

**AC 2009-256: DEVELOPING AN ENGINEERING-FOCUSED NARRATIVE
TELEVISION SERIES**

Elizabeth Cady, National Academy of Engineering

Norman Fortenberry, National Academy of Engineering

Developing an Engineering-Focused Narrative Television Series

Abstract

As a means to enhance technological literacy, attract more young people to careers in engineering and contribute to the sustainment of the national capacity for technological innovation, the Center for the Advancement of Scholarship at the National Academy of Engineering seeks to increase public awareness of the role of engineering. We seek to build upon our experience with previous workshops that have explored the representations of engineers and engineering in films and television in order to advance the implementation of a “prime-time” commercial television series that highlights the positive roles of engineers in modern society. A key first step was to have a committee plan and convene a forum wherein experienced producers, writers, and directors devoted one and one-half days in November, 2008, to discussion of key questions which will determine the viability of attaining an engineering-focused narrative television series. This project builds upon social constructivism and cultivation theory to offer the hypothesis that those who view positive television and/or movie images of engineers are more likely to believe that engineering represents a legitimate career field than are those who have not been exposed to such images. We seek to engage three sectors critical to the testing of our hypothesis – writers, directors, and producers—in order to lay the foundation for the conduct of a proper large-scale experiment. The potential broader impacts are increased public attention to, interest in, and support of engineering as a profession in general and as a career choice in particular.

Introduction

Although engineers help to address basic human needs as well as broader societal objectives like improved health, quality of life, economy, and security, the general public has a distorted perception of engineers and the work they perform ^[1]. This distorted view exists despite expensive public relations campaigns aimed at educating the public about engineers and engineering. Accurate images are critical to maintaining the field through the recruitment of younger individuals, maintenance of national technological prowess in a global context, and improvement of the public’s general level of knowledge of science, engineering, technology, and the ways in which they relate to each other. On the bright side, Americans do view engineers in a positive light ^[1], indicating that developing a more accurate picture about the field could achieve the recruitment and literacy goals because it may be seen as a desirable and achievable career goal. A recent National Academy of Engineering report suggests a coordinated effort to provide this information ^[1], which could include an entertainment media element.

This element could come in the form of a prime-time television drama, as Norman Augustine suggested in 1992 when he proposed a show called “LA Engineer” that would showcase engineers in both their work and their personal lives as well as illustrate the exciting work of engineers ^[2]. In the intervening years that idea has not come to fruition, but entertainment media provide a vehicle to educate the public about engineering while entertaining them, which could improve the general public image of engineering.

Theoretical Framework

Entertainment media has the capacity to engage and involve viewers and allow them to experience events and circumstances they may not encounter in their lives. Compelling stories and interesting characters increase involvement with the entertainment media and enhance viewer enjoyment^[3]. Viewers tend to choose movies and television shows that include one or more characters with whom they can identify. The audience may also gain information about groups from the entertainment media, especially if they have little experience with individuals in those groups^[4]. When viewers learn information about the world from entertainment media, that information affects their social reality and worldview^[5]. Thus, it is critical to provide viewers with positive portrayals of engineers with diverse perspectives and backgrounds.

When a television viewer identifies with a character, she may feel the same emotions as the character, feel empathy for the character, and come to understand and experience both the thoughts and the actions of that character. Writers, actors, and directors must work together to produce a quality media experience that encourages viewer identification and involvement. In addition to production qualities, several attributes of both the show and the viewer affect how strongly the viewer identifies with a character. Although shared backgrounds and experiences both predict identification, viewers will also identify with characters they find attractive or want to emulate. Viewers are also drawn to heroes rather than villains. Characters who narrate or speak directly to the audience also promote identification. When viewers feel a connection to media characters, they may internalize social cues and information. In this way, the characters serve as role models, but only if the viewers identify with them. Empathizing with the characters also intensifies the emotional reactions of the audience, causing them to become more absorbed with the characters and their fate^[3].

Another possible outcome of viewer identification, especially in younger viewers, occurs with the viewer vicariously experiences the behavior and attitudes of their favorite character. Although teenagers do not assimilate all aspects of these characters, identifying with them allows a teenaged viewer to experiment with different aspects of a social identity just as they are forming their own^[3]. For example, a teenager might watch an exciting television show about a group of engineers who work together to solve pressing societal problems and start to imagine herself as an engineer working on that team. For that identification to happen, at least one character must appeal to the teenager on some level.

Entertainment media provide information about the world, leaving the viewers to interpret and organize that information. Given the abundance of information that individuals must process to make sense of the world, it is reasonable to expect them to use cognitive shortcuts. Two of the shortcuts, or heuristics, that apply to television viewing are the representativeness and availability heuristics. Both are affected by how vivid and frequent an example is. Frequent and vivid examples of a certain group will increase the likelihood that viewers will picture those examples when given the group category^[5]. For example, showing an engineer creatively solving a life-or-death threat to a group of people will provide a vivid exemplar, while showing the work of engineers every week will increase the frequency of the examples. The availability heuristic states that an exemplar of a group that is easily recalled is likely to be seen as typical^[5]. For instance, a strong example of the engineer saving the world may allow viewers to think that engineers are creative team players rather than relying on a prior negative stereotype of a lone

engineer working on an abstract project with few discernable real-world applications. Related to availability, using the representativeness heuristic involves judging both whether an example accurately represents its group and whether the choice of example appears random^[5]. For example, portraying engineers as intelligent, hard-working, and creative in several situations will make that portrayal represent engineers in the minds of the viewers.

Examples of Television Shows Featuring Engineers

Engineers and engineering have been featured in some reality or narrative television shows. The reality shows include *Design Squad* on PBS, which involves teams of high school students who compete to solve engineering problems as well as several programs on the History or Discovery Channels (e.g., *Modern Marvels* and *MythBusters*)^[6]. Narrative shows that feature engineers occasionally exist, although the engineer generally works alone or with very few others and focuses on localized problems. One example is *Prison Break*, in which one of the main characters has two engineering degrees^[6]. The lead character in *MacGyver* used his engineering background as well as creative thinking under pressure to save himself, and occasionally a few others, from various predicaments^[6]. However, few television shows accurately portray engineers as working in teams for a larger goal than their own self-preservation.

Prior Research

Based on (a) the idea of social construction of gender roles rather than these roles being immutable and nature, and (b) the idea that heavy television viewers create a worldview based on what they observe on television (cultivation theory), Wasburn^[7] hypothesized that individuals who see women engineers or technicians will view careers in STEM as viable options for women, while non-viewers will not see these careers as appropriate for women. In a telephone survey, respondents were asked if they had seen women in several professions, whether they thought men would prefer a spouse who was either an elementary school teacher or in one of those professions, and whether they agreed that women could be in certain professions. The 284 respondents were most likely to have seen women portraying nurses, medical doctors, lawyers, or secretaries, with over 90% of the sample having seen women in those professions on television shows. Approximately 78% had seen female research scientists, while about 65% had seen factory workers and 64% had seen elementary school teachers. Half the respondents had seen female engineers on television, and only 45% had viewed women portraying computer technicians^[7].

Respondents believed that men would prefer an elementary school teacher as a spouse compared to several of the listed professions. Although medical doctors and nurses were chosen more frequently than teachers, 44% of respondents believed men would prefer an engineer spouse over a teacher. Less than 40% thought men would prefer a research scientist for a spouse, and only 28% believed men would prefer a computer technician spouse over a teacher spouse. This indicates that these careers are not viewed as particularly attractive for women. On the final question, comparisons between viewers and non-viewers were not significant for whether either research science or engineering are suitable careers for women, and most respondents agreed that they were acceptable. Computer technician was viewed as an improper career for women by a

majority of participants, with those who had seen a woman portraying a computer technician on television having slightly more positive impressions of female technicians than non-viewers^[7].

Project Structure

The current project brought together engineers, script writers, and directors for a two-day meeting to explore the idea of developing an engineering-focused television show. The first day was devoted to a discussion of such key questions as the following:

1. What factors influence audience demand and commercial potential?
2. What type of series (i.e., comedy, drama, etc.) might be most commercially viable and best serve to highlight positive role models?
3. What types of story lines might work to best to highlight the positive roles of engineers?
4. Should the effort target cable or network television? Why?
5. What expertise is required to pursue the endeavor?
6. What marketing efforts are needed to attract sponsors and viewers?
7. What are the potential project costs?
8. What support services are required?
9. What core planning and personnel are required?
10. What other pertinent issues should be considered?
11. What are next steps in moving forward?

The second day was devoted to a one-day script development workshop featuring commercial writers exploring the key question of what is the story and how is it constructed in a commercially attractive manner to advance the implementation of a “prime-time” commercial television series that highlights the positive roles of engineers in modern society.

Workshop Discussions and Outcomes

Workshop attendees discussed a series concept that seemed versatile and rich with opportunities to present engineers as interesting people who offer much to society. Especially in the eyes of the writers and producers, the concepts discussed presented opportunities for conflict and drama. These elements are crucial to the acceptance and popularity of the show, as they allow for identification with the characters. Other crucial elements include highlighting several domains in which engineers operate, a variety of engineering disciplines, and individuals from diverse populations who operate as engineers; thus, an ensemble cast that addresses a variety of situations is desirable. Attendees discussed the idea of an elite team with exceptional talents in their particular discipline of engineering (environmental, systems, structural, biomedical, design & manufacturing, computer science, etc). Although engineers have been portrayed in the past as solo workers (i.e., *Prison Break*, *MacGyver*), the attendees agreed on the benefits of focusing on a team of engineers instead. Although the solo engineers in these shows are invariably successful, they function in a small space and generally their actions affect only themselves and possibly a few other characters, whereas this show concept provides an accurate view of the way engineers work in multidisciplinary and multicultural teams. In addition, televising a group of engineers gives an opportunity to showcase women and underrepresented minorities in addition to the prior examples listed above, both of whom are white males. This diversity of characters allows for a wide variety of viewers to identify and empathize with at least one of them^[3], which would then create an audience of devoted watchers who might dream of an engineering career.

The team should be made of 5-6 characters, diverse in ethnicity, age, gender and ability. In addition to this core team, guest characters from other engineering disciplines will help the team in some episodes. Independently funded by an unnamed source, with competing factions motivated by contradicting ideals, the team members are assigned the duty of solving potential disastrous scenarios in order to save themselves and the world. These scenarios include natural disasters, catastrophic man made mistakes, national security dangers, and humanitarian issues. The team constantly works against time and utilizes a unique virtual environment to simulate the outcome of these potential disasters, explore alternate solutions, and attempt to avert disaster. This virtual environment not only allows the team to simulate current events but also travel back in time to relive events of the past in attempts to learn from past mistakes and take advantage of lost and misunderstood technologies. A high level of challenges allow the audience to understand the true definition of engineers and dispel the mythical “engineer” representation of the mainstream media. Each of the team members has a story to tell of why they joined, and their individual moral choices give the audience a human element to their stoic title of “engineer.”

Story lines for the show were discussed but not developed thus far. Examples were drawn from current news as well as recent global situations (e.g., economic crisis, earthquake). Solutions to the problems involve knowledge and skills held by engineers from several different disciplines to allow for the entire team to work together as well as bring in guest stars to highlight other fields. One possibility centers on pirates who have hijacked an oil tanker carrying 4 million barrels of crude worth \$100 million and threaten to scuttle it, which would result in both an economic and environmental catastrophe, so the team has to develop means to disable the hijackers and mitigate a possible spill. Another possibility involves an earthquake that has formed a natural dam in a river near large population areas. The team members would have to use their skills to safely blast a spillway before the dam collapses and causes a disaster. Yet another possibility involves the team finding incorrect system models and computer programming that affects the global financial market. They must determine the cause of the faulty programs (e.g. malicious terrorism or benign error) and avert imminent financial collapse.

Potential Impact

The early stages of this project are encouraging, but future plans call for the development of a script and subsequent filming of a pilot episode. If the pilot garners interest in the television media and moves forward, it has the potential to reach both future college students and their parents. Given an exciting television show with interesting and multidimensional characters, the audience could change their views of engineers and engineering, and younger viewers may consider a career in engineering so they can emulate their favorite character.

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