Evaluation of a Social Marketing Class for Engineers

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Abstract

Today's complex and interconnected world has made it ever more important for engineering students to learn how to collaborate across various fields to tackle complex societal issues. One field that can aid in enhancing the acceptance/uptake of engineering projects that address complex societal issues (i.e., climate change, littering, etc.) or industry challenges (i.e., water treatment plants dealing with things being flushed that should not be), is social marketing. Social marketing is the use of traditional marketing principles to create a positive behavior change for an individual, community, or society. Though the benefits of utilizing social marketing principles in addressing engineering topics has been noted, the integration of teaching these principles to engineers has not been explored. This study seeks to evaluate a semester-long course on research methods in social marketing tailored for engineering students. The course aimed to bridge the gap between engineering principles and social marketing strategies, fostering interdisciplinary skills crucial for addressing societal challenges. Through a mixed-methods approach, student engagement, knowledge acquisition, and practical application of research methodologies were assessed. Data were collected through a pre-post survey and project assessments. The results of this study will provide insights into the challenges and benefits of teaching social marketing principles to engineering students. Student feedback and results will also be used to update the course content for future semesters.

Introduction

The National Academy of Engineering announced the 14 grand challenges for engineering in 2008. These challenges aimed to call engineers to solve wicked problems such as making solar energy economical, manage the nitrogen cycle, and provide access to clean water through engineering achievements. However, a great engineering achievement does not always lead to the implementation and appropriate usage of technology or product. For example, many technology advances focused on agriculture (i.e. nitrogen recovery) have been over the last decade.[1] Implementation of these technologies tends to still lag behind as they often require a behavior change (i.e. tillage vs. no-till for corn crops).[2]

One field that can aid in enhancing the acceptance/uptake of engineering projects that address complex societal issues (i.e., climate change, littering, etc.) or industry challenges (i.e., water treatment plants dealing with things being flushed that should not be), is social marketing. Social marketing is the use of traditional marketing principles to create a positive behavior change for

an individual, community, or society.[3] Though most notably used for public health campaigns such as smoking cessation,[4] childhood obesity,[5] and increasing immunization rates[6] it also has a history of usage for environmental protection, such as reducing waste,[7] and to encourage transportation safety[8] and alternative transportation methods.[9]

Though the benefits of utilizing social marketing principles in address complex problems that engineers are working on has been noted the application in industry and integration of teaching these principles to engineers has not been explored. To address this gap and foster interdisciplinary skills crucial for addressing societal challenges, a research methods course for engineers focused around the ten-step social marketing process was developed. The course had six outlined learning objectives for students (1) Define social marketing, (2) Define the key principles of social marketing, (3) Identify appropriate uses of social marketing in engineering, (4) Utilize a ten-step model for developing, implementing, and evaluating a social marketing campaign, (5) Determine appropriate qualitative methods for gathering data, (6) Determine appropriate quantitative methods for gathering data.

The purpose of this study is to evaluate the student learning outcomes. Primary interest is in the students' ability to identify ways for social marketing principles to be applied within the engineering field. The remainder of this paper will briefly outline the format of the class and course project, methods for assessment, results, and recommendations for future implementation of the course.

Course Description

The Research Methods course is a three-credit elective course available to all senior or graduate level engineering students. The course met for 50 minuets three times a week for a 16-week period. The course used the Kotler and Lee 7th edition Social Marketing; Behavior Change for Social Good book to guide students through the 10 steps of social marketing.[10] Along with readings and class lectures a semester long group project with small deliverables throughout the semester was utilized. The link between the 10-steps and the semester long project can be seen in Table 1. The course also utilized class discussions, quizzes, peer to peer teaching (i.e. small groups of students from the class were responsible for teaching a given topic), online modules from the Pan American Health Organization,[11] and guest presentations from social marketing practitioners.

Table 1: Semester Project Link to Social Marketing 10-Step Model

Social Marketing 10-Step Model	Semester Project Assignments
1.Establish Purpose & Focus	1. Topic Statement 2. Background Statement
2. Analyze Situation (SWOT)	3. SWOT Analysis
3. Select Target Audience	4. Priority Audience Selection

4. Determine Behavior Objectives & Goals	5. Research Survey
5. Understand Barriers, Benefits, & Competition	6. Research Results
6. Craft a Positioning Statement	7. Positioning Statement
7. Develop a 4P Strategy	8. Product Strategy
	9. Pricing Strategy
	10. Placement Strategy
	11. Promotional Strategy
	12. Pretesting Strategy
8. Determine Monitoring & Evaluation Plan	13. Implementation and Evaluation plan
9. Set Budgets & Find Funding	
10. Write Implementation Plan	14. Final Report/Plan
	15. Final Presentation
	16. Final Project Poster

Methodology

This study utilized a pre- and post-course survey format designed to gain an understanding of if students self-report understanding surrounding the course objectives. The survey consisted of eight 5-point Likert scale questions (see Table 2). In addition to the Likert scale questions the post questionnaire asked four additional open-ended questions in hopes to gain deeper insights. The pre-survey was given to students during the first week of classes while the post-course survey was given during the last week of classes. No results were examined until after grades were assigned to adhere with IRB approvals (IRB H24-11022-Exempt).

Table 2: Student Survey Questions

Pre- and Post-Survey 5-point Likert Scale Questions
Please select your level of agreement with each of the following statements. (Strongly disagree to strongly agree). 1. I can define/explain what social marketing is. 2. I can define/explain the key principles of social marketing. 3. I can identify appropriate uses of social marketing in engineering. 4. I can utilize a ten-step model for developing, implementing, and evaluating a social marketing campaign. 5. I can determine appropriate qualitative methods for gathering data. 6. I can employ appropriate qualitative methods for data analysis. 7. I can determine appropriate quantitative methods for gathering data. 8. I can employ appropriate quantitative methods for data analysis.
Post-Survey Open Ended Questions
1. How would you define social marketing? 2. Please explain how you see the principles of social marketing discussed in this class applying to your future studies/careers. 3. What did you enjoy the most about this course? 4. What would you remove from this course?

Results & Discussion

This study examined student learning outcomes in a research methods course based in social marketing during the Fall 2024 semester. During this semester a total of 12 students at a junior, senior, or graduate level participated in the course. A pre- and post-survey format allowed the students to self-assess their understanding of the eight course learning objectives using a five-point Likert scale. Pre-survey responses can be seen in Figure 1.

At the beginning of the semester a majority of students felt confident in their ability to use both quantitative and qualitative methods for gathering and analyzing data. These responses were expected as all students in the class were upper-level students. Typically, by junior or senior year students will have taken multiple lab classes and classes such as *probability and statistics*, *visual and graphics*, and *intro to technical communications* or similar courses where quantitative and qualitative methods would have been introduced and utilized to some degree.

Nine out of the 12 students agreed with the statement "I can define/explain what social marketing is." However, on the learning objectives that indicated understanding of the principles of social marketing or being able to employ the principles a majority of students ranked themselves negatively (i.e., disagree or strongly disagree). Though there seems to be a disconnect in these responses it is plausible that students feel they could give a definition of social marketing but not feel they know the guiding principles or how to apply it within their field. The highly debated and disputed knowledge-action principle that 'if you know x, then you should be able to do x' speaks to the lack of correlation between these responses.[12] Furthermore, it is likely that many students had heard a definition of social marketing prior to the fall 2024 research methods class as many of them had taken a class with or heard of the instructor and her social marketing research. Alternatively, students could have mistaken social marketing for social media when self-reporting. The confusion between social marketing and social media has become more prevalent as social media becomes more engrained into society. Though social marketing campaigns can employ social media as a promotional or evaluation avenue, the two fields are vastly different.

At the completion of the course all students classified their ability to perform the eight learning objectives positively (i.e., neutral, agree, or strongly agree). The post-survey distribution can be seen in figure 2. These responses indicate a self-reported positive shift in the students understanding of social marketing and ability to utilize the framework within engineering.
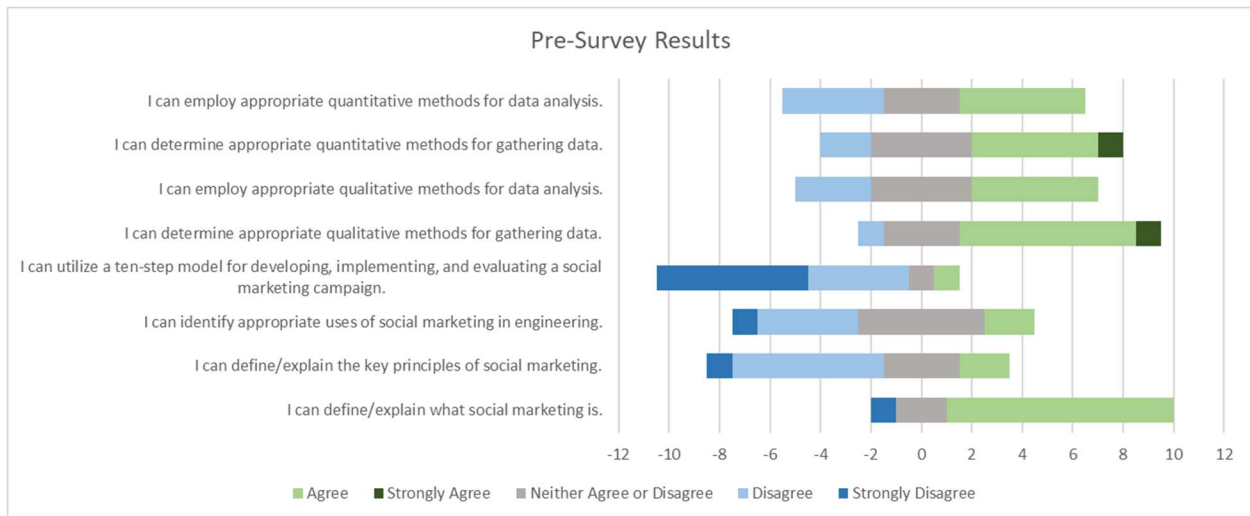
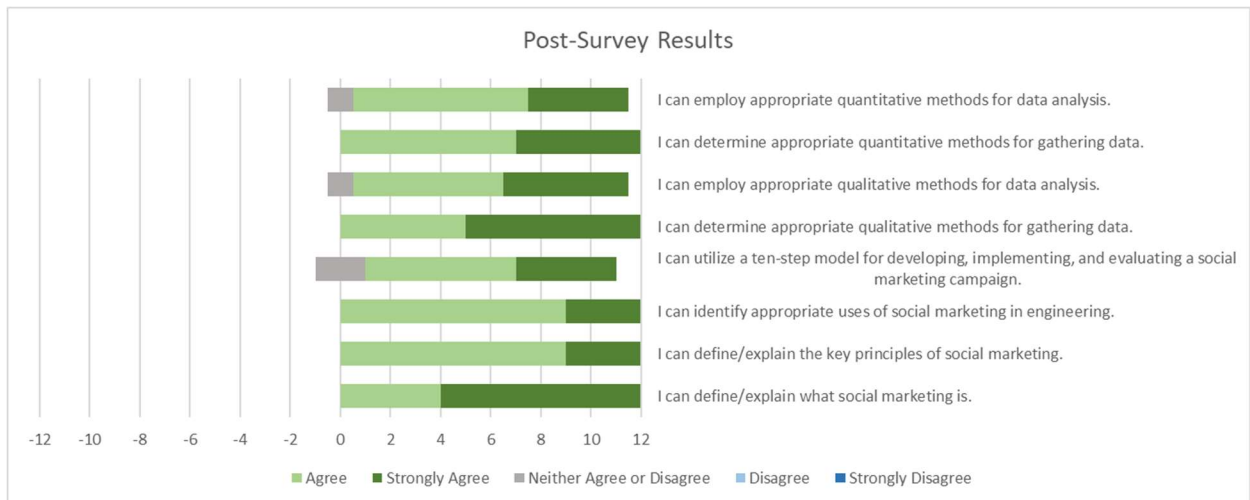Figure 1. Pre-survey Likert scale responses (n=12)

Figure 2. Post-survey Likert scale responses (n=12)

To check this self-reported understanding of the learning outcomes multiple open-ended questions were asked on the post-survey. First students were asked "how would you define social marketing?" Responses were all unique but focused on key concepts of social marketing such as the use of traditional marketing principles and a positive benefit for one's self or society. For example, Student A responded "*Discipline that uses marketing techniques for the benefit of society.*" Other students provided more details about social marketing in their definition such as Student B who responded, "*Social marketing is a 10 step process, although the number of steps can vary, in which the focus is changing a behavior. Social marketing is only trying to influence a behavior or change an existing behavior, not trying to make a profit. An example would be a social marketing campaign revolving around the usage of condoms to promote safe sex.*"

The next open-ended question posed to the students was "Please explain how you see the principles of social marketing discussed in this class applying to your future studies/careers." Many students mentioned how they may not use the full social marketing framework in their future careers or studies, but how they could see a specific part of the framework applying. For example, Student B said "*I think social marketing can be used in all aspects of my future studies/careers. While I may not use the full 10-step approach every time, I will more than likely use parts of the approach for various topics. I think, if done right, social marketing can be a very powerful tool for influencing behavior*." Student C highlighted the marketing component of the material "*Regardless of what job we pursue we will need to market our product. Social marketing concepts can be utilized for any product, but also raises awareness for how our actions can have effects past the dollar sign. How does our construction serve the community and what prices are required become crucial to promoting outcomes that benefit all sides.*" Many students specifically mentioned using social marketing principles to help improve health or safety aspects of a project or work environment. One student also mentioned seeing ways to utilize the principles of social marketing in their upcoming Senior Design class. Overall, students indicated seeing ways that social marketing could be applied in their future studies/careers with many providing specific aspects or topics they thought it would apply to.

The final open-ended questions asked the students about what they liked and did not like about the class. Feedback from the students indicated that they enjoyed the class project and that it helped them better understand the framework. Student D, for example, said "*I think having everyone design their own social marketing campaigns as a semester project was pretty cool. It really helped me get a better idea of what social marketing work would be like in practice.*" Other aspects of the class that were mentioned were guest speakers and case studies that were discussed through the semester as they provided practical examples of how social marketing is being used. The main drawbacks or things students would change focused on the project being a group assignment and having a hard time meeting with their group indicating to change some of the group assignments to individual assignments or provide more group work time in class.

Conclusion & Recommendations

Responses to the pre-post survey indicate that the eight learning objectives for the course were met. However, based on this instructor reflection and student feedback multiple updates to the assessment and course would be made. For the assessment it would be recommended to add the open-ended question of "how would you define social marketing?" to the pre-survey. This would help to gain a deeper understanding of students' thoughts when answering the Likert scale questions. Other open-ended questions about methods of quantitative or qualitative data collection and analysis techniques students know could also lend deeper insights.

If offering this course again updating the project to make sure students pick a topic that could be addressed on campus or in the local community would be recommended. This would lend to

students being able to practice interviewing/surveying skills with the correct target audience and strengthen project outputs. Working with a local topic would also offer the potential for the group or a student to carry the project forward outside of class for an independent research project if interested.

The assessment presented in the paper indicates that students see the potential for using social marketing and the frameworks and topics covered in the course in their future classes and careers.

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