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Fusing Introduction to Engineering and Intercultural Communication and Its Effect on the Customer Awareness Aspect of the Entrepreneurial Mindset

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Work In Progress: Fusing Introduction to Engineering and Intercultural Communication and its Effect on the Customer Awareness Aspect of the Entrepreneurial Mindset

Abstract

This Work In Progress paper will describe an effort to emphasize the customer awareness aspect of the entrepreneurial mindset in the first year curriculum, based on a novel approach that is being implemented at Arizona State University called ProMod, which stands for Project-Based Modular Learning. Based on this approach, the two first year courses Introduction to Engineering and Intercultural Communication have been made cohered with each other using a single Clean Water design project. As students design for a customer that they are not familiar with, they explored their cultural background, their value, etc. based on what learned in the intercultural communication class and used the insights gained in the design process, especially the problem definition stage to ensure that they were on the right path to create added value for their customer. Therefore, it emphasizes the customer awareness aspect, an important part of the entrepreneurial mindset. In this paper, the design and implementation of this ProMod project will be described, and results from preliminary assessment will be discussed.

Introduction

Technical skillset alone is no longer sufficient to prepare our engineering students for the global economy and for the societal challenges that they will help address today. It is important for educators to prepare the students who possess both a strong technical skillset and an entrepreneurial mindset. Instilling an entrepreneurial mindset is different from preparing entrepreneurs. The former focuses on preparing students who could exercise curiosity to identify opportunities and make connections, in order to design added-value products and processes. Students instilled with an entrepreneurial mindset will place products benefits before design features and utilize technical skills to help fulfil unmet customer needs [1]. In order to promote the entrepreneurial mindset in engineering education, the Kern Family Foundation has established a network, known as the Kern Entrepreneurial Education Network (KEEN), of institutions across the nation that are committed to this effort [2]. KEEN uses the KEEN pyramid to depict the attributes of an entrepreneurial engineer, with each of the three bottom corners of the pyramid being technical fundamentals, business acumen, and customer awareness and the top corner being societal values; and defines the entrepreneurial mindset using the Three C framework: curiosity, creating value, and making connections [1-2]. Therefore, ‘customer awareness’ is a very important aspect of the entrepreneurial mindset and it is important to provide students with opportunities to consider their customer when designing a solution to a problem, otherwise, it is likely that their solution will only be based on their own experiences and perspectives about the problem and thus may not fulfill others’ need to a satisfactory level.

The importance of incorporating customers in students' training has been mentioned by a few authors [3-5].

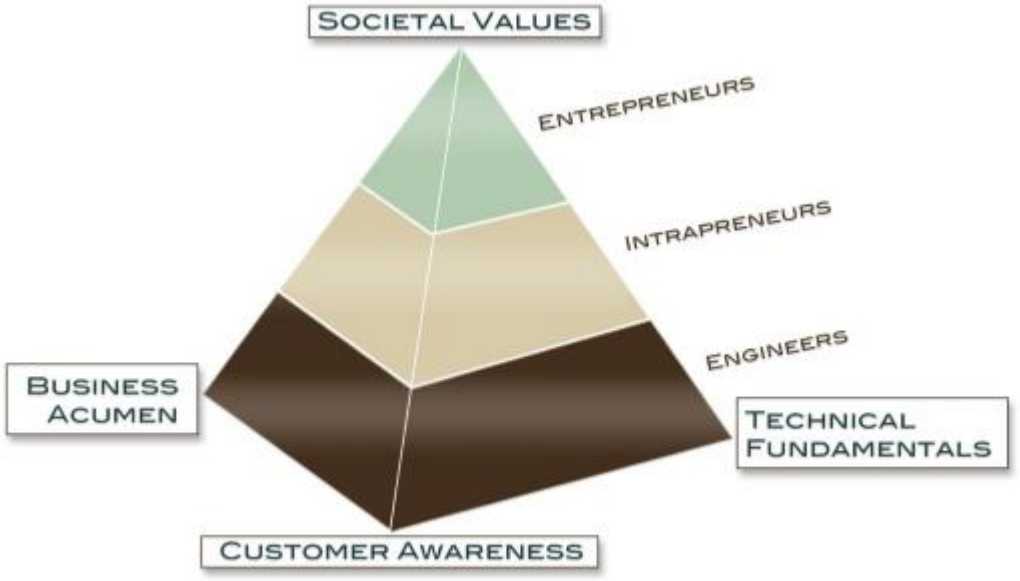

Fig. 1 The KEEN pyramid depicting the attributes of an entrepreneurially-minded engineer [1]

In addition to an entrepreneurial mindset, engineers have increased need for intercultural communication competence. Both academic programs and professional environments are globalized spaces [6] where intercultural communication competence is a necessary skill for advancement. Effective intercultural communication requires an understanding of culture that moves beyond mere translation of language and into understandings of the cultural backgrounds of potential customers [7]. Understanding intercultural competence as more than translation but the ability to approach to collaborate with others who solve problems in different ways defines the necessity of intercultural communication competence for students who intend to work both within and outside of the US [8]. Previous research has stated that engineering students have a vague awareness that culture affects communication behavior, but were unable to provide concrete examples and relied on ethnocentric norms common among US college students [9]. There is little evidence that engineering students have lower intercultural communication competence than students of similar backgrounds, but engineering students with low intercultural competence are more likely to struggle in undergraduate education programs with diverse student populations and workplaces in both the US and abroad. Engineers with high intercultural communication competence, by contrast, will have high potential for both employment and advancement.

In recent years, various efforts have been made to instill the Entrepreneurial Mindset in the first year introductory to engineering courses. However, some of these efforts focused on other aspects of the Entrepreneurial Mindset and did not emphasize customer awareness. For example,

Wang has modified the first year course to teach the Entrepreneurial Mindset but the focus of this effort was mostly on the market and economics side of the Entrepreneurial Mindset [10]. Similarly, Rayess covered various topics related to the Entrepreneurial Mindset in the freshman design course and utilized a project that involve a fictitious company and focused on identification and validation of market opportunities in the project [11]. In other efforts, customers were incorporated, but they were either fictional or local. For example, Jensen and Schlegel have modified their first year mini-golf hole design project to require students to interview potential mini-golf customers. Though students' feedback about this new version of the project has been very positive, they only interviewed other people available on campus such as their friends and because of this the findings of this effort are very similar to those from traditional first year hands-on design projects [12]. In Bernal et al.'s first year engineering design studio, three assignments were utilized to foster entrepreneurial thinking and the third assignment involved a local non-profit organization as students' client [13]. Gerhart et al., have redesigned their first year course to multidisciplinary and to foster the entrepreneurial mindset and they incorporated various projects and assignments in their new course. One of these projects emphasized customer awareness and encouraged students to speak to relevant stakeholders of the University as well as the course instructor [14]. Even though there are benefits to utilizing fictional or local customers as evidenced in a preliminary study and comparison of different ways to incorporate customers in a first year course [5], these approaches do not emphasize the cultural backgrounds of potential customers and how they might affect different aspects of engineering design. This is an important skill in the global economy and failing to understand the cultural backgrounds of the customers and utilize the insights to guide design decisions may result in design failures [15].

Project-Based Learning, or PBL, is not new and it has been proven to be a very effective pedagogy [16-20]. There are a lot of efforts in recent years to incorporate PBL in the first year introduction to engineering courses with great success [21-30]. At Arizona State University, an innovative approach called Project-Based Modular Learning (ProMod) has been used since 2015 in many programs including engineering and the major difference between ProMod and traditional PBL is that ProMod brings together two or more courses using a single project and it helps students see the connections of what they are learning from different disciplines and become more motivated to learn in courses outside of their core curriculum, as they apply the knowledge and skills gained from the different disciplines in that single real world project. Students take two or more courses that are cohered around the project and their work gets assessed in each course based on how well it demonstrates the specific learning outcomes for that course.

In Fall 2017, a ProMod project that involves both introduction to engineering and intercultural communication classes was implemented for a cohort of 14 freshman mechanical engineering students. The project allows students to focus on a community that has a different cultural

background than their own and develop a design solution to help the community of their chosen gain access to clean water. Students worked in teams of 3 or 4 and each team performed research and selected a different community to focus on. The introduction to engineering course introduces the engineering design process, as well as knowledge and skills that are important for students to approach design problems. The intercultural communication class focuses on the fundamentals of intercultural communication as it applies to making their designs. Since students design for a different cultural group that they are not familiar with, it is very important for them to apply the knowledge and skills gained in the intercultural communication class to gain a deeper understanding of their customer, their specific needs, in order to better empathize with them and eventually design a solution that is going to create added value for them. And therefore, it enhances the customer awareness aspect of the entrepreneurial mindset.

Project Implementation

The ProMod project has been designed to incorporate all of the elements according to the Gold Standard of PBL [31], with the driving question "How can you address the Grand Challenge of "Provide Access to Clean Water" for a community?". Students worked in teams of 3 or 4 throughout the 15-week semester on this project, mostly in the scheduled labs for the introduction to engineering class. During each week, they also attended lectures for both classes to learn about the concepts as they became needed for their project. Students performed research at the beginning of the semester and chose a community that faces the challenge of lack of access to clean water, and then worked through the steps in the design process and at the end of the semester ended up with a working prototype that solved the design problem.

The introduction to engineering covers topics that include the engineering design process; identification of an opportunity & problem definition; brainstorming techniques; engineering models; design of experiments; MATLAB; engineering decision making; technical drawing; project testing; as well as skills such as project management; technical communication; and teamwork. It follows a structure that is very similar to the one discussed in [32]. The intercultural communication class covers the basics of intercultural communication including theories and approaches to intercultural communication, methods of studying intercultural communication, power dynamics in culture, popular media and cultural impact, transitions like migration and seeking asylum/refugee status, intercultural relationships, and basic interpersonal communication skills.

Between the two classes, various cohered assignments have been implemented, which means that students make one submission to both classes and receive a grade in each of these two classes. These cohered assignments include, a weekly reflection assignment that asks students to reflect upon how they have applied what they've learned in both classes to their project; a project planning assignment; and a final design presentation that addresses both an audience that has the

technical background and a non-technical audience. There are other various project deliverables that are designed to help students work through the design process. For example, in the introduction to engineering class, students submitted problem definition, project proposal, and final report deliverables. In the intercultural communication class, students submitted a culture report about the community at the beginning of the semester that focuses on the culture's values and rules, including, for example, their gender values, age values, authority values, rules about interpersonal communication and corporate communication, etc. For this assignment, students explored answers to various questions about the community, such as, 'is the culture price-sensitive or are they willing to pay a lot for quality?'; 'Is there a greater emphasis on selling or making quality products?'; 'How does communication with client or customer work?'; 'Are they more democratically oriented, authority oriented, or consensus oriented?'; 'Are they hierarchical among genders?'; etc. Answers to these questions as well as other additional information they have researched about the problem for their problem definition deliverable provided very important insights about their customer, which then were translated to design constraints, criteria, as well as other design considerations such as local customs, persistent poverty, and the socio-political environment in which the customer lives. For example, a student group working for customers part of Africa where clean water is sold by private owners and crime is high designed their water filter small, portable, and something that resembled a common local product rather than a specialized tool. Another group reflected on their design after their potential customer's government heavily restricted the importation of plastics. The group began testing prototypes less dependent on plastics to make an effective design.

Assessment and Results

To assess how this effort affects students' confidence in defining the design problem that focuses on the real need of their customer; and customer awareness, emphasizing intercultural aspects & notions of motivation, a survey instrument was designed and administered near the beginning of the semester to the cohort that is enrolled in this ProMod project and then again at the beginning of the Spring 2018 semester. The control group used in this case consisted of first year mechanical engineering students who did not participate in ProMod but were enrolled in two traditional introduction to engineering sections that each also had a semester-long design project. In one of these sections, the design project was a renewable energy project that involved a fictional town, and in the other section the project was a solar powered vehicle for a fictional rental company. Fictional stakeholders with contradictory interests were introduced in each of these two projects. Out of the 14 students enrolled in ProMod, 11 students provided their consent to use their institutional and survey data. Eight of the 11 completed the pre-survey and 29 responses were collected from the control group. For the post-survey, 5 and 9 responses were collected from the ProMod and control group, respectively. The small sample size, especially for the ProMod group might limit the effectiveness of the results.

Unfortunately, due to the late consent schedule, the pre-survey had to be given to students after they have already completed their cultural report on the community as well as their problem definition deliverable for the project, which means by the time the pre-survey responses were collected, students have already had an opportunity to better understand the cultural background of their customer, and use the insights gained to help them better define the problem. However, similarly the control group students who were enrolled in a traditional introduction to engineering course with a design project had also completed a problem definition deliverable for their project. So the comparison of results from the pre-survey still provides very useful information and in fact these results probably measure the effect of the ProMod intervention more accurately because of the timing of the survey. So in the following section, discussions will first be given about the pre-survey results only comparing the ProMod and control groups and then comparisons between the pre- and post-survey results for the ProMod group will be given.

The survey contained both rating questions on a Likert scale of 1-5, with 1 being Strongly Agree, and 5 being Strongly Disagree; and one open-ended question. The first set of rating questions is about students' confidence in identifying their customer's needs, fully defining the problem, and approaching a problem that is ill defined and open-ended. Table 1 contains the list of questions with responses from the pre-survey. As we could see from the results, the ProMod group outperformed the control group for all of these questions and out of these questions statistically significant difference is found in results for Q4 between the two groups with a large effect size (Cohen's d>=0.8). As the ProMod students had a more rigorous effort at the beginning of the project, it helped them learn how to identify an opportunity based on the specific needs of their customer, fully define the problem and approach a more ill-defined and open-ended design problem.

Table 1. Pre-survey responses for questions related to problem definition (* $p<0.05$)

Survey Question (1=Strongly Agree; 5=Strongly Disagree)	ProMod Group			Control Group			Mean Difference	Cohen's d
	n	Mean	STD	n	Mean	STD		
Q1. I am confident in identifying the real problem that needs to be solved for my customer.	8	1.75	0.71	29	2.10	1.18	0.35	0.36
Q2. I am confident identifying the specific needs of a customer.	8	1.88	0.35	29	2.17	1.17	0.30	0.34
Q3. I am confident identifying the wants of a customer.	8	1.75	0.46	29	2.07	1.28	0.32	0.33
Q4. I am confident approaching a design problem that is ill-defined and open-ended.	8	1.75	0.71	29	2.69	1.20	0.94*	0.95

Q5. I am confident defining design requirements.	8	1.88	0.35	29	2.21	1.18	0.33	0.38
Q6. I am confident defining design criteria	8	1.88	0.35	29	2.28	1.16	0.40	0.47

The second set of questions is about how confident and comfortable students are working with, and more specifically, designing for a different culture. The complete set of questions and results from the pre-survey can be found in Table A1 in the Appendix. The figure below shows results for questions that had a medium to large effect size (Cohen's d >=0.5). These results show that students in ProMod are more confident and feel more comfortable working with and designing for a customer from a different culture and thus it is more likely that they could better empathize with these customers and not approach design problems based on their own experiences and perspectives.

There are two questions that are worth considering in detail. Specifically, there are questions that show ProMod students are more likely to be uncomfortable working with students of different cultural backgrounds and tending to make new experiences fit old mindsets. The data appears to show both the control and ProMod groups read the question with a similar valance. It is possible that both groups read the statements in the opposite valence because the relationship between the groups did not change. Our data might indicate methodological issues in our survey methods rather than the effect of the course.

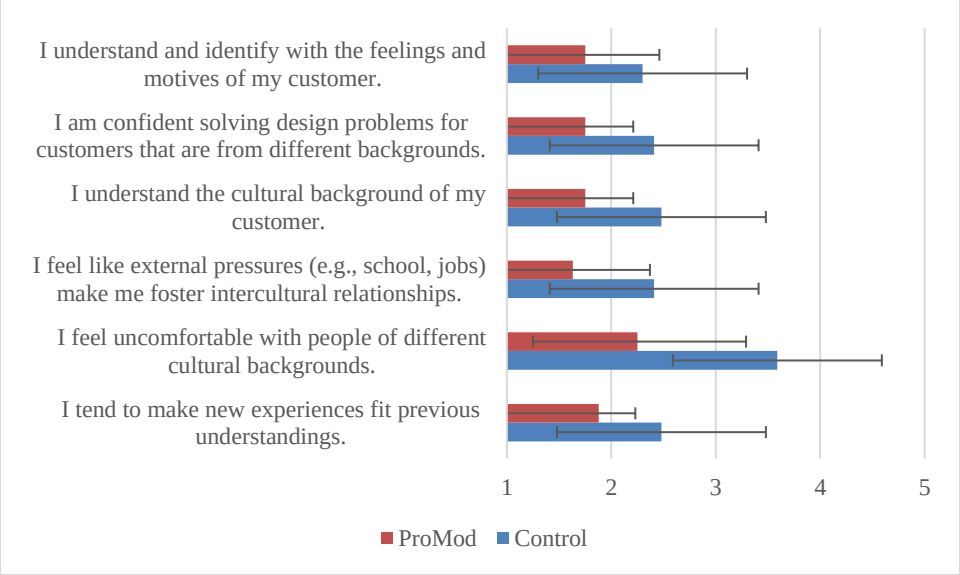

Figure 2. Pre-survey results for the second set of questions that have a medium to large effect size (1=Strongly Agree; 5=Strongly Disagree)

The third set of questions is adapted from a survey instrument that has been designed by Brunhaver et al. [33] to assess students' entrepreneurial mindset and the goal of this is to measure the changes of students' mindset before and after the project. The complete set of questions and results from the pre-survey can be found in Table A2 in the Appendix and some of the results (medium to large effect size) are shown in Fig. 3. These questions measure characteristics that range from open mindedness, to ideation, curiosity, empathy, help seeking, and altruism, etc. For example, the first two questions shown in the figure below is about empathy and the others ideation and both of these are related to the three C's as defined by KEEN [2]. The results show that the ProMod group showed stronger characteristics in these areas than the control group by the time the survey responses were collected, i.e., after they have submitted the culture report and problem definition assignments.

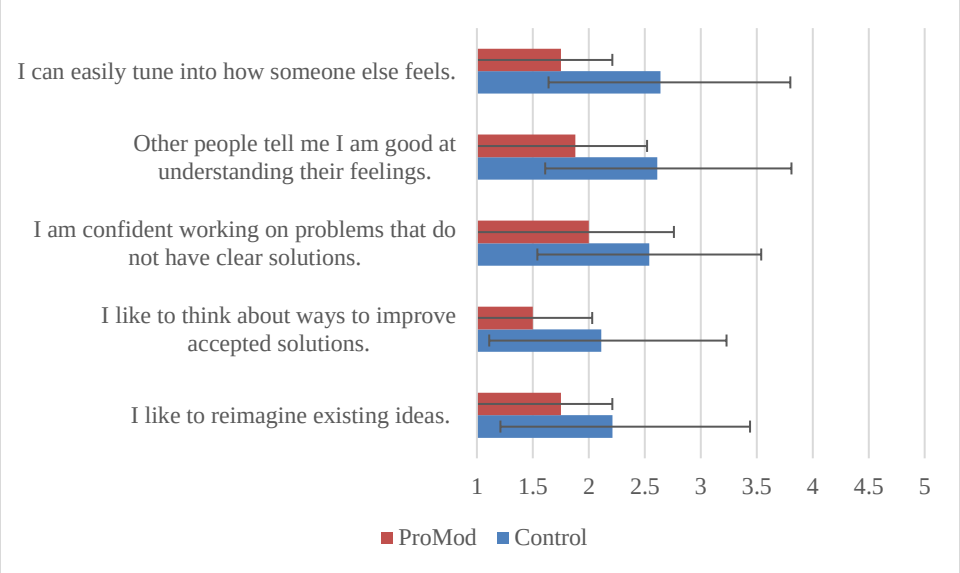

Figure 3. Pre-survey results for the third set of questions that have a medium to large effect size (1=Strongly Agree; 5=Strongly Disagree)

Finally, there was an open-ended question that prompted students to comment on the specific roles their customer plays in the design process. Seven responses were collected from each of the two groups, respectively. Some of the control group responses were general, for example, two participants mentioned 'customer plays an important role', 'customer is always right'. And five participants mentioned in one way or another the design is based on the customer's needs and wants. In terms of the ProMod group responses, one participant mentioned that 'I don't really know.', and four mentioned customers needs and wants but two out of these three emphasized that the customer may not know or clearly state the real problem and therefore it is the designer's job to identify the real problem to solve for the customer. Two mentioned that it is important to always keep the customer in the loop and keep communicating with them. Overall the responses from both groups were not very long and this could be because that this question was the last question on the survey and these survey questions were included as the last questions in along

survey that contained questions about other research questions for ProMod. The responses between the two groups were similar, but it is interesting to note that two participants from the ProMod group mentioned that the customer may not be sure what the problem was indicating that when approaching a design problem it is more likely that they would not just blindly follow what is provided and it is more likely that they would try to identify an opportunity that is going to create value for their customer.

The same set of questions were given in the post-survey. Out of the total of 39 rating questions improvements were seen in both groups in many questions when comparing the post-survey results to the pre-survey results though the ProMod group had a lot more effect sizes (Cohen's d>=0.5) than the control group (15 questions vs. 4 questions and out of these 15 questions 9 measured students' entrepreneurial mindset). These questions and results for the ProMod group can be found in Fig. 4 below. The complete comparison of pre- and post-survey results for both the ProMod group and control group can be found in Table A3 in the Appendix. Unfortunately, due to the late consent schedule for the pre-survey, pre-survey responses were collected after some major interventions and therefore the comparison between pre- and post-survey results does not provide very accurate assessment of learning gains.

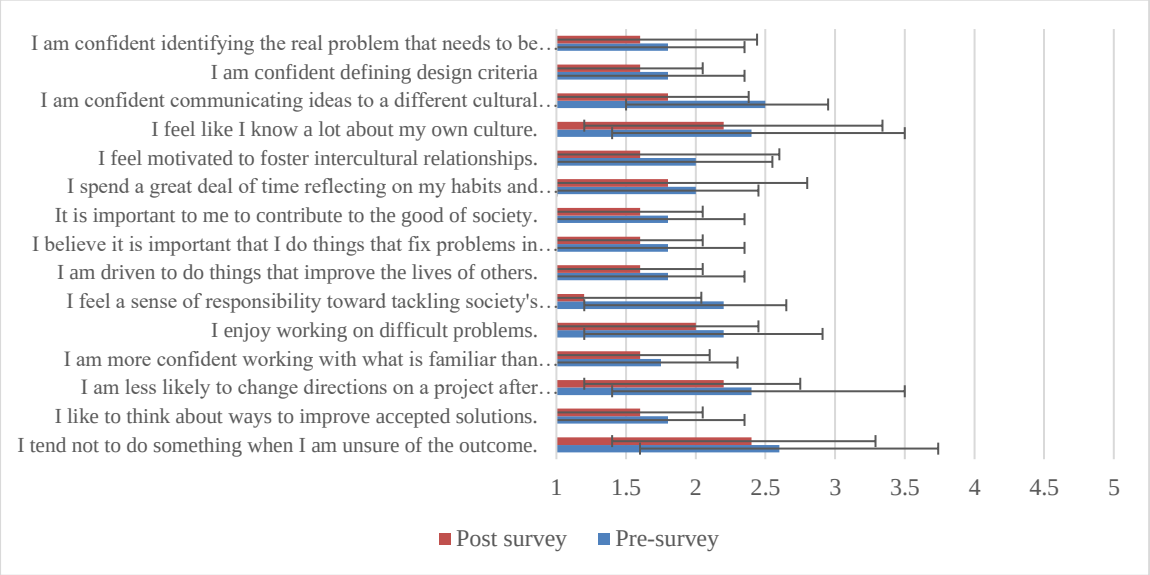

Figure 4. ProMod group pre- and post-survey results for questions that have a medium to large effect size (1=Strongly Agree; 5=Strongly Disagree)

Conclusions

This paper discusses an approach known as ProMod (Project-based Modular Learning) that coheres two first year courses introduction to engineering and intercultural communication using a single project for a cohort of 14 mechanical engineering freshman students at Arizona State

University. The difference between this approach and traditional project-based learning was discussed and the effect of this approach on the customer awareness aspect of the entrepreneurial mindset was assessed and results were presented and discussed. Preliminary assessment based on a pre-survey that was conducted after some major interventions due to a late consent schedule shows that compared to students who enrolled in a traditional introduction to engineering class that also involves a project, students enrolled in ProMod became more confident identifying an opportunity, defining the problem for their customer based on their specific needs, and approaching ill-defined and open-ended design problems; and became more comfortable and confident designing for and working with a customer with a different culture. Even though unfortunately accurate conclusions cannot be drawn based on comparison of pre- and post-survey results, and the results from the pre-survey may be limited by the small sample size, the results available do suggest that this approach is very promising. A more comprehensive assessment of this approach is the area of future work.

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Appendix A. Survey Results

The table below shows the survey responses to the second set of questions.

Table A1. Pre-survey responses for questions about customer awareness, emphasizing intercultural aspects (* $p<0.05$)

Survey Question (1=Strongly Agree; 5=Strongly Disagree)	ProMod Group			Control Group			Mean Difference	Cohen's d
	n	Mean	STD	n	Mean	STD		
Q1. I understand and identify with the feelings and motives of my customer.	8	1.75	0.71	27	2.30	1.23	0.55	0.54
Q2. I am confident solving design problems for customers that are from different backgrounds.	8	1.75	0.46	27	2.41	1.22	0.66	0.71
Q3. I understand the cultural background of my customer.	8	1.75	0.46	27	2.48	1.12	0.73	0.85
Q4. I am confident communicating ideas to a different cultural group.	7	2.29	0.76	27	2.37	1.28	0.08	0.08
Q5. I feel like I know a lot about my own culture.	8	2.13	0.99	27	2.33	1.24	0.21	0.19
Q6. I am interested in working with people who are different from me.	8	1.63	0.52	27	1.78	1.15	0.15	0.17
Q7. I want to improve myself by developing as an intercultural communicator.	8	1.63	0.74	27	2.04	1.13	0.41	0.43
Q8. I feel motivated to foster intercultural relationships.	8	1.88	0.83	27	2.07	1.24	0.20	0.19
Q9. I feel like external pressures (e.g., school, jobs) make me foster intercultural relationships.	8	1.63	0.74	27	2.41	1.01	0.78	0.88
Q10. I can tolerate uncertainty.	8	2.25	1.49	27	2.44	1.25	0.19	0.14
Q11. I feel uncomfortable with people of different cultural backgrounds.	8	2.25	1.04	27	3.59	1.50	1.34	1.04
Q12. I spend a great deal of time reflecting on my habits and thoughts.	8	1.88	0.83	27	2.04	1.43	0.16	0.14
Q13. I tend to make new experiences fit previous understandings.	8	1.88	0.35	27	2.48	1.28	0.61	0.64

The table below shows the survey responses to the third set of questions.

Table A2. Pre-survey responses for questions related to entrepreneurial mindset (* $p<0.05$)

Survey Question (1=Strongly Agree; 5=Strongly Disagree)	ProMod Group			Control Group			Mean Difference	Cohen's d
	n	Mean	STD	n	Mean	STD		
Q1. I understand and identify with the feelings and motives of my customer.	8	1.63	0.52	28	1.79	1.17	0.16	0.18
Q2. I believe it is important that I do things that fix problems in the real world.	8	1.50	0.53	28	1.82	1.25	0.32	0.33
Q3. I am driven to do things that improve the lives of others.	8	1.50	0.53	27	1.85	1.29	0.35	0.36
Q4. I feel a sense of responsibility toward tackling society's biggest problems.	7	1.88	0.83	28	2.00	1.15	0.13	0.12
Q5. I can easily tune into how someone else feels.	8	1.75	0.46	28	2.64	1.16	0.89*	1.01
Q6. Other people tell me I am good at understanding their feelings.	8	1.88	0.64	28	2.61	1.20	0.73	0.76
Q7. I try my best to be sensitive to other people's feelings and attitudes.	8	1.88	0.64	27	2.19	1.18	0.31	0.33
Q8. I find it easy to put myself in somebody else's shoes even when their viewpoint differs from mine.	8	2.00	0.53	28	2.36	1.25	0.36	0.37
Q9. I enjoy working on difficult problems.	8	1.88	0.64	28	2.00	1.05	0.13	0.14
Q10. I know when to acquire new information that is needed when approaching a design problem.	8	2.00	0.53	28	2.32	1.22	0.32	0.34
Q11. I am more confident working with what is familiar than what is unfamiliar.	7	2.14	0.69	28	2.14	1.21	0.00	0.00
Q12. I am confident working on problems that do not have clear solutions.	8	2.00	0.76	28	2.54	1.00	0.54	0.60
Q13. I am willing to compromise if another idea seems better than my own.	8	1.75	0.46	28	1.79	1.13	0.04	0.04
Q14. I am less likely to change directions on a project after putting forth a lot of effort.	8	2.50	0.93	28	2.75	1.27	0.25	0.23
Q15. I like to think about ways to improve accepted solutions.	8	1.50	0.53	27	2.11	1.12	0.61	0.70

Q16. I will keep on working on a problem even when no solution is immediately apparent.	8	1.75	0.46	28	2.18	1.19	0.43	0.48
Q17. I like to reimagine existing ideas.	8	1.75	0.46	28	2.21	1.23	0.46	0.50
Q18. I am willing to consider an idea put forth by someone with a different background than my own.	8	1.63	0.52	28	1.64	1.06	0.02	0.02
Q19. I like trying new things even if my efforts are unsuccessful.	8	1.75	0.46	28	2.11	1.17	0.36	0.40
Q20. I tend not to do something when I am unsure of the outcome.	8	2.50	0.76	28	2.86	1.24	0.36	0.35

The table below shows the survey responses from pre- and post-surveys for both groups.

Table A3. Pre- and post-survey responses for both groups (* $p<0.05$)

Survey Question (1=Strongly Agree; 5=Strongly Disagree)	ProMod Group		Control Group	
	Mean Difference (Pre- to Post-Survey)	Cohen's d	Mean Difference (Pre- to Post-Survey)	Cohen's d
I am confident in identifying the real problem that needs to be solved for my customer.	-0.20	0.71	-0.09	0.18
I am confident identifying the specific needs of a customer.	0.00	0.45	-0.09	0.18
I am confident identifying the wants of a customer.	0.40	0.63	0.09	0.17
I am confident approaching a design problem that is ill-defined and open-ended.	0.20	0.59	-0.55	0.70
I am confident defining design requirements.	0.20	0.32	-0.18	0.37
I am confident defining design criteria	-0.20	0.50	0.00	0.00
I understand and identify with the feelings and motives of my customer.	0.60	0.71	0.03	0.05

I am confident solving design problems for customers that are from different backgrounds.	0.20	0.32	-0.18	0.25
I understand the cultural background of my customer.	0.00	0.67	-0.09	0.13
I am confident communicating ideas to a different cultural group.	-0.70	0.52	-0.10	0.12
I feel like I know a lot about my own culture.	-0.20	1.12	0.20	0.22
I am interested in working with people who are different from me.	0.40	0.63	0.42	0.74
I want to improve myself by developing as an intercultural communicator.	0.20	0.55	-0.06	0.09
I feel motivated to foster intercultural relationships.	-0.40	0.81	-0.07	0.11
I feel like external pressures (e.g., school, jobs) make me foster intercultural relationships.	0.80*	0.50	-0.01	0.01
I can tolerate uncertainty.	0.20	1.61	0.05	0.04
I feel uncomfortable with people of different cultural backgrounds.	0.40	1.28	0.22	0.14
I spend a great deal of time reflecting on my habits and thoughts.	-0.20	0.77	-0.55	0.57
I tend to make new experiences fit previous understandings.	0.00	0.45	-0.38	0.43
It is important for me to contribute to the good of society.	-0.20	0.50	0.09	0.15
I believe it is important that I do things that fix problems in the real world.	-0.20	0.50	0.00	0.00
I am driven to do things that improve the lives of others.	-0.20	0.50	0.00	0.00
I feel a sense of responsibility toward tackling society's biggest problems.	-1.00*	0.67	0.00	0.00
I can easily tune into how someone else feels.	0.80	0.74	-0.55*	0.97
Other people tell me I am good at understanding their feelings.	0.20	0.71	-0.64*	0.96

I try my best to be sensitive to other people's feelings and attitudes.	0.20	0.59	-0.06	0.11
I find it easy to put myself in somebody else's shoes even when their viewpoint differs from mine.	0.20	0.71	0.00	0.00
I enjoy working on difficult problems.	-0.20	0.59	0.18	0.31
I know when to acquire new information that is needed when approaching a design problem.	-0.40	0.45	0.18	0.20
I am more confident working with what is familiar than what is unfamiliar.	-0.15	0.52	0.09	0.14
I am confident working on problems that do not have clear solutions.	0.20	0.59	0.00	0.00
I am willing to compromise if another idea seems better than my own.	0.20	0.32	0.09	0.18
I am less likely to change directions on a project after putting forth a lot of effort.	-0.20	0.87	0.18	0.16
I like to think about ways to improve accepted solutions.	-0.20	0.50	0.00	0.00
I will keep on working on a problem even when no solution is immediately apparent.	0.00	0.45	0.00	0.00
I like to reimagine existing ideas.	-0.40	0.39	-0.09	0.11
I am willing to consider an idea put forth by someone with a different background than my own.	0.00	0.45	0.27	0.55
I like trying new things even if my efforts are unsuccessful.	0.20	0.32	0.18	0.28
I tend not to do something when I am unsure of the outcome.	-0.20	1.02	-0.27	0.27