

# Why Engineering? A Descriptive Study Mapping the Motivations of Aspiring Engineers

by

Isabel Marie Lloyd

Submitted to the Department of Mechanical Engineering  
in partial fulfillment of the requirements for the degree of

Bachelor of Science in Mechanical Engineering

at the

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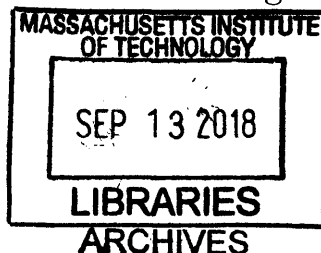
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## Abstract

As the importance of technology and innovation grows with the progression of society, so does the importance of engineers. Because of this, the engineering disciplines come with promise of good salaries and job security, but not all students choose engineering as a career path for the promise of jobs. In order to further understand their motivations, ten engineering students from the Massachusetts Institute of Technology were interviewed and eighteen others completed an online survey pertaining to their personal motivations for choosing engineering as a career path. The interview and survey questions gathered demographic information from each of the participants, statements regarding why they chose to attend MIT and pursue engineering as a career path, self reported data on their high school, university, and intended professional extra curricular activities, and lastly a list of their important personal values. Combined, the results of analysis showed that the motivations of aspiring engineers can generally be grouped into three broad categories - intrinsic motivation, external influence, and extrinsic motivation. The intrinsic motivation for choosing engineering comes from a place of interest in the subject matter, and the problem solving mindset necessary in the field. External influence refers to the outside factors to the decision making process such as role models or past experiences. The extrinsic motivation comes from a place of potential for impact creation, and the promise of creating long lasting and meaningful change. Though many students cite two or more of the broad motivational categories as important to their engineering aspirations, when asked to state the top contributing factor in their decision for choosing engineering all study participants responded within one of these three categories.

Thesis Supervisor: Maria Yang  
Title: Associate Professor

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# Chapter 1

## Introduction

When asking "Why Engineering?" to students at the Massachusetts Institute Of Technology a variety of responses come to the surface. Some students prefer the challenging, problem solving mindset that the field provides; others list off their high school teachers, mentors, and parents as main contributors to their chosen career path.

This study serves to classify the motivations of engineers, and find motivational patterns among the various populations that make up the total engineering student population. These populations include gender, ethnicity, home location, chosen engineering field, and extra curricular involvement.

It is important to classify the motivations of engineers as the findings can be used to develop engineering programs accessible to a broader student population. Furthermore, as it stands today men significantly dominate the world engineering population. Gaining insight into the motivations of engineers could help the world engineering population reach gender parity.

# Chapter 2

## Background

Technology and innovation form two cornerstones of society, and as these cornerstones progress the importance of engineers grows. Numerous articles cite engineering as playing a pivotal role in where society stands today, but more importantly how it will grow over the next century. With this increasing emphasis on the importance of engineering, students in universities across the country are turning to the various engineering disciplines as potential career paths. According to a recent study in the National Academy of Engineering by M. Thursby, Chair of Entrepreneurship in the Scheller College of Business at the Georgia Institute of Technology, the institution of engineering disciplines in universities has contributed "much of the talent behind US domination of world markets during the 20th century" [1]. The engineering career path provides job security and money where many other fields do not, but many students choose engineering for reasons exterior to money or promise of work.

The Massachusetts Institute of Technology epitomizes engineering schools across the United States. According to Quacquarelli Symonds, an organization specializing in education, MIT is the best university in the world - and has been for the past 6 years [2]. At the Massachusetts Institute of Technology engineering students comprise almost half of the students, and they serve as a subset of the nationwide engineering student population that can be regarded as a representative body. With this in mind, the results found from this study of MIT engineers can be generalized further to fit the United States engineering student population.

The MIT D-Lab "works with people around the world to develop and advance collab-

orative approaches and practical solutions to global poverty challenges" [3]. Their slogan, "Development through Discovery, Design, and Dissemination" highlights the key aspect of programs within the lab - to create lasting impact in the developing world. Within the framework of this study, D-Lab falls within the extrinsic motivational category as they focus on creating social impact. Students of all backgrounds across the MIT School of Engineering participate in D-Lab programming and classes, and throughout their time in the department they work on projects and travel the globe implementing technology to engage the developing world.

Though students from all backgrounds can participate in D-Lab, according to a recent interview with department staff the program draws a gender distribution consistently ranging from 70% to 80% women. In comparison, according to a recent study conducted by Ms. Kathy Xu, the MIT Mechanical Engineering department has reached gender parity with a rate of 49.5% women and 50.5% men [4]. Both MIT Mechanical Engineering and MIT D-Lab incorporate the same engineering practices and technical proficiency standards seen by the school of engineering as a whole. Though there are differences in subject matter and intent, the most glaring discrepancy between these two subsets of MIT engineering is the focus on creating social impact provided in the D-Lab department.

The gender distribution in D-Lab includes a much greater percentage of women than the Department of Mechanical Engineering, and D-Lab places a much higher focus on social impact and lasting change. This study aims to provide explanation for this statistic by mapping the motivations of engineering students against their demographics and chosen extracurricular activities.

# Chapter 3

## Interview and Survey Methods

To better understand why students choose engineering as a career path, and the thought processes involved in their decisions, ten engineering students at the Massachusetts Institute of Technology were interviewed and eighteen others completed an online survey pertaining to their personal motivations for choosing engineering as a career path.

### 3.1 Interview Methods

To recruit participants, emails were sent out to the author's personal network at MIT. Initially, the emails invited engineering students to participate in a 20-30 minute in-person or over-the-phone interviews. The first section of interview questions pertained to the demographic and contextual information of the student. These questions included:

- Where are you from (city and state)?
- How old are you?
- What gender do you identify with?
- What ethnicity do you identify as?
- Where do you attend school?
- What class year are you?

- What level of degree are you working towards?
- What field of engineering do you study?

These questions served to inform the responses in the second half of the interview pertaining to the individual's educational history and personal motivations. Furthermore, this initial information provides links between participants in certain cases - giving more avenues for categorizing the motivations of aspiring engineers. After gathering the demographic and contextual information, the educational history and personal motivation questions followed:

- What have been your favorite classes so far in your college career?
- Why did you choose the aforementioned field within engineering?
- Why did you choose your current school?
- Please list 3-5 reasons why you chose engineering as a career path.
- What extracurricular activities did you participate in during high school? Why?
- What extracurricular activities did you participate in during university? Why?
- What extracurricular or outside-of-work activities do you intend to participate in after graduation? Why?
- What are your general values? What motivates you?

The section of educational history and personal motivation questions serve to inform the main purpose of this study: why engineering? Asking about why the students chose their specific field, as well as their favorite classes so far, give more detailed information regarding the personal preferences of the participants. The more general questions such as "Why did you choose your current school?", "Please list 3-5 reasons why you chose engineering as a career path.", and "What are your general values? What motivates you?" inform a broader set of motivations that can be linked across multiple participants. Lastly, the questions pertaining to past, present, and future extracurricular activities serve to further inform the participants' motivations, and identify any links between the way the student chooses to

spend their free time and their decision making process behind choosing engineering as a career path.

In order to fit the participant's responses into categories, follow up questions were asked during interviews to clarify responses and confirm assumptions. An example of these follow up questions is as follows:

Participant F: "My parents studied computer science so they encouraged me to code. They taught me how to program and I got really into it."

Interviewer: "With that information, would you say that role model influence played a significant role in your chosen career path?"

This follow up question served to confirm the assumption that Participant F was alluding to "Role Model Influence" - one of the pertinent motivations explored in this study. Other follow up questions were asked in the same format in order to confirm assumptions and categorize the interviewee's statements.

## 3.2 Survey Methods

After conducting ten rounds of interviews, the author distributed a survey to her personal network, inviting those who did not participate in interviews to respond to an online survey. The survey covered many of the same subjects as the interviews, however no follow up questions were asked. The estimated survey completion time was 20 minutes. The questions included in the survey were:

- What is your name?
- How old are you?
- Where are you from (city and state)?
- What gender do you identify with?
- What ethnicity do you identify as?

- Where do you attend school?
- What level of degree are you working towards?
- What class year are you?
- What field of engineering is your degree in?
- Please list 3-5 reasons why you chose engineering as a career path.
- What extra-curricular activities did you participate in during high school? Why?
- What extra-curricular activities did you participate in during university? Why?
- What extra-curricular or outside-of-work activities do you intend to participate in after graduation? Why?

The some of the questions from the interviews were omitted in the survey based on responses from the interview participants. The three questions are "Why did you choose the aforementioned field within engineering?", "Why did you choose your current school?", and "What are your general values? What motivates you?". The purpose for omitting the first two questions was to shorten the overall length of the survey so potential participants would be more inclined to fill it out. The last question, about general values, requires some explanation - so it worked in the interview setting and but not through the survey format. These questions, though informative, do not provide as much pertinent detail as the other educational history and personal motivation questions included in the survey.

With the inability to ask follow up questions through the survey format, the author took the responses and fit them to the categories as accurately as possible. For example:

Question: "Please list 3-5 reasons why you chose engineering as a career path."

Participant O: "Father is an engineer," etc.

Analysis: "Father is an engineer" equates to "Role Model Influence."

Each of the responses to the survey questions was handled in this manner, and then they were combined with the interview data to form one total population of twenty-eight people. The combined interview data and combined survey response data sets were analyzed separately, and then analysis was performed on the total combined data set of the study.



### 3.3 Why MIT? Categories

In order to better analyze the responses as a complete data set, each of the interview responses to "Why MIT?" was fit to a general set of categories that encompass the participant responses. The list was determined throughout the interview process - as new responses emerged from the participants new categories emerged. Each of the categories was cited by at least one of the study participants. These categories are (in alphabetical order):

- Financial Aid - One participant cited the amount of financial aid they received from MIT to be one of the main attractors in their decision.
- MIT Community - recently admitted MIT students have many opportunities to preview the campus, the most prominent being the MIT Campus Preview Weekend. Multiple students cited their experience with the community at MIT to be their main attractor.
- Role Model Influence - Many students cited the influence of parents, teachers, and mentors as the most prominent reason they aspired to attend MIT.
- Top Engineering School - According to Quacquarelli Symonds, an organization specializing in education, MIT is the top ranked university in the world and has been for the past 6 years [2]. A large majority of participants cited this statistic as their most important attractor to MIT.

### 3.4 Why Engineering? Categories

In order to better analyze the responses as a complete data set, each of the interview and survey responses to "Why Engineering?" was fit to a general set of categories that encompass the participant responses. The list was determined throughout the interview process and carried over to the survey process - as new motivations emerged from the participants new categories emerged. Each of the categories was cited by at least one of the study participants. These categories are (in alphabetical order):

- Challenging - This category came from participants citing their desire to work on challenging projects as a motivation for becoming an engineer.

- Interest in Subject Matter - Many students cited their personal interest in the subject matter as being their biggest attractor to the field of engineering.
- Job Security and Money - As technology advances the importance of engineers grows, and so follows the rising job demand and the money in the field. This aspect of engineering proves attractive for many of this study's participants.
- Personal Experience - This category encompasses all responses that cited engineering experience at a young age. Activities such as FIRST Robotics fall into this category.
- Position of Innovation - Students whose responses fit this category cited their intrigue and excitement about being in a position of innovation as an attractor to the engineering field.
- Potential for Impact - Many students responded that they believe engineering to have a high potential for social impact, and they are drawn to the field for the realistic prospect of impacting the world for the better and leaving lasting positive change.
- Problem Solving Mindset - The engineering field solves world problems and develops civilization. Many participants cited their love of "solving problems" (engineering) over "answering questions" (research) as an attractive attribute of the field.
- Role Model Influence - Many students cited the influence of parents, teachers, and mentors as the most prominent reason they aspired to become engineers.

### 3.5 Extracurricular Activities Categories

In order to better analyze the complete data set, each of the interview and survey responses to the extracurricular participation section was fit to a general set of categories that encompass all participant responses. The list was determined throughout the interview process - as new activities emerged from the participants new categories emerged. Each of the example activities below includes at least one of the study participants. These categories are (in alphabetical order):

- Arts - The arts category encompasses both performance/theatre art as well as visual and graphic art. Some examples of these activities are:
  - The Chorallaries of MIT: the Chorallaries are MIT's oldest Co-Ed a cappella group. They compete in the ICCAs, go on tour around the country, and produce music for popular streaming applications and sites.
  - Dance Troupe: the MIT Dance Troupe is a dance group that welcomes any skill level. They put on a showcase at the end of each semester that includes many dances ranging from beginner hip-hop to advanced contemporary.
  - The Borderline Project: the Borderline Project, featured in the tunnels at MIT, combines visual art and digital art in a unique way. Upon entering, visitors see murals painted along the walls of a large stretch of hallway. Then, using their smart phones, visitors are able to overlay digital art through augmented reality technology.
  
- Athletics - The athletics category encompasses varsity and club sports, as well as hobby activities and intended future physical activities. Some examples of these activities are:
  - Varsity Soccer Team: MIT has a variety of sports at various levels. One of the participants is an active member of the MIT varsity soccer team-competing in the fall semesters in the NEWMAC conference.
  - Outdoor Sports: many participants cited outdoor activities such as mountain biking, hiking, surfing, and rock climbing as intended activities when they are in grad school or at a full time job.
  
- Community/Social: - the community/social category brings together Greek Life, student government, and religious organizations into one group. Some examples of these activities are:
  - Delta Tau Delta: Delta Tau Delta, colloquially referred to as "Delts" is a Greek Life fraternity at MIT. There are thirty fraternities and seven sororities on the MIT campus, many of which have houses that are open to members to live in.

There are also five independent living groups on campus, and though they are not Greek affiliated, many function similarly to Greek Life organizations at the institute.

- MIT Class Council: every class year at MIT has a governing body of students called the class council. Furthermore, there is an overarching student governing body called the Undergraduate Association that works with the class councils. These student government organizations oversee and plan many class events, as well as serve to keep the class informed when it comes to larger events such as commencement.
- MIT CRU: the Campus Crusaders for Christ, also known as CRU, is a Christian organization focusing on giving students a place to celebrate Christianity and find a religious community at MIT.
- Entrepreneurship: - the entrepreneurship category encompasses start-ups and student run businesses. Some examples of these activities are:
  - Animo: Animo is a startup borne out of a class at MIT: 2.009, the product development process. The product focuses on tremor reduction for Parkinson's patients through vibration therapy. The team is filing for a patent and looking for financial investors as they develop the startup.
  - Lean on Me: Lean on Me is a mental health not-for-profit based at MIT. They provide an anonymous texting support service that is meant to provide an outlet for stress and depression through conversations with peers.
- Service: - the service category includes all activities meant to serve the community. Some examples of these activities are:
  - Camp Kesem: Camp Kesem is a nationwide organization with chapters at most large universities. Each chapter raises money and hosts events throughout the semester in order to support two weeks of summer camp each year for children whose parents are affected by cancer.

- TMAYD: Also called Tell Me About Your Day, TMAYD is a nationwide mental health and suicide prevention initiative based at MIT. The group aims to promote staying mentally healthy by turning to community and human-to-human interaction.
- STEM: - the STEM category includes all activities that's main objectives fall within science, technology, engineering, and/or math. These activities do not belong in the entrepreneurship category as they are not meant to be organizations that generate revenue. Some examples of these activities are:
  - Rocket Team: the MIT Rocket team spends the year organizing and building functional scale rocket. Then, at the end of the school year, they compete their rocket against other schools across the nation.
  - Formula SAE: similar to the Rocket Team, the Formula SAE team work together throughout the semester to build a race car for competitions.

Each of the responses for activity participation was assigned a numerical value based on the student's expressed commitment to the activity. If they participated for 2 years and over, the response was given a 1.0, and for less than two years the response was given a 0.5 in the data set.

For the future intended involvement section, each of the responses was assigned a 1.0 in the pertinent category.

### 3.6 Personal Values As Defined

The personal values section of the interview got a wide range of responses. This section serves to further inform the participants' decision-making processes for becoming engineers. Below is a comprehensive list covering all of the interviewee responses, as well as their definitions as stated in the Merriam-Webster Dictionary [5]. Each of the values listed below was cited by at least one of the study participants.

- Community - a unified body of individuals, a social state or condition, society at large.

- Consideration - continuous and careful thought, thoughtful and sympathetic regard, an opinion obtained by reflection.
- Determination/Tenacity - the act of deciding definitely and firmly, persistent in maintaining, adhering to, or seeking something valued or desired.
- Empathy - the action of understanding, being aware of, being sensitive to, and vicariously experiencing the feelings, thoughts, and experience of another of either the past or present without having the feelings, thoughts, and experience fully communicated in an objectively explicit manner.
- Engagement - emotional involvement or commitment, involved in an activity, the state of being in gear.
- Generosity - the quality or act of being generous.
- Impact - to have a direct effect or impact on.
- Independence - the quality or state of being independent, not requiring or relying on something else, showing a desire for freedom.
- Kindness - the quality or state of being kind, pleasing, agreeable.
- Love - strong affection for another arising out of kinship or personal ties.
- Morality - conformity to ideals of right human conduct.
- Optimism - an inclination to put the most favorable construction upon actions and events or to anticipate the best possible outcome.
- Passion - ardent affection, a strong liking or desire for or devotion to some activity, object, or concept.
- Patience - the capacity, habit, or fact of being patient.
- Respect - an act of giving particular attention, high or special regard, expressions of high or special regard or deference.

- Trust - assured reliance on the character, ability, strength, or truth of someone or something, one in which confidence is placed.

# Chapter 4

## Interview and Survey Results

Below are the responses from the interviews as well as the survey. A third section was added containing the combined results for the total study population.

### 4.1 Interview Results

Ten engineering students were interviewed to gather further insight into their personal motivations for choosing engineering as a career path. They come from many different locations around the United States and study a variety of engineering fields. All interview participants attend the Massachusetts Institute of Technology.

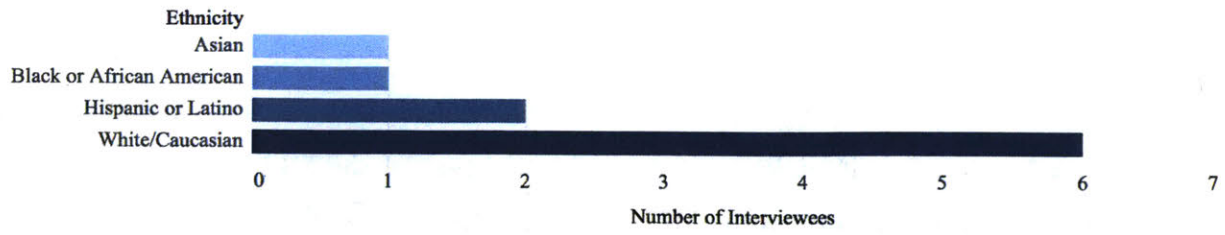
#### 4.1.1 Interview Demographic Information Results

The first section of each interview focused on the demographic information of each participant. Questions such as "What gender do you identify with?" and "Where are you from?" were asked.

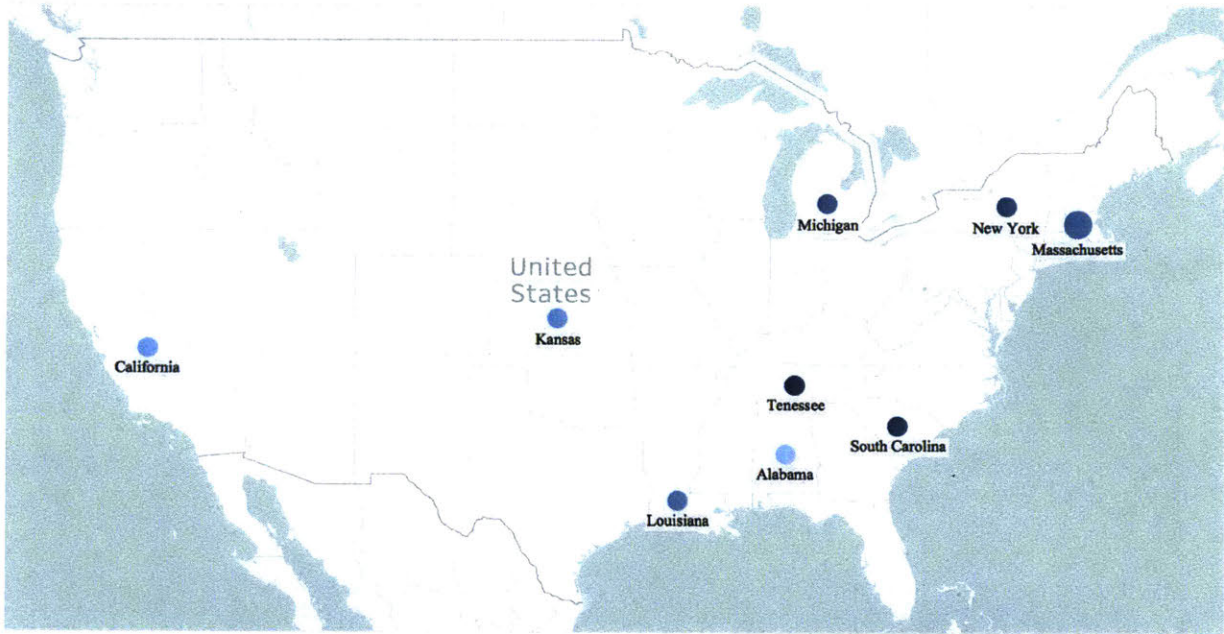
The ethnicity distribution from the interview response data set shows that a majority of the total participants identify as White/Caucasian at a count of six individuals. The other participants consist of two individuals who identify as Hispanic or Latino, one who identifies as Black or African American, and one who identifies as Asian (Figure 4-1a). The gender distribution of the interviewee population consists of six males and four females (Figure 4-



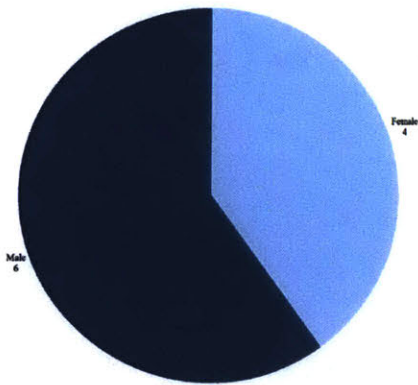
1c). As you can see from the interviewee location distribution (Figure 4-1b) the interview participants come from cities spanning the entire United States - the most concentrated location being the suburbs of Boston, Massachusetts. Nine of the interview participants are in their fourth year of their undergraduate degrees as part of the MIT Class of 2018, and one of the participants belongs to the MIT Class of 2019 (Figure 4-1d).



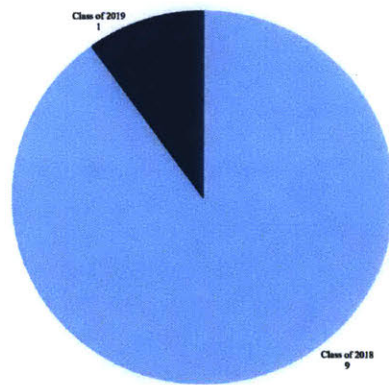
(a)



(b)



(c)



(d)

Figure 4-1: Of the ten interview participants, 6 identify as White/Caucasian, 2 identify as Hispanic or Latino, 1 identifies as Black or African American, and 1 identifies as Asian. The participants represent 9 different states, and they are comprised of 60% male and 40% female. Nine of the interviewees are MIT Class of 2018, the final student is MIT Class of 2019.

### 4.1.2 Interview Educational History and Personal Motivation Results

Each of the interview participants was asked questions pertaining to their educational history and their personal motivation for pursuing an engineering degree. These questions encompassed topics such as the participants chosen field of engineering, why they chose to attend the Massachusetts Institute of Technology, and why they chose engineering as a career path in general.

Of the ten participants in the interview population five study mechanical engineering, two study material science and engineering, one studies computer science and engineering, one studies computer science and molecular biology, and lastly one participant studies aerospace engineering (Figure 4-2). When asked why they chose their given fields, most of the interview participants cited their interest in the specific subject matter within that field as the main factor. Examples of participant responses are:

"I've always been really interested in chemistry. Bonding atoms, anything like chemical bonds and equations were always super interesting to me." - Participant G

"The reason I chose mechanical engineering was not only did I love the cool theory that was behind it, but I also really enjoyed seeing how things worked in the real world on a large scale." - Participant H

Though they all study different fields of engineering, each interview participant currently studies at MIT - and each participant was asked why they decided to attend the university. Though they cited a variety of reasons, the most frequently cited was MIT's status as the top engineering school in the world (Figure 4-3b). Another key factor in the participants' aspirations towards MIT was the presence of influential role models. Many participants stated they would not have had the confidence to apply to MIT had one of their role models not encouraged them:

"I didn't really think of [MIT] as an option until one of the college counselors at my high school said 'oh this seems like a school you'd have a shot at getting into,

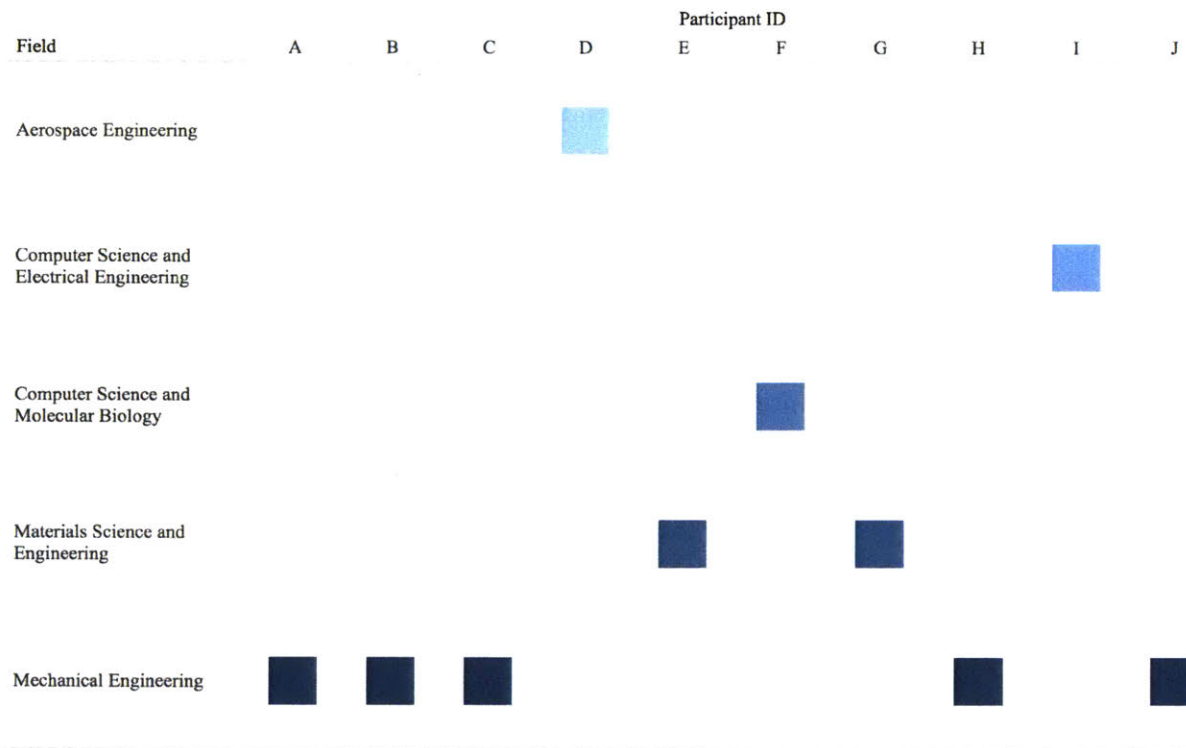


Figure 4-2: The interview study population includes 5 mechanical engineering students, 2 materials science and engineering students, 1 computer science and engineering student, 1 computer science and molecular biology student, and 1 aerospace engineering student.

you should look into it.'" - Participant I

"I just had a lot of very influential teachers I would say. I think some things I got into were because I had a lot of mentors who took the time and effort to make me care. For me, that was how I ended up applying to MIT-it was definitely because some of my teachers thought I could get in, I probably wouldn't have if they didn't push me to." - Participant F

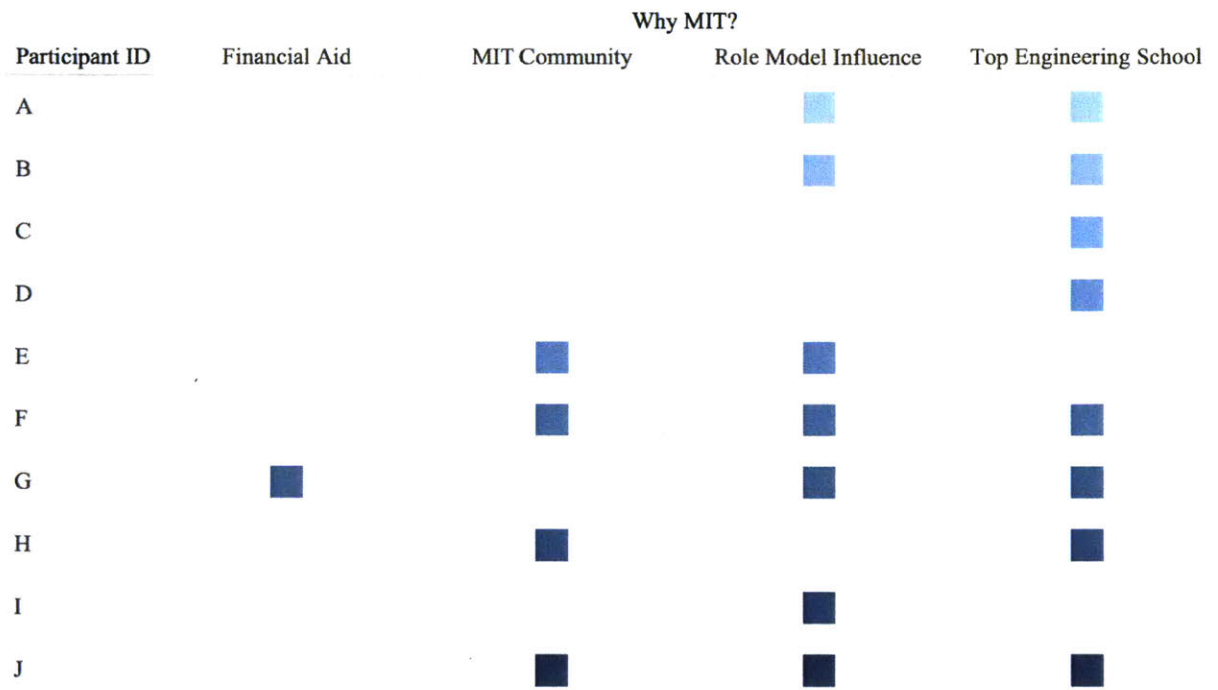
After being asked why they chose to attend MIT, each of the interview participants was asked the broader question of why they chose the field of engineering as a career path. Instead of being asked "why did you choose engineering?" the participants were asked to state 3-5 reasons why they chose the broader field of engineering to study. The most frequently cited response was "Interest In Subject Matter" - talking about their love for the specific, detailed work involved in the engineering field (Figure 4-4b).

The next most cited response for why the interview participants chose to study engineering was "Role Model Influence" (Figure 4-4b). Some of the responses in this category were:

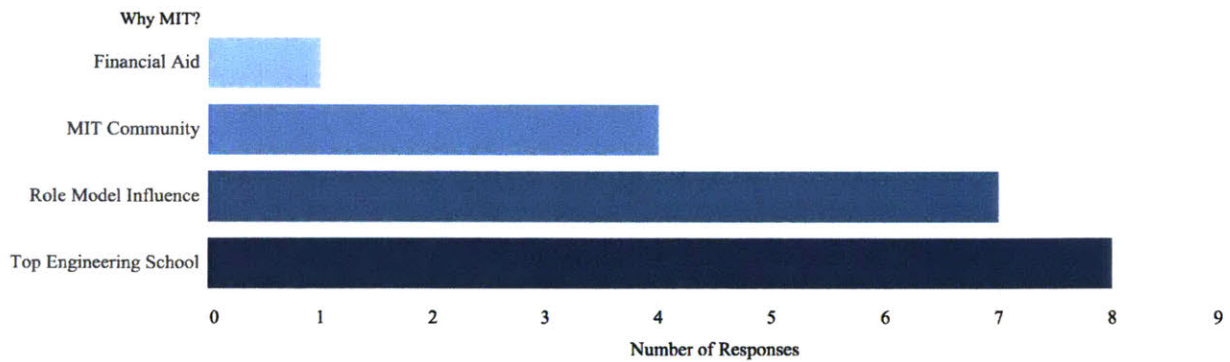
"Math and science teachers at some point in my high school career mentioned engineering to me, both my parents are engineers and they also kind of mentioned it." - Participant E

"I was never told by anyone that [I] should do this. I think a lot of it came from within, but I was kind of led by example from primarily my parents. My parents are both architects, and my dad used to be a contractor, and so I grew up in a house where we were always building things. I was given a lot of freedom to play with tools and play with things that most parents would typically consider dangerous." - Participant C

One noteworthy response category, cited five times from the ten interview participants, was "Potential for Impact." Interviewees that cited this category claimed engineering to be



(a)



(b)

Figure 4-3: The interview participants all answered the question "Why MIT?" Figure 4-3a shows responses as divided by interview participant, and Figure 4-3b shows the frequency at which each response category was cited.

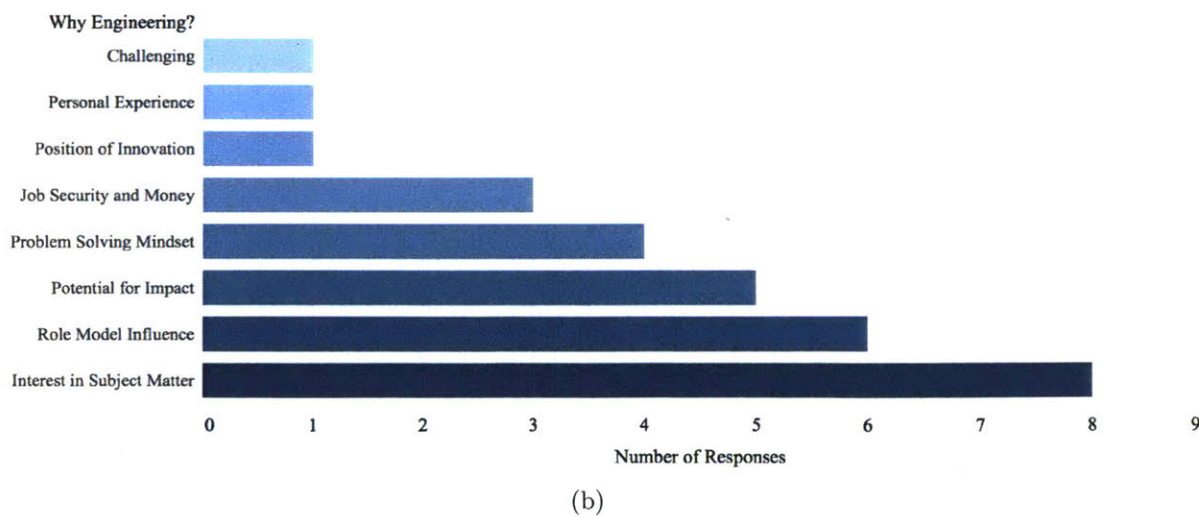
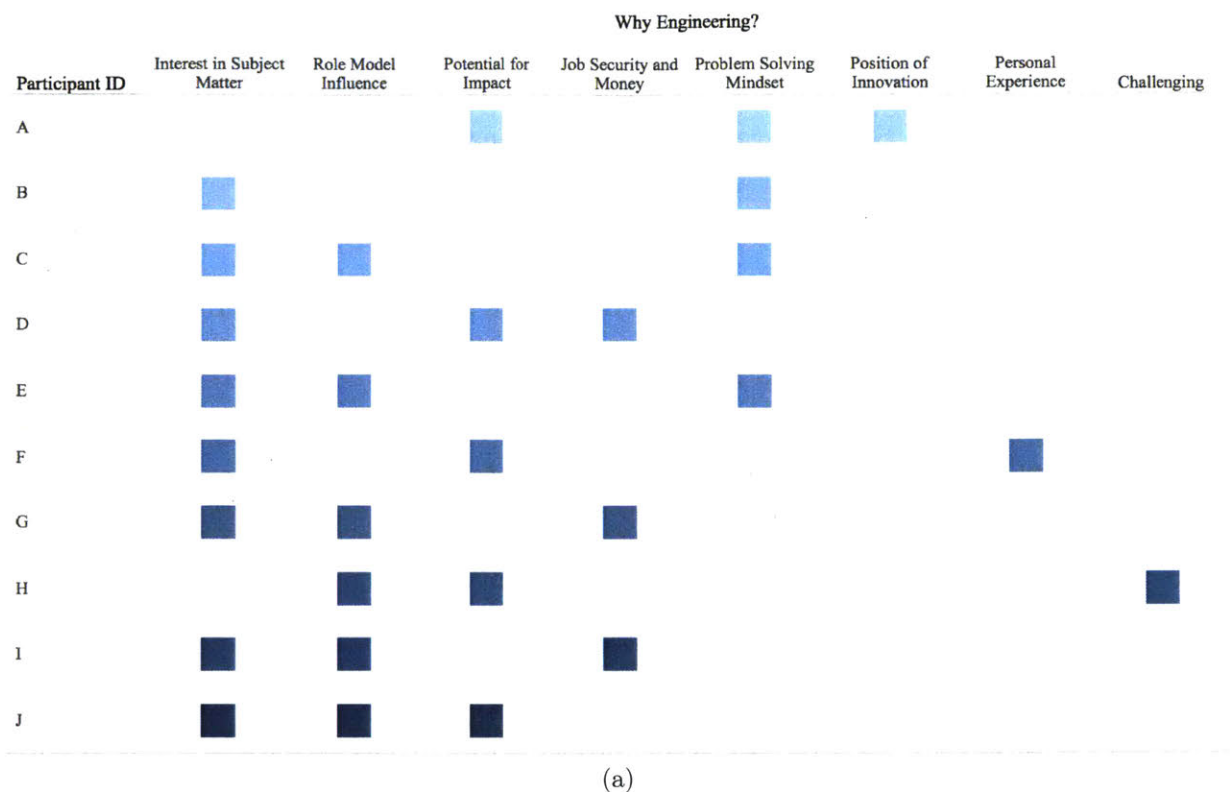


Figure 4-4: The interview study participants were all asked to list 3-5 reasons why they chose engineering as a career path. Figure 4-4a shows responses as divided by interview participant, and Figure 4-4b shows the frequency at which each response category was cited.

a field in which they believe they can create good and lasting change for society. A few examples of these responses are:

"I think it helps that [I] can see real world impact of [my] work. I am a really firm believer that STEM [science, technology, engineering, and math] is a tool for changing the world to be better." - Participant F

"I feel being an engineer impacts people beyond just myself. While I do enjoy working on it, and the thrill of being an engineer is a very personal thing to me, [I am able] to affect the other people around me. So I feel like I have an impact on [a] larger community." - Participant D

"I like to see that the work that I'm doing, or anything that I'm doing, is really impactful" - Participant G



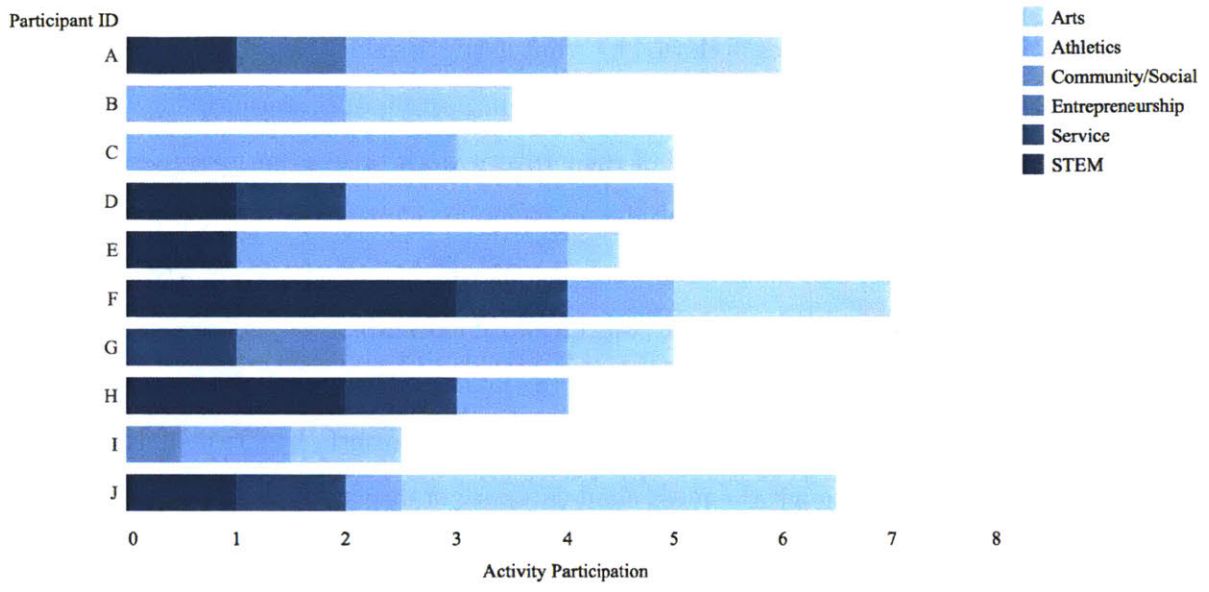
### 4.1.3 Interview Extracurricular Activities Results

One section of each interview was dedicated to the extra curricular involvement of each of the participants. They were asked what activities they participated in throughout high school and why they chose those activities, followed by what activities they participated/participate in during university. As a final question in this section, participants were asked what activities they intend to participate in outside of their future work or graduate studies.

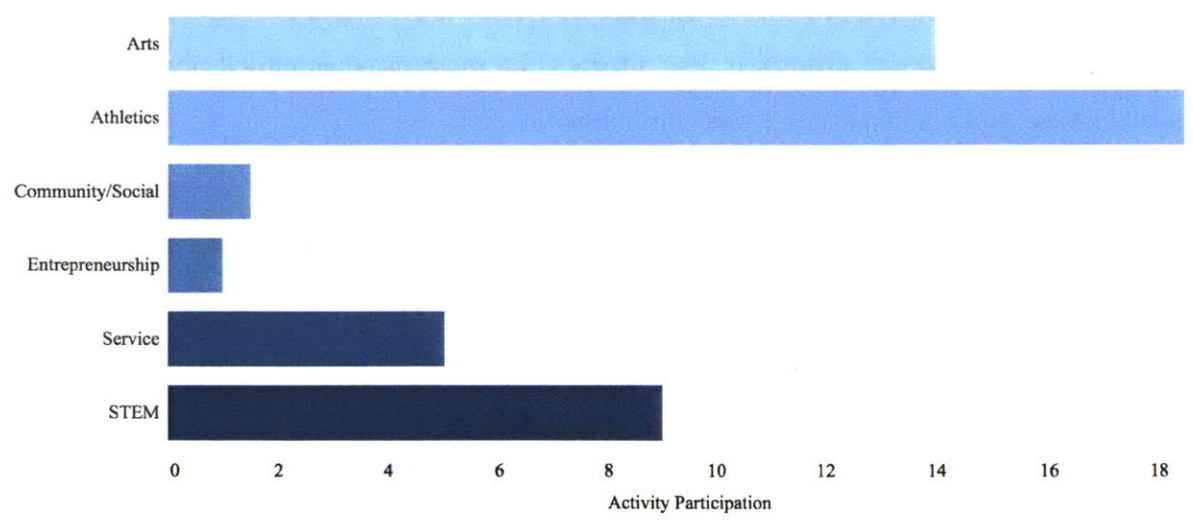
Figure 4-5 depicts the high school activity participation for the interview participants. Broken into six categories, the most cited category in which interviewees participated was athletics. The least cited activity category was entrepreneurship.

The interview participants were also asked about the activities they participated in or are currently participating in throughout their time at the Massachusetts Institute of Technology. Unlike in the high school category, the most cited category of university activity participation was community/social. The least cited university activity category was a tie between service and entrepreneurship.

Each interview participant was asked what activities they intend to participate in outside of their work or graduate studies in the future. The most cited intended activity category was athletics, and the least cited was community/social.

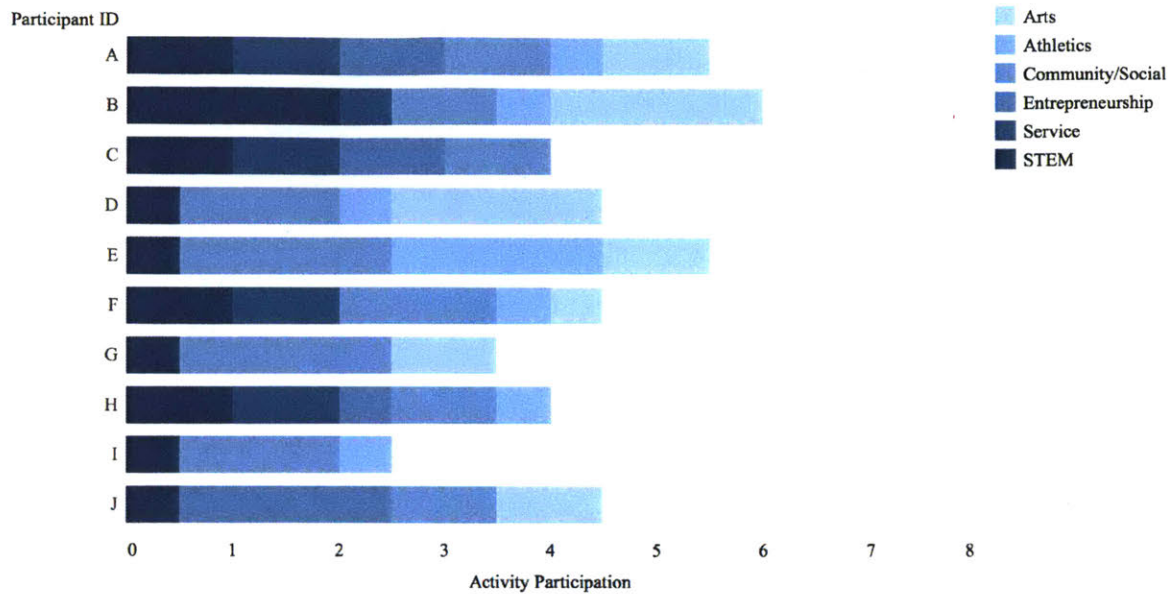


(a)

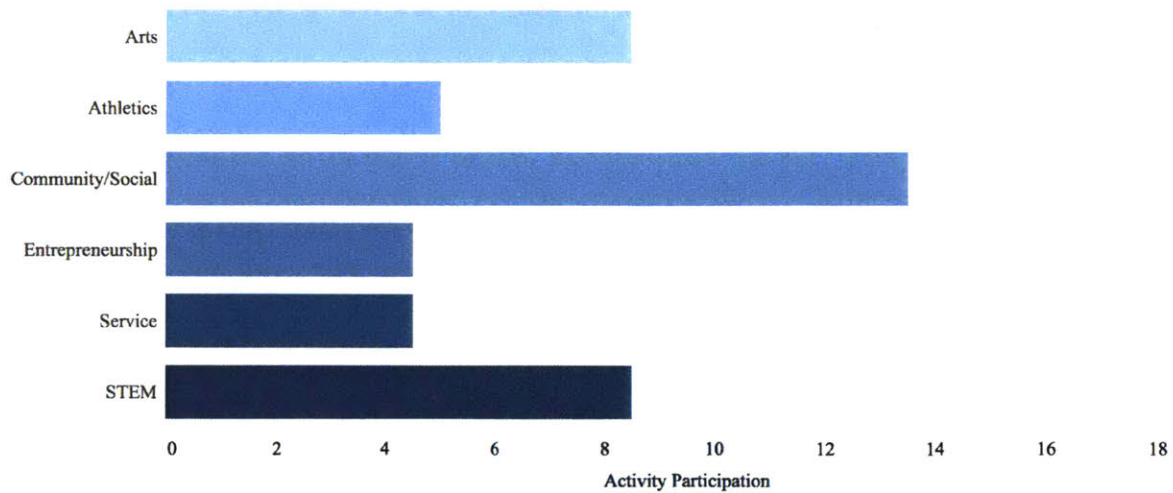


(b)

Figure 4-5: Figure 4-5a depicts the high school activity participation as stated by each interview participant. Figure 4-5b depicts the frequency at which each high school activity category was cited.

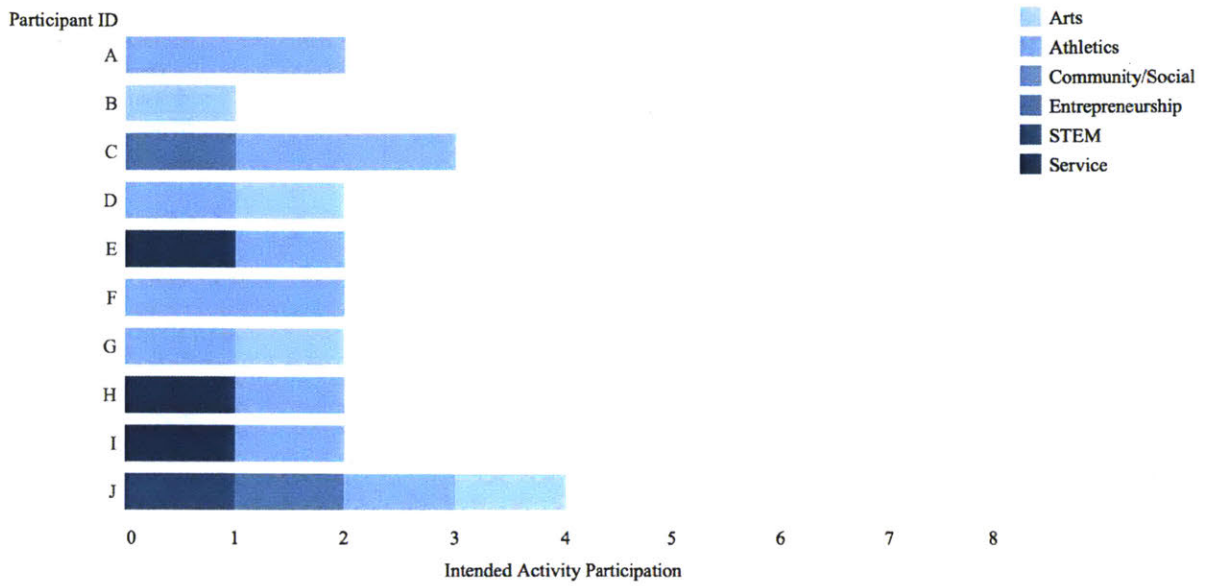


(a)

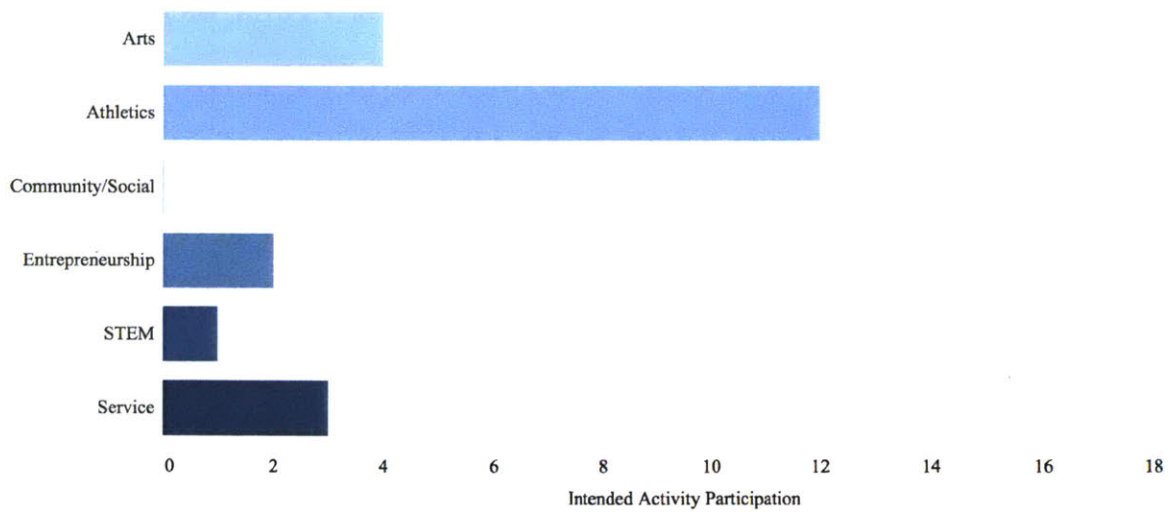


(b)

Figure 4-6: Figure 4-6a depicts the university activity participation as stated by each interview participant. Figure 4-6b depicts the frequency at which each university activity category was cited.



(a)

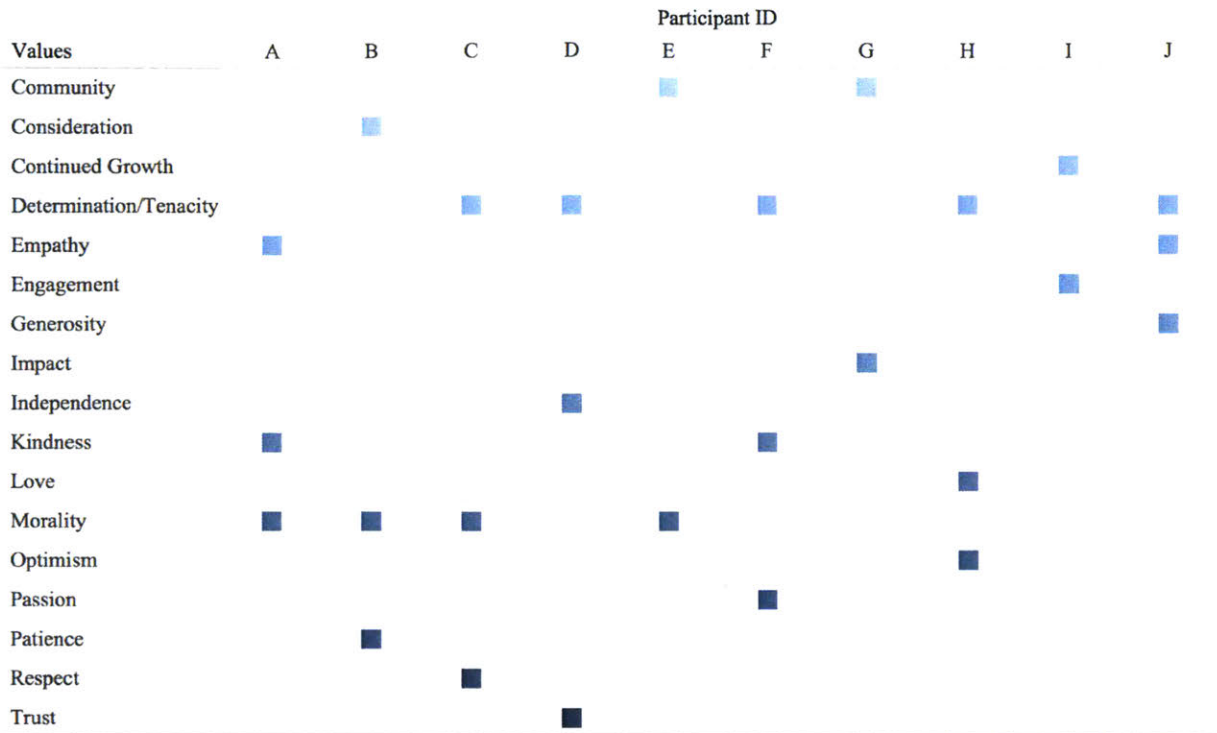


(b)

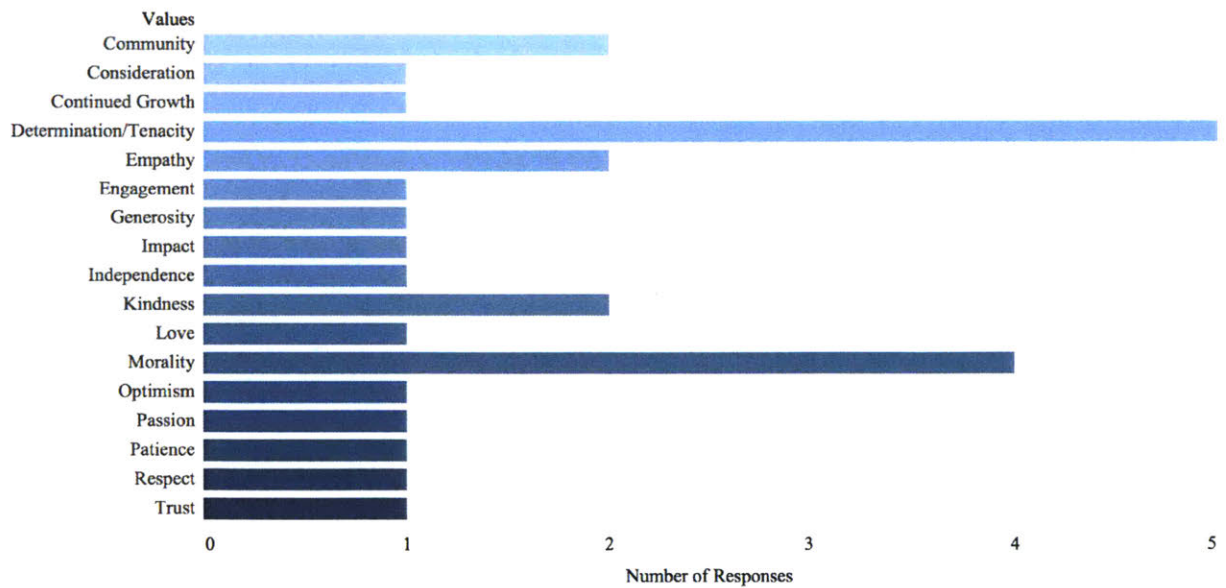
Figure 4-7: Figure 4-7a depicts the intended activity participation outside of work or graduate studies as stated by each interview participant. Figure 4-7b depicts the frequency at which each intended activity category was cited.

#### **4.1.4 Interview Values Results**

The final portion of each interview asked participants to state 2-3 values that generally motivate them throughout their day-to-day lives, not just in their decision to pursue engineering. The most cited personal value among the interview participant population was determination/tenacity, closely followed by morality.



(a)



(b)

Figure 4-8: Figure 4-8a depicts the personal motivational values as stated by each of the participants. Figure 4-8b depicts the frequency at which each personal value was cited.

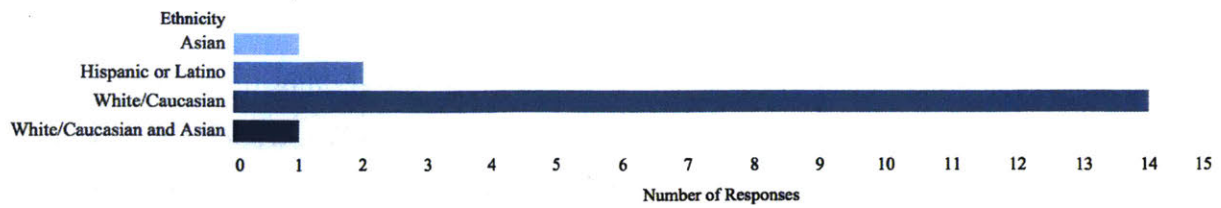
## 4.2 Survey Results

Eighteen engineering students responded to an online survey seeking to gather further insight into their personal motivations for becoming engineers. The respondent population encompasses a wide variety of engineering fields, class years, and ethnicities. Each of the respondents attends the Massachusetts Institute of Technology.

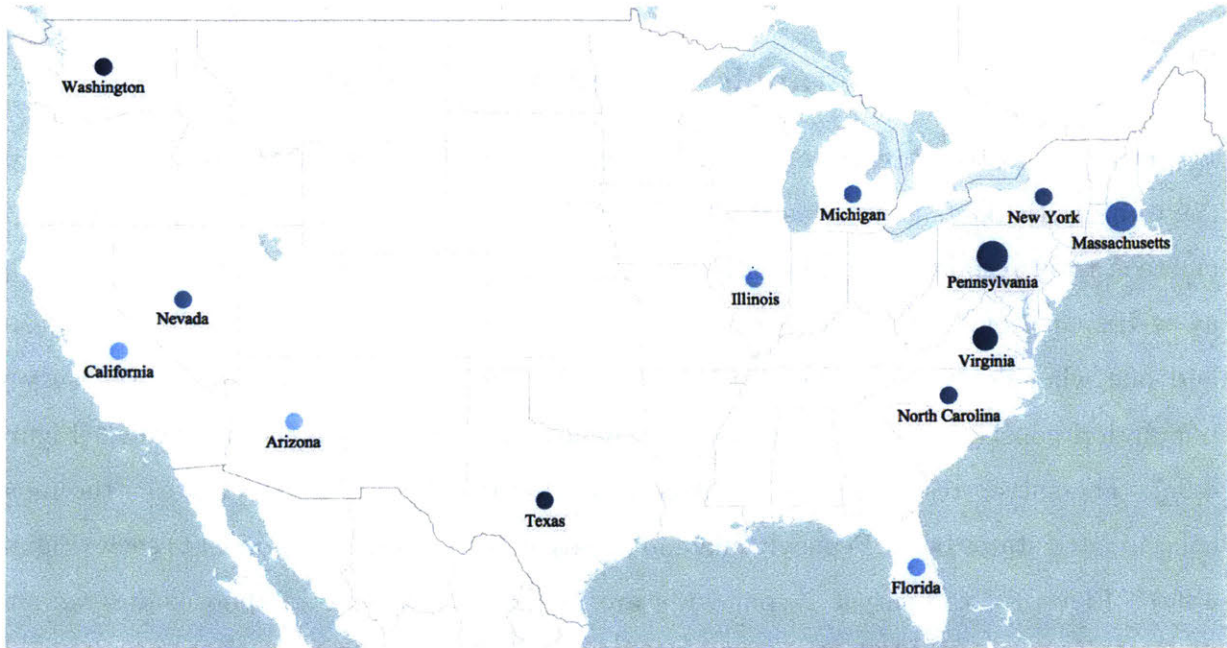
### 4.2.1 Survey Demographic Information Results

The ethnicity distribution from the survey response data set shows that a large majority of the total participants identify as White/Caucasian at a count of fourteen individuals out of eighteen total respondents. The other participants consist of two individuals who identify as as Hispanic or Latino, one who identifies as as Half Asian and Half White/Caucasian, and one who identifies as Asian (Figure 4-9a). The gender distribution of the survey population consists of five males, twelve females, and one non-binary individual (Figure 4-9c). The survey respondents come from many locations across United States - the most concentrated states being Pennsylvania and Massachusetts at three respondents each (Figure 4-9b). Eleven of the survey respondents are in their fourth year of their undergraduate degrees as part of the MIT Class of 2018, five belong to the MIT Class of 2019, one belongs to the MIT Class of 2020 and one belongs to the MIT Class of 2021(Figure 4-9d).

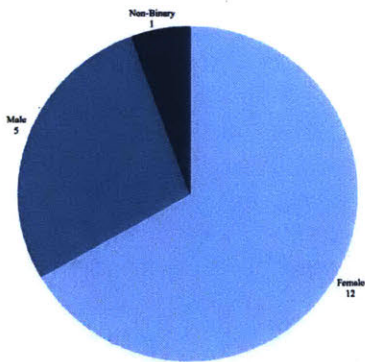




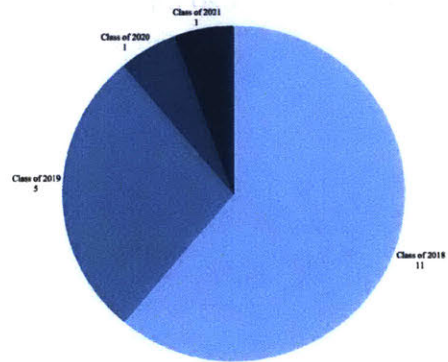
(a)



(b)



(c)



(d)

Figure 4-9: Of the eighteen survey respondents 14 identify as White/Caucasian, 2 identify as Hispanic or Latino, 1 identifies as half Asian and half White/Caucasian, and 1 identifies as Asian. Respondents represent 13 different states, and they are 66.7% female, 27.7% male, and 5.5% non-binary. Fourteen of the students are MIT Class of 2018, five are MIT Class of 2019, one is MIT Class of 2020, and one is MIT Class of 2021.



## 4.2.2 Survey Educational History and Personal Motivation Results

Each of the survey respondents answered questions pertaining to their educational history and personal motivations. These questions encompassed topics such as the participants chosen field of engineering and why they chose engineering as a career path in general. Of the eighteen survey respondents eleven study mechanical engineering, four study computer science and engineering, one studies nuclear science and engineering, one studies civil and environmental engineering, and one studies chemical engineering (Figure 4-10).

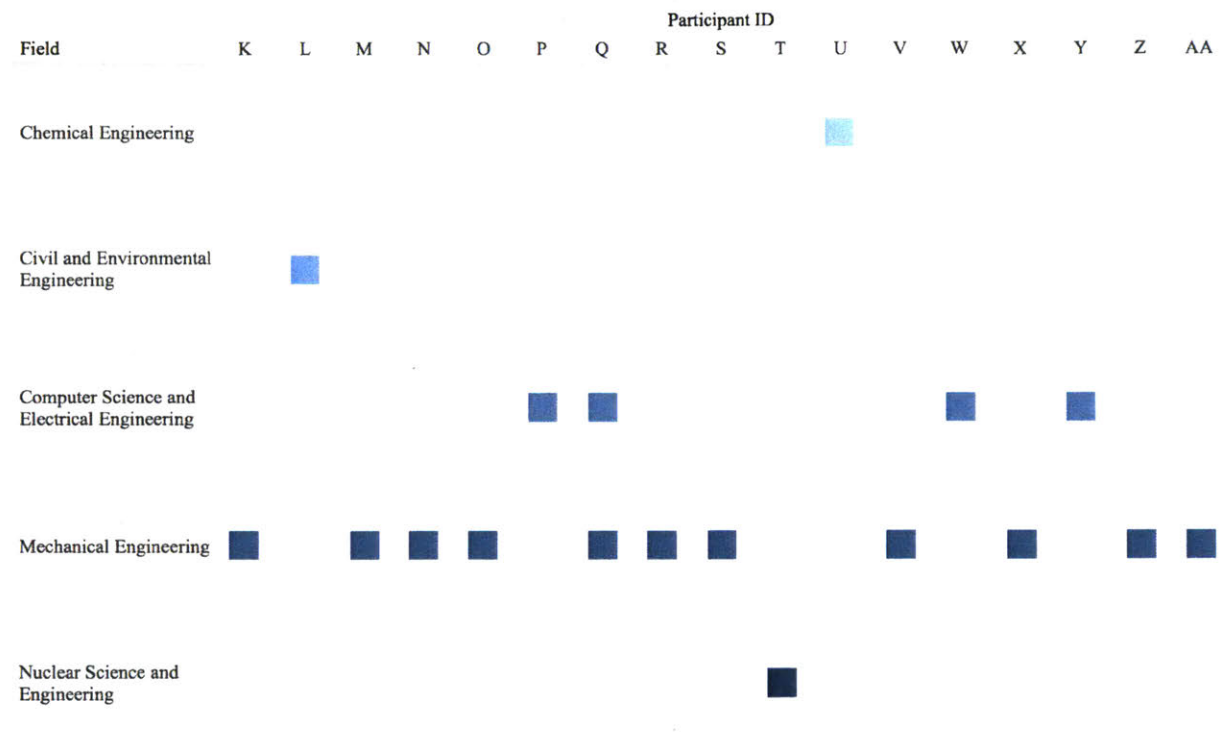
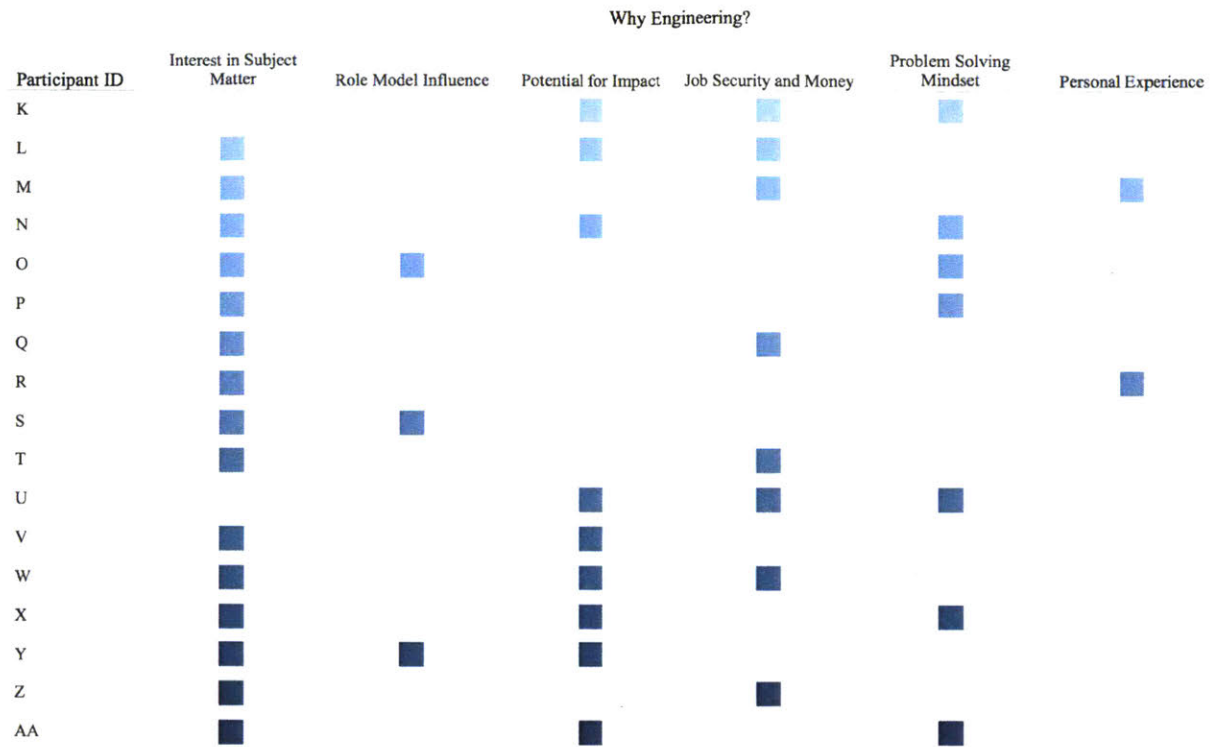
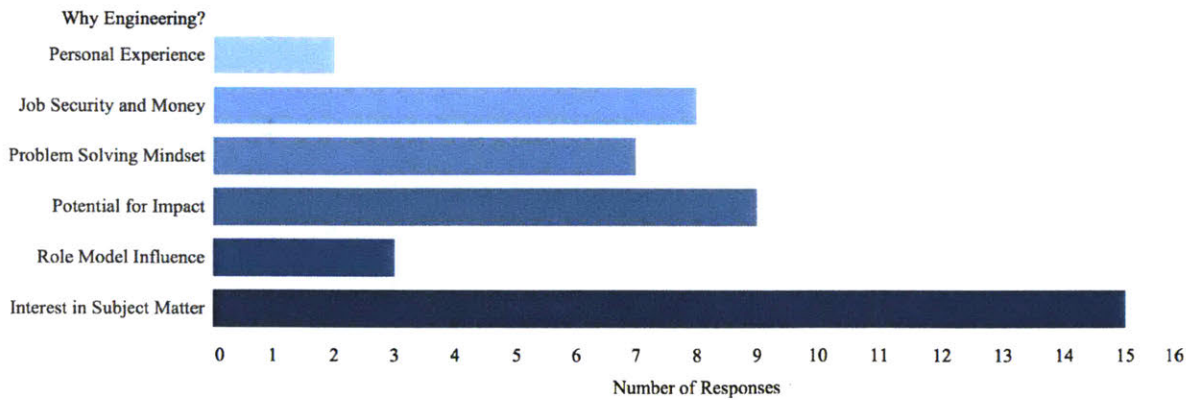


Figure 4-10: The survey respondent population includes 11 mechanical engineering students, 4 computer science and engineering students, 1 nuclear science and engineering student, 1 civil and environmental engineering student, and 1 chemical engineering student.

All of the survey respondents were tasked with writing 3-5 reasons why they chose the broader field of engineering as a career path. The most frequently cited response was, just as in the interview participant population, "Interest In Subject Matter" (Figure 4-11b).



(a)



(b)

Figure 4-11: The survey respondents were all asked to list 3-5 reasons why they chose engineering as a career path. Figure 4-11a shows responses as divided by interview participant, and Figure 4-11b shows the frequency at which each response category was cited.

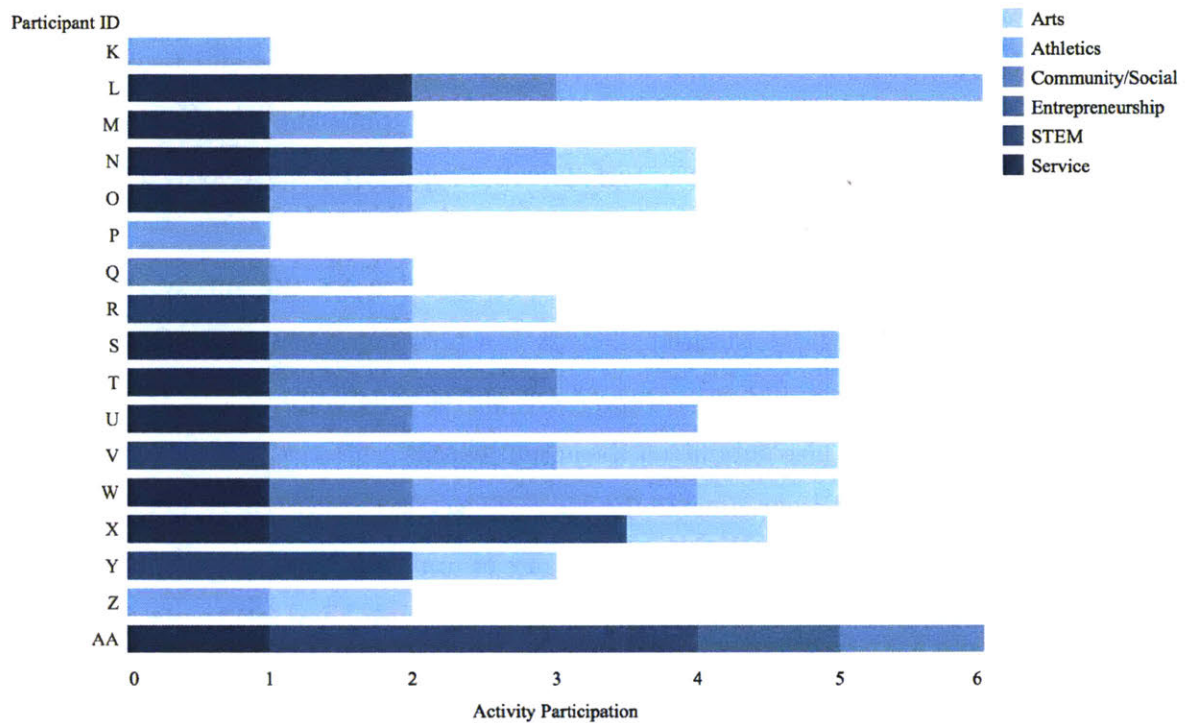
### 4.2.3 Survey Extra-Curricular Activities Results

One section of the survey was dedicated to extra curricular involvement. Survey respondents were asked what activities they participated in throughout high school and why they chose those activities, followed by what activities they participated/participate in during university. As a final question in this section, survey respondents submitted what activities they intend to participate in outside of their future work or graduate studies.

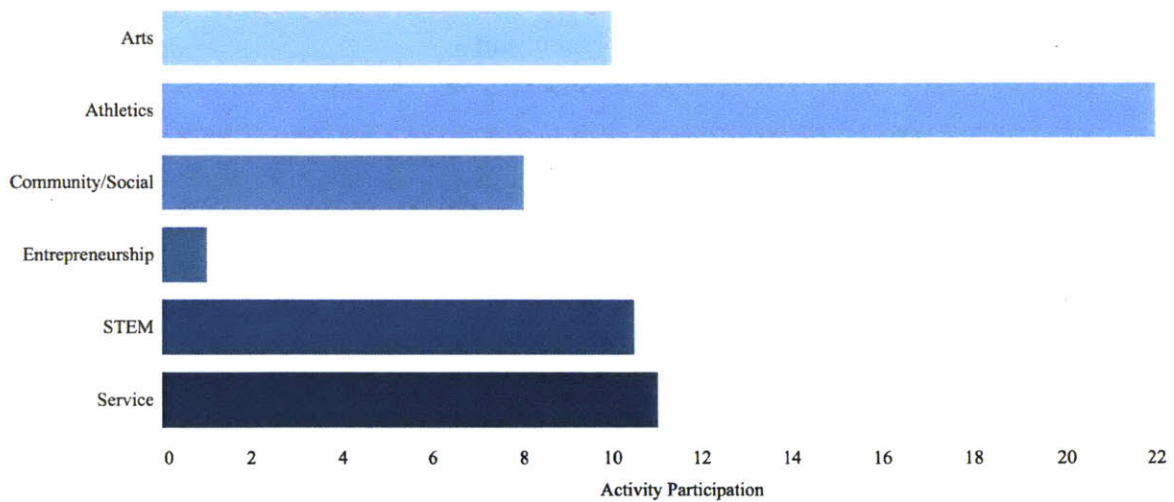
Figure 4-12 depicts the high school activity participation for the survey respondents. Broken into six categories, the most cited category in which survey respondents participated was athletics. The least cited activity category was entrepreneurship.

The survey respondents also submitted the activities they participated in or are currently participating in throughout their time at the Massachusetts Institute of Technology. Unlike in the high school category, the most cited category of university activity participation was community/social. The least cited university activity category among the survey responses entrepreneurship.

Finally, each survey respondent stated what activities they intend to participate in outside of their work or graduate studies in the future. The most cited intended activity category was athletics, and the least cited was entrepreneurship.

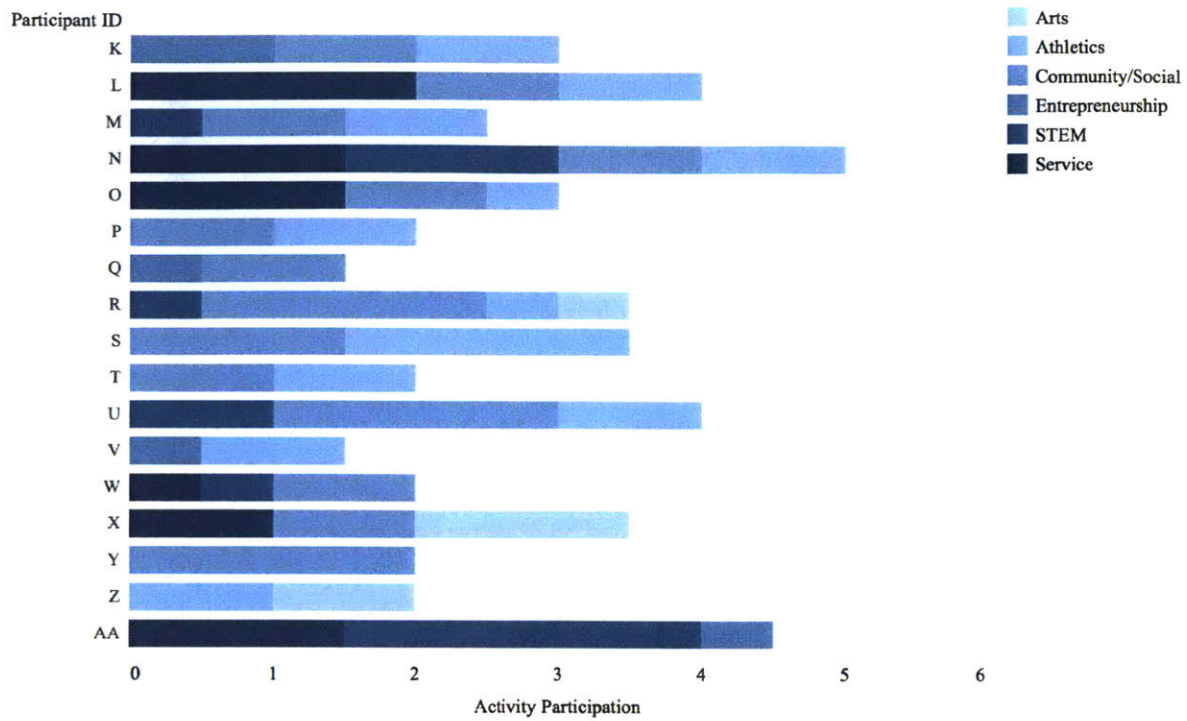


(a)

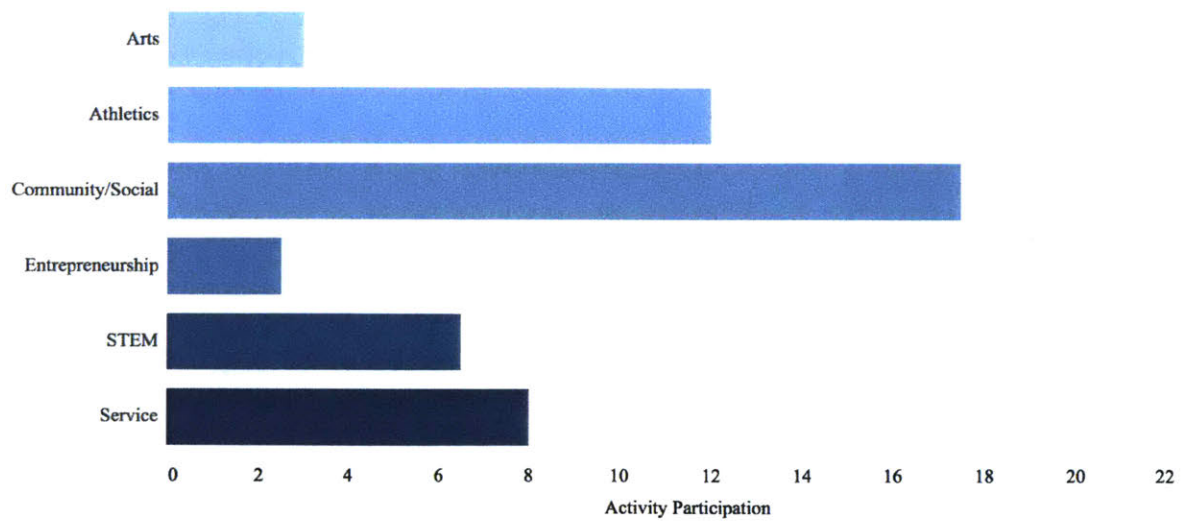


(b)

Figure 4-12: Figure 4-12a depicts the high school activity participation as stated by each survey respondent. Figure 4-12b depicts the frequency at which each high school activity category was cited.

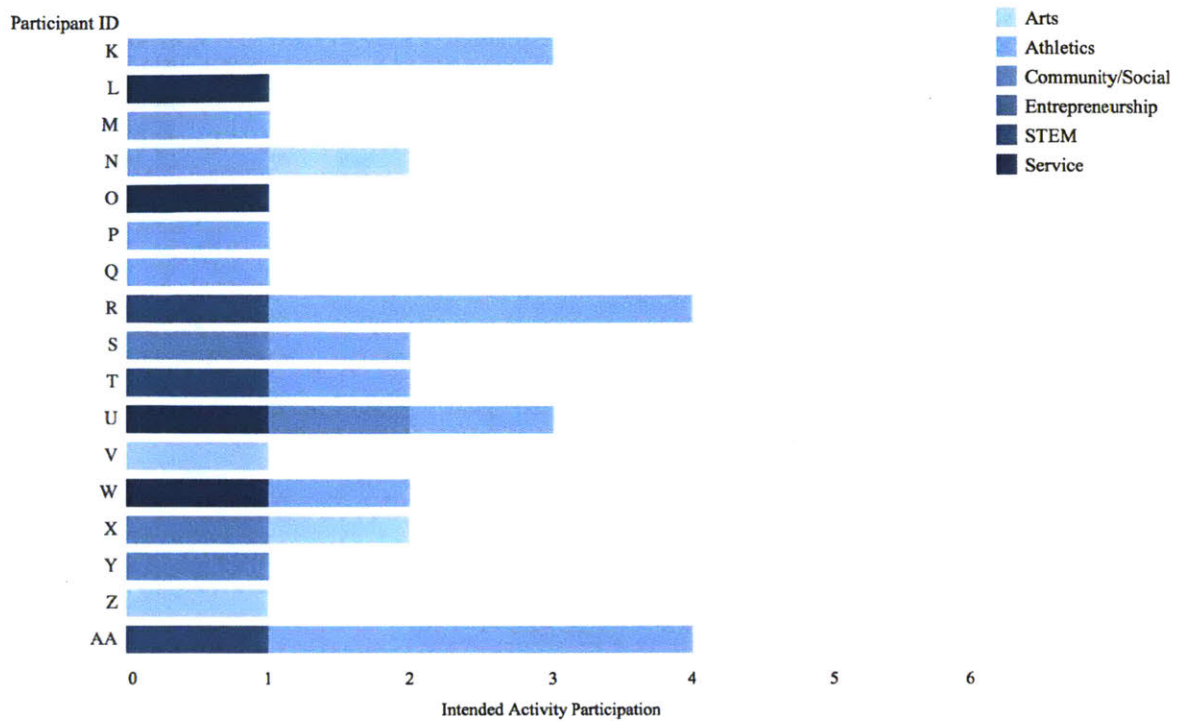


(a)

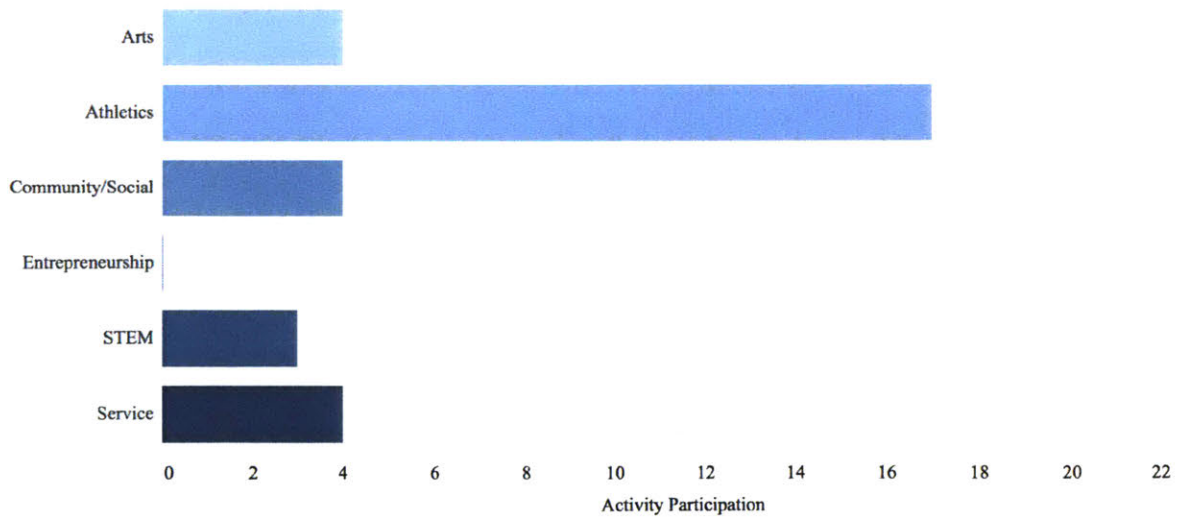


(b)

Figure 4-13: Figure 4-13a depicts the university activity participation as stated by each survey respondent. Figure 4-13b depicts the frequency at which each university activity category was cited.



(a)



(b)

Figure 4-14: Figure 4-14a depicts the intended activity participation outside of work or graduate studies as stated by each survey respondent. Figure 4-14b depicts the frequency at which each intended activity category was cited.

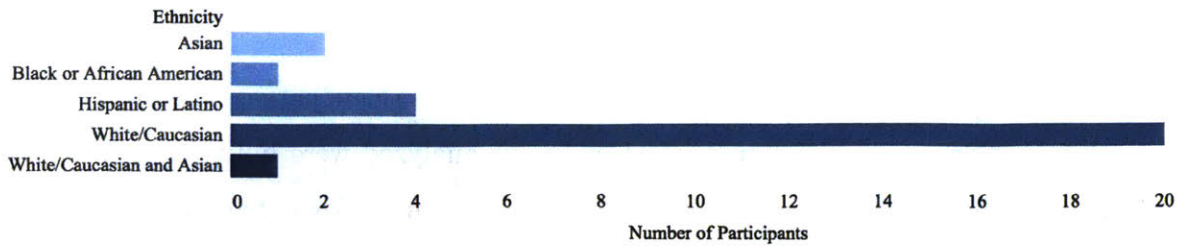
## 4.3 Combined Results

After looking at each of the data sets individually, the interview participant data and the survey response data were combined. The questions analyzed were limited to those built into the survey, as there were more questions asked in the interviews than in the survey.

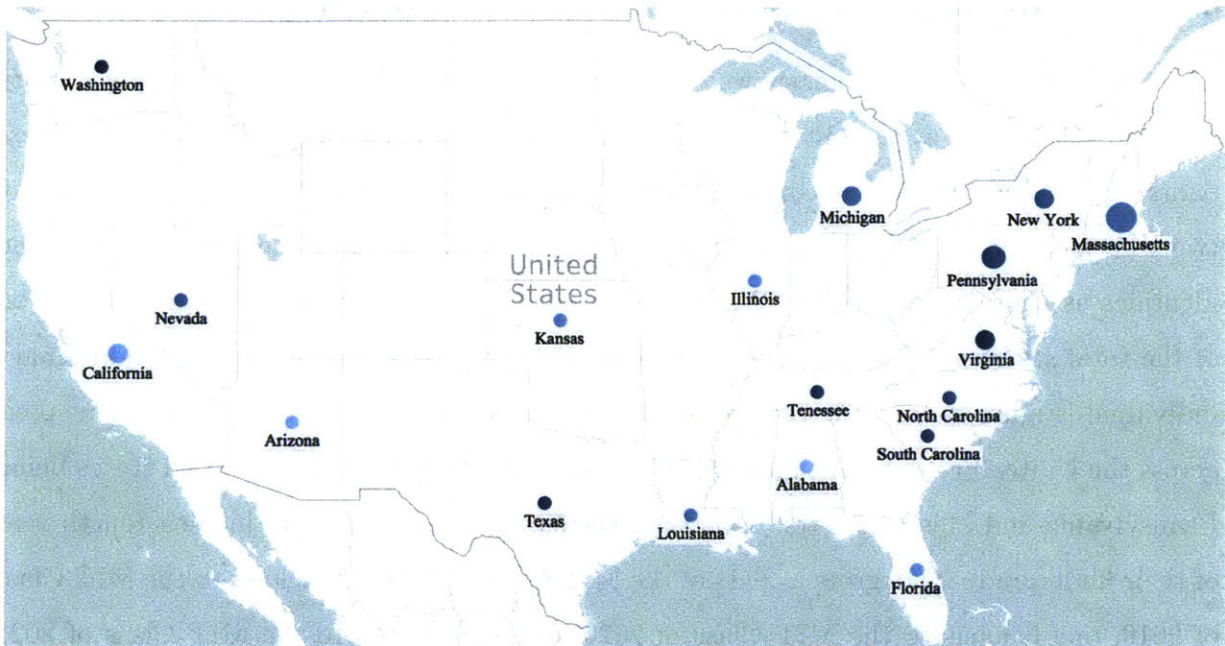
### 4.3.1 Combined Demographic Information Results

The total ethnicity distribution shows that a large majority of the study participants identify as White/Caucasian at a count of twenty individuals out of twenty-eight total study participants. The other participants consist of three individuals who identify as Hispanic or Latino, two who identify as Asian, one who identifies as Black or African American, and one who identifies as Half Asian and Half White/Caucasian (Figure 4-15a). The gender distribution of the total study population consists of eleven males, sixteen females, and one non-binary individual (Figure 4-15c). As you can see from (Figure 4-15b), the study population spans across the United States with eighteen states represented-the most concentrated states being Pennsylvania and Massachusetts. Twenty of the survey respondents are in their fourth year of their undergraduate degrees as part of the MIT Class of 2018, six belong to the MIT Class of 2019, one belongs to the MIT Class of 2020 and one belongs to the MIT Class of 2021 (Figure 4-15d).

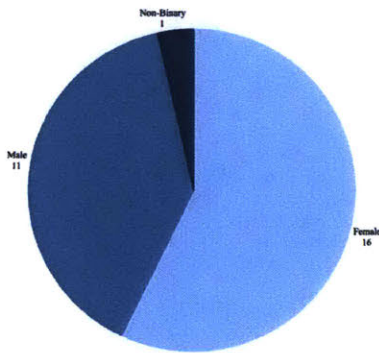




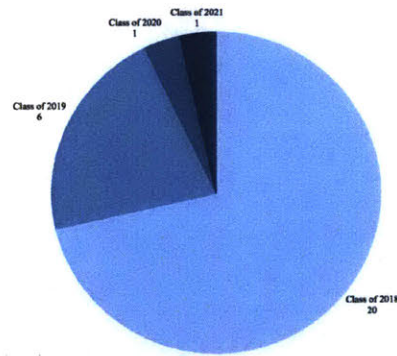
(a)



(b)



(c)



(d)

Figure 4-15: Of the 28 total participants, 20 identify as White/Caucasian, 3 identify as Hispanic or Latino, 2 identify as Asian, one identifies as Black or African American, and one identifies as half Asian and half White/Caucasian. The study population represents 18 different states, and it is 57% female, 39% male, and 4% non-binary. Twenty of the students are MIT Class of 2018, six are MIT Class of 2019, one is MIT Class of 2020, and one is MIT Class of 2021.



### 4.3.2 Combined Educational History and Personal Motivation Results

Each of the participants from both the interviews and the survey answered questions pertaining to their educational history and personal motivations. These questions encompassed topics such as the participants chosen field of engineering and why they chose engineering as a career path in general. Of the twenty-eight total participants, sixteen study mechanical engineering, five study computer science and engineering, two study material science and engineering, one studies aerospace engineering, one studies computer science and molecular biology, one studies nuclear science and engineering, one studies civil and environmental engineering, and one studies chemical engineering (Figure 4-16).

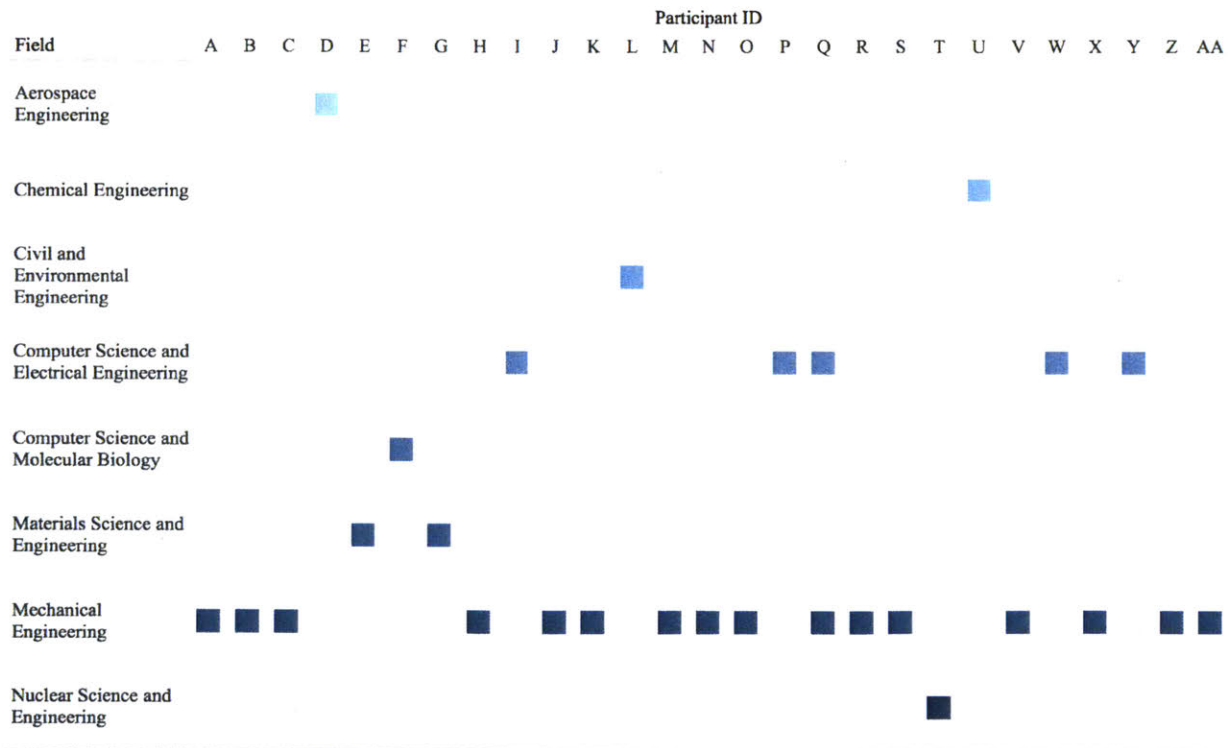
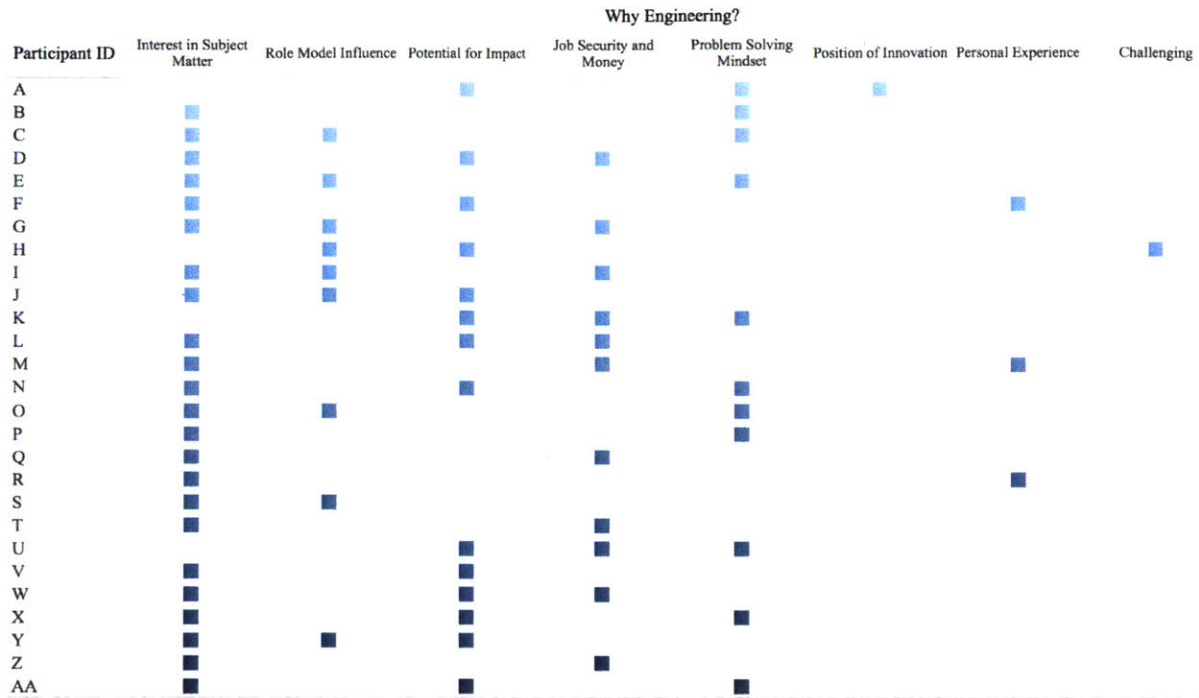


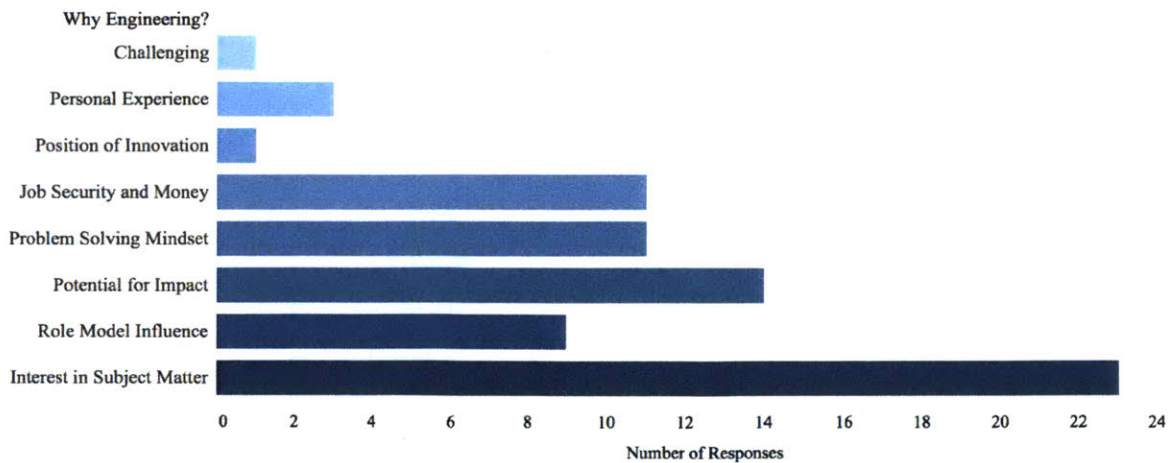
Figure 4-16: The total study population includes 16 mechanical engineering students, 5 computer science and engineering students, 2 materials science and engineering students, 1 aerospace engineering student, 1 computer science and molecular biology student, 1 nuclear science and engineering student, 1 civil and environmental engineering student, and 1 chemical engineering student.

All of the study participants were tasked with coming up with 3-5 reasons why they chose

the broader field of engineering to study. The most frequently cited response was "Interest In Subject Matter" at twenty-three responses out of twenty-eight total study participants (Figure 4-17b).



(a)



(b)

Figure 4-17: Each participant in the study was asked to list 3-5 reasons why they chose engineering as a career path. Figure 4-17a depicts the study responses as divided by participants, and Figure 4-17b shows the frequency at which each response category was cited.

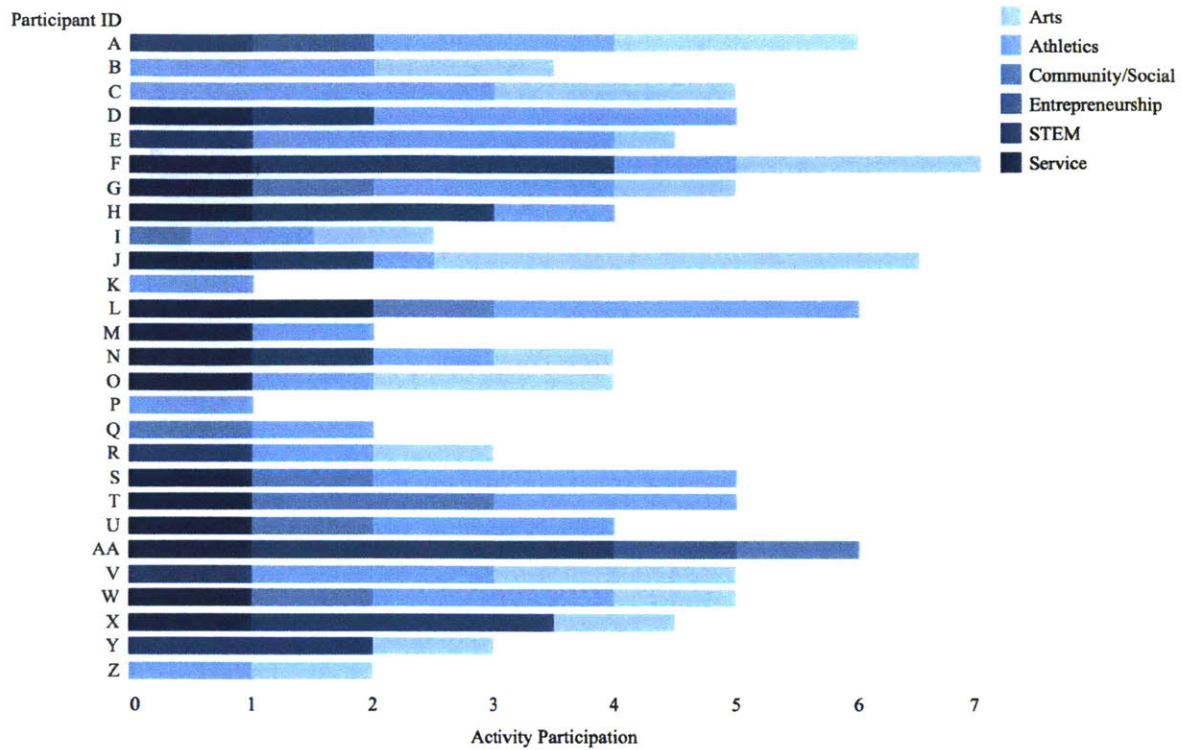
### 4.3.3 Combined Extracurricular Activities Results

All study respondents were asked what activities they participated in throughout high school and why they chose those activities, followed by what activities they participated/participate in during university. As a final question in this section, study participants were asked what activities they intend to participate in outside of their future work or graduate studies.

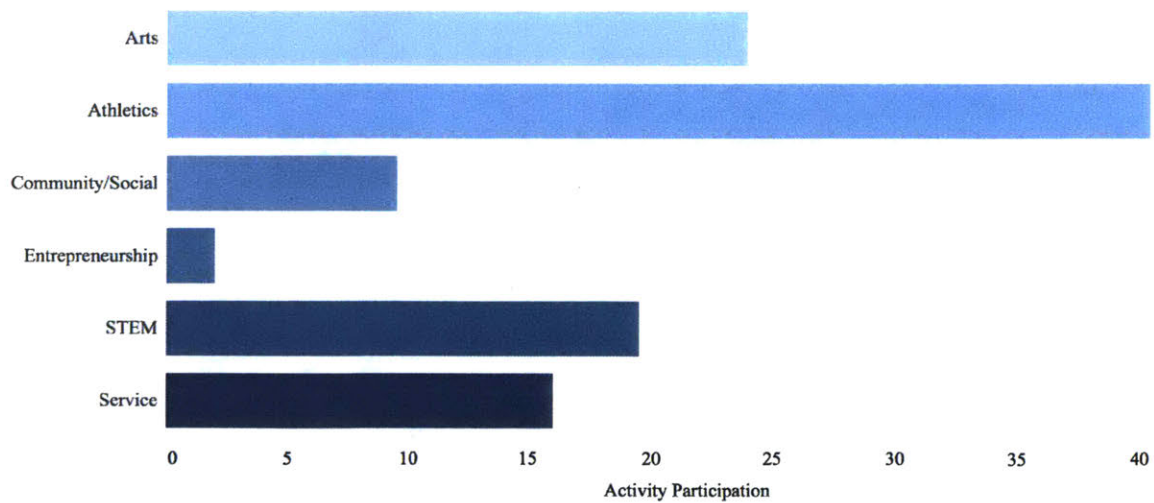
Figure 4-18 depicts the high school activity participation for all study participants. Broken into six categories, the most cited category in which survey respondents participated was athletics. The least cited activity category was entrepreneurship.

All study participants also disclosed the activities they participated in or are currently participating in throughout their time at the Massachusetts Institute of Technology. Unlike in the high school category, the most cited category of university activity participation was community/social. The least cited university activity category among the survey responses entrepreneurship (Figure 4-19b).

Finally, each study participant stated what activities they intend to participate in outside of their work or graduate studies in the future. The most cited intended activity category was athletics, and the least cited was entrepreneurship (Figure 4-20b).

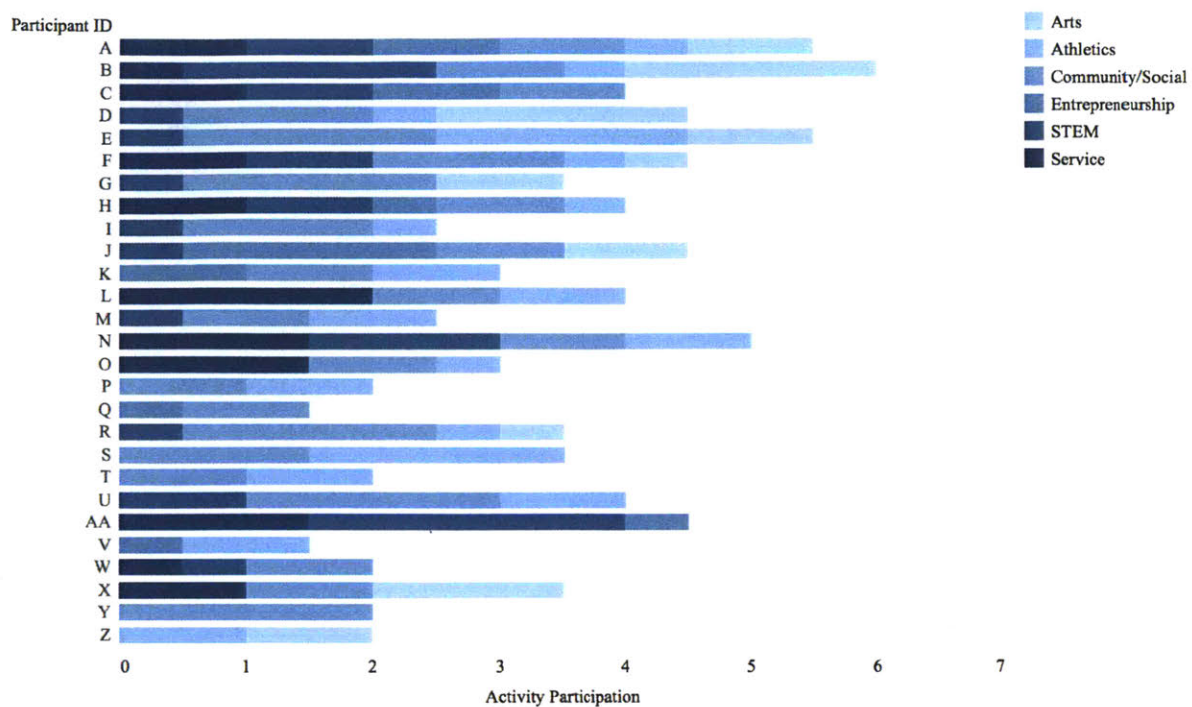


(a)

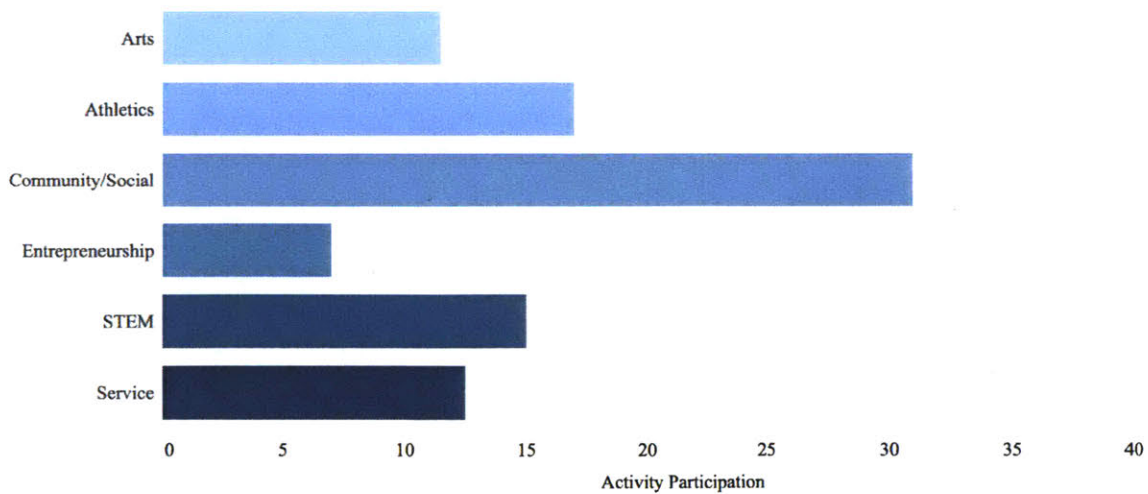


(b)

Figure 4-18: Figure 4-18a depicts the high school activity participation as stated by each study participant. Figure 4-18b depicts the frequency at which each high school activity category was cited.



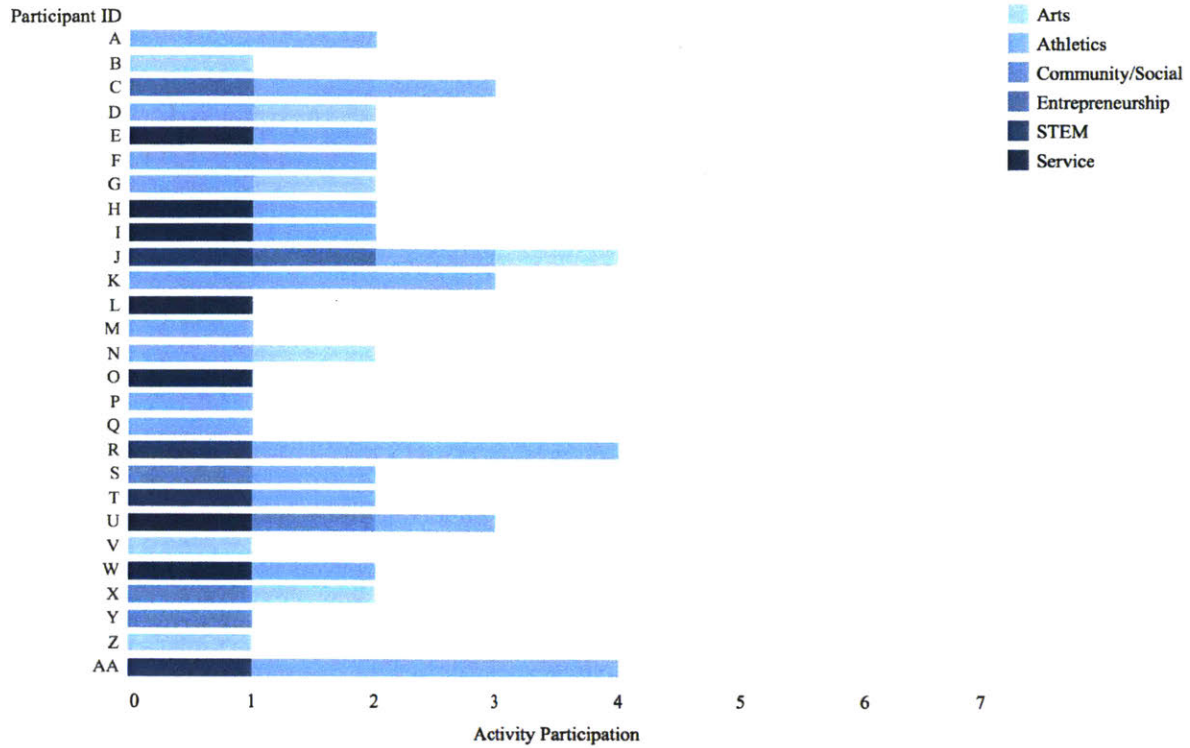
(a)



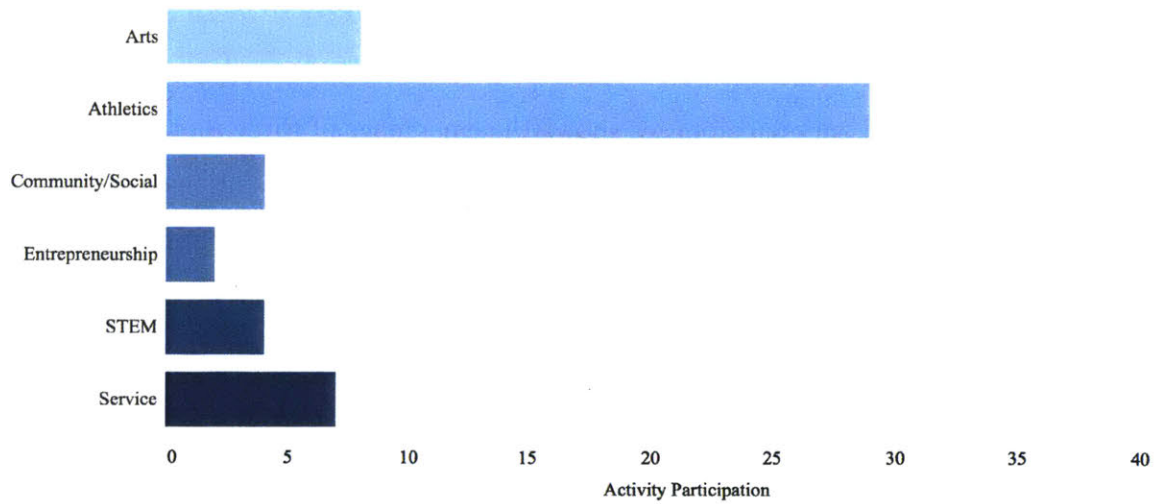
(b)

Figure 4-19: Figure 4-19a depicts the university activity participation as stated by each study participant. Figure 4-19b depicts the frequency at which each university activity category was cited.





(a)



(b)

Figure 4-20: Figure 4-20a depicts the intended activity participation outside of work or graduate studies as stated by each study participant. Figure 4-20b depicts the frequency at which each intended activity category was cited.

# Chapter 5

## Discussion and Conclusions

To gain further insight into why students choose engineering data sets from the interview participants and survey respondents were analyzed. Analysis served to look for patterns of behavior across the broader study population, as well as to see if any patterns exist within the underlying populations. These populations include gender, ethnicity, home location, chosen engineering field, and extra curricular involvement.

### 5.1 Three Types of Motivation

Analysis of interview and survey responses shows the emergence of three motivational categories in which all of the reasons for choosing engineering can be placed-Intrinsic Motivation, External Influence, and Extrinsic Motivation. Many students in the study population tend to hybridize these categories with their primary motivations aligning to one, but their decision-making processes being influenced by the two others.

#### 5.1.1 Intrinsic Motivation

The most frequently cited category for why study participants chose engineering was "Interest In Subject Matter"-the general attraction to the details and type of work involved in the engineering field. This category is an example of intrinsic motivation for choosing engineering. Students find self-satisfaction in the engineering disciplines and therefore they follow



that path. This is not to say that these students are acting in a self-centered way, rather they chose engineering because it is the path that brings them the most fulfillment.

"I love to build things...and I always just kind of knew that I was going to be a mechanical engineer. I like building mechanisms, and I like knowing a bit about a lot of different types of engineering, and I think mechanical engineering provides that opportunity most readily." - Participant C "I've definitely been moving towards problems that I'm interested in that excite me." - Participant G "[Engineering] is really hard, and I love working on hard problems." - Participant H

There are many types of intrinsic motivations for choosing engineering, but when diluted each of them has the same general principle of choosing engineering for the sake of self-fulfillment. The categories of this study that fall under intrinsic motivation are:

- Challenging
- Interest In Subject Matter
- Job Security and Money
- Problem Solving Mindset

### **5.1.2 External Influence**

The second most frequently cited category for choosing engineering was "Role Model Influence"- the notion that the influence of parents, teachers, and/or mentors contributed to the participant's wish to become an engineer. "Role Model Influence" is an example of external motivation, or, an influence that happened upon the student, not one that came out of their own decision making process. The external motivation category includes:

- Personal Experience
- Role Model Influence

"Personal Experience" belongs in the external motivation category as the experience influenced the participants from a place outside of their own decision making process. That said, "Personal Experience" was cited as explanation for multiple study participant's interest in the subject matter.

"[Engineering] is really hard, and I love working on hard problems." - Participant H

"My dad is an engineer, and he's always been an inspiration to me-the way that he explains things and looks at the world." - Participant H

### 5.1.3 Extrinsic Motivation

Aside from role model influence, an important category but external to the engineers influence, the next most cited category was "Potential for Impact." This category comes from the notion that students decide to pursue engineering because of the opportunity to create large-scale, lasting social impact. "Potential for Impact" is an example of an extrinsic motivation for choosing engineering—the students that cited this category consider choosing engineering to give them a high level of ability to change the lives of other people around the world.

"I realized that I wanted to do international development work, and for me the best and most effective way to do that was to find a career where instead of doing things for other people I had skills that I could use to empower other to do for themselves. And I found mechanical engineering to be the most conducive to that for me in terms of being able to teach people and affect change on a broader scale." - Participant A

"I truly believe that engineering can have the most impact on the most people in the long term." - Participant H

"I think it helps that [I] can see real world impact of [my] work. I am a really firm believer that STEM [science, technology, engineering, and math] is a tool for changing the world to be better." - Participant F

"I realized I kind of hate research because it doesn't feel motivated by anything except maybe your own intrinsic curiosity, and I like things that solve a problem more than answer a question." - Participant F

One participant stated that engineering puts them in a position of innovation-one where they can create new products and develop new ideas. They then proceeded to state how they could use their position of innovation to better their communities. The response categories that make up the extrinsic motivation category are:

- Position of Innovation
- Potential for Impact

### 5.1.4 Hybridized Motivation

Because all study participants were asked to state more than one reason why they chose engineering, namely three to five, twenty-two out of the twenty-eight participants hybridized at least two of the aforementioned broader motivational categories in their reasoning (Figure 5-1).

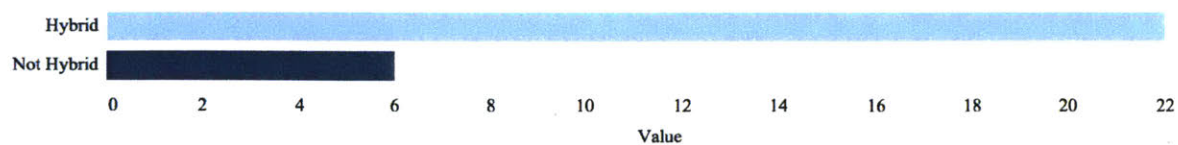


Figure 5-1: 22 of the 28 participants stated a hybrid of two or more of the broad motivational activities when giving their 3-5 reasons for choosing engineering as a career path.

Within the hybrid responses, some are intrinsic/external, some intrinsic/extrinsic, and some external/extrinsic. Three participants responded with statements that included all three categories. The most frequent type of hybridization from the study population was a combination of intrinsic/extrinsic-these participants cited both their love of the subject

matter and problem solving mindset as well as their aspirations to create lasting impact as main factors contributing to their decisions to become engineers (Figure 5-3).

Though it stands that many factors influenced the participants' decision-making processes, and a large majority of the study population gave hybridized responses when prompted to list 3-5 reasons why they chose engineering, each of the participant's primary reasons can be categorized as intrinsic, external, or extrinsic (Figure 5-2).

Six of the study participants gave their 3-5 responses for why they decided upon engineering in only one of the three broad motivational categories-and all six of these responses count as intrinsic motivation (Figure 5-4).

Almost all of the study participants stated reasons for choosing engineering as a career path that fall within two or more of the broader categories Intrinsic Motivation, External Influence, and Extrinsic Motivation. The frequency at which respondents hybridized their answers, 78.5%, shows that for most aspiring engineers many types of factors are involved in the decision making process (Figure 5-1).

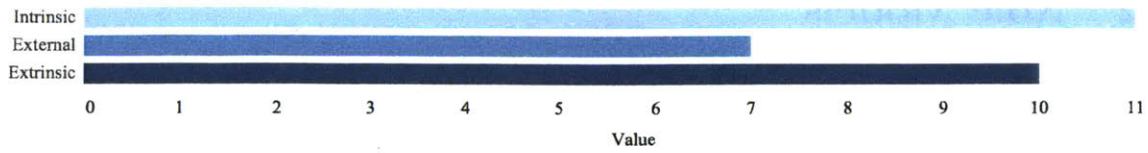


Figure 5-2: Of the 22 participants that stated hybridized motivations 12 responded within the intrinsic/extrinsic category, 7 responded within the intrinsic/external category, three responses encompassed all three categories, and 0 responded with a combination of external/extrinsic.

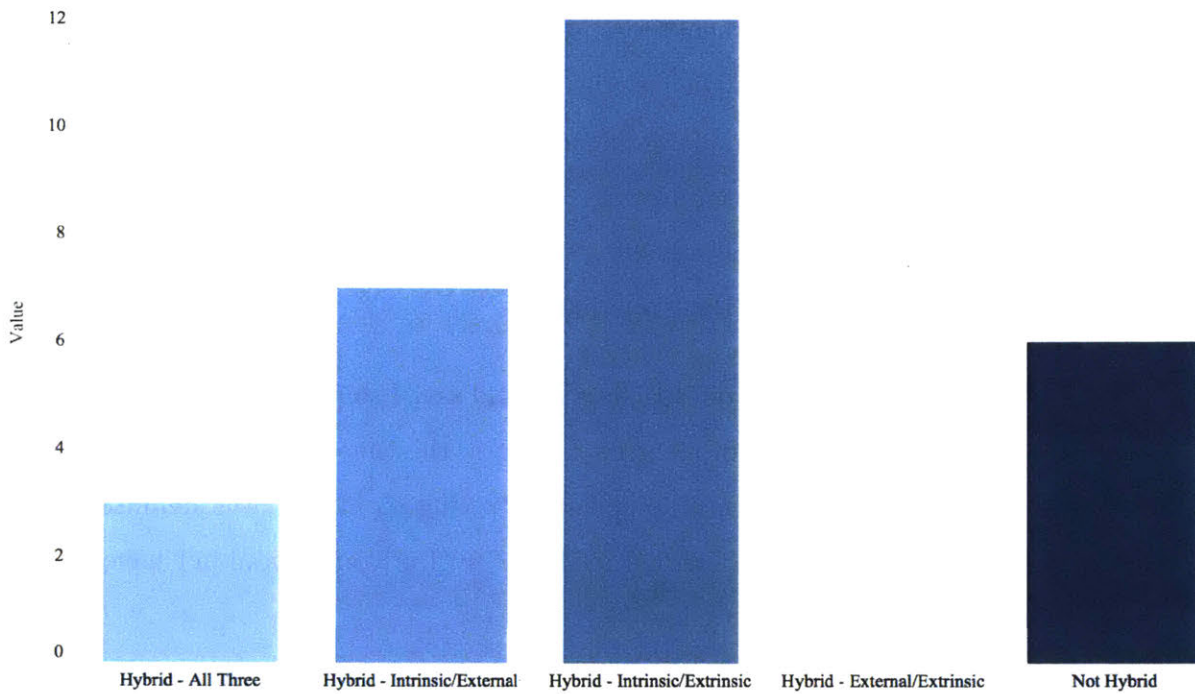


Figure 5-3: Of the 22 participants that stated hybridized motivations 12 responded within the intrinsic/extrinsic category, 7 responded within the intrinsic/external category, three responses encompassed all three categories, and 0 responded with a combination of external/extrinsic.

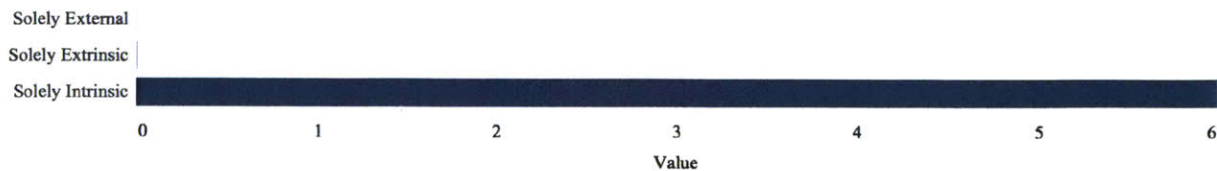


Figure 5-4: Of the 22 participants, only 6 of the study participants gave that only fell within one broad motivational category-and all 6 of these responses belong to intrinsic motivation.

## 5.2 Role Models

Of the twenty-eight total study participants, nine cited role model influence when submitting their 3-5 reasons for choosing engineering (Figure 4-4b). These participants had parents, teachers, and/or mentors throughout high school and the college application process that encouraged their pursuit of engineering.

Though only nine of the study participants cited role model influence as a major contributor to their decision to choose engineering, almost all of the participants cited some sort of role model influence—whether in their response to why they chose MIT, why they chose engineering, or why they chose to participate in specific extracurricular activities. Furthermore, some participants cited role model influence as part of their decision making process for choosing their specific field of engineering. Lastly, when interview participants were asked which classes they enjoyed most and why, some cited role model influence—particularly naming the professor of the class as their role model.

"I just had a lot of very influential teachers I would say. I think some things I got into were because I had a lot of mentors who took the time and effort to make me care. For me, that was how I ended up applying to MIT—it was definitely because some of my teachers thought I could get in, I probably wouldn't have if they didn't push me to." - Participant F

"My parents studied computer science so they encouraged me to code. They taught me how to program and I got really into it." - Participant F

"Both of my parents are engineers, so I kind of knew I wanted to be an engineer." - Participant G

"2.006 [was one of my favorite classes] because my professor was absolutely amazing, I loved him, and it was without a doubt the hardest class I've ever taken at MIT, but I just learned so much." - Participant H

"My dad is an engineer, and he's always been an inspiration to me-the way that he explains things and looks at the world." - Participant H

"I didn't really think of [MIT] as an option until one of the college counselors at my high school said 'oh this seems like a school you'd have a shot at getting into, you should look into it.'" - Participant I

"I think the instructor was really good...[he] influenced my decision to concentrate in economics. He was the most engaging lecturer I've ever had, and I didn't care what he was teaching I was going to take his classes." - Participant I

"Math and science teachers at some point in my high school career mentioned engineering to me, both my parents are engineers and they also kind of mentioned it." - Participant E

With the frequency at which each of the interview participants cited role model influence as a contributing factor to multiple important decisions they have had to make throughout their lives, it shows that adults play a large role in the decision making processes of young students, and that many engineers choose engineering because of the role models in their lives.

## **5.3 Extra Curricular Activities**

### **5.3.1 High School Activities**

Part of the interviews and survey asked participants to state which activities they participated in throughout high school and why. The responses gathered here showed that widest range of types of activity involvement occurred in high school (Figure 4-18b). Twenty-six out of twenty-eight study participants involved themselves in activities that fell within two or more of the six defined activity types.

An interesting note, many study participants joined activities in high school because they

knew others in the activities. This involvement in extracurricular activities for no reason other than knowing people in the activity was most cited within the high school section.

"I wrote for the school newspaper because it was pretty low commitment and I liked hanging out with my friends there." - Participant I

"I did the things that were interesting to me, and that my friends were in."  
- Participant G

"I joined theatre because I had a lot of friends in the theatre group, and so it was kind of an easy in for me-especially joining an activity I didn't know if I was going to like or not." - Participant B

### **5.3.2 University Activities**

Coming into university with little-to-no prior connections with people, many study participants chose their activities more intrinsically rather than choosing based on who they knew in the activities. Along these same lines, many study participants sought out community/social based activities to participate in throughout their university careers. This can be seen by the stark increase in community/social activity involvement from 9.5 in high school to 31 in university (Figure 4-18b, Figure 4-19b).

"I have done mostly community based things in college. I like to get involved in the communities I care about, I guess to look out for [my] own people." - Participant G

Another notable difference between high school activity participation and university activity participation is the decrease in number of extracurricular activities taken on per participant. The total number of activities cited for the high school section was 111.5, and the total number of university activities was 94 (Figure 4-18b, Figure 4-19b). This can be contributed to the increase in difficulty of the schoolwork in university-study participants stated that school work became more time intensive in university.



### 5.3.3 Intended Post-University Activities

The last section of the extra curricular portions of the interviews and survey asked participants to consider which activities they intend to participate in outside of their future work or graduate studies. One of the most notable findings from this section are that all but seven study participants stated their intention to participate in athletic activities in the future (Figure 4-20b). The other notable finding from the intended post-university section is the stark decrease in STEM based extra-curricular activities. When asked, many interview participants stated that since they will be focusing so heavily on engineering and STEM based projects in their professional lives they feel less need to occupy their free time with STEM activities.

## 5.4 Job Security and Money

As the technology and innovation grow in importance for society, so does the need for engineers. This high demand means that studying engineering in university will likely lead to a full time job that pays more than the average salary in the United States. For many engineering students the promise of job security and cash inflow is enough to draw them to choose engineering. Within the broad promise of job security and money, though, two distinct categories emerged. Of the eleven activity participants who cited job security and money as an attractor to the engineering field, five noted the desire to support a certain personal lifestyle as the driving factor, and six noted the desire to support their family or community as the driving factor.

"I love theatre, but I just never considered theatre as an option because you just cant get jobs doing it" - Participant G

"One thing I've always wanted is financial independence, such that I can maintain a comfortable amount of leisure along with my work. Like, being able to do what I want to do comfortably. And engineering is profitable, so that is something I do take into consideration when choosing a job or which opportunities I am going

to take. Its not the top, but its definitely a factor for me." - Participant D

"Ill take into account that I will make more money in a specific job, because then I will be able to better support my people" - Participant G

## 5.5 Gender and Motivation

After taking each study participant's top ranked reason for choosing engineering as a career path and determining whether it was intrinsically motivated, extrinsically motivated, or externally influenced analysis was done to find patterns among the different sub-populations within the total study population. One prevalent finding was discovered through this analysis in that of the sixteen female study participants, nine cited extrinsic motivations such as potential for impact or position of innovation as their main attractor to the engineering field. Conversely, of the eleven male participants zero cited extrinsic motivations to be their main attractor. (Figure 5-5. Instead, eight cited intrinsic motivations and three cited external influences. This finding aligns directly with the gender distribution for MIT's D-Lab, a program that focuses on creating impact in the developing world.

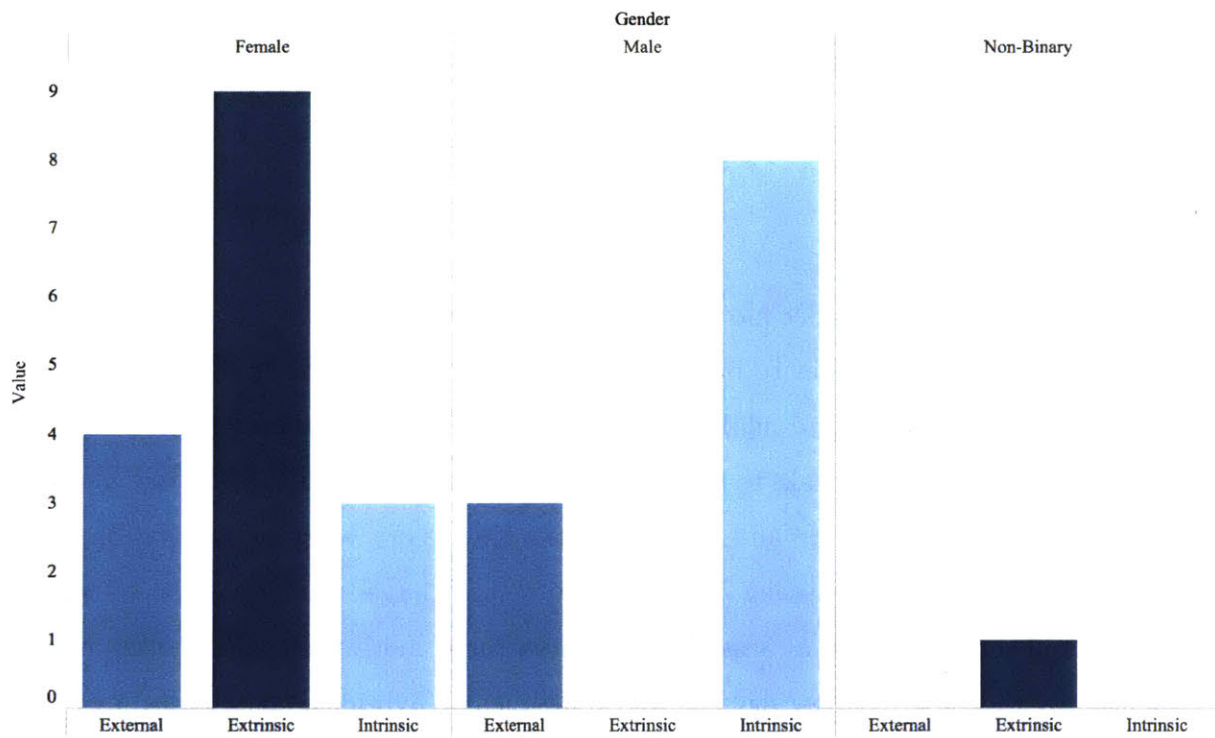


Figure 5-5: Of the 16 total female study participants, 9 cited extrinsic motivations such as potential for impact and position of innovation as their main reason for choosing the engineering career path. At a stark contrast, of the 11 total male study participants, 0 cited extrinsic motivations.

## 5.6 Personal Values

When interview participants were asked what their personal values and general motivations are, determination/tenacity was the most cited (Figure 4-8b). When speaking to their beliefs in determination/tenacity, many participants stated that the engineering disciplines almost require determination/tenacity within their successful populations. The interview participants did not, however, state that they want to become more tenacious since joining the engineering field-rather that they recognize that engineering requires more determination than other fields, and that they have been successful in the field due to their own personal value of determination/tenacity.

### 5.6.1 Conclusions

There are three types of broader motivational categories that influence aspiring engineers in their decision-making processes to become engineers. The first, intrinsic motivation, comes from the student's desire to find fulfillment through their interest in the subject matter. The second, external influence, speaks to the factors exterior to the student such as role models or personal experiences. The third and final motivational category, extrinsic motivation, comes from students choosing engineering as a pathway to enact large-scale impact on society.

Many students hybridize at least two of these three motivational categories in their reasoning for choosing engineering. The most frequently hybridized categories are intrinsic/extrinsic, showing that many aspiring engineers wish to have lasting social impact and find engineering to be a well-suited platform due to their interests in engineering subject matter.

Role models play a huge part in the decision-making processes of young students. Many of the study participants cited the influence of role models in their decision to attend MIT, to choose their specific field of engineering, and to choose the broad field of engineering in general. Furthermore, role models have continued to play a part throughout university as many students look to their favorite professors for guidance.

Study participants were a part of the most, and widest variety of, extra curricular activities when they were in high school. The decrease in activity involvement from high school

to university can be attributed to university academics being more time intensive.

Furthermore, participants joined activities in high school because they knew others in those activities. This behavior halted in university, however, as students knew little-to-no people at MIT upon arrival. Instead of joining activities because of existing relationships, most study participants joined activities to create new relationships as seen by the large increase in participation within the community/social category.

When asked about intended activity participation for outside of future work or graduate studies, most study participants stated their intent to participate in some sort of athletic activity. Study responses also showed a significant decrease in intended STEM participation, explained by participants plans to focus on STEM projects within their future jobs or graduate studies.

Many survey participants cited job security and money as a major factor in their decision to choose engineering. Within the broad category two sub-categories emerged: some students want job security and money in order to pursue a desired personal lifestyle, others want job security and money in order to support their families and communities.

When looking at the distribution of those who cited intrinsic, external, and extrinsic motivations for choosing engineering, the gender distribution is not even. Of the sixteen women participants eleven cited extrinsic motivation such as potential for impact or position of innovation as being their top most driving factor for choosing engineering. Conversely, of the eleven males that participated in the study, none cited extrinsic motivations.

Within interview population the most cited personal value was determination/tenacity - the act of deciding definitely and firmly, persistent in maintaining, adhering to, or seeking something valued or desired. This is an important quality for young engineers as the field is demanding and requires a high level of determination to achieve success.

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- [5] *Dictionary by Merriam-Webster*.

# Appendix A

Below is a collection of quotes taken from the interviews conducted during this study.

"I've always been really interested in chemistry. Bonding atoms, anything like chemical bonds and equations were always super interesting to me." - Participant G

"I've definitely been moving towards problems that I'm interested in that excite me." - Participant G

"I did grow up with my parents stressing that engineering is important and problem solving is important." - Participant G

"I think it helps that [I] can see real world impact of [my] work. I am a really firm believer that STEM [science, technology, engineering, and math] is a tool for changing the world to be better." - Participant F

"I love theatre, but I just never considered theatre as an option because you just cant get jobs doing it" - Participant G

"I was a freshman in high school, I didn't have many decision making processes." - Participant F

"I just had a lot of very influential teachers I would say. I think some things I got into were because I had a lot of mentors who took the time and effort to make me care. For

me, that was how I ended up applying to MIT-it was definitely because some of my teachers thought I could get in, I probably wouldn't have if they didn't push me to." - Participant F

"I did the things that were interesting to me, and that my friends were in." - Participant G

"I have done mostly community based things in college. I like to get involved in the communities I care about, I guess to look out for [my] own people." - Participant G

"I realized I kind of hate research because it doesn't feel motivated by anything except maybe your own intrinsic curiosity, and I like things that solve a problem more than answer a question." - Participant F

"I like to see that the work that I'm doing, or anything that I'm doing, is really impactful." - Participant G

"I'll take into account that I will make more money in a specific job, because then I will be able to better support my people." - Participant G

"My parents studied computer science so they encouraged me to code. They taught me how to program and I got really into it." - Participant F

"Both of my parents are engineers, so I kind of knew I wanted to be an engineer." - Participant G

"The reason I chose mechanical engineering was not only did I love the cool theory that was behind it, but I also really enjoyed seeing how things worked in the real world on a large scale." - Participant H

"2.006 [was one of my favorite classes] because my professor was absolutely amazing, I loved him, and it was without a doubt the hardest class I've ever taken at MIT, but I just



learned so much." - Participant H

"My dad is an engineer, and he's always been an inspiration to me-the way that he explains things and looks at the world." - Participant H

"[Engineering] is really hard, and I love working on hard problems." - Participant H

"I truly believe that engineering can have the most impact on the most people in the long term." - Participant H

"My parents have always been a huge influence on me, in guiding me towards a more righteous path or whatever you want to call it. I definitely think my parents were a huge influence on me doing service, and getting involved with the local community and causes that were important to me." - Participant H

"Camp Kesem is a summer camp for children whose parents have been affected by cancer. It is run by MIT student volunteers...Its my number one thing that I am most proud of doing at MIT." - Participant H

"I continue to pour so much of my time because it is these kids and the other counselors that are involved in CK that breathe life into my mind, into my heart, and essentially give me a reason to smile every day. And besides that, I learned so much about morality and about how to live your fullest life through these campers. I definitely think that these are the most resilient people I have ever met in my entire life. I know that Camp Kesem is a family for all of us, and I want to make as big and moving impact on the campers as I can. So being able to be a part of the organizing body for this organization I know that I can have that impact. I just do it because I want these kids to be able to grow up and live their fullest lives, because they have shown me how to live my life to the fullest." - Participant H

"I realized that I wanted to do international development work, and for me the best and

most effective way to do that was to find a career where instead of doing things for other people I had skills that I could use to empower other to do for themselves. And I found mechanical engineering to be the most conducive to that for me in terms of being able to teach people and affect change on a broader scale." - Participant A

"An engineering education is incredibly valuable because of the way you learn to solve problems." - Participant B

(Regarding which high school extracurricular activities they participated in) "Oh god, all of them!" - Participant A

"I joined theatre because I had a lot of friends in the theatre group, and so it was kind of an easy in for me-especially joining an activity I didn't know if I was going to like or not." - Participant B

"Making others happy is the most organic way to be happy yourself." - Participant B

"Math and science teachers at some point in my high school career mentioned engineering to me, both my parents are engineers and they also kind of mentioned it." - Participant E

"I probably wouldn't have [become an engineer] because I wouldn't have really considered it. I wouldn't have known what it was or thought to look into it." - Participant E

"I figured if I was going to be studying something for 3-4 years it should be something I am interested in learning about." - Participant E

"I didn't really think of [MIT] as an option until one of the college counselors at my high school said 'oh this seems like a school you'd have a shot at getting into, you should look into it.'" - Participant I

(regarding his favorite class) "I think the instructor was really good...[he] influenced my decision to concentrate in economics. He was the most engaging lecturer I've ever had, and I didn't care what he was teaching I was going to take his class[es]." - Participant I

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"One thing I've always wanted is financial independence, such that I can maintain a comfortable amount of leisure along with my work. Like, being able to do what I want to do comfortably. And engineering is profitable, so that is something I do take into consideration when choosing a job or which opportunities I am going to take. Its not the top, but its definitely a factor for me." - Participant D

"I feel being an engineer impacts people beyond just myself. While I do enjoy working on it, and the thrill of being an engineer is a very personal thing to me, [I am able] to affect the other people around me. So I feel like I have an impact on [a] larger community." - Participant D

"My family traveled a lot when I was a kid, my dad had jobs in multiple areas so we flew a lot-and I've always thought that planes are really cool." - Participant D

(In response to if he would have chosen aerospace if he had not flown so much as a child)

"Actually probably not, because planes just became a very comfortable thing for me to do...If I didn't have that initial base interest in the idea of being in the air, then I don't think I would have [chosen] aerospace." - Participant D

"I wanted to become an engineer as soon as I learned what the word engineer meant, and I knew I wanted to do that sort of stuff with my life much before that even." - Participant C

"I love to build things...and I always just kind of knew that I was going to be a mechanical engineer. I like building mechanisms, and I like knowing a bit about a lot of different types of engineering, and I think mechanical engineering provides that opportunity most readily."

- Participant C

"I was never told by anyone that [I] should do this. I think a lot of it came from within, but I was kind of led by example from primarily my parents. My parents are both architects, and my dad used to be a contractor, and so I grew up in a house where we were always building things. I was given a lot of freedom to play with tools and play with things that most parents would typically consider dangerous." - Participant C

"Anything can be boiled down to an engineering problem, even if its not really that technical." - Participant C