

Entrepreneurial Mindset Project

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Abstract

This paper describes a project for an entrepreneurial mindset class required for all engineering students. The purpose of the project is to give students an introduction to entrepreneurship, but with minimal risk. The course described here was offered in the fall 2025 semester and consisted of two class sections which were broken into a total of seven teams with five or six students on a team.

Each team recommended a product that would be sold by both sections. Their proposal had to include the design of the product, how it could be obtained, and how much it would cost to purchase. The teams produced a sixty-second video and a handout on their recommended product, to try to convince their colleagues to select their product for the class to sell. Students individually ranked the product proposals (except for their own team's proposal), which led to selecting a faux leather-wrapped tumbler recommended by one team, with an image design proposed by another team.

This paper reports on the details of the project, including the successes and challenges. It also includes descriptions of the assignments, the results, lessons learned, what was done with the profit, student feedback, and recommendations.

Entrepreneurial Mindset

Organizations have recognized the importance of innovation to enhance their operations, status, and market share. Failure to innovate can lead to reduced brand recognition and profits. This means not only coming up with new innovations, but also improving existing products and services. Creativity should be encouraged as it is often the catalyst for innovation [1]. The project described here is designed for students to use creativity and innovation.

The phrase “creative destruction” is often attributed to the Austrian economist Joseph Schumpeter [2]. It means that companies should be constantly exploring how to obsolete existing products and services with better ones. While this may sound counter-intuitive, particularly when a product or service is currently in great demand, it is ultimately necessary because if it is not done, then someone else will do it.

One of the more famous examples of failing to creatively destroy a product is Kodak film. Kodak was one of the first to invent electronic cameras but decided not to offer them for sale because they would have dramatically reduced their very successful film business. Ultimately, that happened despite Kodak's efforts to prevent it and now Kodak's market share has been dramatically reduced. Blackberry phones are another example. At one time, Blackberry held a large share of the business portable phone market. However, they failed to sufficiently improve their product and were eventually overtaken by competitors such as Apple and Android.

Innovation by itself is not enough. If there is no market for an innovative new product or service, this will ultimately be of little or no value and in fact can be a significant waste of precious organizational resources. Ekanem defines entrepreneurship as “the process by which individuals

or a group of individuals exploit a commercial opportunity, either by bringing a new product or process to the market, or by substantially improving an existing good, service or method of production” [3]. Innovation must be coupled with entrepreneurship which involves meeting particular wants and needs addressed by a new or improved product or service. Having the proper mindset is critical to the success of innovative engineering projects [4]. The project described here is designed to enhance students’ entrepreneurial mindset by selling a new product.

One of the largest privately held companies in the U.S. (Koch Industries) has coined the phrase Principled Entrepreneurship™ [5]. Koch specifically and deliberately encourages employees to take risks to develop new or improve existing processes, products, and services that will be of interest to their customers and their own operations. Koch has long recognized that their own employees are an excellent source for innovation; therefore Koch wants its employees to have an entrepreneurial mindset. They reward success but do not punish failure and in fact expect some if employees are truly pushing the boundaries.

Schoeniger describes “mindset” as that which “drives the behavior that enables them to accomplish extraordinary things” [6]. Schoeniger defines entrepreneurship as “the self-directed pursuit of opportunities to create value for others” [7]. Bowman and Fernhaber define the *entrepreneurial mindset* as “the inclination to discover, evaluate and exploit opportunities” [8]. The project described here is designed to encourage students to find opportunities that can be exploited to create value for others.

Widmer argues that, although challenging, entrepreneurship can and should be taught to the next generation [9]. Unlike some who believe some people are entrepreneurial and some are not, the overwhelming belief today is that entrepreneurship can be taught, which is the assumption here. McGrath and MacMillan believe that habitual entrepreneurs have the following five characteristics [10]:

1. They passionately seek new opportunities.
2. They pursue opportunities with enormous discipline.
3. They pursue only the very best opportunities and avoid exhausting themselves and their organizations by chasing after every option.
4. The focus on execution.
5. They engage the energies of everyone in their domain.

Johnson lists 100 beliefs, characteristics, and habits of elite entrepreneurs [11]. Some examples include thinking big, doing what’s important first, and outsourcing when it makes sense. Garman believes the entrepreneurial mindset is characterized by eight core domains [12]:

1. Future orientation
2. Creativity & innovation
3. Comfort with risk
4. Communication & collaboration
5. Flexibility & adaptability
6. Critical thinking & problem solving
7. Initiative & self-reliance
8. Opportunity recognition

The entrepreneurial mindset needs to be resilient and adaptable [13]. Singh recommends embracing failure, which often happens during the process of innovation, but which also often leads to success [14]. A famous example is Edison who tried over 1,000 prototypes for the light bulb until he found one that worked. Here, students are exposed to this principle through their readings and lectures.

Swamdas believes engineers create value for investors and that entrepreneurship is one of the best ways to do that [15]. This principle is emphasized throughout the class as the course described here was recommended by industry partners. Goldberg lists the ten competencies for the entrepreneurial engineer [16]:

1. Seek the joy of engineering.
2. Examine personal motivation and set goals.
3. Master time and space.
4. Write fast, revise well, and practice BPR (the elements of background, purpose, and road map).
5. Prepare and deliver effective presentations.
6. Understand and practice good human relations.
7. Act ethically in matters large, small, and engineering.
8. Master the pervasive team.
9. Understand leadership, culture, and the organization of organizations.
10. Assess technology opportunities.

He recommends three nontechnical skills for entrepreneurial engineers to master: (1) seek engagement, (2) create first; criticize later, and (3) analyze through the eyes of others [17].

The Entrepreneurially Minded Engineering Resource Group for Educators (EMERGE) is a community of academics who are starting or have recently started new engineering programs, departments, or colleges [18]. One goal of EMERGE is to share best practices and to encourage an entrepreneurial mindset in faculty and students. The engineering program at Oklahoma Baptist University is connected to EMERGE which is a good source for resources for teaching an entrepreneurial mindset in an engineering curriculum.

The project described here is the major assignment for an Entrepreneurial Mindset course. There were several other related activities to help students develop their entrepreneurial mindsets. There were discussion board questions where each student had to reply to at least two of their colleagues' posts. Students were required to write short reflections on their textbook readings. Teams of two to three students wrote one page reviews on an relevant journal article that had to be approved by the instructor first. Teams of two to four students presented to the class on a famous entrepreneur (e.g., Elon Musk) and a famous invention (e.g., Dyson vacuum cleaner) selected from pre-approved lists of entrepreneurs and inventions, respectively. Students also had to provide at least four takeaways for each of 11 guest speakers.

Project Description

The project described here was the major assignment for a 1 credit course entitled Entrepreneurial Mindset which is required for all engineering students. The textbook for the course is *The Entrepreneurial Mindset Advantage* by Gary Schoeniger [19]. The project

accounted for 60% of the overall grade. The primary objective of the project was to give the students some real-world experience selling a product and earning a profit. They read about the theory and heard lectures in class, but actual application of these principles is important to showing how they work in practice. Developing and selling an actual engineered product was well beyond the scope [20, 21] of a one credit course for junior engineering students.

The course is normally taken in the junior year. The grading for the project was based on the following:

<u>Assignment</u>	<u>Points</u>
Product commercial	5
Product handout	5
Product ranking	10
Recommended product changes & order quantity	10
Supplier analysis	10
Marketing plan	10
Final report	25
<u>Profit</u>	<u>50</u>
Total	125

The following is the original schedule for the project during the 15 week semester:

<u>Week(s)</u>	<u>Description</u>
1 – 2	Develop product recommendation
3	Submit 60 sec commercial and 1 page handout
4	Class to vote on which product to sell
5	Submit any suggested product improvements
6	Submit marketing plan including pricing
5 – 8	Product to be ordered (each team will decide how much product to order)
9 – 14	Teams sell product
15	Group reports

Product Teams

There were two sections of the course with 26 students in section A and 12 students in section B. Section A was divided into 5 teams with 5 or 6 students on a team. Section B was divided into 2 teams with 6 students on each team. Both sections were mostly juniors although there were a few freshmen in each class. Students were assigned to each team by the instructor. The team assignments were approximately random, except that no team had more than 1 freshman. There was no separation of sections for the project as all teams competed against each other regardless of section.

There were some reasons why students were not permitted to self-select their teams. First and most important, project teams in industry are assigned by leadership, where employees are generally not permitted to select their own teams. Therefore, it is important students understand how projects are executed in industry so they will be appropriately prepared when they graduate. Second, high achieving students often select other high achieving students for their teams when

given the chance. That could cause a significant imbalance in performance. Third, random selection generally leads to more diverse teams which can lead to more innovative results by examining problems from more perspectives.

Product Selection

Each team was required to come up with a product to recommend for both sections of the class to sell. There were some restrictions on the product including:

- the product cost (not the sales price) could be no more than \$25 (in order to maximize the potential clients who could afford to purchase the product),
- the product had to be new, not something already available, for example, in the school bookstore or online,
- the product had to be more substantial than adding a sticker/decal to an existing product,
- the product could not require special storage such as refrigeration, and
- the product could not be a car wash, bake sale, or the like.

The product recommendation had to include the product design, the cost, and the supplier. Each team had to produce a 60 second video commercial and a handout to try to convince their classmates to select their product. The 1 page product handout had to include the following:

- product image
- supplier
- delivery time
- cost including any volume discounts
- product competition
- target clients
- the problem/opportunity to be addressed by the product

Figure 1 shows the products recommended by each team.



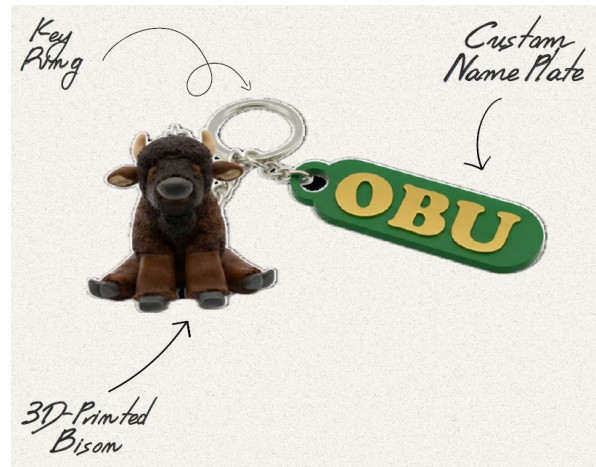
(a) Team 1: hat with school logo.



(b) Team 2: leather-wrapped tumbler with school logo.



(c) Team 3: t-shirt with school logos.



(d) Team 4: keychain with school logo.



(e) Team 5: bobble-head of school president.



(f) Team 6: wristband with school logo.



(g) Team 7: hoodie with wireframe head of the school mascot.

Figure 1 Product recommendations by Teams 1 – 7.

While teams had the option to make their product, such as with 3D printers, all teams recommended purchasing commercially-available customizable products. Each student (not each team) ranked the 7 product recommendations from 1 (highest rank, given 6 points) to 6 (lowest rank, given 1 point) where students could not vote on their own team's recommendation. Teams 1 – 7 received the following total points, respectively: 99, 128, 88, 116, 77, 73, 112. Team 2's leather-wrapped tumbler was the clear winner. Some of the key characteristics of that product included:

- 20 oz capacity
- double-wall vacuum insulation
- durable 18/8 food-grade stainless steel
- faux leather wrap
- push-on clasp lid
- branded with laser cut logo
- free shipping in 2-3 days (large orders may take slightly longer)

The tumblers were available in the following colors: black or rustic with silver lettering/image, blue with white lettering/image, and rawhide, brown, gray, pink, teal, tan, bamboo, red, or white with black lettering/image. The printing on the tumbler could be text only, image only, or both text and image. Many different fonts were available. After the product was selected, teams then had the opportunity to suggest changes to the original design, particularly the image on the tumbler and the color scheme. Teams overwhelmingly selected the black with a silver image of the wireframe mascot head. No such tumbler was available in the school's bookstore or online.

An unexpected challenge was that the school's logos could only be put on products from approved vendors. This was not discovered until after the teams proposed their products. Unfortunately, the winning team selected an unapproved vendor. There were 58 approved vendors which were divided up among the 7 teams to see if any sold the selected product. Unfortunately, only one of the approved vendors had a comparable product, but at a significantly higher cost. The students decided to go with the originally-proposed vendor, but recommended an image other than any of the school's logos, so the product could be made by any vendor.

The logo selected by the class was actually recommended by Team 7 to go on a sweatshirt. It is a wireframe image of the head of the school's mascot. Figure 2 shows the final product which was a combination of Team 2's tumbler (Figure 1b) and Team 7's logo (Figure 1g). The inspiration for that image came from a wireframe piece of art of the school's mascot in front of the engineering building. This art came from a company on the school's engineering advisory board which also by coincidence has the same mascot as the school. The school's president saw a wireframe piece of art of the mascot at the company's headquarters and asked if they could make one for the school which they did. Since the wireframe head was not an official school logo, it could be used on a product from a vendor that was not approved to make products with the school's logos.



Figure 2 Final product design.

Product Marketing

An essential element for selling a product is an effective marketing plan. Each team then developed a marketing plan that included their target audience, the competition, the product selling price, any discounts they would offer, and how they would market the product. While it was expected that at least part of the target audience would include students, it could include anyone who might buy the product. The only restriction was that the product could not be sold for less than its cost. Table 1 shows the volume discounts available for purchasing the tumblers.

Table 1 Tumbler unit costs as a function of the quantity purchased.

Quantity	Unit Cost
1 – 2	\$45.00
3 – 5	\$28.42
6 – 11	\$25.92
12 – 23	\$21.97
24 – 47	\$16.80
48 – 71	\$14.25
72 – 143	\$12.55
144 – 502	\$12.30

Selecting a single product for all students to sell had some advantages, such as simplifying ordering and getting a substantial quantity discount. Hart describes a classroom experience for teaching entrepreneurship where students compete by selling lemonade in the same high traffic area [22]. However, selling the same product also had some disadvantages, such as teams competing against each other for similar target audiences and the same product having different selling prices. The latter sometimes occurs in industry when distributors sell a company's product and determine their own selling price, although there is usually not an overlap in geographic territories, like there was for this class.

One part of the marketing plan included how many tumblers each team estimated it would sell. This was used to determine how many tumblers to buy for the class. The total number of tumblers recommended was 377 or approximately 54 tumblers per team and 10 tumblers per student. This quantity qualified for the best discount where the price (\$12.30) was only about 27% of the full list price (\$45.00). The tumblers were purchased by an administrative assistant with a school purchasing card.

Those quantity estimates were based on teams determining their own selling prices. After those estimates were made, it was decided that all teams should sell the product for the same price, so teams would not be trying to undercut each other on price. Teams agreed on a list price of \$25 with a discount of 10% for purchasers 65+, veterans or law enforcement, or for quantities of 2 or more. Note that this price included tax which in the school's location is approximately 10%.

Results

In the middle of the tumbler sales, it was decided to incentivize the students beyond just their course grade by offering each student on the winning team \$50 to spend in the campus bookstore and the students on the second place team \$25 at the bookstore. Table 2 shows the results of the tumbler sales.

Table 2 Tumbler sales where the gross profit was before taxes and incentives.

Team	Sales @ \$25	Sales @ \$22.50	Total Sold	Total Sales	Gross Profit	Profit Rank
1	30	5	35	\$862.50	\$432.00	7
2	43	14	57	\$1,390.00	\$688.90	2
3	62	6	68	\$1,685.00	\$848.60	1
4	38	14	52	\$1,275.00	\$635.40	3
5	32	20	52	\$1,265.00	\$625.40	4
6	43	4	47	\$1,165.00	\$586.90	6
7	47	0	49	\$1,225.00	\$622.30	5
Total	297	63	360	\$8,867.50	\$4,439.50	

Sales were also tracked by individual student which ranged from 0 to 28. Six students sold 2 or less tumblers including 2 who sold none. One of the concerns was that there would be many unsold tumblers, but there were only 17 unsold and most of those were sold after the course was over. The net profit was \$4,439.50 – \$443.95 (10% sales tax) – \$375.00 (incentives) = \$3,620.55. The 17 unsold tumblers are not included in the profit, even though most have been sold, as the sales were not allocated to any particular teams. All revenue was deposited with the school's business office under a special account set up for the project. The business office handled paying the sales taxes. The team grades for this part of the assignment were scaled according to the profits, where the highest profit received 100% and the lowest profit received 70%.

Students were given an anonymous survey after the class was over which included five questions. The first question was to rate the change in their entrepreneurial mindset as a result of the project with the following choices: much worse, worse, same, better, and much better. The results for that question were: 31% selected the same and 69% selected better.

The second question was what they liked best about the project. The results for this question fell into four categories. The first was that many students liked selling a product for a profit. One specifically commented they liked promoting a product with the school's logo on it. Another liked the rewards for sales performance. The second category was that many of the students liked working with people. One wrote, "I liked the opportunity to learn marketing, not just to customers but also to my classmates, or stockholders, to try to get them to pick my product." The third category concerned competition where several students liked that aspect of the project. One student wrote, "The project encouraged competition which is an essential part of entrepreneurship." The last category was related to picking and designing the product. Many students appreciated having input on the selection of the product.

The third question was what they liked least about the project. The responses centered around four themes. The first was that many students did not like that their grades were dependent on their sales. One wrote, "Grades depending on team score felt a bit counterproductive. The second theme was that some students did not like the teams aspect of the project. Two did not like that they had to rely on their teammates to pull their weight. The third theme concerned everyone

selling the same product which many students did not like. One felt this limited a team's ability to express their creativity. The fourth theme related to time commitment where some students felt too much time was required for a one credit course.

The fourth question asked if they had any suggestions for improvement. The answers were related to the previous two questions. Some suggested letting students pick their own teams while another recommended against any teams at all. Some comments were related to grades such as either not having a competition related to grades or having a fixed grading scale so that if students sold a certain amount they would get a certain grade, rather than having teams compete against each other. Quite a few suggestions related to giving students the freedom to select their own product. One student wrote, "Make each team create their own product and manufacturer. Allows for more diversity, creativity, and an individual style to form along the groups." There were also some miscellaneous comments. One student suggested limiting how many products could be sold to family and friends, as students with bigger families and more friends had a decided advantage. Another suggestion was to start the project as early as possible to give more time to sell.

The last question asked if the student had any other comments. One interesting comment was that the product could promote the school's engineering program as there are currently no such products. Another noted the product should be very high quality as a complaint against the tumbler was that it did not have a way to seal the lid.

Recommendations

As discussed above, one of the main critiques from the students was selling the same product for the same price with a limited market, so students who started selling earlier had a significant advantage as purchasers typically only needed one tumbler. Another anecdotal critique was the list selling price of \$25 which was expensive for the main target audience of other students.

While most students believed their entrepreneurial mindset was improved as a result of this project, an even better scenario for future classes would be to have each team design, purchase, and sell their own product at a price they determine. To encourage the entrepreneurial mindset, instructors are recommended to allow students to take as much control of their own learning as possible [23]. Letting each group completely handle their product would give them more control than they had in the project described here. This should encourage more innovation to come up with products of value to potential clients who would likely be fellow students. However, it would also likely lead to smaller overall profits as quantity discounts would be much smaller, although profit is not the primary objective of the project.

Instructors need to find out in advance if there are any restrictions on using school logos and if only approved vendors can be used, and if so then students should be restricted to only consider them. Since this project was done at a smaller private school, there is a limited amount of swag available at the bookstore and online, which makes it easier to select products that are not currently available otherwise. However, this may not be the case for larger schools that already have lots of swag available.

The tumblers were stored in a locked closet which was open during class meeting times so students took tumblers as needed on the honor system. This should have been better controlled to keep track of which team had how many tumblers at any given time.

Another recommendation is to measure the profit per student for each team since some teams had 6 students, while others had only 5. A provision might be made to exclude the results from students who did not sell any products or who only sold a minimal amount. This was a source of frustration for those teams who had some students who were “freeloaders.” A related suggestion is there should be a minimum number of products each student has to sell.

Conclusions

Overall, the project was successful and raised more money than expected, although that was not the primary objective. Students improved their entrepreneurial mindset by designing and selling an actual product. They learned that while plans can and should be made, projects often do not proceed according to plans. For example, teams produced a sales brochure which most did not end up using. Word-of-mouth and social media were by far the most effective marketing methods in the relatively limited sales territory of the campus and family and friends of the students. The profit from the tumbler sales will be used to purchase more equipment for the 3D printing labs, so the students will benefit from the profits they generated.

Although this project did not involve an engineered product, which was outside the scope of this course, it did allow students to experience many of the elements of a successful engineering innovation project including design, procurement, teamwork, marketing, and sales. The project is easily scalable and would work with larger or smaller teams and larger or smaller classes. It is argued here the project made a significant contribution to the education of the students in Oklahoma Baptist University’s engineering program.

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