

# **AC 2008-1570: ENGINEERING IMAGES IN TELEVISION: AN ANALYSIS FOCUSING ON THE IMAGES DEVELOPED BY HIGH SCHOOL JUNIORS AND SENIORS**

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# Engineering images in television: An analysis focusing on the images developed by high school juniors and seniors

## Abstract

Media images can play a significant role in the establishing of profession images, particularly in youth. For many individuals, television is the dominant media exposure. This research probed high school student television-influenced images of professions, focusing on physicians, teachers, lawyers, and engineers. It was hypothesized that an understanding of such images would provide insights into recruitment issues related to secondary students selecting engineering as their future profession. The survey instrument employed included unstructured rating scales of: not creative – creative, dull/boring – exciting, cold/uncaring – warm/caring, and (regarding impact on society) negative impact – neutral – positive impact. Results indicated that television presentation of the engineering professionals is extremely limited. Students developed images of engineering professionals as not particularly exciting, relatively creative, relatively neutral on caring/uncaring, and somewhat neutral in regards to societal impact. Such images may be one reason why many high school students do not select engineering as a future profession.

*Keywords: high school, engineering profession, professional image, media.*

## Introduction

Media images influence our perception of many things. As Kellner states<sup>1</sup>:

*Radio, television, film, and the other products of media culture provide materials out of which we forge our very identities ... Media images help shape our view of the world and our deepest values ... They contribute to educating us how to behave and what to think, feel, believe, fear, and desire – and what not to.*

More specifically, the image that one has of an occupation or profession is often influenced by media images. This may be especially true when the individual has no first hand knowledge of the occupation or profession. The formed mental image is obviously strongly dependent on the content and presentation of the information by the media. The associated accuracy of any such formed images is often questionable, although many consumers will not normally probe any such accuracy issues.

For many individuals, television is the dominant media exposure. According to A.C. Nielson data and other sources<sup>2,3</sup>, the average American will spend about four hours per day (28 hours per week) watching television. In fact, in the average American household, the television is on for 6 hours and 47 minutes per day. American youth will spend on average about 1,500 hours per year watching television. For perspective,

average American youth spend about 900 hours per year in school. As a side note, there is increased societal concern as to the amount of time that youth spend watching television and other similar activities<sup>4</sup>. Various studies have shown that, not surprisingly, television has a strong role in forming child and teenage opinions<sup>5,6</sup>.

### *Minority images as influenced by television*

There have been numerous studies that analyzed the influence of television on the resulting negative images that viewers (particularly white viewers) developed as related to various minority groups, including race, gender, and ethnicity. One classic example of such an analysis is the study of the image of race (focusing on African-Americans) during the early days of television (the 1950s). MacDonald<sup>7</sup> notes that blacks portrayed during the 1950s were typically cast as inferior, lazy, dumb, and dishonest individuals. Negro doctors were presented as quacks; Negro lawyers were cast as unethical cowards who did not understand their own profession. Even in the 1970s, it was noted that black children had few positive role models on television<sup>8</sup>. Reflecting more recent portrayals (mainly the 1980s and 90s), Entman and Rojecki<sup>9</sup> investigated the role of the presentation of various professions (doctors, police, attorneys, etc.) as a function of race. They noted significant negative portrayals of blacks in these professions. One notable exception was the physician role portrayed by Bill Cosby in *The Bill Cosby Show*, a series that has been recognized as having a very positive effect on black youth since its initial airing.

Other minorities have similarly suffered. Native American Indians were often portrayed as the “noble savage” (or worse) during the early days of television<sup>10</sup>. Women were often relegated to the role of housewife, with the occasional female teacher or nurse being portrayed. Latinos were seen as having a hot temperament (recall Desi Arnaz in *I Love Lucy*); Latino portrayals of the 50’s and 60’s (particularly Mexican roles) more often displayed characters as villains or buffoons. Asians were portrayed as either menial workers or as “mysterious”<sup>11</sup>. Even in current times, the portrayal of gays and lesbians tends to follow rather limited stereotypes<sup>12</sup>. Finally, it should be pointed out that the presentation of “blue collar” whites is often reinforcing of societal stereotypes (consider Archie Bunker in *All in the Family* and Homer Simpson)<sup>13</sup>.

### *Recent trends regarding professional portrayals on television*

Many recent television series portray various professions in a very positive light. For example, the medical profession is typically presented as a noble profession where highly intelligent and ethical doctors routinely care for their patients, sometimes fighting for their patients’ lives. Examples include *M\*A\*S\*H*, *ER*, *City of Angels* (which featured black physicians), *Grey’s Anatomy*, and *House*. Certainly many of these characters are very inspirational to youth in the process of formulating their life goals. Nursing has similarly been presented in a positive way, although the casting has almost always involved female characters. The portrayal of the legal profession is often positive (with some notable exceptions). Most attorneys are visualized as fighters for truth and justice. From the early days of *Perry Mason* to more recent series such as *Family Law*, *The Practice*, *Boston Legal*, and *Ally McBeal*, the positive role of attorneys in society is

emphasized. Many of the more recent series feature females, blacks, and minorities in prominent roles.

Similarly, the teaching profession is often cast in a positive light. Teachers, sometimes working under adverse conditions, strive to educate their students and otherwise have a positive influence. Sometimes, teachers were a character in a comedy series (Gabriel Kaplan in *Welcome Back*, Kotter and Howard Hesseman in *Head of the Class*). Other series were more serious (*Boston Public*).

### *Purpose of this study*

This study probed the images of doctors, lawyers, teachers, and engineers as formed in the mind of high school students by television shows. The prime focus is on the formed image of engineering as a profession; doctors, lawyers and teachers were included as reference points. Such knowledge may provide insights into what the image of the engineering profession is in this important age group and what information such students are using to form their images. The focus is on high school juniors and seniors since they are often pondering what life path to pursue, what to major in college (those that intend to attend college), and other life choices. Often, these images are not strongly formed by first hand knowledge, with the exception of the situation where an immediate family member is involved in the profession.

## **Methodology**

### *Study participants*

This study followed approved protocols by the University of South Florida's IRB and also Hillsborough County school systems. Junior and senior students were selected from three regional general high schools, two engineering/technology high school magnet programs, and two IB (International Baccalaureate) high school programs. A total of 277 students participated, of which 72.9% were seniors and 27.1% were juniors. Of these students, 11.6% considered themselves to be on a pre-engineering track, 29.2% on a pre-science (including pre-med) track, and 59.2% on another track, did not have plans to pursue college, or were undecided. In terms of type of high school, 50.2% were from regular high schools, 22.4% from the engineering/technology magnets, and 27.4% from the IB programs. Gender composition was 52.0% male and 48.0% female. Less than 6% of the participants had an immediate family member that was a doctor, lawyer, teacher, or engineer; in terms of high school program, the highest concentration of such family members was observed in the IB program, where the percentage was approximately 20%.

### *Survey protocol*

A survey instrument was developed that consisted of two sections, the first focusing on media images of doctors, lawyers, teachers, and engineers and the second focusing on basic demographic information and television viewing behavior. The survey instrument provided a definition of "television program":

For purposes of this survey, a “television program” can include any program that you may receive on a “channel” (NBC, CBS, CNN, ESPN, Disney Channel, Public Access, etc.), whether you have cable, dish, antenna only, or some other source. Furthermore, “television program” includes any program you think is currently available, i.e., it is a program that you think someone can actually watch sometime this week on some channel. Also, we are focusing on regularly scheduled programs, i.e., programs that appear at the same time every week (examples: CSI: Crime Scene Investigation, Sixty Minutes, Jerry Springer), i.e., are not “specials” or other one-time showings

In the first section, a series of questions were presented that requested responses focusing on doctors, lawyers, teachers, and engineers:

- Citing a specific example of an actual character and/or a show that featured a main character in one of the professions
- Judging the gender balance (mainly male, mainly female, approximately balanced male/female, or no opinion) of all portrayed characters for each of the professions
- Rating each profession using an unstructured rating scale by marking a “D” for doctor, “L” for lawyer, “T” for teacher, and “E” for engineer along a line approximately 12 cm in length with the following labels at each end: not creative – creative, dull/boring – exciting, cold/uncaring – warm/caring, and (regarding impact on society) negative impact – neutral – positive impact. Responses were converted to numerical values by simply measuring their lengths in millimeters from the left end of the line, providing numerical results that ranged 0 to 120. A one-way analysis of variance was conducted on the rating scale means for each professional category using Tukey’s multiple comparison procedure.

In the second section, basic demographic and viewing behavior was sought, including:

- Status in school (junior or senior)
- Gender
- Type of high school environment (regular high school, magnet program, or IB program)
- Projected academic path (pre-engineering, pre-science including pre-med, other, undecided, or no plans to attend college)
- Whether a doctor, lawyer, teacher, or engineer was a member of the immediate family
- Personal television viewing behavior (average hours per day)

In addition to completing the survey form, randomly selected groups of 3-5 students also participated in focus group discussions to obtain additional qualitative information and also provide some validation for the survey instrument. These groups were facilitated by the investigator.

## Results

Respondents television viewing frequency were as follows (mean/std dev):

All students (n = 277)	3.1 hrs / 0.8 hrs
Regular high school (n = 139)	3.5 hrs / 0.6 hrs
Magnet program (n = 62)	2.2 hrs / 0.4 hrs
IB program (n = 76)	1.8 hrs / 0.3 hrs

There were no significant differences based on gender.

Respondents generally had no problem identifying characters and/or television series that featured doctors and lawyers, with almost all participants providing at least one response. Frequently cited responses included:

Doctors	Hawkeye Pierce, House, <i>M*A*S*H</i> , <i>Grey's Anatomy</i> , <i>ER</i> , <i>Trauma: Life in the ER</i> , <i>General Hospital</i> , <i>Scrubs</i>
Lawyers	Perry Mason, Ally McBeal, <i>Boston Legal</i> , <i>The Practice</i> , <i>Law and Order</i>

However, only about 42% of the respondents could identify a character or series that featured a teacher. The most common response was the series *Boston Public* with a few other series cited at a lower frequency, typically involving series in re-run such as *Fame* or *Welcome Back, Kotter*. Only about 12% of respondents could correctly identify an engineer character/series, with the dominant citation being the character *Scotty* in *Star Trek*. About 15% of the respondents incorrectly cited a forensics type series as an example of an engineer character/series.

Figure 1 presents the results of the respondent evaluations of the scale: Dull/boring to Exciting. Respondents generally had an image of doctors as being in an exciting profession, whereas the other three were collectively seen as less exciting. The “doctor” responses were significantly different from the other three professions as a group ( $p < 0.05$ ); the “lawyer”, “teacher” and “engineer” responses were not statistically different from each other. Figure 2 presents the results for the scale: Not creative to Creative. Doctors were generally seen as more creative than the other groups, with engineers and lawyers somewhat less creative and teachers even less creative. From a statistical viewpoint, there are three statistically different groups ( $p < 0.05$ ): the “doctor”, the “engineer” and “lawyer” treated as a group, and “teacher”.

Figure 3 presents the results of the respondent evaluations of the scale: Cold/uncaring to Warm/caring. Doctors and teachers as a group were seen as “warm/caring” at a higher level than engineers/lawyers as a group (statistically different,  $p < 0.05$ ). Figure 4 presents the results for the scale that addressed impact on society: Negative impact to Neutral to Positive Impact. Doctors were seen as having a positive impact, followed by teachers. Engineers were seen as relatively neutral and lawyers as neutral to negative

impact. The responses for doctors and teachers as a group were statistically different ( $p < 0.05$ ) from the lawyers and engineers as a group.

No significant differences were seen regarding any of the responses in terms of gender, type of high school environment, or “immediate family with a member in the profession” versus those families that did not.

## Discussion

It is clear that the respondents have developed a very positive image of the medical doctor and the medical profession. Individual television characters and series were readily cited and the ratings on the various scales were very positive. In focus group discussions, no one could site a specific example of a negative character or series. While citations of teacher characters or series were not as plentiful, teachers and the teaching profession nonetheless also were associated with a positive image, with the possible exception of not being associated with a high level of creativity. In focus group interviews, many participants stated that their images based on television characters or series were somewhat biased by their personal experiences and observations with teachers and the teaching profession.

Lawyers and the legal profession did not generally have as positive image as the doctors and teachers. Focus group discussions often cited lawyers and the legal profession as being somewhat bimodal; there were “good guys” and “bad guys”. This is one of the reasons why the legal responses typically had higher standard deviations relative to the other professions. Also, many of the television series involving lawyers were often within a context of criminal situations, which were not appealing in terms of possible future careers from the student’s point of view.

Most respondents could not cite specific examples of characters or series that featured an engineer. The character “Scotty” from the 70’s series *Star Trek* was the only example correctly identified as an engineer. The images projected via the scale responses were not particularly positive. In focus groups, most respondents did not report a high level of confidence in their assessment of engineers, recognizing that their evaluations were based on a sparseness of information.

Furthermore, both questionnaire responses and focus group information indicated that many confuse forensics professionals with engineers. Indeed, there has been a significant growth in interest in the forensic sciences as a possible career as expressed by high school and college students. Much of this growth in interest has probably been fueled by the plethora of forensic science-based television series that are currently popular.

The engineering profession (including engineering academics) has frequently expressed concern regarding why more high school students do not pursue a career in engineering. What this study showed is that television media images of engineers are very limited; as a result, high school students have an image of engineers and the engineering profession that are not particularly positive. While one may debate the influence of images on the

attractiveness of certain professions to high school students, it is clear that the medical profession has a very positive media image and is also very appealing to students as a possible career path (also apparently true of the forensics profession). Engineering does not have this benefit; positive role model characters are extremely limited. Therefore, any boost in career interest as a result of television's portrayal of the profession is almost nonexistent.

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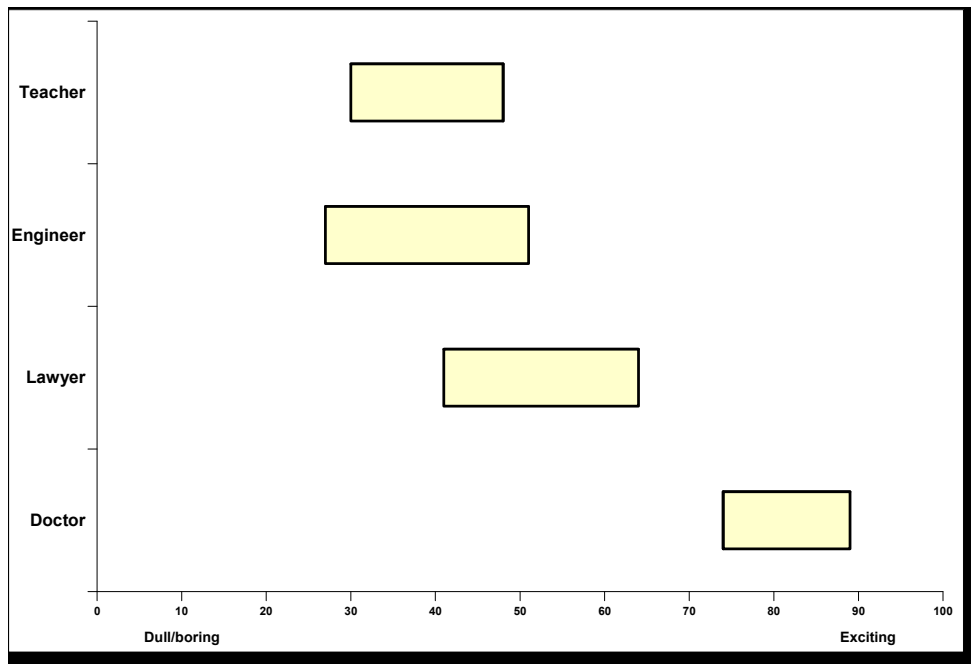


Figure 1: Respondents (n = 277) evaluation of the professions for the scale: Dull/boring to Exciting. Mid-point of an individual box is the mean value and the width is  $\pm$  the standard deviation.

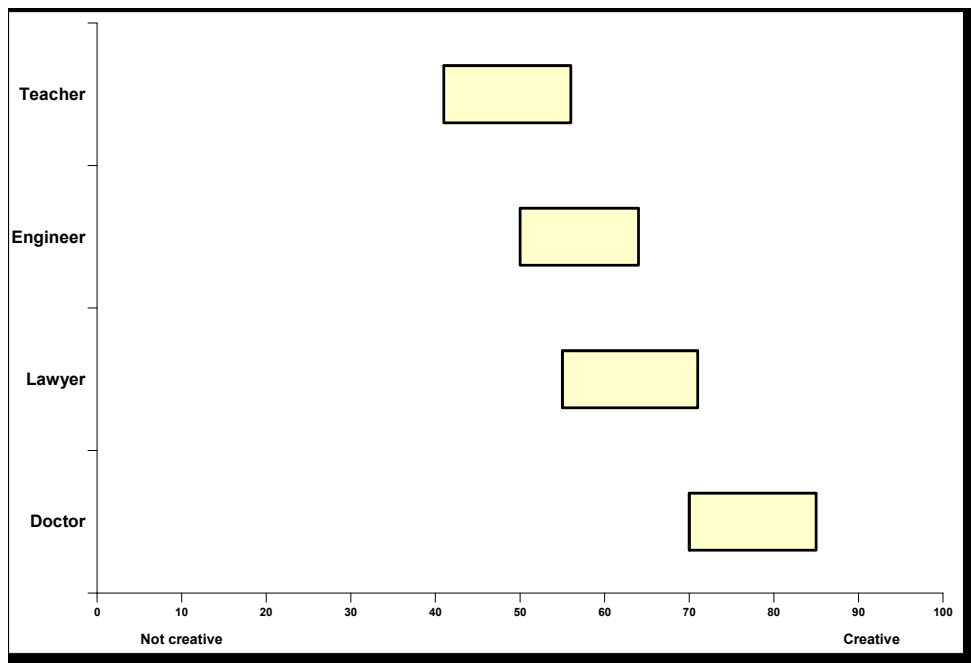


Figure 2: Respondents (n = 277) evaluation of the professions for the scale: Not creative to Creative. Mid-point of an individual box is the mean value and the width is  $\pm$  the standard deviation.

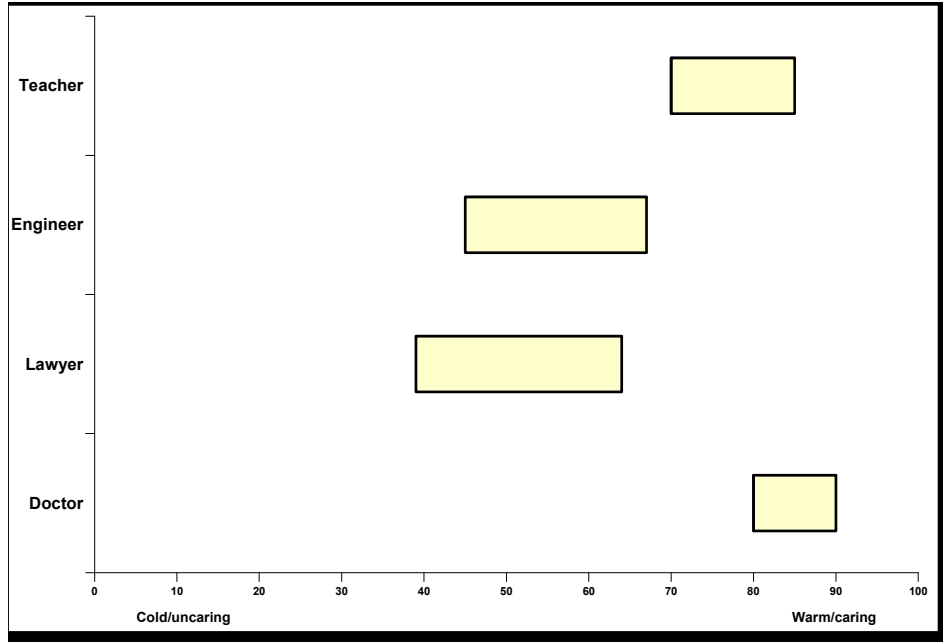


Figure 3: Respondents (n = 277) evaluation of the professions for the scale: Cold/uncaring to Warm/caring. Mid-point of an individual box is the mean value and the width is  $\pm$  the standard deviation.

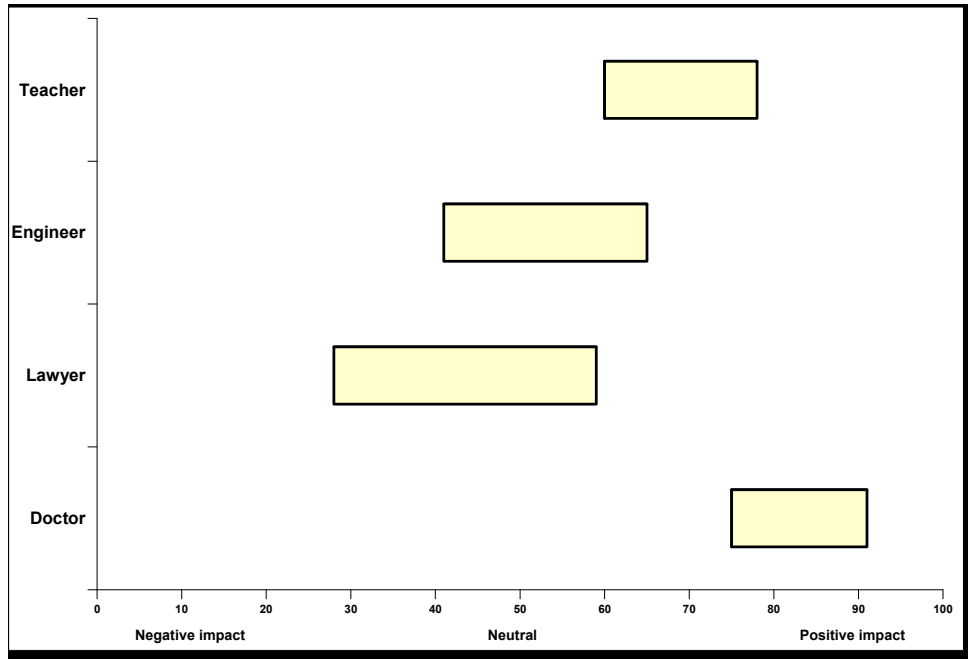


Figure 4: Respondents (n = 277) evaluation of the professions for the scale (regarding impact on society): Negative impact to Neutral to Positive impact. Mid-point of an individual box is the mean value and the width is  $\pm$  the standard deviation.