken multiple semesters. This was done intentionally so that students could build competency and leadership while bringing consistency and institutional knowledge to the venture. Students perform technical services for existing clients which were previously started as real-world client projects from other IS courses. In addition, students seek new business from clients in the community and on campus. Students gather requirements, provide an estimate for services, a time line for completion, and manage each project end-to-end. They are ultimately responsible for the success and failure of each decision they make. The faculty serves as a liaison, buffer, and safety net for students as needed. When a project is complete, students have the client sign-off on the work and present them an invoice to be paid. Students pay themselves an hourly wage for work on client projects. All finances go through the university and students are paid through the university payroll office. Students reserve 50% of the prior semester's net profit for reinvestment into the venture. Their reinvestment can be spent on technology, conference travel, or wages to lead specific business-related projects.

The university assumes some level of risk knowing that students are performing work for external clients under the institution's name. All students sign confidentiality agreements at the beginning of the semester, and again with each individual client. In addition, students have language for documents such as scopes of work and project sign-off reviewed by in-house legal council. A year-end report is provided to the university's Center for Entrepreneurship on clients served, and financial statements are submitted to the university business office on a regular basis. In addition, the advisory board provides a forum for students to gain additional advice and expertise beyond the faculty's point of view. Between the faculty, the Center for Entrepreneurship, and the advisory board, there are sufficient checks and balances to ensure that students can experience real risk and real reward with a safety net in place.

In the original course design, enrollment was limited to IS majors. However, as roles became more defined and skill assessments were performed, it became apparent that a diverse set of disciplines were needed in the venture, just as is common in a typical organization. In 2018, the venture opened up to students who have taken Foundations of Information Systems, a course required by all business students, because majors outside IS are allowed to take the course. A typical semester has between 10 and 14 students enrolled. Each class meeting begins with a venture-wide Scrum, led by student leaders, to address the current status of client or business-related projects, set tasks for the next week, and address any roadblocks. Students are "coached" each week by the faculty during the later portion of class time and address timely topics specific to the client or the business operations. These topics can include, but are not limited to: learning the consulting process, working with difficult clients, budget forecasting, code review, or managing DNS. Guests with specific strengths are sometimes invited to help students work through acute problems.

Students begin as junior consultants in their first semester and are promoted to associate consultants the following semester (assuming a re-enrollment) after learning the operations and taking ownership of a specific process or task for the semester. This could be anything from taking meeting minutes to managing email and social media to building and maintaining the office computer equipment. Associate consultants work on client projects and perform operational functions for the venture. The faculty will appoint two or three senior consultants to lead client projects and operations of the venture for the semester. These are typically students who have been in the venture for multiple semesters, have internship experience, and have previously demonstrated leadership and organizational qualities. Senior consultants often continue as senior consultants if they elect to enroll again in a subsequent semester, but can be rotated out due to changing needs or poor performance.

While some client projects can be completed within the bounds of the academic semester, some continue from fall to spring or from spring into the summer months. Initial conversations with potential clients include time line requirements, and expectations related to

response time, communication channels, and milestone objectives. Even though students earn credit for the course, they are also paid for their work. As a result, students will continue working on client projects when school is not in session with faculty supervision. Students have the ability to turn down a prospective client due to unclear objectives, too large of scope, unreasonable time line, or if the client's project does not fit within the skill sets of the consultants.

Because the venture is dependent upon client work and can vary greatly from semester-to-semester, student consultants are evaluated in the course through means that mimic a workplace more than a classroom. Student consultants are charged with developing a set of goals for the semester. These can be technical in nature, non-technical such as verbal communication, or organization-related to advance a new initiative for the venture. Students must determine how they will measure their success in each of these goals, and report at the end of the semester, using both quantitative and qualitative methods, on how they met (or did not meet) their goals. Similarly, students go through two performance evaluations; one at midterm and one at the end of the semester. Students complete a self-evaluation and the faculty completes the same evaluation. The self-evaluation is asks students to rate themselves (on a scale from 1 to 5), in the areas of communication, job knowledge, work habits, quality of work, problem-solving ability, initiative, attitude and cooperation, adaptability, and leadership ability. Additionally students are asked to write a one-page narrative summarizing their performance and engaging in reflection. One-on-one meetings lasting approximately 10-15 minutes take place to compare the evaluations, provide constructive feedback on how to improve, and provide a forum for the student consultant to voice any concerns. Student consultants also complete a team evaluation to rate the quality of work of their peers. Student consultants report to an advisory board at the end of each semester, and occasionally reach out to them for mentorship throughout the school year.

From a pedagogical perspective, this student-run venture exemplifies two specific active learning frameworks. These include Kolb's work on experiential learning as seen as Table 2 (1984), and Merrill's first principles of instruction for effective and efficient instruction related to active learning as seen in Table 3 (2002). Kolb's learning theory, specifically, combines experience, perception, cognition, and reflection to create knowledge through experience; all hallmarks of real-world projects. Merrill's principles of instruction focus on the knowledge transfer from existing knowledge or new knowledge into the student-run venture, or in this case, creating an environment similar to that of a consulting practice.

Kolb's Required Elements of Experiential Learning	**Evidenced through Student-run Consulting Venture**
1. Include a concrete experience	1. Work on real-world client projects and perform business operations
2. Include abstract conceptualization	2. Requirements gathering, forecasting, project planning, and strategic thinking
3. Include active experimentation	3. New business models, different ways of tracking project progress, using different technology tools, and performing testing
4. Engage in reflection	4. performance evaluations, Scrum meetings, and client sign-off sessions

Table 2.

Merrill's First Principles of Instruction That Learning is Best Achieved When	**Evidenced through Student-run Consulting Venture**
1. Learners are solving real problems	1. Student consultants are performing real work for real clients, handling payments and expenses. They are running a business.
2. Existing knowledge is activated as the foundation of new knowledge	2. Student consultants use knowledge gained from previous courses (technical and non-technical)
3. New knowledge is demonstrated to the learner	3. Some projects involve skills not yet learned or practiced
4. New knowledge is applied by the learner	4. Student consultants select how business is transacted, and how work is completed for clients
5. New knowledge is integrated into the learner's world	5. Student consultants document their work into a knowledge base for current and future student consultants.

Table 3.

4. RESULTS

Over the past three years, students have earned over $15,000 in revenue and served 15 unique clients. Some of those clients return each semester for new projects or ongoing work. The course has enrolled 36 distinct students with a total enrollment over six semesters of 69 students. The maximum number of semesters a student has been enrolled in the venture is four, while the average tenure of a student consultant is 2.03 semesters. As is the trend in technical disciplines, the gender balance skews towards male (80.5%) over female (19.5%). The diversity of students across majors beyond IS is represented in Table 4. Some majors like entrepreneurship and digital media marketing, as well as the entrepreneurship minor, require at least a semester in one of the 14 student-run ventures on campus, so this provides a forum for those students to experience work in the technical space.

Major	Number of Students
Information Systems	22
Digital Media Marketing	4
Mathematics	4
Accounting	2
Entrepreneurship	1
International Business	1
Music	1
Theatre	1

Table 4.

Student consultants have completed projects for clients that involve web design, network consulting, server/system implementation, database programming using Microsoft Access, data migration from Postgres to a cloud point-of-sale application, system analysis, design and recommendation, web application development in WordPress and Vanilla Forums, and mobile application development using PhoneGap and Microsoft PowerApps/SharePoint. In general, students gain client projects through word-of-mouth or actively seeking new work through their existing network of connections. In fall 2018, student consultants recognized the majority of their client work was web related. As a result, they decided to begin offering web hosting and support services and acting as the intermediary between the client and a third-party hosting provider. Students promote this as a value-added service to clients who don't have the expertise or interest in managing a website. Additionally, students manage all the financials using QuickBooks Online and coordinating deposits and checks through the university business office. They track projects using Trello and physically on a white board full of sticky notes. For communication, students use Slack with different channels for each client and have preferred it over traditional means such as email and group texts.

For the last four semesters, fall 2017 through spring 2019, students completed a team evaluation of their peers. Within that peer evaluation contained a section asking students to rate on a scale from one to five, one meaning never and five meaning continually, how often they practiced certain skills in their particular role of the venture. Within this collection period, 33 team evaluations were gathered. The skills ranged from technical to functional disciplines such as accounting and marketing, but also included essential skills like collaboration and presentation. In summary, 87.9% of students recognized that they practiced communication and collaboration either often or continually, project management (69.7%), and consulting (51.6%). System Analysis and Design is being practiced, in some form, by at least half the students (51.6%). However, 72.8% of students self-reported that they practiced technical skills either never or barely, accounting (66.7%), and legal issues (66.7%). When looking at the data set in totality (see Appendix A), it becomes apparent that someplace between 18% and 25% of students are working either in a technical or business discipline with a defined role, while between 39% and 70% of students are practicing essentials of communication, presentation, consulting, entrepreneurial thinking, and so on. The data show areas where students may need to be paying more attention such as legal risk and may also indicate that those working on technical projects may be individuals and not teams of student consultants. Furthermore, it may be concluded that either the majority of the technical work is being completed by the minority (rather than the majority) of student consultants or that the student consultants perceive some work as not being technical (e.g. system analysis and design, research and recommendation, web content updates). Further examination of what skills are being developed and practiced within the student-run venture is needed.

Students across all the disciplines mentioned above reflected in their evaluations on what the

experience provided for them. Multiple IS majors stated that they learned how to work with clients better while increasing their technical skills on-the-fly rather than from a textbook. Additionally, students commented that the student-run venture forced them to learn and adapt as situations and requirements changed. One IS major said "I believe it gives me a huge step ahead with my major and learning how to deal with real-world clients will be important in my future internships and jobs." Another IS major learned that "you can't always rely on email to communicate with individuals, and that sometimes you must use alternate methods like phone calls or physically visiting them." Math majors who were interested in IS commented that the experience provided them with more collaboration and team work that what was typical in their discipline. A digital media marketing major said "I worked continuously on trying to better understand how to market the student-run venture to our multiple target audiences and ways to engage our followers while sharing information about the business. This aspect of the business really showed me that you can't just post a picture on your social media that you find relevant and expect people to engage with it. You have to post eye catching pictures that followers want to see and create opportunities for them to engage." In general, students have had positive experiences from the student-run venture while preparing them for careers in their chosen disciplines.

5. RECOMMENDATIONS AND CONCLUSIONS

Starting and running and student-run venture admittedly consumes time from the faculty's perspective. In lieu of preparing for class lectures and grading typical work, the time is spent gathering progress reports from students, and following up with clients, if necessary. In general, it has been the faculty's perspective to engage with the client at the onset of the project and at the completion so that the student consultant must manage the process in the middle. The faculty solicits feedback from the client throughout the project and only intervenes when problems occur. It has been the purview of the faculty to act as a coach rather than a dictator. The senior consultants are the ones to take charge and direct the student-run venture on how to operate. Again, the venture is meant to be "faculty-led" and "student-driven." The faculty advisor is there as a safety net, but at the end of the day, students need to take ownership of their decisions, whether they are good or bad, reflect on them, and make recommendations on how enact change.

This experience works well for students who are highly motivated and interested in taking initiative. Developing a system for allowing high-quality students into the venture is an important aspect of ongoing success. In this particular case, it has worked well for current students to recruit new students into the venture. They oversee vetting and interviewing students to recommend for invitation, and are ultimately signed into the course by the instructor. Having proper evaluations instruments in place for checkpoints throughout the semester also provides a way to deliver corrective action for those who are under-performing.

As students work on projects for a client from semester-to-semester, it is imperative that students build documentation of their work for future student consultants. This is a challenge in the professional workplace, and it remains a challenge in this student-run venture as well. Not only are student consultants required to document their work, they are required to teach someone younger than them about the project. The two methods reinforce sustainability and strengthens the knowledge of the student consultant who worked on the project. Although students manage a Google Drive account for convenient access to files and data from the cloud, a dedicated office space is helpful to have for students to work on projects that require specialized software, to meet with clients, or to collaborate.

Additionally, students need to be given the opportunity to improve existing processes such as billing or social media or client communication. Part of working on the business and in the business concurrently is applying the entrepreneurial mindset of finding ways to do work better given the resources available while recognizing new opportunities. Students need the autonomy and permission to develop new streams of revenue, new markets, or research and develop their own IT solutions. Overall, the student-run venture has provided and will continue to provide students opportunities to practice their disciplines in a real-world setting with real risk and real-reward.

Potential future research may include soliciting feedback from clients on their experiences working with a student-run IT consulting venture, and providing a guide on how students and faculty select clients. Additionally, since the

university operates 14 student-run ventures, it would be helpful to devise a universal instrument to survey students across all the ventures to understand which discipline-specific, business, and entrepreneurial mindset skills are being exercised most and least. This may provide better insight into the overall effectiveness of student-run ventures and how to improve them for future student generations.

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Appendix A

Skills Practiced throughout the Semester					
Skill	**Never (1)**	**Barely (2)**	**Sometimes (3)**	**Often (4)**	**Continually (5)**
Technical	42.4%	30.3%	9.1%	6.1%	12.1%
System Analysis & Design	30.3%	18.2%	27.3%	15.2%	9.1%
Marketing	24.2%	24.2%	30.3%	6.1%	15.2%
Accounting and Finance	45.5%	21.2%	15.2%	6.1%	12.1%
Consulting	12.1%	15.2%	21.2%	21.2%	30.3%
Legal Risks/Issues	36.4%	30.3%	15.2%	18.2%	0.0%
Business Process Management	24.2%	6.1%	27.3%	27.3%	15.2%
Human Resource Management	33.3%	6.1%	21.2%	24.2%	15.2%
Project Management	6.1%	6.1%	18.2%	36.4%	33.3%
Collaboration and Communication	3.0%	0.0%	9.1%	27.3%	60.6%
Entrepreneurial Thinking	6.1%	9.1%	45.5%	27.3%	12.1%
Presentation	3.0%	9.1%	42.4%	30.3%	15.2%