Assessment of Student Learning in an Entrepreneurship Practicum Course

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Abstract

As entrepreneurship education has moved from traditional business schools into engineering programs, instruction itself has transformed from traditional approaches disseminating business content to more practice-oriented approaches targeting students' professional development. Particularly, entrepreneurship training has been included in undergraduate engineering education to instill domain-general skills (such as innovativeness, creativity and communication) needed to meet the demands of competitive global market. In addition to technical knowledge, engineering students should also demonstrate the ability to identify new venture opportunities, commercialize technologies, and exhibit an understanding of market operations. Entrepreneurship education focuses on instilling these skills by exposing students to business content and entrepreneurial practice through engagement in project-based courses, pitch competitions and providing opportunities to interact with practicing entrepreneurs.

Over the last several years, many undergraduate engineering programs have incorporated entrepreneurship education into their curricula through formal coursework and other informal co-curricular programs. Although it is imperative to evaluate these programs to better inform entrepreneurship education practices, minimal attention has been devoted to assessment of entrepreneurship education programs. Furthermore, of the few existing studies, most have examined students' perceptions of learning gains and affective responses such as entrepreneurial self-efficacy, mindset and attitude. In this study, we present an examination of students' actual learning in an entrepreneurship practicum course at large research university. The course leverages widely used Lean Launch Curriculum and Business Model Canvas (BMC) to engage students in entrepreneurship in a project-based learning environment. In contrast with prior work that has primarily relied on students' self-assessment of learning gains, we evaluated students' entrepreneurial knowledge using pre/post open-ended surveys with questions examining students' approaches to starting a new venture at different phases of development. Our findings provide evidence supporting the anticipated positive change in student learning outcomes, indicating that the students were able to understand and internalize the BMC concepts they were exposed to in the course.

Introduction and Background

Historically, entrepreneurship has been associated with seeking self-employment opportunities and creating new enterprises (Katz, 2003). While venture creation has traditionally been a metric of entrepreneurship education, researchers have argued that while entrepreneurship may involve venture creation, it is also the demonstration of a particular set of skills, knowledge and behaviors used to identify and develop new opportunities. As Kuratko (2005) explains, "the characteristics of seeking opportunities, taking risks beyond security, and having the tenacity to push an idea through to reality combine into a special perspective that permeates entrepreneurs" (p. 578). This paradigm shift in the conceptualization of entrepreneurship from an innate characteristic to a developable skillset, has led to the creation of several entrepreneurship education programs in multiple institutions to impart entrepreneurial knowledge, instill entrepreneurial skills, and develop entrepreneurial mindset in students. Especially in engineering, entrepreneurship has received significant attention in the last decade. As reported by Shartrand, Weilerstein, Besterfield-Sacre, & Golding (2010), in 2010, more than 50% of universities affiliated to ASEE were offering entrepreneurship through formal courses and informal programs such as pitch competitions. This urgency has been fueled by recurrent national calls for fostering an

entrepreneurial and innovate economy and the need to develop innovative engineering graduates to compete successfully in a global economy (National Academy of Engineering, 2005).

Advances in Entrepreneurship Education

Recent initiatives from the National Science Foundation (NSF) have further promulgated entrepreneurship in higher education institutions. In 2011, NSF launched the Epicenter Program: National Center for Engineering Pathways to Innovation (Epicenter, 2017) and I-Corps Program (NSF, 2016) to impart entrepreneurship training to students and faculty members respectively. During the last five years of Epicenter program, more than 450 students affiliated to 130 institutions have been exposed to entrepreneurship training through the University Innovation Fellows initiative. In addition, through the Pathways to Innovation program, faculty teams representing 50 universities have been mentored on entrepreneurship. Similarly, the I-Corps program has assisted scientists and engineers involved in NSF funded projects to explore opportunities for commercializing their technical innovations. The I-Corps program has exposed faculty members to entrepreneurship education through the Lean Launch curriculum. To date, approximately 18 research-focused universities are using Lean Launch curriculum for providing entrepreneurship training to science and engineering faculty members (Venturewell, 2016).

Lean Launch utilizes experiential learning to immerse students in projects that allow them to hypothesize and test their business models outside the classroom. The curriculum uses Business Model Canvas (BMC) to teach important concepts related to venture creation and guide students in their venture creation projects (Osterwalder & Pigneur, 2010). BMC is a tool developed to help plan, examine, design, and create business models. The canvas is divided into 9 sections, representing the 9 fundamental components of a business model. The 9 sections include key partnerships, key activities, key resources, value proposition, customer relationships, channels, customer segments, cost structure, and revenue streams.

- *Customer segments* delineates the potential customers of the business and helps shape the product towards such audience.
- *Customer relationship* describes how the project or product will be related to the target audience so they are aware of its existence and become eager to try it.
- *Key partnerships* refer to people, companies or projects that would be strategic when making connections for the business.
- *Key activities* refer to the strengths of the entrepreneur and those that add special value to the business.
- *Key resources* include both tangible and intangible resources that the entrepreneur can count on when developing his/her project.
- *Value propositions* present the benefit that the project will provide and the plan behind it that shows the creative aspect of the entrepreneur as this has to novel.
- *Channels* describe the distribution medium of the product and the intermediate participants of this process.
- *Cost structure* describes the costs associated with developing and running the future business.
- *Revenue stream* talks about how the business will acquire funds both through profit and investors/necessary loans.

The BMC provides a platform to organize and analyze components critical for the development of a scalable and repeatable business model. Students are encouraged to use customer discovery, the practice of interviewing stakeholders, to populate and iterate on the BMC. Recently, the

BMC and the process of customer discovery have become two of the more commonly used tools in entrepreneurship education programs. As a teaching tool, the BMC allows students to learn important entrepreneurship concepts as they engage in experiential venture projects and test their hypotheses through customer discovery. It provides a platform for students to understand customer needs, product market fit and how to operationalize their solution. To better inform entrepreneurship education design and teaching, it is important to assess what students are learning in correspondence with what they are being taught (Shartrand, Weilerstein, Besterfield-Sacre, & Olds, 2008). In our study, we focus on examining students' entrepreneurial knowledge taught using BMC in an engineering entrepreneurship course.

Entrepreneurship Education Research

As more universities start focusing on developing entrepreneurial and innovative skills in their graduates, the number of formal engineering entrepreneurship programs is likely to increase in the near future. To meet the demand of developing entrepreneurially minded engineers, engineering institutions "will need to keep pace by offering opportunities to acquire entrepreneurial knowledge and experience" (Besterfield-Sacre et al., 2012). Considering the emergent state of engineering entrepreneurship education, the assessment of entrepreneurship programs is important and necessary to identify best practices for teaching entrepreneurship to engineering students.

Although investigation of the impacts of engineering entrepreneurship is a relatively new field of study, investigation of a range of student outcomes has already begun to emerge. Researchers have examined a wide variety of aspects relevant to entrepreneurship education including but not limited to students' academic performance and retention (Ohland, Frillman, Zhang, Brawner, & Miller, 2004), career choice and attitudes (Duval-Couetil, Reed-Rhoads, & Haghighi, 2012; Jin et al., 2016), and learning outcomes (Duval-Couetil, Reed-Rhoads, & Haghighi, 2011; Duval-Couetil, Reed-Rhoads, & Haghighi, 2010). These studies provide a window into the impact of engineering entrepreneurship programs, with growing evidence supporting their effectiveness in addressing several predominantly noted engineering education challenges such as student learning and retention.

Despite the above studies, the impact of engineering entrepreneurship programs on entrepreneurial knowledge is poorly understood. In one of the very few studies, Besterfield-Sacre et al. (2012) developed the Entrepreneurship Knowledge Inventory and examined the differences in entrepreneurship knowledge among engineering students across six engineering institutions. The inventory assessed the students on their familiarity with commonly used engineering entrepreneurship terminology and concepts. The researchers reported positive impact of entrepreneurial experiences on students' entrepreneurial knowledge. The researchers suggested that entrepreneurial experiences could considerably assist in increasing engineering student's entrepreneurial knowledge, encouraging development entrepreneurship programs that expose students to entrepreneurship in an experiential learning format.

Although Besterfield-Sacre et al. (2012)'s work presents a tool for assessing entrepreneurial knowledge, the inventory is a measure of students' self-assessed knowledge rather than a "direct measure of measurement of the actual skills and knowledge" (p. 8). We argue that this approach does not completely capture students' understanding of entrepreneurial concepts due to emphasis on only students' familiarity with concepts and terms, rather than their ability to internalize and apply entrepreneurial knowledge. In other words, overall there is almost no research that uses a direct measure of entrepreneurial knowledge to assess the impact of entrepreneurship programs on student learning. Guided by this gap, in our study, we examined students' entrepreneurial

knowledge using open-ended survey items which examines students' ability to apply entrepreneurial knowledge in response to given problem scenarios.

Methods

This study was conducted in three sections of a senior-level, three-credit entrepreneurship course offered by the College of Engineering at a large research university in the US (n=57 students). The three sections were taught by three different instructors and leveraged the Business Model Canvas and customer discovery approach for course design and instruction. Each course met once a week for 120 minutes and followed a student-centered teaching approach that engaged students in different venture projects, in-class discussions, quizzes and presentations.

A Pre/Post research design was implemented for this study. Students responded to open-ended survey in the first and last week of the class. The response rates were 81% (n=46) and 65% (n=37) for the pre and post survey, respectively. Survey questions assessed students' knowledge of key concepts emphasized in the course: customer discovery, feasibility of product, and adaptability to customer segment. The survey was administered online and included the following questions:

1) Your company has a new idea for a cellphone app to help people manage their diabetes. You have been tasked with evaluating whether or not this app should be brought to market by the company. Describe who you would speak to, why you want to speak to these people, and how you would make contact with them. *(Customer Discovery)*
2) An elderly woman is having trouble managing her diabetes. Describe at least five steps you would take to determine if this cellphone app would be a potential solution for her problem. *(Feasibility of product)*
3) In speaking with potential users you discover that the majority of diabetic patients are over the age of 60. Describe how this might influence your company's next steps with the app. *(Response to customer discovery results)*

Students provided open-ended responses to each of the three survey questions. Survey responses were analyzed by two researchers who independently performed thematic coding on the pre and post datasets respectively (Robson, 2011; Strauss & Corbin, 1990). Four researchers reviewed the initial set of codes and resolved discrepancies to ensure inter-rater reliability. The findings emerging from students' responses for the three questions are reported in the sections below. The example responses for the emergent codes are provided in Appendix.

Findings and Discussion

Overall, the students' survey responses demonstrated that students were able to internalize and understand the concepts of BMC that were taught in an experiential project-based learning environment. In the area of customer discovery, students' understanding expanded to include a wider range of key stakeholders, consider their relationships with the targeted customer segment, and include relevant factors pertaining to these relationships when evaluating an entrepreneurial idea. Similarly, for determining the feasibility of the product, students' post responses showed increase in students' preferences to follow a more iterative approach to refine the product as per customer needs. Lastly, responding to customer discovery results, students' answers noted a change from following a conventional approach involving modification of product in the pre-survey, to willingness to accept infeasibility of the entrepreneurial idea and making decision to not move forward with the venture. These findings are presented in detail in the sections below.

Customer Discovery

The first question focused on examining students' understanding of the process of customer discovery. For the '*who would you talk to*' part of the question, students' responses grouped into six categories: diabetics, doctors, business experts, health providers, technology developers and others (e.g. mentors and organizations). Patients emerged as the most frequently reported answer noted in the students' responses. Approximately half of the instances noted diabetes patients in the pre (55%) and post (49%) responses (Table 1).
While the categories of patients, physicians and business consultants noted a decline in the post responses, there was an increase in instances pertaining to healthcare providers, developers and other such as mentors, organizations, and phone users. For example, while the percentage of instances noted in pre responses for patients was 55%, the percentage was 50% in post responses. In contrast, while the percentage of instances noted in pre responses for technology developers was 5%, the percentage increased to 8% in the post responses. Overall, while students mentioned contacting diabetics and doctors/physicians in both pre and post responses, 36% of the post responses were distributed among the other four categories as opposed to 27% of the pre responses.

An implication of these finding is that the instead of simply focusing only on the more obvious group of patients and physicians; the students took into consideration a broader group of stakeholders that need to be accounted in the process of evaluating an entrepreneurial business plan. In the context of BMC, the findings indicate that in contrast with pre responses, the students in their post responses considered a wider range of key partners and their potential relationships with their targeted customer segment to evaluate their business plan.

Table 1: Student response to 'Who would you talk to'

Category	Pre	Post
Diabetics	37 (55%)	29 (50%)
Doctors/Physicians	12 (18%)	8 (14%)
Business Experts /Consultant/Marketing	7(10%)	5 (8%)
Healthcare providers	3 (5%)	3 (5%)
Technology Developers	3(5%)	5(8%)
Other (Mentor/Organizations/Phone Users)	5(7%)	9(15%)

For the '*why would you talk to*' section of the question, students' reported reasons were spread across a wide range of themes that focused on finding more information about the targeted customer, market and product. In particular, nine different categories of responses emerged from the data set: assessing user needs, determining market viability, gauging interest, familiarizing with disease, target audience, determining product benefits, gaining feedback on market value product, familiarizing with competing products, and determining technological validity of the product.

There were a few noteworthy trends that emerged in this section. First, 'determining user needs' emerged as the most commonly reported reason in both pre (28%) and post (18%) responses. Similarly, 'market viability' was also frequently noted in the students' pre (18%) as well as post (13%) responses (Table 2).

Table 2: Student response to 'Why would you talk to'

Category	Pre	Post
User Needs	19 (28%)	7 (18%)
Market Viability	12 (18%)	5 (13%)
Product Benefit	10 (15%)	3 (8%)
Feedback on MVP	9 (13%)	4 (11%)
Gauge Interest	6 (9%)	5 (13%)
Familiarize with disease	4 (6%)	4 (11%)
Target Audience	2 (3%)	5 (13%)
Familiarize with competing products	4 (6%)	3 (8%)
Technological Validity	1 (2%)	2 (5%)

Second, in contrast with pre survey, students' responses in post survey were well distributed across the different categories (Figure 1). For example, while 61% of the pre responses were in the first three categories (user needs, market viability and product benefit), the total percentage of post responses in these categories was just 39%. Conversely, the students' responses pertaining to the other six categories totaled to 61% in post survey in contrast with 39% in pre survey.

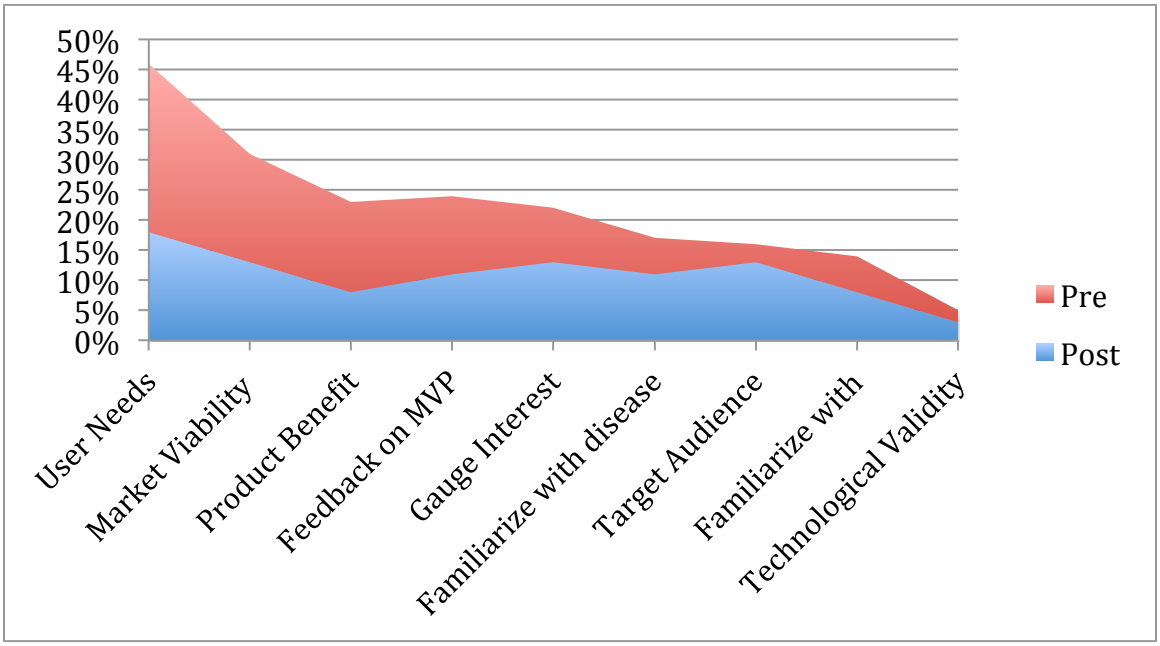

Figure 1: Concentration of 'Why would you talk to' student response

These findings imply that student awareness of factors that they need to gather more information about while conducting customer discovery increased. For example, while the percentage of responses decreased from 28% to 18% for assessing user needs in the post survey, there was an increase in the percentage of responses from 6% to 11% for the 'familiarize with disease' category in the post survey. This finding is connected to student response to 'who would they talk to' question. Since the students focused more on a diverse group of stakeholders in the post survey responses, they were able to think more broadly in terms of the information they will need to gather from different stakeholders than just diabetics. In the context of BMC, the students not only expanded the list of important stakeholders but also were able to understand the information that they need to gather from them to evaluate an entrepreneurial venture plan/idea.

For the '*how would you contact them*' section of customer discovery question, similar trends were noted in students' responses. First, majority of the students reported that they would contact through doctors/physicians in both the pre (36%) and post (36%) responses. This is primarily because students thought that it would be the most efficient way to contact their targeted customer segment, i.e., diabetes patients. Table 3 presents student response to 'how would you contact them' question.

Second, there were several categories that witnessed positive and negative changes between the pre and post responses. Particularly, while the percentage of responses for the email/phone call, personal networks and in-person meeting declined in the post survey, there was an increase in the percentage of student responses for other categories such as survey, focus groups, and databases. This shows that students relied on more formal methods of data collection in their post responses when compared to pre responses to gather information needed to evaluate their business plan and/or idea.

Table 3: Student response to 'How would you contact them'

Category	Pre	Post
Through doctors/physicians	16 (36%)	9 (36%)
Email, Phone Call	9 (21%)	3 (12%)
Personal Networks	3 (7%)	1 (4%)
In-Person Meeting	5 (11%)	2 (8%)
Survey	5 (11%)	5 (20%)
Social Media	2 (5%)	2 (8%)
Focus Groups	1 (2%)	1 (4%)
Database	0 (0%)	1 (4%)
Advertising	3 (7%)	1 (4%)

Feasibility of product

While the previous question focused on customer discovery, the second question examined students' ability to determine the feasibility of a product in solving the problem. The question asked students to describe steps that they would take to determine if the app would be a potential solution for an elderly diabetic. Results of student response for this question are presented in Table 4.

Overall, in both pre and post survey, the majority of the students (56%) responded that they would research how the elderly women manage their diabetes. However, there were few noteworthy changes between the students' pre and post responses. Particularly, responses for the category providing training and assessing patients' willingness to use the app declined from 12% and 15% in the pre survey to 2% and 0% in the post survey responses respectively. On the other hand, a 20% rise in student responses pertaining to 'make the app easy to use' was noted in the post survey in contrast with the pre survey. This suggests that instead of providing training or gathering feedback on customer's willingness to use the product, student in the post survey followed a more iterative approach involving making changes in the product to better suit the needs of the user.

Table 4: Student response to feasibility of product

Category	Pre	Post
Research diabetes management	58 (56%)	45 (56%)
Make the app easy to use	5 (5%)	20 (25%)
Provide training to use the app	12 (12%)	2 (2%)
Gather feedback on app	6 (6%)	4 (5%)
Assess patients' willingness to use app	16 (15%)	0 (0%)
Contact programmer/make appropriate changes to app	6 (6%)	8 (10%)
Problems of other patients	0 (0%)	2 (2%)

Response to customer discovery results

The last question aimed at assessing how students will respond to results obtained from the customer discovery process. Specifically, the question asked students what their company's next steps would be when they learn that a majority of the potential users of their app are over the age of 60. In the pre responses, 'simplify app' and 'finding a different problem' emerged as the most commonly noted response with a significant 84% responses falling in these two categories (Table 5). Although students also reported that they would simplify the app (20%) or find a different problem (14%) in the post survey, the most frequently noted response was making the app user friendly. In contrast with 10% in pre-survey, 31% of the post-survey responses noted that the students would make the app user friendly. This shows that there was a shift from just simplifying the app to more following a user/customer-centered approach.

Furthermore, in contrast with pre survey, two additional response categories were noted in students' post responses. Particularly, there were several responses in the post survey that reconsidered the viability of the app among elders (20%) and the decision to not develop the app (6%). This demonstrates that instead of going forward with the entrepreneurial idea, the students were able to identify scenarios in which the decision to move forward will be futile. This finding is particularly noteworthy because one of the key recommendations of LeanLaunch Curriculum is to initiate a startup venture at a small scale and use the BMC iteratively to evaluate whether the idea is worthy for further pursuit. In other words, shift in students' response from simplifying the app to evaluating the feasibility of the entrepreneurial idea shows that the students were not just able to understand the concepts of BMC but also use it as tool to make decisions about their proposed venture plan.

Table 5: Student response to customer discovery results

Category	Pre	Post
Simplify app	22 (45%)	7 (20%)
Find a different problem	19 (39%)	5 (14%)
Making the app user friendly	5 (10%)	11 (31%)
Viability among elders	0 (0%)	7 (20%)
Would not develop app	0 (0%)	2 (6%)
Other (teaching app and changing audience)	3 (6%)	3 (9%)

Conclusion

By nature, entrepreneurship breeds a culture of high paced transactions as individuals seek to capture value from unrealized opportunities. At the same time, entrepreneurship program development has been outpacing entrepreneurship education research and is often created based upon anecdotal evidence. This paper is an attempt to rigorously capture the impact of the BMC/customer discovery approach to entrepreneurship education on student knowledge development. Using pre/post survey design, we were able to demonstrate that students internalize and understand the concepts of the BMC and customer discovery approach. After engaging in customer discovery, students were more apt to include a wide range of stakeholders for feedback, critically analyze their relationship with their customer segment and integrating these findings when evaluating their entrepreneurial ideas. In addition, students demonstrated two fundamental concepts that are considered inherent to the entrepreneurial process, iteration and pivoting. Post course responses demonstrated that students continuously reviewed the findings of customer discovery process to iterate on their business model and were open to the idea that they may need to reconsider revisiting their initial concept and preconceptions.

Not only does this work establish the impact of the BMC/customer discovery approach on student knowledge development, but it offers a new approach for examining the impact of entrepreneurship instruction. In this approach, we assess the impact of instruction on entrepreneurial knowledge, rather than perceptions of affective variables or student self-report of learning gains. Initial qualitative results are promising for several reasons. First, pre- and post-instruction results are different, with differences aligning with anticipated learning outcomes. This suggests that the three knowledge constructs (customer discovery, feasibility of product, response to customer discovery results) under investigation were effectively targeted by the survey itself. Second, analysis of survey responses yielded themes that aligned with survey intentions and which were reproducible across researchers. This thematic analysis suggests that this initial set of qualitative data can serve as the foundation for a quantitative survey of entrepreneurial knowledge. Future studies can then evaluate the validity and reliability of a quantitative entrepreneurial knowledge assessment designed for engineers. Finally, this study provides some of the first evidence of knowledge gains among students resulting from exposure to Lean Launch and the Business Model Canvas. These knowledge gains suggest that interdisciplinary education – exposing engineers to business concepts in engineering-appropriate contexts – has significant potential for addressing the needs of the 21st century engineer.

Acknowledgements

This project is funded by the U.S National Science Foundation through grant number 1504257. The opinions are those of the authors and do not necessarily represent the National Science Foundation. We are thankful to Laura Hirshfield for her help in this work.

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Appendix

	Category	Example Response
Table 1	Diabetics	I would speak to people who have diabetes because I would want to better understand what methods they themselves use to monitor their diabetes.
	Doctors/Physicians	I would approach doctors first as they could potentially recommend the app to their patients with diabetes.
	Business Experts /Consultant/Marketing	I would speak to the marketing company because they are in charge of outreach and customer acquisition.
	Healthcare providers	I would speak to health care providers to determine if the app is complete and functional, then distribute/promote via recommendations from heart care providers.
	Technology Developers	Some professional app developers to evaluate the app.
	Other (Mentor/Organizations/Phone Users)	Cell phone users, because they are offer the most helpful information.
Table 2	User Needs	I would speak to people with diabetes who would potentially use this application and see if there is a need for it and if people would actually use it.
	Market Viability	I would first speak to customers (diabetes patients and their doctors) to determine the viability of the product in the market.
	Product Benefit	I would speak to a group of people that have diabetes and see if it would be beneficial or not.
	Feedback on MVP	I would speak to those with diabetes ages 16-25, allow them to test out the app and report back with their thoughts and opinions on it.
	Gauge Interest	I would speak with potential customer segments (people with diabetes, doctors) to gauge their interest in the app.
	Familiarize with disease	Would speak to people with diabetes, they have direct knowledge of the disease and how they track it. Speak to doctors, they have knowledge of the disease and how they progress.
	Target Audience	I would want to speak with as many people as possible suffering from diabetes, because they are the intended audience for the app.
	Familiarize with competing products	I would speak to people who have diabetes because I would want to better understand what methods they themselves use to monitor their diabetes.
	Technological Validity	I would talk to mobile app developers who would help me build the app and could give me more in-depth information.

Table 3	Through doctors/physicians	I would plan on making contact with these people by contacting a doctor who may specialize in the disease, in the hopes of reaching out to people who may have diabetes.
	Email, Phone Call	Nutritionists/doctors: I would like to speak to them to see their opinions as to how well a cellphone app can actually help people manage their diabetes. Depending on how urgent this is, I will email or phone them.
	Personal Networks	I would use my personal networking contacts.
	In-Person Meeting	I would contact them through an email or possibly by teaming up with a specific department in a hospital or office that specializes in diabetes to help promote our product with doctors and others who will benefit.
	Survey	Talk to current diabetes patients because you want to know how they would go about using it for and what the most important features in their mind would be. You could send out a survey
	Social Media	I would make contact with them through over social media and through diabetes awareness/cure organizations, such as the JDRF (Juvenile Diabetes Research Foundation).
	Focus Groups	I would start with small focus groups of regular people with diabetes to see if there really is a need for this type of application.
	Database	Potential customers from the customer segment, surveying and maybe phone interviews from the national diabetes organization database.
	Advertising	To reach these people I would put up ads across towns or on local websites like craigslist. I'd also advertise at libraries and schools.
Table 4	Research diabetes management	Learn how she currently manages her diabetes /Determine if she is capable of managing her diabetes on her own, even with the app
	Make the app easy to use	1. Is the app easy to use for a older women. 2. Are the users of these apps tech savvy enough to use the app / 3. Is the app accurate with its readings / 4. does the app meet all the requirements it needs to be successful
	Provide training to use the app	I would go into the women house and help train her to get a gage on the user experience
	Gather feedback on app	Ask her if she has a phone. Describe the app you have developed to her .Ask her to download it. Have her try it for a while. Ask for feedback and if it worked
	Assess patients' willingness to use app	Do those who are over the age of 60 own a smart phone? Do they use their smart phone beyond its basic

		functions and accept new technology/is open to new technology?
	Contact programmer/make appropriate changes to app	This could mean a simplification of the application. Need to talk to UI/UX designers to fix this issue.
	Problems of other patients	I would ask her? What do you do now to manage your diabetes? Would you use a cell phone to help mange your diabetes? What would you be looking for in an app to help manage your diabetes? Do you know of other people with similar problems? / 5. What would your ideal solution be?
Table 5	Simplify app	We may have to make the app very simple to use because the people who are using it didn't grow up in an age when smart phones and apps were prominent.
	Find a different problem	We might have to use a different platform other than apps to address this issue with our clientele
	Making the app user friendly	People over 60 are generally less tech-savvy than their younger counterparts. As such, I would aim to make the app incredibly user-friendly and easy to use.
	Viability among elders	Do people > 60 have phones, know how to use phones, are willing to use/get phones, are their family members will to teach them how to use phones?
	Would not develop app	Most individuals over the age of 60 have little smartphone experience. May not want to create an app
	Other (teaching app and changing audience)	We might have to use a different platform other than apps to address this issue with our clientele