Gender Differences in Attitudes Towards Science, Technology, Engineering, and Math Among High School Students

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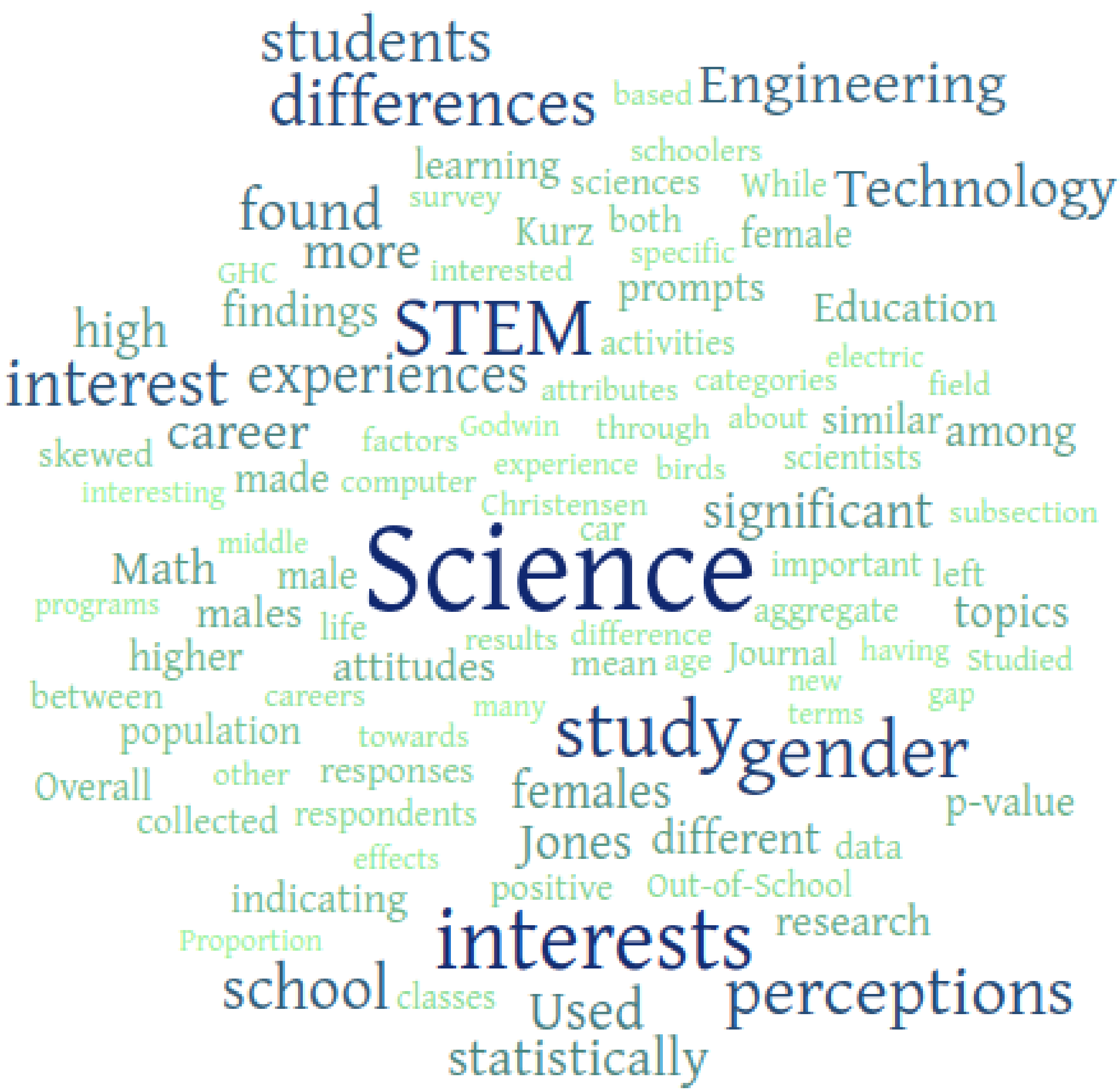


Introduction

Research from the last four decades has studied and mapped perceptions and interests in Science, Technology, Engineering, and Math (STEM) in children, adolescents, and college age students (Jones 2000). When determining a student's level of interest in STEM, researchers analyze categories such as attitudes, course and career enrollment, and formal and informal experiences. The most highly documented difference in experience and attitudes regarding STEM has been seen through gender (Jones 2000). This has contributed to a "gender gap" in these fields as women are underrepresented in STEM among careers, interests, academics, and perceived abilities (Jones 2000). In addition to gender, life experiences and factors such as exposure in the form of both formal and informal learning experiences, have also been documented to have a large impact on a student's interests as they introduce students to new ideas (Kurz 2015). While most studies review younger students as STEM interests are formed and solidified, highschool students still experience both stability and shifts in STEM interest that are important to consider (Godwin 2016). Overall, this research will aim to answer the question of to what extent does gender influence different aspects of interests in STEM among high schoolers.

Literature Review

Factors of Attitudes

Historically, the fields of science, technology, engineering, and math have been male dominated. These differences not only include interest in this field, but also enrollment and achievement in classes, and perceived abilities (Christensen 2017, Hirsh 2011, Sadler 2012). However, many researchers point to some decrease of this trend overtime with the change of social and cultural attitudes (Salmon 2015). Furthermore, the nature of this gender gap in STEM is still under debate. Studies have found that females have higher interest in life sciences, such as biology, while males had higher interests in physical sciences (Jones 2000, Haussler 2002, Christensen 2017). Additionally, a study on differences in science and engineering career interest in terms of demographic factors, such as gender and socioeconomic status, found no significant gender differences in science interest, but just in engineering and technology disciplines (Ing 2014).

The paper "Gender differences in students' experiences, interests, and attitudes toward science and scientists.", by Gail M. Jones, a professor of Science Education at North Carolina State University, examines sixth grade student's experiences and attitudes related to science in order to explore the nature of gender differences in attitudes towards science topics. This study used a seven part survey that included Scientists as Persons, Out-of-school Experiences (science related experiences), Things to learn about (topics participants were interested in), Importance for Future Job (favorable attributes in a job), Science in Action (adjectives associated with science), Scientists at Work (what participants thought scientists did), and Me as a Scientist, all of which adopted from the international study "Science and Scientists" by S. Sjoberg. Overall, the research found that all of the categories had statistically significant results pointing to interests falling on gender typic lines (Jones). Some of these findings include females being more interested in and having more experience with biological sciences, and males with physical science, since males are more interested in science by associating it with positive traits (Jones 2000).

One common explanation for this disparity in interest among males and females are historic and cultural stereotypes. A study analyzes the causes of gender differences in STEM fields, learning achievement, and transition to the labor market found worldwide trends (Salmon 2015). This report attributed overall low proportion of females at higher education in STEM fields and a gap in achievement in math and science at different educational stages to factors such as lack of gender sensitive STEM related teaching material and teacher training, lack of female role models, gender differences in perceived performance, and psychological and social influences (Salmon 2015). Furthermore a literature review on the effects of race and gender on science education supports these ideas as it describes how historical discrimination and bias has lead to unconscious bias in modern society (Pinder 2014). Subconscious stereotypes created by these cultural and historical norms lead to decreased interest, and lower self-perceived abilities STEM related fields (Pinder 2014). The study, "An intervention study to enhance girls' interest, self-concept, and achievement in physics classes." found differences in children's self interests in terms of physics, but also found that training techniques to improve self concept had low effects, ultimately supporting the idea that there are gender differences in self concept in regards to STEM (Haussler 2002).

However, another explanation for this disparity is a lack of knowledge and exposure to the subject. According to many researchers, the topic of experienced stimuli, such as classes and extracurriculars on STEM interests were the best indicators of STEM interest among students. They hypothesize that this is because students are participating of their own vocation, and thus often result receive more hands on experience (Sullivan 2016, Blanchard 2015, Schnittka 2016). A study by Dr. Rhonda Christensen, a professor of learning technologies, analyzes the differences in STEM dispositions among students in different STEM related activities. This study looked at the effects in participation in a STEM oriented school, an after school program, and a club. Although this paper found strong interests among students in their respective areas of focus, this paper also supports the importance of active engagement (Christensen 2015). While this study found typical gender differences among participants, the findings also point to these programs having a more positive impact on female participants (Christensen 2015). However, despite extracurriculars often being the strongest indicator of STEM interests, researchers must also be weary of the effects of participating in these activities as participants self select inclusion in these programs (Welch 2011). Because of this, findings regarding extracurriculars can not be applied to all students (Welch 2011). A study on the effect of showing videos of Scientist describing what they do in order to students in grades 6 to 8 in order to educate students on current work in the field of science found that the treatment group had far higher levels of interest after watching the videos, but also found no gender differences in the post-test results (Wyss 2012). This finding suggests that the gender disparity in interest is due to differences in exposure to topics, rather than biological or social reasons (Wyss 2012). Despite this study only documenting the short term effects of activities that create exposure such as this four day camp, it indicates the possibility of experience create long term interest.

Similarly, "Disciplinary Differences in Out-of-School High School Science Experiences and Influence on Students' Engineering Choices." by Godwin et. al surveyed over 1,000 college freshman on out-of-school engineering related experiences during high school and analyzed them in terms of college major (Godwin 2016). This study found that participation in science-related out of school experiences increased the likelihood of enrolling in an engineering discipline in college as well as the presence of the gender gap in both experiences and science interests (Godwin 2016). The findings point to the importance of informal learning experiences as factors, indicating that initiating these activities can foster interests among students (Godwin 2016). This is significant as fostering interest through informal activities may help to decrease the gender gap and lead to more women entering STEM.

Populations of Interest

By analyzing levels of interests in STEM, researchers attempt to establish a link between adolescent interest and career intent. As a culture and surroundings play a large role in developing interests, researchers have looked at student's STEM interests from early life through college, finding gender differences as early as preschool (Leibham 2013). The majority of current research focuses on elementary and middle school students are learning about new topics and developing interest (Wyss 2014 , Christensen 2017, Hammack 2015, Blanchard 2015). Furthermore, as research have found differences in STEM interest by age, often worsening as age increases, it is important to view the career interests of students in high school as an indication of career choice (Kurz 2015). Research such as "Relationship of middle school student STEM interest to career intent", published in the Journal of Education in Science, Environment and Health, found a high correlation between middle school interest in and career aspirations in the STEM field (Chistensen 2017). These findings support the idea that interest is a high motivator for career interest at this age, above factors such as money or fame (Christensen 2017). However, research on high school students and career interest by Thomas P. Dick, the director of mathematics education at Oregon State University, found a gender gap between highschool courses and career interest as many students cited other factors such as money and parental affirmation as factors in career choice.

In addition to gender, current research is also tracking STEM interests among different age levels from preschool to college. Research such as "Stability and volatility of STEM career interest in high school: A gender study" shows high schoolers to be an important age group as there is a mix of consistency and fluctuation in career interest at this age (Sadler 2012). This study surveyed 6860 undergraduate students in both STEM and non-STEM related majors and asked students about their career aspirations at different times in high school and found that the highest predictor of STEM career interest at the end of highschool, and therefore following a career in the field, was interest during high school (Sadler 2012). However, this study also found gender differences in career patterns as females were more likely to lose interest in STEM careers and less likely to enter (Sadler 2012).

Overall, research on the issue of adolescent interest in science, technology, engineering, and math has an overall emphasis on the issue of gender while also including research on other topics such as involvement in different activities and different stages of adolescence. This topic of adolescent interest is becoming increasingly important as current estimates suggest future growth and demand in careers that emphasize science, technology engineering and math (Bureau of Labor Statistics). One gap this study will investigate is an in depth look at gender disparities in STEM interests at the highschool level in terms of experiences, interests, and career aspirations.

Methods

Population

The population studied were high school students at GHC, a densely-populated public high school located in suburban southern California with over 4,000 students. This population is ethnically diverse with a middle income, the median income of feeding districts being $74,222. About half of the student body qualifies for free or reduced lunch programs. These characteristics of diversity and income level of this school allows for the findings of this report to be generalized for other suburban schools around the country. This study includes respondents from 9th to 12th grade of both genders. Additionally, this school offers many different classes ranging in difficulty and over 50 clubs for students to participate in and that feed and foster interests in areas such as STEM. For this study, the general population will be separated and analyzed by subpopulation based on gender.

Instruments

Data will be collected from subjects regarding attitudes of STEM topics. This survey is a combination of different surveys from peer-reviewed journal articles on similar topics. This survey includes 7 different subsections, classes and extracurriculars, career perceptions, interests, career interests, out-of-school experiences, learning interests, and attributes of science. Demographic information regarding grade, gender, and ethnicity were collected at the beginning of the survey. Full Instrument can be found in Appendix #1.

The classes and extracurriculars subsection was created for this study and asked students to self report their extracurricular involvement and length of involvement, as well as Advanced Placement (AP) science or math classes along with the grade that they received. Options for Advanced Placement classes were collected from the College Board website under the mathematics and science labels. AP classes taken and success in those classes are important factors to study as their rigorous curriculum introduces new ideas (Godwin). Similarly, extracurriculars are also a sign of demonstrated interests, and often involve hands-on experience with STEM.

The career perceptions subsection was adapted from the study "Effects of exposure on attitudes towards stem interests" (Kurz 2015) and was used to measure students perceptions of different STEM careers, such as curing disease or teaching math. Perceptions were recorded with a five point likert-scale from boring to interesting. Some of the wording for these questions were altered as the Kurz study population was 5th graders. Additionally, prompts regarding overall opinions of STEM careers were added. This subtest is important because it measures subjects opinions on STEM careers. The career interests subsection was also adapted from the same Kurz study and measured student's interests in STEM topics. Prompts in this section are the same as the previous subtest, however, it asks students their opinions on pursuing those careers themselves. Similarly, interest was measured using a 5 point likert-scale from "Hate to Do" to "Love to Do".

The table below includes the Perceptions and Career Interests sections from the Kurz Study:

Subsection	Perceptions (Boring to Interesting)	Career Interests (Hate to do to Love to do)
Science	-To me, a career curing disease is: -To me, a career helping sick people is:	-Curing disease is something I would: -Helping sick people is something I would:
Technology	-To me, a career making robots is: -To me, a career working to make new games for computers is:	-Making robots is something I would: -Making new games for computers is something I would:
Engineering	-To me, a career helping send people to space is : -To me, a career designing bridges is : -To me, a career designing cars is:	-Sending people to space is something I would: -Designing bridges is something I would: -Designing cars is something I would:
Math	-To me, a career teaching Math is:	-Teaching Math is something I would:

The out-of-school experiences, learning interests, and perceptions of science, subtests were all adapted from “Gender differences in students' experiences, interests, and attitudes toward science and scientists.” (Jones 2000) These tests were formatted as lists that subjects check off the options that apply to them. The out-of-school experiences subtest indicates experiences that may help to teach or learn science or indicate a pursued interest. Learning Interests indicate science related concepts the subject in interested in learning and indicates if there is a specific type of science they are interested and overall interest. Perceptions of Science gives a list of traits and asked the subjects which of these they associated with science. Despite the fact that this study focused on science, prompts from these subsections included areas of engineering and technology, such as interest in cars and computer programs, which made these tests highly useful in completing the goals of this study. Additional prompts were added from "Disciplinary Differences in Out-of-School High School Science Experiences ..." into the out-of-school experiences subtests (Godwin).

Table below includes prompts for the out-of school experiences, learning interests, and attributes of science subtests from the Jones study:

Out-of-School Experiences (Have you ever done this outside of school?)	Learning Interests (What topics look interesting to you?)	Attributes of Science (When you think of “science” what comes to mind?)
• Used an air gun or rifle • Made bow and arrows, catapult, or boomerang • Used a car jack or changed tires • Made a cart or wheelbarrow • Chopped wood or collected firewood • Charged a car battery or other batteries • Played with electric batteries and bulbs or motors • Used electric toys	• What an atomic bomb consists of and how they are made • Atoms and molecules • Why birds and planes can fly • The car and how it works • Chemicals and their properties • Computers, PCs, and what we can do with them • Dinosaurs and why they died out • Electricity, how it is	• Power • Easy to understand • Helping the poor • Destructive and dangerous • Creates problems for society • Most suitable for boys • Difficult to understand • Doing

• Charged a fuse or attached electric lead to plug • Studied the inside of a radio, TV, video, or similar • Mended a bicycle tire • Used a microscope • Used a rope and pulleys for lifting heavy things • Used a saw • Made bread or pastry • Watched a bird make a nest • Made your own clothes • Knitted, or made baskets or mats • Observed or Studied the Milky Way or constellations of stars • Used a needle and thread for sewing • Planted and watched seeds grow • Weaved cloth and textiles • Read/Watched non-fiction science* • Read/Watched science fiction* • Played computer/ video games* • Wrote computer programs or designed web pages* • Talked with friends or family about science*	produced and used in the home • Important inventions and discoveries • Latest developments in technology • Light and optics • How nuclear power plants functions • How radioactivity affect life and the body • Rockets and space travel • How scientists think and work • Sounds and music from birds and other animals • New sources of • energy from the sun, wind, ect • X-rays and ultrasound in medicine • The rainbow, what it is, and why you can see it • What we should eat to be healthy • What are colors and how do we see different colors • Clouds, rain, and snow • How birds and animals communicate • AIDS: What it is and how it spreads	experiments • Useful in everyday life • Important for Society • Interesting and Exciting • Creates pollution • Boring

Prompts from the Godwin study are indicated by the *

Sample Selection

Respondents for this study were chosen through a stratified random sample in order to collect data from a representative population of the entire student body. The stratum chosen were the different gates of entry to the school, as all students must enter through these gates and consistently use the same entrance, which allowed data collection to span multiple days. After responses were collected. A random number generator was used to get a sample of 100 students proportionately collected from each of the gates based off of popularity, resulting in a sample representative of the entire population of the school. Furthermore, the sample was collected in the morning between 7:00 and 8:20 as the large majority of students enter school at this time and do so only once a day.

Implementation Details

The survey will be administered electronically through Google Forms, an app that has allowed me to compile and organize the subtests used in this survey. This program was also used to randomize the order of prompts in each subsection to prevent confounding of the order and attitude toward STEM. The Respondents had the option to take the survey at the time they are asked at the entrances to the school or provide their student ID and receive the survey through their email. After data is collected with Google Forms, it was transferred into Microsoft Excel in order to sort and statistically analyze. Excel tool pack such as, univariate and bivariate calculations, p-value determination for t-tests, and histogram construction were used to interpret the data and determine statistically significant results.

In order to minimize nonresponse bias, this survey was available to students at their leisure, accessible on their personal laptops, and would enter participants into a raffle for a gift card as incentive. Social desirability bias was avoided by keeping responses anonymous and avoiding strong wording in prompts and questions.

Relation to Current Body of Knowledge

By following instruments developed in peer reviewed academic journals, prompts used and data collected has been tested and approved by experts in the field. Data collected in these foundational articles were also collected with self-assessing surveys. However, this study deviates from the two foundational sources in terms of the age of populations studied as the Kurz study surveyed students after being exposed to the stimuli of an engineering exposition, and Jones study was conducted on a younger age group and over a decade ago. Overall these population differences and possible comparisons between data illustrate a new area of understanding addressed by this study.

Findings

Complete data collected is located in Appendix #2

Population Findings

Perceptions (Interesting - Boring)	Aggregate Mean	Confidence Level	Kurz Aggregate Mean
Science (2-10)	7.82	.45	5.9
Technology (2-10)	6.94	.5	7.5
Engineering (3-15)	9.37	.62	10.1
Math (1-5)	2.16	.24	2.7

Interests (Love to Do - Hate to Do)	Aggregate Mean	Confidence Level	Kurz Aggregate Mean
Science (2-10)	7.39	.47	6
Technology (2-10)	6.34	.49	6.8
Engineering (3-15)	9.37	.62	9.7
Math (1-5)	2.3	.27	2.5

Out of School Experiences	Overall Proportion (%)	Learning Interests	Overall Proportion (%)	Attributes of Science	Overall Proportion (%)
Used an air gun or rifle	33	What an atomic bomb consists of and how they are made	43	Power	46
Made bow and arrows, sling, catapult, or boomerang	34	Atoms and molecules	32	Easy to Understand	20
Used a car jack or changed tires on a car	24	Why birds and planes can fly	42	Destructive and Dangerous	16
Made a cart or wheelbarrow	7	The car and how it works	29	Creates Problems for Society	11
Chopped wood or	41	Chemicals and their	36	Most Suitable for	6

collected firewood		properties		boys	
Charged a car battery or other batteries	36	Computers, PCs, and what we can do with them	48	Difficult to Understand	47
Played with electric batteries and bulbs or motors	38	Dinosaurs and why they died out	28	Doing Experiments	82
Used electric toys	70	Electricity, how it is produced and used in the home	41	Useful in everyday life	65
Charged a fuse or attached electric lead to plug	12	Important inventions and discoveries	51	Important for society	67
Studied the inside of a radio, TV, video, or similar	25	Latest developments in technology	51	Interesting and Exciting	64
Mended a bicycle tire	17	Light and optics	33	Creates Pollution	13
Used a microscope	61	How nuclear power plants functions	30	Boring	9
Used a rope and pulleys for lifting heavy things	28	How radioactivity affect life and the body	38		
Used a saw	31	Rockets and space travel	43		
Made bread or pastry	65	How scientists think and	34		
Watched a bird make a nest	22	Sounds and music from birds and other animals	35		
Made your own clothes	25	New sources of energy from the sun, wind, ect	44		
Knitted, or made baskets or mats	26	X-rays and ultrasound in medicine	37		
Observed or Studied the Milky Way or constellations of stars	37	The rainbow, what it is, and why you can see it	43		
Used a needle and thread for sewing	57	What we should eat to be healthy	44		
Planted and watched seeds grow	58	What are colors and how do we see different colors	53		
Weaved cloth and textiles	18	Clouds, rain, and snow	37		
Participated in Science groups/ camps/ clubs	29	How birds and animals communicate	41		
Participated in Science/	23	AIDS: What it is and	31		

Math competition(s)		how it spreads			
Read/Watched non-fiction science	67				
Read/Watched science fiction	72				
Played computer/ video games	86				
Wrote computer programs or designed web pages	33				
Talked with friends or family about science	69				

Gender Differences

Perceptions (Boring- Interesting)	Overall mean	Female Mean	Male Mean	P-value Gender	P-value Gender (Kurz Study)
To me, a career curing disease is:	3.89	4.00	3.75	.1415	
To me, a career helping sick people is:	3.91	4.15	3.58	.0102	
Science Perceptions Sum	7.82	8.15	7.325	.0303	.0470(-)
To me, a career making robots is:	3.27	3.18	3.45	.1788	
To me, a career working to make new games for computers is:	3.64	3.55	3.80	.1824	
Technology Perceptions Sum	6.94	6.733333333	7.25	.1598	.0001(+)
To me, a career helping send people to space is :	3.66	3.60	3.78	.2577	
To me, a career designing bridges is :	2.66	2.60	2.75	.2892	
To me, a career designing cars is:	3.04	2.85	3.38	.0300	
Engineering Perceptions Sum	9.37	8.916666667	9.9	.0642	.0002(+)
To me, a career teaching Math is:	2.16	2.41	1.80	.0039	.7959

Career Interests (Hate to do- Love to do)	Overall mean	Female Mean	Male Mean	P-value Gender	P-value Gender (Kurz)
Curing disease is something I would:	3.7	3.87	3.43	.0448	
Helping sick people is something I would:	3.71	3.97	3.30	.0048	
Science Interests Sum	7.39	7.833333333	6.725	.0146	.0007(-)
Making robots is something I would:	2.97	2.88	3.10	.2327	
Making new games for computers is something I would:	3.36	3.13	3.73	.0168	
Technology Interests Sum	6.34	6.016666667	6.825	.0589	.0001(+)
Sending people to space is something I would:	3.26	3.22	3.35	.3031	
Designing bridges is something I would:	2.35	2.24	2.50	.1612	
Designing cars is something I would:	2.81	2.57	3.18	.0174	
Engineering Interests Sum	9.37	7.983333333	8.95	.0704	.0002(+)
Teaching math is something I would:	2.3	2.43	2.08	.0874	.4644

*(-) indicates male students having stronger perceptions or interests from the Kurz Study.

Out of school experiences	Overall Proportion (%)	Male (n=40)	Female (n=60)	P-value	Jones study Male	Jones study female	Jones study P-value
Used an air gun or rifle	33	55	18.3	.0001	73.5	35.5	.0000
Made bow and arrows, sling, catapult, or boomerang	34	42.5	28.3	.0640	71.0	43.3	.0000
Used a car jack or changed tires on a car	24	37.5	15	.0043	61.4	25.1	.0000
Made a cart or wheelbarrow	7	10	5	.162	40.2	20.5	.0000
Chopped or collected firewood	41	47.5	36.6	.1403	89.1	74.8	.0000
Charged a car battery or other batteries	36	47.5	28.3	.0252	66.2	51.6	.002
Played with electric batteries or motors	38	45	33.3	.1195	85.1	71.4	.001
Used electric toys	70	72.5	68.3	.3280	94.6	87.7	.011
Charged a fuse or	12	20	6.6	.0222	89.7	80	.004

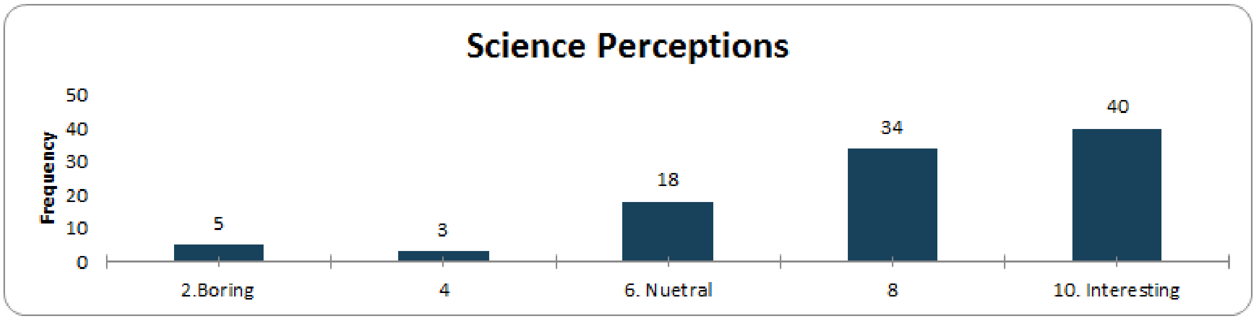
attached electric lead							
Studied the inside of a radio, TV, or similar	25	35	18.3	.0297	71.8	46.9	.000
Mended a bicycle tire	17	22.5	13.3	.1159	67.1	35.7	.000
Used a microscope	61	70	55	.0659	87.9	79	.011
Used a rope and pulleys for lifting	28	30	26.6	.3580	75.3	52.8	.000
Used a saw	31	50	18.3	.0000	92	72.6	.000
Made bread or pastry	65	55	71.6	.0435	71.9	89.2	.000
Watched a bird make a nest	22	15	26.6	.0838	52.7	62.2	.000
Made your own clothes	25	2.5	40	.0000	12.3	32.2	.044
Knitted, or made baskets or mats	26	10	36.6	.0014	26.7	51.4	.000
Observed constellations of stars	37	35	38.3	.3676	57.8	68.4	.025
Used a needle and thread for sewing	57	32.5	73.3	.0000	69.5	92	.000
Planted and watched seeds grow	58	42.5	68.3	.0052	73.3	83.2	.012
Weaved cloth and textiles	18	10	23.3	.0445	53	77	.004
Participated in Science groups/ camps/ clubs	29	37.5	23.3	.0630	-	-	-
Participated in Science/ Math competition(s)	23	20	25	.2802	-	-	-
Read/Watched non-fiction science	67	67.5	66.6	.4654	-	-	-
Read/Watched science fiction	72	67.5	75	.2066	-	-	-
Played computer/ video games	86	90	83.3	.1732	-	-	-
Wrote computer programs or designed web pages	33	47.5	23.3	.0059	-	-	-
Talked about science	69	67.5	70	.3956	-	-	-

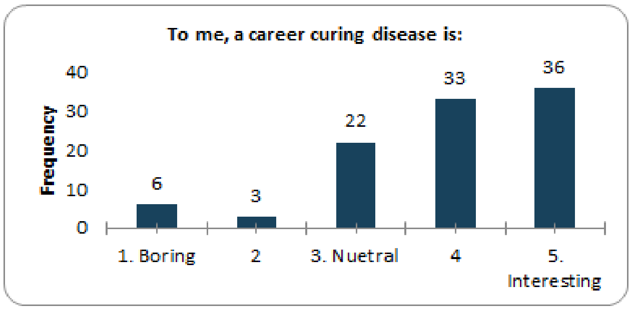
Learning Interests	Overall	Male (n=40)	Female (n=60)	P-value	Jones study Male	Jones study female	Jones study P-value
What an atomic bomb consists of and how they are made	43	55	35	.0239	70	40	.000
Atoms and molecules	32	.425	.25	.0330	43	23	.000
Why birds and planes can fly	42	.35	.466	.1234	55	33	.000
The car and how it works	29	.375	.233	.0630	70	30	.000
Chemicals and their properties	36	.40	.333	.2481	54	32	.000
Computers, PCs, and what we can do with them	48	.55	.45	.1635	69	50	.000
Dinosaurs and why they died out	28	.25	.30	.2927	70	57	.0009
Electricity, how it is produced and used in the home	41	.425	.40	.4016	42	24	.000
Important inventions and discoveries	51	.475	.5333	.2837	50	37	.005
Latest developments in technology	51	.50	.516	.4351	68	46	.000
Light and optics	33	.40	.283	.1120	47	31	.000
How nuclear power plants functions	30	.425	.216	.0129	50	23	.000
How radioactivity affect life and the body	38	.475	.316	.0550	48	31	.000
Rockets and space travel	43	.575	.333	.0084	60	38	.000
How scientists think and work	34	.25	.40	.0605	33	23	.000
Sounds and music from birds and other animals	35	.30	.383	.1960	54	35	.002
New sources of energy from the sun, wind, ect	44	.425	.45	.4025	44	30	.003
X-rays and ultrasound in medicine	37	.20	.483	.0020	54	43	.023
The rainbow, what it is,	43	.25	.55	.0015	45	65	.000

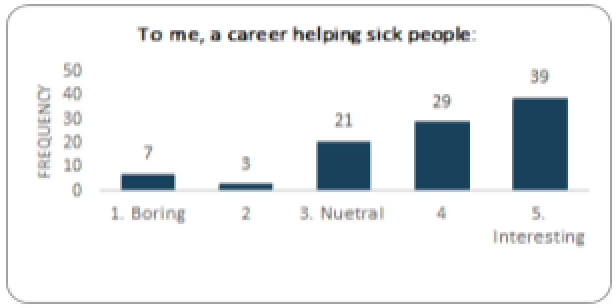
and why you can see it							
What we should eat to be healthy	44	.30	.533	.0106	36	53	.000
What are colors and how do we see different colors	53	.325	.666	.0004	41	52	.026
Clouds, rain, and snow	37	.20	.483	.0020	52	54	.000
How birds and animals communicate	41	.275	.50	.0125	58	71	.000
AIDS: What it is and how it spreads	31	.15	.416	.0023	26	35	.043

Attributes of Science	Overall	Male (n=40)	Female (n=60)	P-value	Jones study Male	Jones study female	Jones study P-value
Power	46	40	.50	.1628	58	44	.003
Easy to Understand	20	.15	.233	.1537	53	41	.015
Destructive and Dangerous	16	.15	.166	.4118	28	16	.003
Creates Problems for Society	11	.15	.0833	.1483	26	15	.006
Most Suitable for boys	6	.05	.06	.3000	14	6	.006
Difficult to Understand	47	.525	.433	.1841	41	51	.050
Doing Experiments	82	.85	.80	.2619	75	84	.025
Useful in everyday life	65	.55	.717	.0434	74	76	NS
Important for society	67	.625	.70	.2172	61	60	NS
Interesting and Exciting	64	.625	.65	.3993	61	59	NS
Creates Pollution	13	.10	.15	.2332	23	15	NS
Boring	9	.075	.117	.2481	19	25	NS

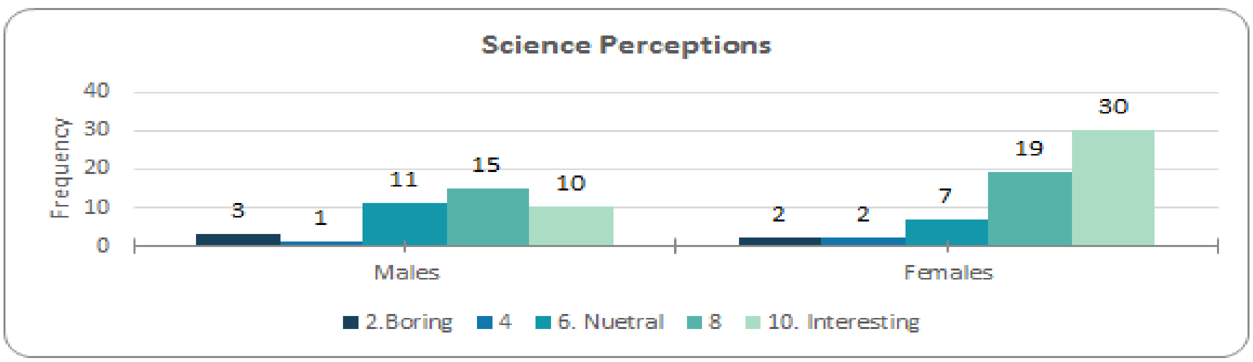
Response Distributions/ Histograms



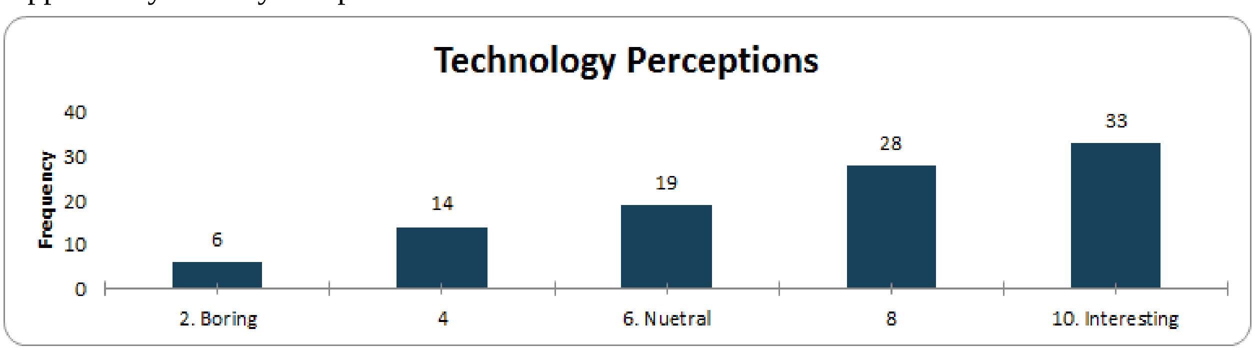


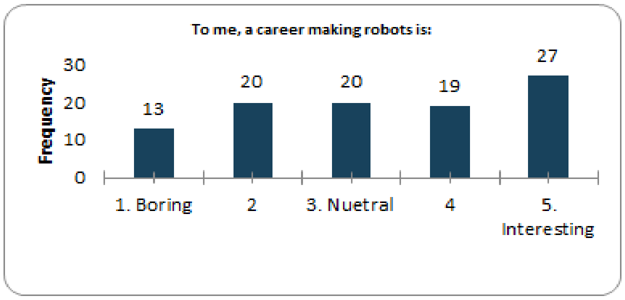


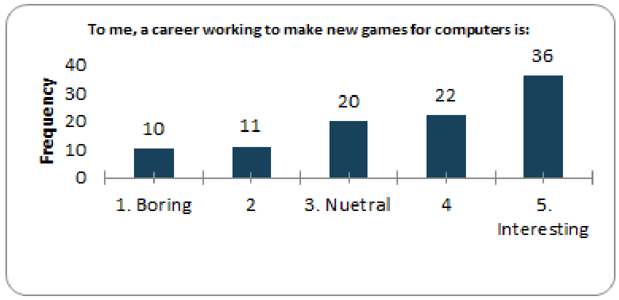
Science Perceptions among GHC high schoolers is skewed to the left. The mean for aggregate Science scores was 7.85 out of 10 with 60% answering 8-10, indicating that they found Science more interesting than boring. This left skewed trend is similar in the two component questions.



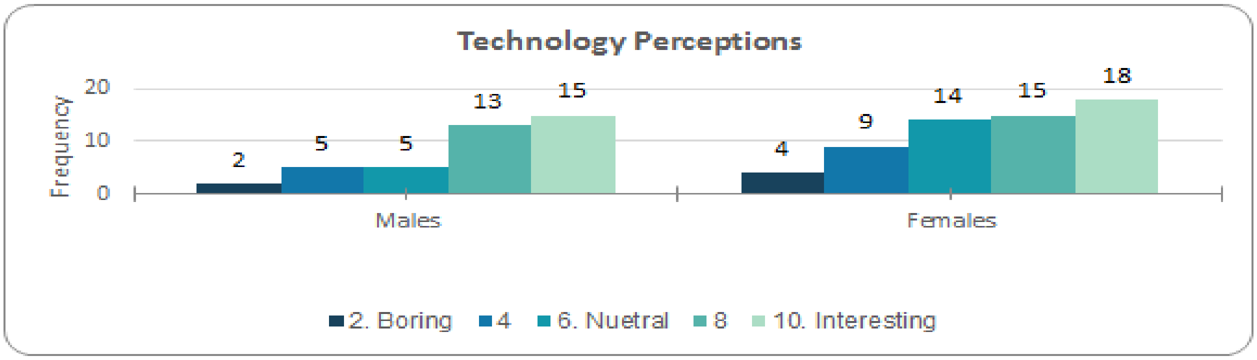
There are differences between the distributions of responses to the Science Perceptions based on gender. This histogram illustrates that female responses were skewed to the left while male responses were clustered closer to Neutral. The difference in nature of perceptions is further supported by the very low p-value of .0303 in favor of females.



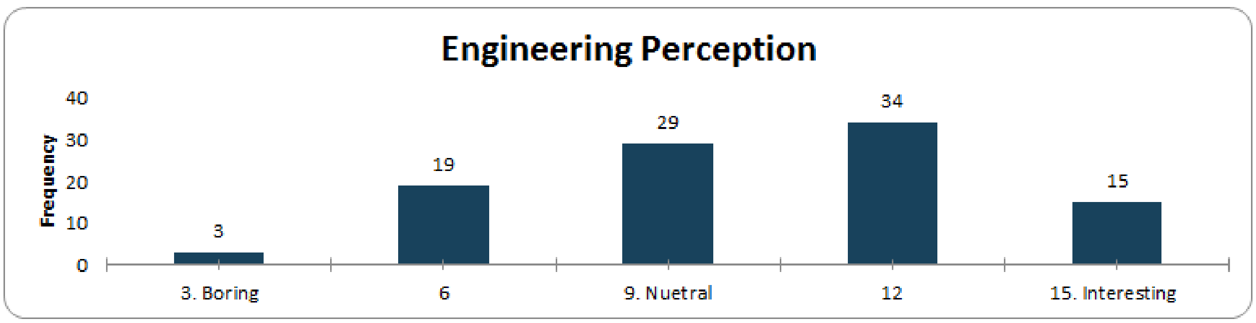


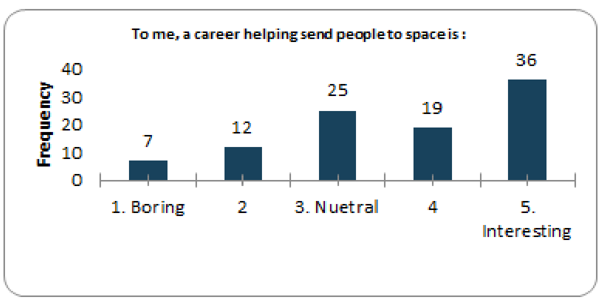


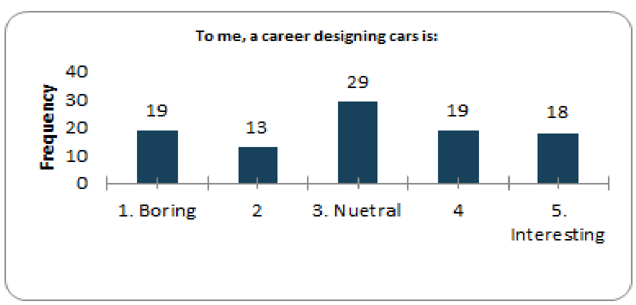
Technology Perceptions among GHC high schoolers is slightly skewed to the left. The mean for aggregate Technology scores was 6.94 out of 10 with 52% answering 8-10, indicating respondents had overall positive technology perceptions. This left skewed trend is similar in the two component questions of this subsection, but the prompt of " ...new games for the computer" is more extreme.

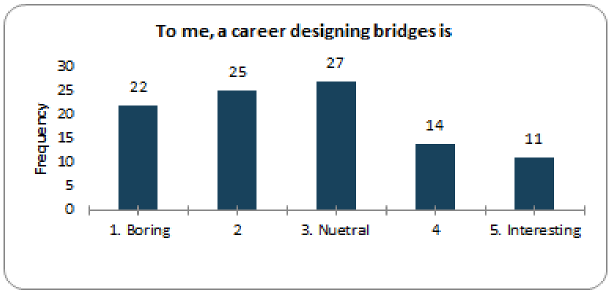


Overall the Female and Male distributions for the Technology Perceptions question display similar trends as both are skewed to the left. Despite the fact that Males had more positive responses in the 4 to 5 range, the high p-value of .1598 demonstrates no statistically significant difference.

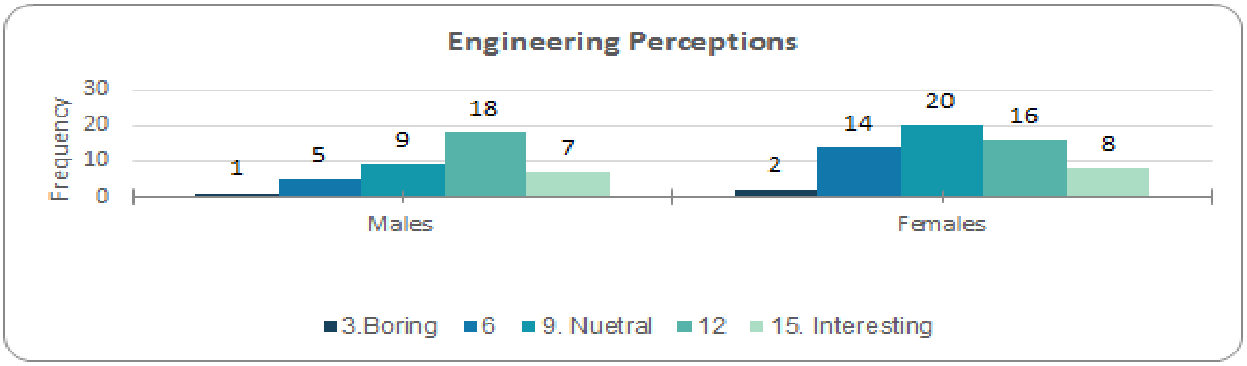




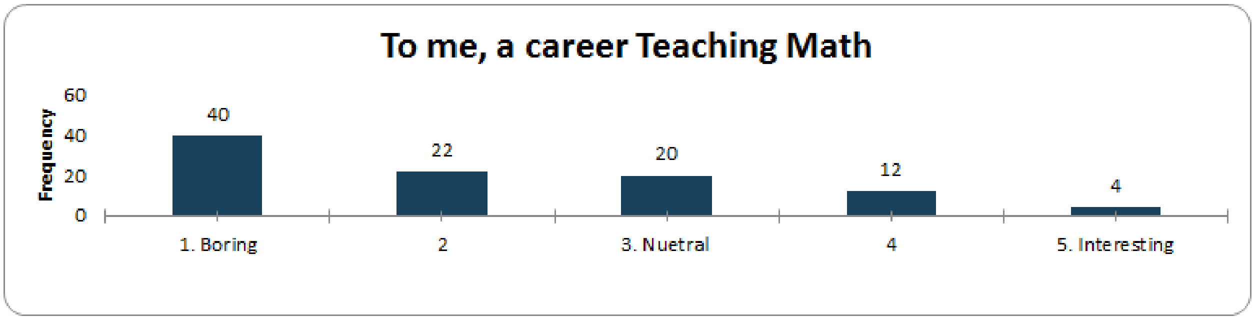




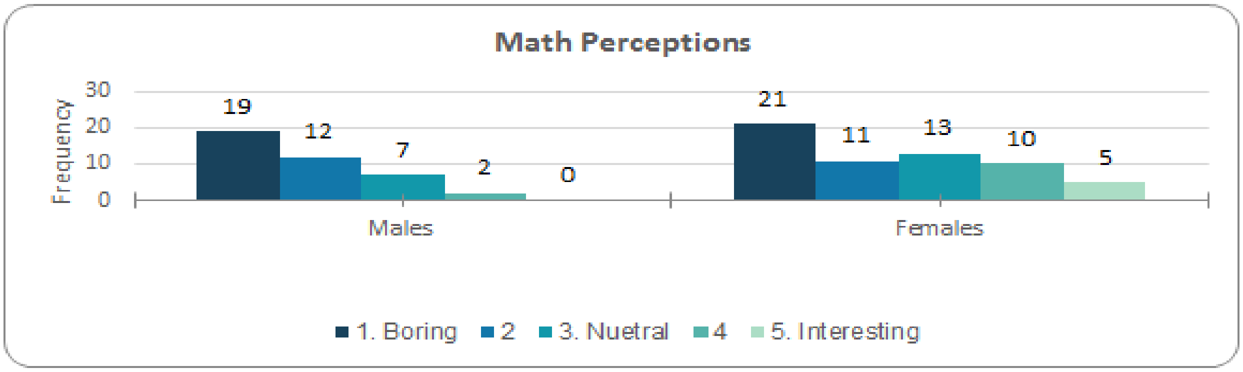
Technology Perceptions among GHC high schoolers is bunched around neutral with a slight left skewness. The mean for aggregate Engineering score was 9.37 out of 15 with 39% answering 12-15 , indicating that they found Engineering slightly more interesting than boring. However, this trend was not followed in the component questions of the subsections.



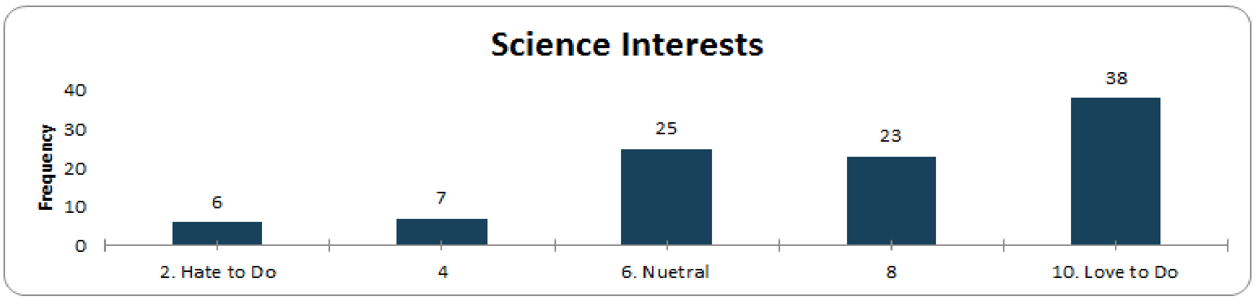
The distribution of Male and Female responses show a fairly similar shape with responses clustering towards the neutral responses. However, Male responses were largely concentrated in the moderately positive response area, resulting in a left skewed distribution and a moderately low p-value of .0659, indicating a possible significant difference.

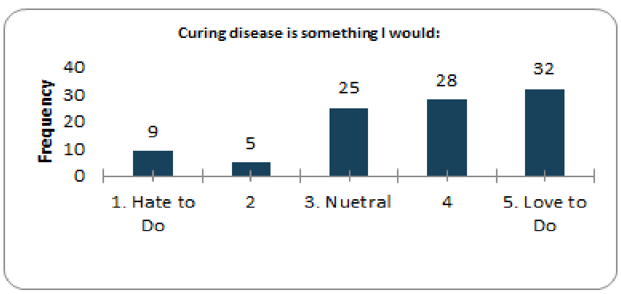


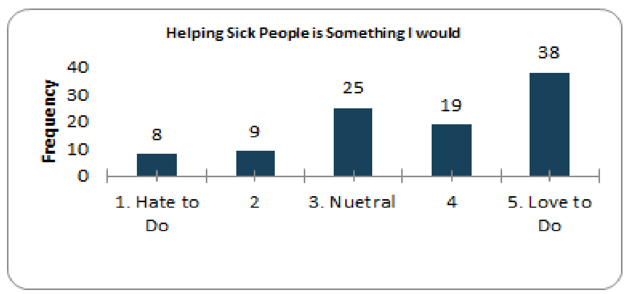
Math Perceptions among GHC high schoolers is strongly skewed to the right. The mean for aggregate Science scores was 2.16 out of 5 with 62% answering 1-2, indicating that they found math more boring than interesting.



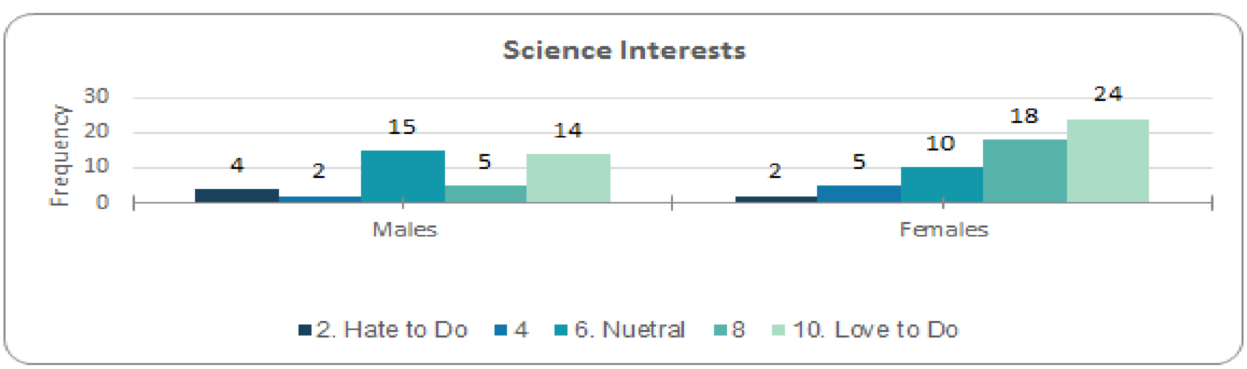
Math Perceptions for both subpopulations demonstrate a right skew. However, male responses are more extreme as almost no respondents answered positively. This difference in perception is further demonstrated by the low p-value of .0039, indicating that Females have higher Math Perceptions.



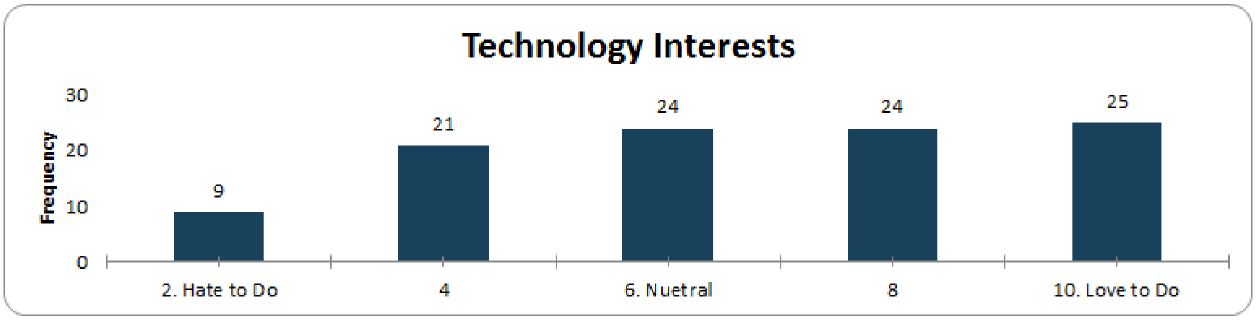


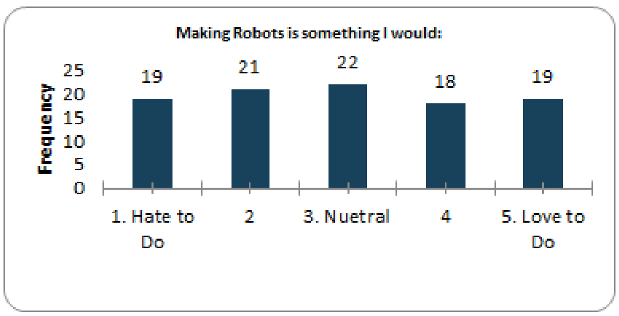


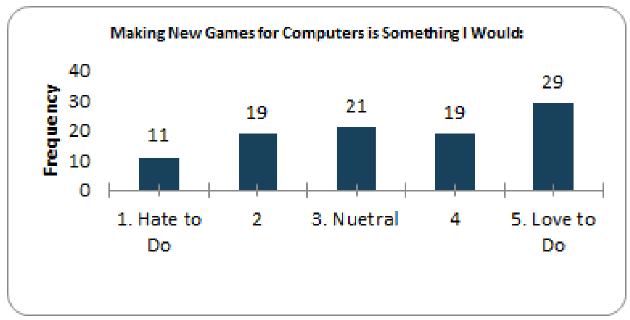
Science Interests is strongly skewed to the left. The mean for aggregate Science scores was 7.39 out of 10 with 59% answering 8-10, indicating that they would like to pursue careers in science in the future. This left skewed trend is similar in the two component questions of this subsection.



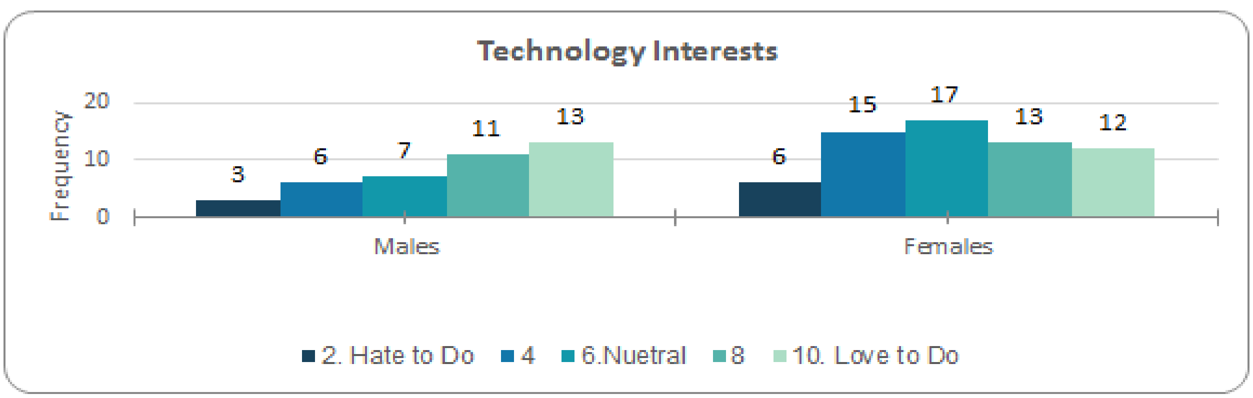
Similarly to Science Perceptions, there is a difference in distribution based on gender as Male interest is more symmetrical and Female interest is skewed to the right, indicating positive attitudes. A p-value of .0146 indicates females have statistically significantly higher Science interests.



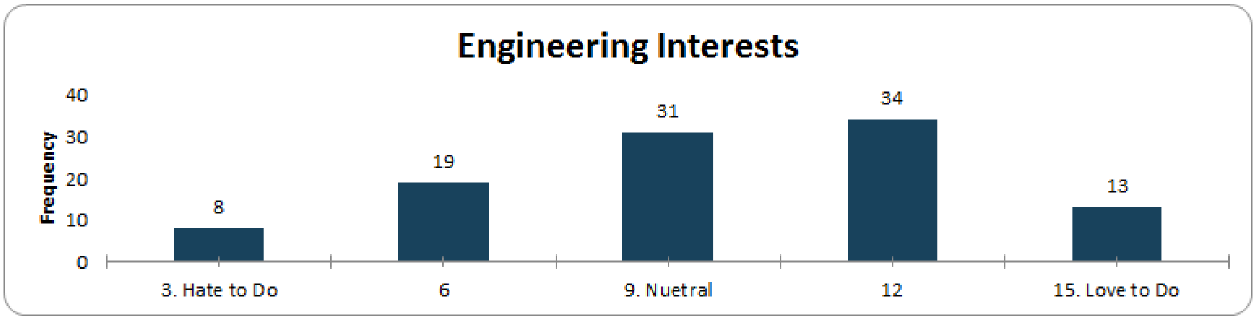


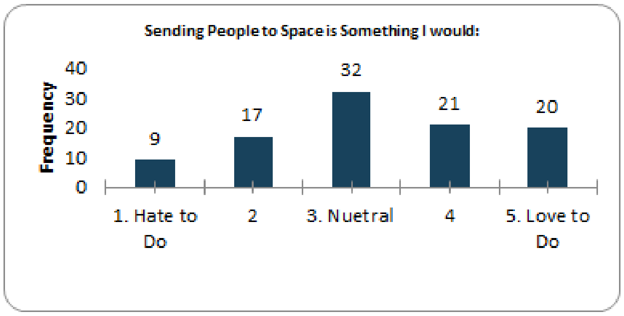


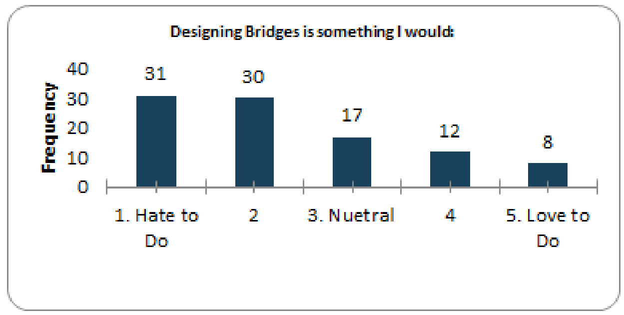
Technology Interests among this population is almost evenly distributed with a slight left skew. The mean for aggregate technology scores was 6.34 out of 10 with 42% answering 8-10. However, this trend is not followed in the component question of " working to make new games for the computer", which shows a right skewness.

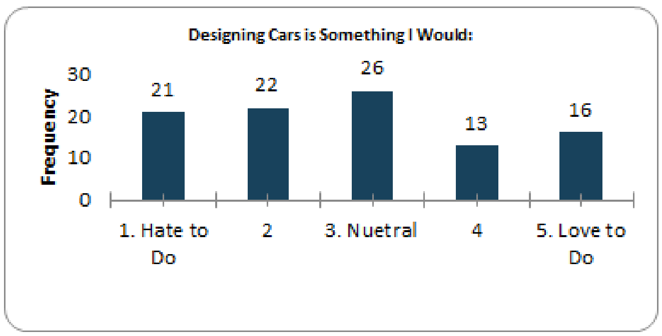


Unlike Technology Perceptions, there is a difference between the Gender distributions as Male responses are skewed to the left and female are clustered around neutral. These differences are supported by the low P-value of .0589, indicating moderate statistical significance.

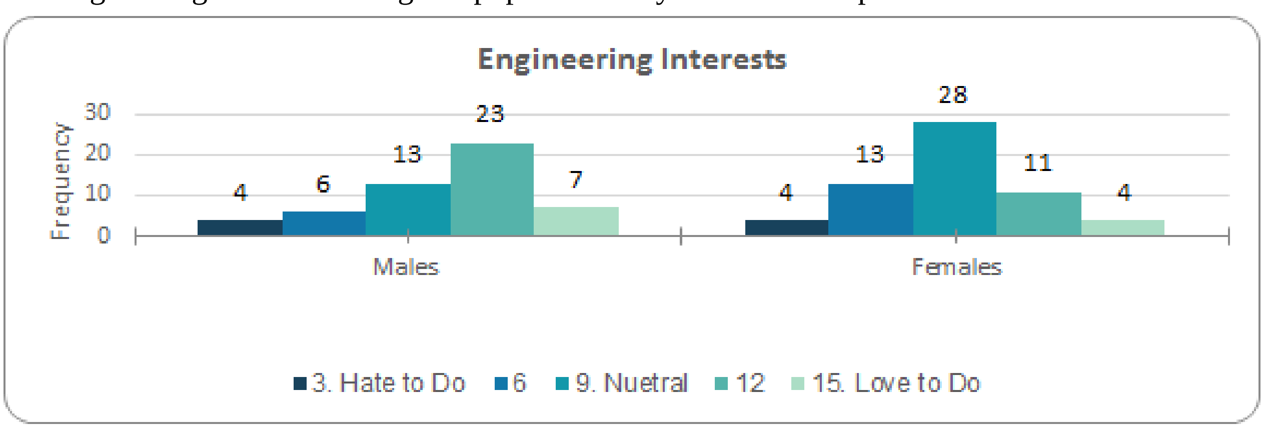




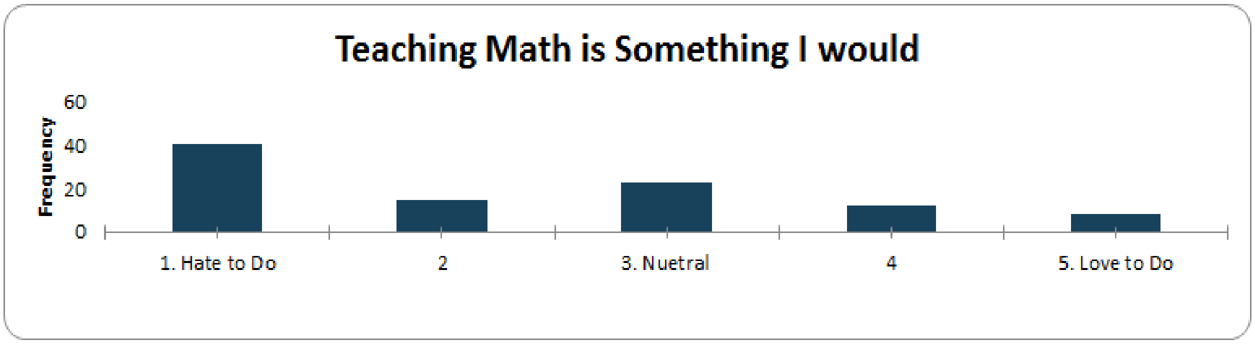




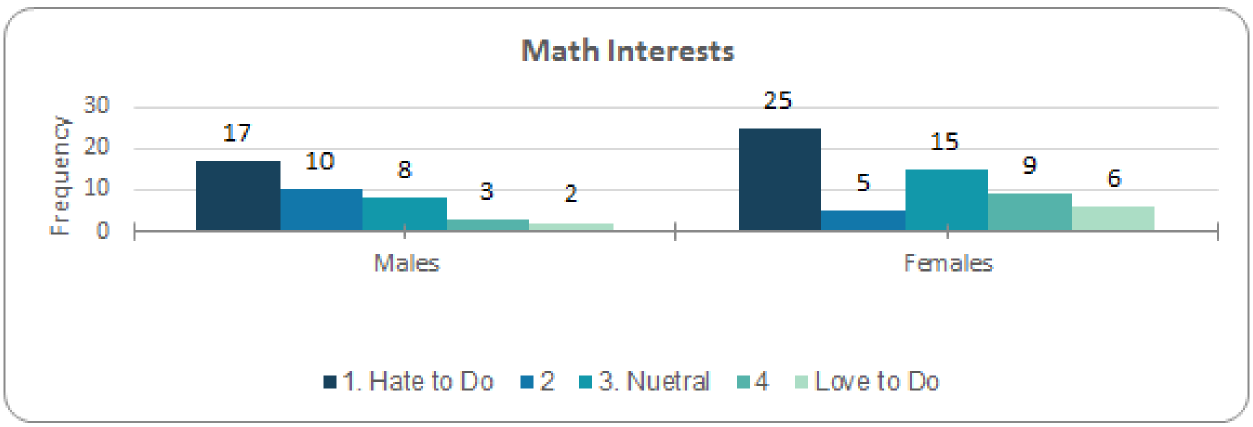
Engineering Interests among GHC high schoolers is concentrated around neutral with a sight skew left . The mean for aggregate technology scores was 9.67 out of 15 with only 35% responding in the extreme values, indicating that most students do not have strong opinions on the topic. However, this trend is not followed in the three component questions of this subsection, indicating that Engineering Interests among this population vary based on the specific asked.



Similar trends to Engineering Perceptions as both male and female responses are clustered around neutral, but male distribution also being moderately skewed to the right, indicating more positive attitudes. The moderately low p-value of .0704 indicates possible statistical significance.



Math Interests among GHC high schoolers is strongly skewed to the right. The mean for aggregate Science scores was 2.16 out of 5 with 62% answering 1-2, indicating that they would not like to pursue it as a career in the future.



Math interests among both males and females are skewed to the left, indicating more negative attitudes. However, the female distribution has a slight cluster around neutral, creating possible gender differences, indicated by the moderately low p-value of .0807 favoring females.

Analysis of Findings

Population analysis/ General Findings

General comparisons between the quantitative scores found in the perceptions and Career Interests subsections of this survey and the foundational source show overall similar values with statistically significant differences in Science and Math Perceptions, and Science Interests. Overall, the strongest Interests and Perceptions were found for the Science subcategory. However one difference between the results in this study and both the Kurz study and Jones study were the amount of Statistically significant findings. As both the Kurz and Jones studies had many more statistically significant findings, it is important to note that both studies had much larger populations, meaning that statistically significant findings could be derived from smaller differences in proportions of subpopulations. However, these differences in statistically significant findings can also indicate stronger gender differences or stronger attitudes regarding STEM in the current population studied and those in the Kurz and Jones Studies.

STEM Perceptions

When analyzing the data in terms of Gender, statistically significant differences were present in the categories of Science Perceptions, Engineering Perceptions and Math Perceptions after running a t-test for unequal variances at a .05 significance level. Science Perceptions and one of the prompt of “a career helping sick people” had a p-value of .0303 and .0102 respectively with the mean response of Females being higher. The t-test for Engineering Perceptions also revealed statistically significant results with the prompt of “a career designing cars” having a p-value of .0300 with the male mean being higher. The Comparison of Means of Math Perceptions resulted in a P-value of .0039 with female respondents having a higher mean. However, many of these findings do not match the pattern set by the Kurz study where these subtests originated from. While the Kurz study found statistically significant gender differences between the Science, Technology, and Engineering Perceptions, that study found that males had higher perceptions of Science while Females had higher perceptions of technology and engineering, the opposite of what was found in the GHC study. While these findings refutes the claims of the Kurz study, it supports the ideas of others, such as the Jones study, as the prompts asked regarding science had to do with life science and therefore were more stereotypically female versus the Technology and Engineering prompts (Jones 2000, Christensen 2015, Wyss 2012).

Furthermore, when comparing the different disciplines based by gender, the vastly different results in terms of distribution and statistically significant differences indicated that Gender differences in STEM perceptions are based on specific subjects such as Math or Technology and can not be generalized to STEM as a whole. Evidence of these differences in discipline can be found in the histograms as there were differences in shape, center, and spread across the disciplines of STEM. The fact that females have statistically significantly higher perceptions in Science and Math while Males have higher perceptions in Engineering further support this point.

STEM Career Interests

STEM Career Interests followed similar trends to STEM Perceptions as statistically significant results were found in the Science, Technology, and Engineering categories. Science Interests resulted in a p-value of .0146 with Females having higher interests. However, Technology interest prompt of “ Making new games for the Computer” resulted in a p-value of .0168 and the Engineering interest prompt of “Designing Cars” resulted in a p-value of .0174, both of which indicating that Male respondents had higher interests in these STEM careers. While different prompts showed statistical significance, this subsection also supports the theory that gender differences in STEM occur based on discipline as the distributions among Science, Technology, Engineering and math were different.

Out-of-School Experiences

Statistically significant differences were found in 14 of the out-of-school experiences when they were analyzed in terms of Gender, with these differences falling along gender-typic lines. Of the statistically significant findings Males reported higher experience with activities involving physical sciences and technology, such as “studied the inside of a radio, TV, or similar” and “ Wrote Computer Programs or designed web pages”. On the other hand, Females reported higher experiences with biological sciences and handiwork such as, “Planted and watched seeds grow” and used a needle and thread for sewing. However, experiences that had to STEM in general instead of specific topics, such as “Participated in Science groups/ clubs/ camps” and “Talked ... about science” had no statistically significant differences, indicating that the main gender difference between males and females of this population come from differences in specific disciples within Science. These trends are largely similar to the Jones study where these prompts originated as that study also found “That gender differences noted… support historical supposition that boys tend to have more experiences in the physical sciences and girls tend to have more experiences with biological sciences” (Jones). However, one differences between the results of this study and the foundational source were the proportion of activities that males and females dominated. While the GHC study had a similar amount of activities that had a statistically significant results in favor of males and females, the Jones study had many more activities that Males had more experience than females.

Learning Interests

Statistically significant differences in the proportion of each gender that was interested in each topic were found in 11 of the prompts. Similarly to the “Out-of-School Experiences” male respondents showed a statistically significant amount of greater interest than females in categories involving physical sciences and technology such as “How nuclear power plants function” and “Rockets and Space travel”. Female respondents showed statistically significant amounts of greater interests in categories involving life sciences such as “x-rays and ultrasounds used in medicine” and “ How birds and animals communicate”. Additionally female respondents showed a statistically significant amount of greater interests in topics that fell outside of this category, but were still stereotypically feminine such as “what the rainbow is and why you can see it” and “ clouds rain and snow”. The Jones study found similar results in terms of which types of topics each gender was more interested in, but had a very different proportion of topics that each gender had statistically significant more interest in. While the Jones study had a total of 20 topics that males were more interested in and 6 topics that females were more interested in, this GHC study has a total of 4 topics that males have statistically significant higher interests in and 7 topics that females have higher interests in. This indicated that females in this population are more interested in Science or that Males are less interested in Science.

Attributes of Science

Statistically significant differences in attributes of Science between Genders was found in 1 topic. The prompt that involving "use in everyday life" had a p-value of .0434, indicating that females viewed sciences as more useful. However, as the rest of the prompts resulted in no statistically significant differences, males and females attribute similar qualities and have similar perceptions of Science. This finding differs from the Jones study as it found statistically significant differences in 8 of the prompts, but no large patterns in which prompts were favored by each gender. This subsection supports the idea that gender differences in STEM are dependant on specific disciplines as these prompts asked about attributes of STEM as a whole.

Conclusion

Discussion

All together, these findings support the concept of a gender gap in the STEM field. However, these findings demonstrate a level of complexity in the nature of STEM attitudes as different subcategories had very different results. Demonstrated by STEM perceptions, career interests, out of school experiences, and learning interests, gender differences are highly dependant on the specific topics within STEM, with females tending to have positive attitudes with topics such as biological sciences and males having more positive attitudes with topics relating to Engineering and physical sciences. However, Lack of statistically significant findings in the subtopics of Out of school experiences and Attributes of Science demonstrate that there is little difference between genders in attitudes towards STEM as a whole.

Limitations

Because of the fact that research in this field dealt with concepts that are familiar in a high school environment and this study focused on a population of suburban high schoolers, this study very closely aligned with the research methods used by the foundational sources.

The issue of imprecision of data can be found in this report due to the subjective nature of this topic. For example, different respondents may be more or less likely to pick a strongly positive answer over a moderately positive answer.

Although the sample size of 100 respondents from this population is large enough to be an accurate representation of the population studied, larger sample sizes found in the Jones and Kurz study allowed them to find statistically significant conclusions based off of smaller differences in population means of proportions.

Furthermore, the presence of non-response bias must also be taken into account when analyzing these findings. As this survey was sent to participants to complete at their own leisure, many of the students who were sent surveys did not provide data, meaning that their may be some factor among those who did not respond that would alter the conclusions found from this data.

Implications

Overall, this study contributes to a deeper understanding of the components of interest and perceptions of STEM topics and the relationship each with gender among suburban highschool students. These attributes were viewed through the categories of perceptions, career interests, out-of school experiences, learning interests, and perceptions of science, with prompts replicated from both the Jones, and Kurz studies in this field. This research supports the findings of these previous reports as it demonstrates similar trends among student interest and perceptions about Science, Technology Engineering, and Math. Based off of data collected and processed from this Study, gender differences in STEM interests and perceptions depend on specific fields within these disciplines, such as life sciences, or technology. In general, Males had statistically significantly more positive responses in categories that involved physical sciences and technology, and females has statistically significantly more positive responses in categories that pertain to life sciences. However, few statistically significant differences were found in categories that asked about science in general, such as most of the prompts in the “Attributes of Science” subsection, indicating that gender differences in reactions towards STEM are not towards the field in general, but towards specific topics.

Although the topic of gender differences in STEM interests have been covered by other researchers in the field, this study contributes to the current body of knowledge by exploring the nature of the relationship between gender and different aspects of a suburban high schoolers interests and perceptions of the STEM field. By aligning with previous studies, this data also gives insight to the relationship of age, geography, and school type through comparisons with their findings. In addition to recognizing an issue, these findings also give future programs specific areas to target, such as involving males with biological science or females with engineering. Overall, these findings illustrate the complexities of the gender gap.

Work Cited

Baram-Tsabari, Ayelet, and Anat Yarden. "Characterizing children's spontaneous interests in science and technology." International Journal of Science Education 27.7 (2005): 803-826.

Blanchard, Sarah; Judy, Justina; Muller, Chandra; Crawford, Richard H.; Petrosino, Anthony J.; White, Christina K.; Lin, Fu-An; and Wood, Kristin L. (2015) "Beyond Blackboards: Engaging Underserved Middle School Students in Engineering," Journal of Pre-College Engineering Education Research (J-PEER): Vol. 5: Iss. 1, Article 2.

Christensen, Rhonda, Gerald Knezek, and Tandra Tyler-Wood. "Alignment of hands-on STEM engagement activities with positive STEM dispositions in secondary school students." Journal of Science Education and Technology24.6 (2015): 898-909.

Christensen, R. & Knezek, G. (2017). Relationship of middle school student STEM interest to career intent. Journal of Education in Science, Environment and Health (JESEH), 3(1),

Dick, Thomas P., and Sharon F. Rallis. "Factors and influences on high school students' career choices." Journal for Research in Mathematics Education (1991): 281-292.

Godwin, Allison, Gerhard Sonnert, and Philip M. Sadler. "Disciplinary Differences in Out-of-School High School Science Experiences and Influence on Students' Engineering Choices." Journal of Pre-College Engineering Education Research (J-PEER) 6.2 (2016):

Hammack, Rebekah, et al. "Effect of an engineering camp on students' perceptions of engineering and technology." Journal of Pre-College Engineering Education Research (J-PEER) 5.2 (2015): 2

Häussler, Peter, and Lore Hoffmann. "An intervention study to enhance girls' interest, self-concept, and achievement in physics classes." Journal of research in science teaching 39.9 (2002): 870-888.

Hirsch, Linda S., et al. "Middle school girls' perceptions of engineers before and after a female only summer enrichment program." Frontiers in Education Conference (FIE), 2011. IEEE, 2011.

Ing, Marsha; Aschbacher, Pamela R.; and Tsai, Sherry M. (2014) "Gender Differences in the Consistency of Middle School Students' Interest in Engineering and Science Careers," Journal of Pre-College Engineering Education Research (J-PEER): Vol. 4: Iss. 2,

Jones, M. Gail, Ann Howe, and Melissa J. Rua. "Gender differences in students' experiences, interests, and attitudes toward science and scientists." Science education 84.2 (2000): 180-192.

Kurz, Mary Elizabeth, S. Elizabeth Yoder, and Ling Zu. "Effects of exposure on attitudes towards stem interests." Education 136.2 (2015): 229-241.

Leibham, Mary Beth, Joyce M. Alexander, and Kathy E. Johnson. "Science interests in preschool boys and girls: Relations to later self-concept and science achievement." Science Education 97.4 (2013): 574-593.

Pinder, Patrice Juliet, and Edith L. Blackwell. "The "black girl turn" in research on gender, race, and science education: Toward exploring and understanding the early experiences of black females in science, a literature review." Journal of African American Studies 18.1 (2014): 63-71.

Sadler, Philip M., et al. "Stability and volatility of STEM career interest in high school: A gender study." Science Education 96.3 (2012): 411-427.

Salmon, Aliénor. "A Complex Formula: Girls and Women in Science, Technology, Engineering and Mathematics in Asia." UNESCO Bangkok(2015).

Schnittka, Jessica and Schnittka, Christine (2016) "“Can I drop it this time?” Gender and Collaborative Group Dynamics in an Engineering Design-Based Afterschool Program," Journal of Pre-College Engineering Education Research (J-PEER): Vol. 6: Iss. 2, Article 1

Sjøberg, Svein. "Science and scientists: the SAS-study: cross-cultural evidence perspectives on pupils' interests, experiences and perceptions: background, development and selected results." Acta didactica http://urn. nb. no/URN: NBN: no-14449 (2000).

Sullivan, Amanda, and Marina Umaschi Bers. "Robotics in the early childhood classroom: learning outcomes from an 8-week robotics curriculum in pre-kindergarten through second grade." International Journal of Technology and Design Education 26.1 (2016): 3-20.

Tandogan, Ruhan Ozkardes, and Akinoglu Orhan. "The Effects of Problem-Based Active Learning in Science Education on Students' Academic Achievement, Attitude and Concept Learning." Online Submission 3.1 (2007): 71-81.

Welch, Anita, and Douglas Huffman. "The effect of robotics competitions on high school students' attitudes toward science." School Science and Mathematics 111.8 (2011): 416-424.

Wyss, Vanessa L., Diane Heulskamp, and Cathy J. Siebert. "Increasing middle school student interest in STEM careers with videos of scientists." International Journal of Environmental and Science Education 7.4 (2012): 501-522.

Appendix #1:

Sample of “STEM Attitudes” Survey

STEM Attitudes Survey

1. **What gate did you enter through today**
   Mark only one oval.
   - Flagpole (Zelzah)
   - Zelzah Teacher Parking Lot
   - Service Road East (Boy's P.E. Side)
   - Hiawatha Lot (P. E. Field)
   - Service Road West (Girl's P.E. Side)
   - J Gate
   - Kingsbury (Main Gate)

2. **Grade**
   Mark only one oval.
   - 9
   - 10
   - 11
   - 12

3. **Gender**
   Mark only one oval.
   - Female
   - Male
   - Other

4. **Ethnicity (Please check all that Apply)**
   Check all that apply.
   - African American
   - American Indian
   - Asian American
   - Caucasian
   - Hispanic/ Latino
   - Mixed
   - Other: ____________

5. **How do you define STEM?**

Classes and Extracurricular Activities

6. **Have you taken any AP Math or Computer Science courses (AP Calculus AB, AP Calculus BC, AP Statistics, AP Computer Science A or AP Computer Science principles**
   Mark only one oval.
   - Yes
   - No *Skip to question 22.*

Calculus AB

7. **Have you taken AP Calculus AB**
   Mark only one oval.
   - Yes
   - No *Skip to question 10.*
   - Currently Enrolled *Skip to question 10.*

AP Calculus AB

8. **What grade did you receive fall semester**
   Mark only one oval.
   - A
   - B
   - C
   - D
   - F

9. **What grade did you receive Spring semester**
   Mark only one oval.
   - A
   - B
   - C
   - D
   - F

Calculus BC

10. **Have you taken AP Calculus BC**
Mark only one oval.

- Yes
- No *Skip to question 13.*
- Currently Enroller *Skip to question 13.*

AP Calculus BC

Select N/A if you are currently taking the course

11. **What grade did you receive fall semester**
Mark only one oval.

- A
- B
- C
- D
- F

12. **What grade did you receive Spring semester**
Mark only one oval.

- A
- B
- C
- D
- F

Computer Science A

13. **Have you or are you taking AP Computer Science A**
Mark only one oval.

- Yes
- No *Skip to question 16.*
- Currently Enrolled *Skip to question 16.*

AP Computer Science A

Select N/A if you are currently taking the course

14. **What grade did you receive fall semester**
Mark only one oval.

- A
- B
- C
- D
- F

15. **What grade did you receive Spring semester**
Mark only one oval.

- A
- B
- C
- D
- F

Computer Science Principles

16. **Have you taken AP Computer Science Principles**
Mark only one oval.

- Yes
- No *Skip to question 19.*
- Currently Enrolled *Skip to question 19.*

AP Computer Science Principles

Select N/A if you are currently taking the course

17. **What grade did you receive fall semester**
Mark only one oval.

- A
- B
- C
- D
- F

18. **What grade did you receive Spring semester**
Mark only one oval.

- A
- B
- C
- D
- F

19. **Have you taken AP Statistics**
Mark only one oval.

- Yes
- No *Skip to question 22.*
- Currently Enrolled *Skip to question 22.*

AP Statistics

20. **What grade did you receive fall semester**
Mark only one oval.

- A
- B
- C
- D
- F

21. **What grade did you receive Spring semester**
Mark only one oval.

- A
- B
- C
- D
- F

Science

22. **Have you taken any AP Science courses (Biology, Chemistry, Environmental Science, Physics)**
Mark only one oval.

- Yes
- No *Skip to question 41.*

Biology

23. **Have you taken AP Biology**
Mark only one oval.

- Yes
- No *Skip to question 26.*
- Currently taking *Skip to question 26.*

AP Biology

24. **What grade did you receive fall semester**
Mark only one oval.

- A
- B
- C
- D
- F

25. **What grade did you receive Spring semester**
Mark only one oval.

- A
- B
- C
- D
- F

Environmental Science

26. **Have you taken AP Environmental Science**
Mark only one oval.

- Yes
- No *Skip to question 29.*
- Currently taking *Skip to question 29.*

AP Environmental Science

27. **What grade did you receive fall semester**
Mark only one oval.

- A
- B
- C
- D
- F

28. **What grade did you receive Spring semester**
Mark only one oval.

- A
- B
- C
- D
- F

Chemistry

29. **Have you taken AP Chemistry**
Mark only one oval.

- Yes
- No *Skip to question 32.*
- Currently taking *Skip to question 32.*

AP Chemistry

30. **What grade did you receive fall semester**
Mark only one oval.

- A
- B
- C
- D
- F

31. **What grade did you receive Spring semester**
Mark only one oval.

- A
- B
- C
- D
- F

Physics C

32. **Have you taken AP Physics C**
Mark only one oval.

- Yes
- No *Skip to question 35.*
- Currently taking *Skip to question 35.*

AP Physics C

33. **What grade did you receive fall semester**
Mark only one oval.

- A
- B
- C
- D
- F

34. **What grade did you receive Spring semester**
Mark only one oval.

- A
- B
- C
- D
- F

Physics 1

35. **Have you taken AP Physics 1: Algebra Based**
Mark only one oval.

- Yes
- No *Skip to question 38.*
- Currently taking *Skip to question 38.*

AP Physics 1: Algebra Based

36. **What grade did you receive fall semester**
Mark only one oval.

- A
- B
- C
- D
- F

37. **What grade did you receive Spring semester**
Mark only one oval.

- A
- B
- C
- D
- F

Physics 2

38. **Have you taken AP Physics 2: Algebra Based**
Mark only one oval.

- Yes
- No *Skip to question 41.*
- Currently taking *Skip to question 41.*

AP Physics 2: Algebra Based

39. **What grade did you receive fall semester**
Mark only one oval.

- A
- B
- C
- D
- F

40. **What grade did you receive Spring semester**
Mark only one oval.

- A
- B
- C
- D
- F

Activities

41. **Are you involved in any STEM related extracurricular activities ?**
Mark only one oval.

- Yes
- No *Skip to question 48.*

Extracurriculars

42. **If yes, what activity (1)**

43. **If yes, how long? (1)**
Mark only one oval.

- 1 year
- 2 years
- 3 years
- 4 years
- 5 years
- 6 years
- 7 years
- 8 years
- 9 years
- 10 or more years

44. **If yes, what activity (2)**

45. **If yes, how long? (2)**
Mark only one oval.

- 1 year
- 2 years
- 3 years
- 4 years
- 5 years
- 6 years
- 7 years
- 8 years
- 9 years
- 10 or more years

46. **If yes, what activity (3)**

47. **If yes, how long? (3)**
Mark only one oval.

- 1 year
- 2 years
- 3 years
- 4 years
- 5 years
- 6 years
- 7 years
- 8 years
- 9 years
- 10 or more years

Career Perceptions

48. **To me, a career curing disease is:**
Mark only one oval.

	1	2	3	4	5	
Boring						Interesting

49. **To me, a career helping sick people:**
Mark only one oval.

	1	2	3	4	5	
Boring						Interesting

50. **To me, a career making robots is:**
Mark only one oval.

	1	2	3	4	5	
Boring						Interesting

51. **To me, a career working to make new games for computers is:**
Mark only one oval.

	1	2	3	4	5	
Boring						Interesting

52. **To me, a career helping send people to space is :**
Mark only one oval.

	1	2	3	4	5	
Boring						Interesting

53. **To me, a career designing bridges is :**
Mark only one oval.

	1	2	3	4	5	
Boring						Interesting

54. **To me, a career designing cars is:**
Mark only one oval.

	1	2	3	4	5	
Boring						Interesting

55. **To me, a career teaching Math is:**
Mark only one oval.

	1	2	3	4	5	
Boring						Interesting

56. **To me a career in science, technology, engineering, and math (is):**
Mark only one oval.

	1	2	3	4	5	
Means nothing						Means a lot

57. **To me a career in science, technology, engineering, and math (is):**
Mark only one oval.

	1	2	3	4	5	
Boring						Interesting

58. **To me a career in science, technology, engineering, and math (is):**
Mark only one oval.

	1	2	3	4	5	
Unexciting						Exciting

59. **To me a career in science, technology, engineering, and math (is):**
Mark only one oval.

	1	2	3	4	5	
Mundane	◯	◯	◯	◯	◯	Fascinating

60. **To me a career in science, technology, engineering, and math (is):**
Mark only one oval.

	1	2	3	4	5	
Unappealing	◯	◯	◯	◯	◯	Appealing

Interests:

Personally, what are you interested

61. **Curing disease is something I would:**
Mark only one oval.

	1	2	3	4	5	
Hate to do	◯	◯	◯	◯	◯	Love to do

62. **Helping sick people I would:**
Mark only one oval.

	1	2	3	4	5	
Hate to do	◯	◯	◯	◯	◯	Love to do

63. **Making robots is something I would:**
Mark only one oval.

	1	2	3	4	5	
Hate to do	◯	◯	◯	◯	◯	Love to do

64. **Making new games for computers is something I would:**
Mark only one oval.

	1	2	3	4	5	
Hate to do	◯	◯	◯	◯	◯	Love to do

65. **Sending people to space is something I would:**
Mark only one oval.

	1	2	3	4	5	
Hate to do	◯	◯	◯	◯	◯	Love to do

66. **Designing bridges is something I would:**
Mark only one oval.

	1	2	3	4	5	
Hate to do	◯	◯	◯	◯	◯	Love to do

67. **Designing cars is something I would:**
Mark only one oval.

	1	2	3	4	5	
Hate to do	◯	◯	◯	◯	◯	Love to do

68. **Teaching math is something I would:**
Mark only one oval.

	1	2	3	4	5	
Hate to do	◯	◯	◯	◯	◯	Love to do

Out-of-School Experiences

69. **Have you ever done this outside of School?**
Check all that apply.

- [ ] Used a needle and thread for sewing
- [ ] Used electric toys
- [ ] Charged a car battery or other batteries
- [ ] Planted and watched seeds grow
- [ ] Observed or Studied the Milky Way or constellations of stars
- [ ] Used a saw
- [ ] Used an air gun or rifle
- [ ] Used a rope and pulleys for lifting heavy things
- [ ] Mended a bicycle tire
- [ ] Made bread or pastry
- [ ] Used a microscope
- [ ] Participated in Science groups/ clubs/ camps
- [ ] Charged a fuse or attached electric lead to plug
- [ ] Read/Watched non-fiction science
- [ ] Made your own clothes
- [ ] Studied the inside of a radio, TV, video, or similar
- [ ] Watched a bird make a nest
- [ ] Played with electric batteries and bulbs or motors
- [ ] Participated in science/math competition(s)
- [ ] Chopped wood or collected firewood
- [ ] Made a cart of wheelbarrow
- [ ] Wrote computer programs or designed web pages
- [ ] Read/Watched science fiction
- [ ] Made bow and arrows, sling, catapult, or boomerang
- [ ] Played computer/video games
- [ ] Talked with friends or family about science
- [ ] Knitted, or made baskets or mats
- [ ] Used a car jack or changed tires on a car
- [ ] Weaved cloth and textiles

Learning Interests

70. **Check the topics that look interesting to you**
Check all that apply.

- [ ] Electricity, how it is produced and used in the home
- [ ] The rainbow, what it is, and why you can see it
- [ ] What we should eat to be healthy
- [ ] Light and optics
- [ ] What are colors and how do we see different colors
- [ ] Why birds and planes can fly
- [ ] Latest developments in technology
- [ ] What an atomic bomb consists of and how they are made
- [ ] How scientists think and work
- [ ] Important inventions and discoveries
- [ ] New sources of energy from the sun, wind, ect
- [ ] Clouds, rain, and snow
- [ ] How nuclear power plants functions
- [ ] The car and how it works
- [ ] Chemicals and their properties
- [ ] Rockets and space travel
- [ ] Computers, PCs, and what we can do with them
- [ ] Sounds and music from birds and other animals
- [ ] X-rays and ultrasound in medicine
- [ ] Dinosaurs and why they died out
- [ ] AIDS: What it is and how it spreads
- [ ] How radioactivity affect life and the body
- [ ] Atoms and molecules
- [ ] How birds and animals communicate

Perceptions of Science

71. **When you think of "science", what comes to mind?**
Check all that apply.

- [ ] Important for Society
- [ ] Doing experiments
- [ ] Interesting and Exciting
- [ ] Boring
- [ ] Destructive and dangerous
- [ ] Creates problems for society
- [ ] Most suitable for boys
- [ ] Difficult to understand
- [ ] Creates pollution
- [ ] Power
- [ ] Useful in everyday life
- [ ] Easy to understand
- [ ] Helping the poor

Appendix #2:

Data Collected as Presented in Excel

Timestamp	Grade	Gender	Ethnicity	Extracurr	If yes, what activity (1)	If yes, hov	Question 1	Question 2	Question 3	Science Perceptions sum	Question 4	Question 5	Technology perceptions
11/2/2017 10:51:19	12	Female	Hispanic/ Latino	No			A pit of endless suffering l	5	5	10	5	5	10
11/3/2017 4:07:19	10	Male	African American, Asian A	No			Its complicated because I	5	5	10	1	2	3
11/3/2017 10:58:52	10	Male	Caucasian, Hispanic/ Lati	No			Something about math an	4	4	8	5	5	10
11/3/2017 12:26:06	12	Female	Hispanic/ Latino	No			An educational focus on s	3	4	7	4	4	8
11/3/2017 12:59:17	11	Female	Hispanic/ Latino	No			Science, Technology, Eng	5	5	10	5	5	10
11/4/2017 12:01:17	12	Male	Caucasian, Hispanic/ Lati	No			Science, technology, engi	1	4	5	1	4	5
11/8/2017 12:56:43	10	Female	Hispanic/ Latino	No			STEM is a curriculum bas	4	3	7	3	4	7
11/8/2017 18:50:08	12	Female	Hispanic/ Latino	No			A program for the most el	4	4	8	2	4	6
11/9/2017 10:14:04	9	Male	Caucasian, Hispanic/ Lati	No			Science Technology Engi	4	1	5	2	1	3
11/9/2017 10:35:25	11	Male	Hispanic/ Latino, Mixed	No			interesting	5	5	10	5	5	10
11/9/2017 14:05:04	9	Female	Hispanic/ Latino	No			I define STEM as an acac	4	5	9	5	3	8
11/15/2017 11:32:13	10	Male	Middle Eastern	No			The stem on a flower	3	4	7	2	4	6
11/17/2017 12:11:17	9	Male	American Indian	No			Science Technology Engi	3	3	6	4	5	9
11/22/2017 8:37:29	10	Female	Asian American	Yes			Science, Technology, Eng	5	5	10	3	4	7
11/22/2017 8:38:00	10	Female	Caucasian, Mixed	No			STEM is a teaching cours	4	5	9	2	3	5
11/22/2017 8:44:13	12	Male	Asian American	No			Any subject with an objec	4	4	8	1	1	2
11/22/2017 10:16:11	11	Female	Asian American	No			The study of math and ev	2	2	4	4	4	8
11/22/2017 10:16:23	12	Female	Asian American	Yes	Robotics	2 years	Science, Technology, Eng	5	5	10	5	5	10
11/22/2017 11:04:04	12	Female	Asian American	No			It is a group of subjects th	5	5	10	5	5	10
11/22/2017 11:32:26	11	Female	Asian American, Mixed	No			Those pursuing fields in S	4	4	8	4	4	8
11/22/2017 11:39:36	10	Male	Asian American, Hispanic	No			STEM is an acronym shoi	4	4	8	5	5	10
11/22/2017 11:46:29	12	Male	Asian American	No			Science and Math focuse	3	3	6	5	5	10
11/22/2017 12:26:40	12	Female	Asian American	No			curriculum/ education in s	5	5	10	5	5	10
11/23/2017 21:20:26	12	Female	Asian American	Yes	Robotics	4 years	Science, Technology, Eng	3	4	7	4	5	9
11/23/2017 21:26:32	12	Female	Caucasian, Mixed	No			science, technology, engi	3	3	6	3	3	6
11/24/2017 20:42:29	10	Female	Mixed	No			Science technology envio	1	1	2	2	2	4
11/25/2017 15:29:01	11	Female	Asian American	No			Science, technology, engi	4	5	9	4	3	7
11/25/2017 17:25:40	10	Male	Asian American	No			Science, Technology, Eng	4	3	7	5	5	10
11/1/2017 10:26:21	9	Female	Asian American, Caucasia	No			Science Technology Engineering Math	3	4	7	4	5	9
11/13/2017 13:44:59	10	Female	Mixed	No			science and math	3	4	7	1	3	4
11/17/2017 11:01:53	12	Female	Caucasian, Hispanic/ Lati	No			Science, technology, engi	5	5	10	2	4	6
11/19/2017 19:02:23	11	Female	African American, Caucas	No			technically science techno	3	5	8	5	5	10
11/21/2017 8:31:54	12	Female	Asian American	Yes	Robotics	4 years	STEM is an outlet for mat	3	3	6	5	4	9
11/21/2017 18:26:43	12	Female	Caucasian	No			STEM is a branch of scho	4	5	9	3	5	8
11/8/2017 9:37:31	12	Male	Asian American	No			Necessity in this society t	4	4	8	5	4	9
11/8/2017 9:42:17	9	Female	Hispanic/ Latino	No			Science Technology Engi	4	3	7	1	2	3
11/8/2017 11:52:13	9	Female	Caucasian, Armenian, Ru	No			Science Technology Engi	5	5	10	2	3	5
11/13/2017 7:58:19	10	Male	Asian American	No			A program for dedicated s	5	5	10	2	2	4
11/2/2017 11:57:21	9	Male	Caucasian	No			im not in it	3	3	6	3	4	7
11/2/2017 20:18:59	9	Female	Caucasian, Hispanic/ Lati	No				4	4	8	2	1	3
11/15/2017 8:32:07	12	Male	Asian American, Caucasia	No			A branch of discipline that	4	4	8	3	5	8
11/15/2017 8:33:34	12	Male	Caucasian	No			science technology engin	1	1	2	1	4	5
11/15/2017 8:36:40	11	Female	Hispanic/ Latino	No			A program mainly focusin	4	5	9	3	4	7
11/15/2017 8:37:17	11	Male	Middle Eastern	No			Mainly just a program that	4	3	7	3	4	7
11/15/2017 10:11:09	9	Female	Hispanic/ Latino	No			Science, Technology, Eng	3	5	8	2	2	4
11/15/2017 11:25:42	12	Female	Asian American	No			Revolves around students	5	5	10	5	5	10
11/15/2017 11:33:41	9	Female	Caucasian, Hispanic/ Lati	No			Science Technology Engi	5	5	10	2	1	3
11/15/2017 13:41:59	12	Female	Asian American	Yes	Robotics	2 years	Science Technology Engi	3	4	7	5	5	10
11/15/2017 17:47:38	9	Male	Asian American	No			Science Technology Engi	3	5	8	4	3	7
11/16/2017 8:39:25	12	Female	Caucasian	Yes	Robotics	4 years	Science Technology Engi	3	3	6	4	5	9
11/16/2017 8:49:29	12	Female	Asian American	No			Science Technology Engi	4	4	8	4	3	7
11/16/2017 9:03:51	11	Male	Caucasian	No			a program that has to do v	4	4	8	3	4	7
11/16/2017 12:00:35	9	Male	Asian American	No			Hard and for people for su	4	2	6	4	5	9
11/16/2017 14:38:16	11	Female	Caucasian	No			a program for those intere	1	1	2	2	5	7
11/16/2017 16:17:15	9	Female	Asian American, Caucasia	No			STEM is mathematics cor	5	4	9	5	5	10
11/16/2017 16:58:01	12	Female	Caucasian	No			STEM is a program that s	5	3	8	2	5	7
11/16/2017 18:54:31	9	Male	Asian American	No			Science, Technology, Eng	1	1	2	4	3	7
11/16/2017 19:41:06	12	Male	Asian American	No			I define stem as the progr	5	5	10	4	4	8
11/17/2017 8:19:30	11	Male	Asian American	No			Science Technology Engi	4	3	7	1	1	2
11/17/2017 9:39:08	12	Female	Asian American	Yes			science, technology, engi	3	3	6	4	3	7
11/17/2017 12:30:57	10	Female	Asian American	No			obviously it actually stand	4	3	7	2	3	5
11/17/2017 11:31:47	10	Female	Caucasian	No			science, technology, engi	5	4	9	5	5	10
11/1/2017 12:08:06	10	Female	Hispanic/ Latino	No			Science, Technology, Eng	4	5	9	4	3	7
11/2/2017 9:21:21	9	Male	White	No			STEM is a program at Gra	4	1	5	3	4	7
11/2/2017 12:04:39	12	Male	Hispanic/ Latino	No			Science and math related	5	5	10	3	2	5
11/2/2017 12:35:15	10	Male	Mixed	No			School program on the su	4	4	8	2	3	5
11/13/2017 11:05:53	10	Female	African American, Asian A	No			Science Technology Engl	2	2	4	1	1	2
11/9/2017 8:36:58	9	Female	Hispanic/ Latino	No			science, technology, engi	5	5	10	3	4	7
11/9/2017 8:37:57	10	Male	Asian American, Filipino	No			STEM is a program fit for	5	5	10	5	5	10
11/9/2017 8:39:04	9	Male	Asian American	No			A program which teaches	4	4	8	3	5	8
11/9/2017 9:00:23	11	Male	Hispanic/ Latino	No			Stem is a very rigorous pr	1	1	2	3	1	4
11/9/2017 9:33:44	12	Female	Asian American	No			Science,Technology, Eng	5	4	9	4	5	9
11/9/2017 9:58:16	11	Female	Asian American	No			Science Technology Engi	5	5	10	5	5	10
11/9/2017 11:32:07	10	Male	Filipino	No			Sciences; Technology; Er	3	3	6	5	5	10
11/9/2017 12:27:30	10	Male	Hispanic/ Latino	No			a extracurricular program	3	3	6	4	4	8
11/9/2017 14:28:48	10	Female	Asian American	No			a program where they foc	4	4	8	2	2	4
11/10/2017 14:32:08	10	Male	Asian (pure)	No			Science Technology Engi	5	5	10	5	4	9
11/21/2017 8:27:28	12	Male	African American	No			Science, Technology, Eng	5	5	10	5	5	10
11/2/2017 8:21:04	9	Male	Asian American	Yes	Robotics	4 years	Anything about science, te	5	4	9	5	5	10
11/2/2017 9:50:39	10	Female	African American, Asian A	No			Science Technology Engi	4	5	9	2	2	4
11/2/2017 10:57:11	9	Male	Asian American	No			A smart program	3	3	6	1	2	3
11/2/2017 11:55:21	9	Female	Hispanic/ Latino	No			Good program	2	3	5	1	1	2
11/2/2017 12:20:34	11	Male	Hispanic/ Latino, Mixed, V	Yes	NOVA Program for Boy S	1 year	Science Technology Engi	5	3	8	5	5	10
11/2/2017 16:19:30	11	Female	Hispanic/ Latino	No			STEM is a program that is	5	5	10	2	3	5
11/3/2017 7:28:28	10	Female	Caucasian	No			I am not in STEM so I car	4	4	8	2	2	4
11/3/2017 9:40:01	10	Female	Asian American	No			STEM is a program made	5	5	10	3	2	5
11/4/2017 10:47:28	9	Female	Caucasian, Hispanic/ Lati	No			I don't know	5	5	10	1	5	6
11/5/2017 13:23:51	9	Male	Mixed	Yes	engineering	4 years	Science, technology, engi	4	4	8	4	3	7
11/5/2017 13:26:00	11	Female	Caucasian	Yes	Intro to Engineering	1 year	Science/Tech/Engineering	5	4	9	3	3	6
11/6/2017 8:36:33	12	Female	Asian American	Yes			science, technology, engi	3	4	7	2	3	5
11/6/2017 13:41:05	11	Female	Hispanic/ Latino	No			Science, technology, engi	5	5	10	5	5	10
11/6/2017 22:48:26	9	Female	Asian American	No			Science technology engin	5	5	10	1	1	2
11/8/2017 10:44:28	12	Female	Hispanic/ Latino	Yes	Robotics	3 years	Science, Technology, Eng	5	5	10	3	3	6
11/9/2017 12:58:01	9	Male	Hispanic/ Latino	No			Science; Technology; Eng	3	3	6	3	5	8
11/15/2017 9:45:03	9	Female	Hispanic/ Latino	No			A very interesting and ver	4	4	8	5	5	10
11/15/2017 15:51:40	10	Male	African American, Americ	No			A Science Technology Er	4	5	9	4	4	8
11/16/2017 9:52:00	10	Female	Hispanic/ Latino, Mixed	No			stem is for math	3	3	6	3	3	6
11/16/2017 17:53:08	11	Female	Hispanic/ Latino, Mixed	No			I see STEM as an acceler	5	5	10	3	3	6
11/21/2017 9:38:09	9	Female	Hispanic/ Latino, white	No			i have no clue	5	5	10	1	1	2
11/21/2017 9:57:54	10	Male	indian	No			a long or a main section.	5	5	10	5	5	10

Question 6	Question 7	Question 8	Engineering perceptions	Question 9	Question 10	Question 11	Science Interest	Question 12	Question 13	Technologhy Interests	Question 14
5	3	5	13	2	3	3	6	3	4	7	4
3	1	2	6	1	5	5	10	1	2	3	2
5	2	3	10	1	4	2	6	5	5	10	5
5	3	4	12	2	5	5	10	4	3	7	5
5	3	4	12	2	4	4	8	5	5	10	3
4	2	2	8	2	1	3	4	1	3	4	5
3	2	1	6	3	4	3	7	2	2	4	3
4		1	5	1	4	4	8	2	4	6	5
1	1	3	5	1	4	1	5	2	2	4	2
5	4	5	14	1	5	5	10	5	5	10	5
2	1	3	6	2	4	5	9	5	4	9	4
2	1	4	7	1	3	4	7	2	4	6	2
5	2	4	11	3	4	4	8	4	5	9	4
5	1	1	7	1	4	5	9	4	4	8	3
4	2	3	9	1	3	4	7	1	1	2	3
5	5	1	11	1	3	3	6	1	1	2	5
2	2	2	6	1	2	2	4	4	4	8	2
5	4	5	14	4	5	5	10	4	4	8	4
5	5	5	15	4	5	5	10	4	3	7	4
4	4	3	11	3	4	3	7	4	3	7	3
5	2	4	11	1	3	3	6	4	5	9	3
5	5	5	15	1	4	5	9	5	5	10	5
5	3	3	11	4	5	5	10	5	5	10	4
5	5	4	14	2	3	4	7	5	4	9	5
3	3	3	9	3	3	3	6	3	3	6	3
2	1	2	5	1	2	2	4	2	2	4	2
4	3	3	10	4	4	4	8	4	3	7	3
4	4	4	12	2	3	3	6	5	5	10	4
3	2	1	6	1	4	4	8	3	5	8	3
2	1	2	5	1	3	4	7	2	2	4	2
5	1	3	9	3	5	5	10	2	4	6	5
3	3	3	9	1	3	5	8	4	5	9	3
5	4	4	13	4	3	3	6	5	4	9	5
4	1	2	7	1	1	2	3	1	3	4	1
5	2	3	10	3	5	5	10	1	5	6	3
3	1	1	5	1	3	3	6	1	1	2	3
1	2	3	6	2	5	5	10	2	2	4	1
2	2	5	9	1	5	5	10	5	2	7	2
3	2	3	8	1	2	3	5	3	4	7	3
2	1	1	4	1	5	5	10	1	1	2	2
5	2	3	10	1	3	3	6	4	5	9	4
4	2	3	9	1	1	1	2	1	3	4	3
4	4	4	12	5	4	4	8	3	3	6	4
5	2	3	10	2	2	2	4	3	3	6	4
4	1	1	6	3	3	5	8	2	2	4	3
5	3	3	11	1	5	5	10	3	2	5	4
5	2	2	9	4	5	5	10	2	1	3	5
5	2	1	8	3	4	5	9	5	5	10	5
4	3	5	12	3	4	5	9	4	4	8	4
4	2	4	10	2	3	3	6	4	5	9	4
3	5	3	11	3	3	3	6	3	3	6	3
3	2	1	6	1	3	2	5	1	4	5	2
3	2	3	8	2	3	2	5	3	4	7	3
2	1	1	4	1	1	1	2	2	5	7	1
5	3	4	12	4	5	4	9	3	3	6	4
2	4	1	7	4	5	3	8	2	5	7	4
4	3	4	11	3	1	1	2	3	4	7	4
5	3	3	11	1	5	5	10	3	4	7	4
3	1	1	5	1	1	1	2	1	1	2	1
3	3	3	9	3	4	3	7	3	4	7	3
3	2	2	7	5	3	3	6	2	2	4	3
5	4	4	13	3	4	4	8	4	3	7	4
3	3	2	8	2	5	5	10	3	2	5	2
5	4	5	14	4	4	1	5	3	4	7	5
3	2	3	8	1	5	5	10	3	2	5	3
3	3	1	7	2	4	4	8	2	3	5	2
2	1	2	5	2	2	2	4	1	1	2	2
5	5	5	15	1	5	5	10	2	4	6	5
4	3	4	11	2	5	5	10	5	5	10	3
3	2	5	10	2	4	5	9	3	5	8	3
1	4	5	10	1	1	1	2	1	1	2	1
5	3	2	10	1	4	3	7	4	5	9	3
5	4		9		3	3	6	4	5	9	4
5	3	5	13	2	3	3	6	5	5	10	5
5	3	3	11	2	3	2	5	4	3	7	4
3	3	2	8	3	4	4	8	2	2	4	3
5	5	5	15	3	5	5	10	4	3	7	4
5	5	5	15	3	5	4	9	5	5	10	5
5	3	4	12	4	4	4	8	5	5	10	5
3	1	5	9	4	5	5	10	3	1	4	3
1	1	1	3	1	3	3	6	1	2	3	1
1	1	1	3	1	1	3	4	1	1	2	1
5	4	3	12	2	4	3	7	5	5	10	4
4	1	3	8	1	4	5	9	2	2	4	3
3	3	2	8	1	5	5	10	1	3	4	3
4	2	4	10	1	5	5	10	2	2	4	2
4	1	5	10	1	5	5	10	1	5	6	5
3	4	3	10	3	3	3	6	2	2	4	2
3	3	3	9	3	5	4	9	3	3	6	3
3	3	4	10	2	3	3	6	3	3	6	3
5	5	5	15	4	5	5	10	5	5	10	5
2	2	4	8	1	5	5	10	2	2	4	2
3		1	4	3	4	4	8	2	2	4	2
2	1	1	4	2	1	1	2	1	5	6	1
4	5	5	14	2	5	4	9	5	5	10	3
1	3	3	7	1	4	5	9	3	4	7	2
3	3	3	9	3	3	3	6	3	3	6	3
4	4	4	12	5	5	5	10	3	3	6	3
1	1	1	3	5	4	5	9	1	1	2	1
5	5	5	15	2	5	5	10	5	5	10	5

Question 15	Question 16	Engineering Interest	Question 17	Que	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19	a20	a21	a22	a23	a24	a25	a26	a27	a28	a29	sum	Question 19	b1	b2	b3	b4	b5	b6	b7
2	3	9	1	Used a car jack or ch				1	1		1	1							1	1			1		1				1	1	1		1	12	Why birds and planes can fly			1				
2	2	6	2	Studied the inside of a radio, TV, video, or similar, Us										1		1									1					1		1		5								
1	3	9	1	Usec	1	1	1		1	1	1	1		1		1	1	1	1						1		1		1	1	1	1	1	19	The car and how it works, Comput				1		1	1
2	3	10	1	Made bow		1			1		1	1		1				1	1		1	1		1	1	1			1	1	1			15	Computers, PCs, and what we can do with the						1	
2	4	9	3	Usec	1	1	1		1	1	1	1		1		1	1	1	1		1	1		1	1				1	1	1	1	1	21	What an atomic b	1			1	1	1	
1		6	1	Used electric toys, Made bread or pastry, H								1							1			1			1					1	1			6	Rockets and space travel							
2	1	6	3	Used a microscope, Observed or Studied the Milky Way or cons												1							1	1							1		1	5	Why birds and planes can fly			1				1
1	1	7	1	Charged a car battery or other b						1	1	1				1			1						1					1	1		1	9	Important inventions and discoveries, The rainbow, what it							
1	4	7	1	Usec	1	1	1		1	1	1		1		1	1	1	1						1	1									13	What an atomic b	1			1	1		
4	5	14	1	Usec	1					1		1						1	1				1						1	1	1			9	What an atomic b	1		1	1		1	1
2	3	9	3	Chopped wood or collecte					1			1				1				1				1				1	1	1	1		1	10	Why birds and planes can fly			1			1	1
1	4	7	1	Usec	1	1			1			1					1	1	1				1	1					1	1	1		1	13	What an atomic b	1	1	1	1	1	1	1
3	4	11	3	Chopped wood or collecte					1			1		1		1	1		1	1			1	1	1		1		1	1	1	1		15	What an atomic b	1	1	1	1	1	1	1
1	3	7	1	Used electric toys, Used a microscope, Us								1				1	1				1				1	1								6	What an atomic b	1		1			1	
1	2	6	1	Chopped wood or collecte					1			1				1									1					1	1		1	7	Why birds and planes can fly			1			1	1
5	1	11	1	Usec	1	1	1		1	1	1	1				1	1	1					1				1		1	1	1	1	1	17	What an atomic b	1	1	1				
2	2	6	1	Chopped wood or collecte					1	1	1	1				1	1						1		1				1	1	1	1	1	12	What an atomic b	1		1			1	
2	3	9	3	Usec	1	1	1		1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27	What an atomic b	1	1		1		1	
2	2	8	2	Used a car jack			1			1		1				1	1		1		1	1	1	1	1		1	1	1	1	1	1	1	18	What an atomic b	1	1	1	1	1	1	1
2	2	7	2	Used electric toys, Used a needle and thre								1												1					1	1	1		1	6	Rockets and space travel, How scientists think and work, S							
1	4	8	1	Watched a bird make a nest, Planted and watched seeds grow, Participated in Scienc																1					1		1			1	1		1	6	What an atomic b	1					1	1
5	5	15	5	Usec	1	1			1		1	1				1		1	1								1	1	1	1	1	1	1	15	What an atomic b	1	1	1	1		1	
3	3	10	4	Played with electric batteries and bulb							1							1	1			1		1	1		1		1	1	1	1	1	12	What an atomic b	1		1			1	
5	5	15	3	Made bow		1	1	1	1	1	1	1	1	1		1	1	1	1		1	1	1	1	1	1	1		1	1	1	1	1	25	What an atomic b	1	1	1			1	1
3	3	9	3	Chopped wood or collecte					1						1	1			1		1			1										6								
2	3	7	1	Used a car jack			1				1	1		1		1			1			1	1	1	1			1	1	1	1			14	What an atomic b	1	1	1	1	1	1	
3	2	8	5	Made bread or pastry, Used a needle and thread for sewing, Read/Watched non															1					1					1	1	1		1	6	Why birds and planes can fly			1		1		
4	4	12	2	Usec	1	1	1		1	1	1	1	1	1	1	1		1									1		1		1	1		16	Atoms and molecules,		1		1	1	1	1
2	2	7	2	Used electric toys, Made bread or pastry, U								1							1					1	1				1				1	6	What an atomic b	1				1	1	1
1	2	5	1	Charged a car battery or other b						1		1										1		1	1					1	1		1	8	Important inventions and discoveries, How scientists think							
1	3	9	3	Charged a car battery or other b						1		1				1	1		1				1	1	1				1	1	1		1	12	Why birds and planes can fly			1				1
3	3	9	1	Made bow		1						1		1	1	1	1		1		1	1		1	1	1		1		1	1			15	Atoms and molecules,		1	1		1	1	
4	4	13	4	Made bow		1			1		1	1		1		1		1	1				1	1	1		1		1	1	1	1	1	17	What an atomic b	1	1	1	1	1	1	1
	1	2	1	Made bread or pastry, Made your own clothes, Knitted, or made baskets or mats															1		1	1		1					1	1	1		1	8	Computers, PCs, and what we can do with the						1	
1	1	5	3	Charged a car battery or other b						1													1			1								3	Why birds and planes can fly			1			1	
1	1	5	1	Charged a car battery or other b						1		1				1														1	1			5	Important inventions and discoveries, Latest developments							
1	1	3	1	Made bow		1		1	1		1	1			1	1	1		1	1	1	1	1	1	1	1	1	1	1		1		1	21	Why birds and planes can fly			1				
2	5	9	1	Usec	1	1										1													1		1		1	6	Latest developments in technology, Light and optics, How r							
3	3	9	3	Studied the inside of a radio, TV, video, or similar, Us										1				1	1											1	1		1	6	Rockets and space travel							
1	1	4	1	Charged a fuse or attached electric lead to plug,									1			1			1		1	1		1	1	1								8	Latest developments in technology, X-rays and ultrasound							
2	3	9	1	Used electric toys, Used a microscope, Ma								1				1			1										1		1			5	Why birds and planes can fly			1			1	
2	2	7	1	Usec	1	1	1		1	1	1	1				1		1	1			1	1	1	1		1		1	1	1		1	19	What an atomic b	1	1			1	1	1
4	3	11	5	Chopped wood or collecte					1			1				1	1		1	1	1			1	1		1			1	1		1	13	What an atomic b	1		1	1			1
1	2	7	1	Usec	1							1		1		1			1	1	1		1	1		1			1				1	12	Chemicals and their properties, Importan					1		
1	1	5	3	Made bow		1	1		1		1	1		1		1			1				1	1	1				1	1			1	14	Chemicals and their properties, How scie					1		
1	1	6	1	Used electric toys, Made bread or pastry, W								1							1	1					1						1		1	6	What we should eat to be healthy, What are colors and hov							
2	2	9	5	Charged a car battery or other b						1	1	1							1	1	1	1		1					1	1	1		1	11	Dinosaurs and why they died out, Light and optics, H							1
1	2	8	3	Charged a car battery or other b						1	1	1	1	1		1	1	1		1		1	1	1	1		1	1	1	1	1	1	1	20	Atoms and molecules,		1	1			1	
4	5	13	3	Usec	1	1	1		1	1	1	1			1	1		1	1			1	1	1	1		1		1	1	1		1	20	What an atomic b	1	1	1	1	1	1	
2	4	10	2	Usec	1		1		1	1		1							1					1	1				1	1	1	1	1	13	Computers, PCs, and what we can do with the						1	
5	3	11	4	Made bow		1					1	1				1	1		1	1		1		1	1	1	1	1	1	1	1		1	17	What an atomic b	1	1	1		1	1	
1	1	4	1	Used electric toys, Played computer/video								1																			1	1	1	4	Computers, PCs, and what we can do with the						1	
2	3	8	2	Usec	1							1		1		1		1											1	1	1			8	What an atomic b	1	1		1		1	
1	1	3	1	Usec	1							1				1							1		1				1	1	1			8	Computers, PCs, and what we can do with the						1	
3	4	11	4	Charged a car battery or other b						1									1		1			1	1						1		1	7	Why birds and planes can fly			1	1			1
4	1	9	5	Usec	1	1			1			1					1		1				1					1	1	1	1		1	12	What an atomic b	1	1	1	1	1		
3	4	11	4	Usec	1					1	1	1	1	1									1				1	1	1		1	1	1	13	What an atomic b	1	1		1	1	1	
2	2	8	2	Made bow		1										1			1						1				1	1	1		1	8	Latest developments in technology							
1	1	3	1	Charged a car battery or other b						1	1	1		1	1	1		1						1					1	1	1		1	12	Why birds and planes can fly			1			1	
4	3	10	3	Watched a bird make a nest																1														1	Latest developments in technology							
2	2	7	4	Made bow		1						1							1		1	1		1	1			1	1	1	1	1	1	13	Why birds and planes can fly			1				
2	3	9	4	Made bow		1			1		1	1		1	1	1	1	1	1	1			1	1	1				1	1	1		1	18	What an atomic b	1	1			1	1	
2	2	6	2	Played with electric batteries and bulb							1								1					1					1		1			5	Chemicals and their properties, X-rays ar					1		
3	5	13	4	Usec	1		1		1			1				1							1							1	1		1	9	What an atomic b	1	1		1	1		
1	2	6	1	Usec	1	1	1		1	1	1	1					1	1	1					1					1	1	1		1	15	Atoms and molecules,		1					
2	1	5	2	Used a microscope, Read/Watched non-fiction science, Read/W												1													1	1	1	1	1	6	Sounds and music from birds and other animals, New sour							
1	1	4	3	Chopped wood or collecte					1			1							1		1			1						1	1			7								
5	5	15	1	Usec	1				1			1				1			1				1	1	1		1			1	1		1	12	What an atomic b	1	1			1		
3	5	11	2	Usec	1		1			1		1	1			1	1	1							1						1		1	11	What an atomic b	1	1		1	1	1	
2	5	10	3	Charged a car battery or other b						1																					1			2	What an atomic b	1	1	1	1			1
4	5	10	1	Usec	1		1	1	1	1	1	1		1	1	1			1	1								1	1	1	1	1	1	18	The car and how it works, Comput				1		1	
2	2	7	1	Made bow		1						1				1		1	1		1	1	1	1	1	1			1	1	1			14	Dinosaurs and why they died out, Latest developmer							1
3	3	10	1	Charged a car battery or other b						1		1										1		1							1	1	1	7	What an atomic b	1		1	1		1	1
3	5	13	2	Usec	1	1					1	1				1	1		1						1				1	1	1	1	1	13	What an atomic b	1					1	
3	3	10	2	Usec	1	1	1		1		1	1		1	1	1		1	1						1				1	1	1	1		16	What an atomic b	1	1			1		
2	2	7	3	Charged a car battery or other b						1						1								1	1			1	1	1	1			8	Atoms and molecules,		1			1		1
4	3	11	2	Made bow		1			1		1	1	1		1	1		1	1						1		1	1	1	1	1	1	1	17	What an atomic b	1		1		1		1
5	5	15	3	Usec	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1			1	1	1		1	1	1	1	1	1	1	25	What an atomic b	1	1	1	1	1	1	
2	3	10	4	Charged a car battery or other b						1	1	1	1	1		1	1	1					1	1			1	1	1	1	1	1	1	17	What an atomic b	1	1			1	1	
1	4	8	4	Usec	1	1			1								1	1	1	1	1			1	1	1			1	1	1		1	15	What an atomic b	1		1	1	1	1	1
1	1	3	1	Chopped wood or collecte					1			1				1															1			4	Why birds and planes can fly			1			1	
1	1	3	1																															0	Clouds, rain, and snow							
3	2	9	3	Usec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1		1	1	1	1		1	25	What an atomic b	1	1			1		1
2	3	8	1	Usec	1														1															2	X-rays and ultrasound in medicine							
2	2	7	1	Watched a bird make a nest, Observed or Studied the Milky Way or constellations of s																1			1						1	1	1		1	6	Chemicals and their properties, How radi					1		
1	2	5	1	Used a car jack			1					1				1						1		1	1	1			1	1	1	1		11	How radioactivity affect life and the body, How scientists th							
1	5	11	1	Usec	1	1			1			1			1	1			1			1	1	1	1				1	1	1		1	15	What an atomic b	1	1	1	1	1	1	1
4	3	9	2	Usec	1	1	1	1	1		1	1			1	1	1	1	1	1				1	1	1	1		1	1	1	1	1	22	Electricity, how it is produced and used in the home, Impor							
3	3	9	3	Usec	1	1			1			1			1		1		1	1		1	1	1	1		1		1	1	1		1	17	Atoms and molecules,		1	1		1		
3	3	9	3	Charged a car battery or other b						1																								1	Chemicals and their properties, X-rays ar					1		
5	5	15	4	Used a car jack			1			1	1	1		1		1			1	1	1	1		1	1	1	1	1	1	1	1	1	1	20	What an atomic b	1		1	1		1	
2	5	9	1	Used electric toys, Used a microscope, Ma								1				1			1		1		1		1				1	1	1		1	10	The car and how it works, Importar				1			
1	1	4	4	Chopped wood or collecte					1		1	1			1			1	1		1	1		1	1	1	1	1	1	1	1	1	1	18	What an atomic b	1		1			1	1
1	1	3	1	Charged a car battery or other b						1									1				1		1		1	1	1	1	1	1	1	11	What an atomic b	1		1		1	1	
4	4	11	1	Made bow		1						1		1		1			1		1		1	1	1		1	1	1	1	1		1	15	Why birds and planes can fly			1			1	1
2	2	6	3	Chopped wood or collecte					1			1				1			1					1			1				1	1	1	9	What an atomic b	1						
3	3	9	3	Made bread or pastry, Made your own clothes, Used a needle and thread for sev															1		1			1		1					1			5	Rockets and space travel							
4	4	11	5	Usec	1						1								1				1	1				1	1	1	1		1	10	What an atomic b	1	1		1	1	1	
1	1	3	5	Used a microscope, Made bread or pastry, Watched a bird make												1			1	1	1				1				1	1			1	8	The rainbow, what it is, and why you can see it, What are c							
5	5	15	5	Used a car jack			1			1																					1	1		4								
																																				43	32	42	29	36	49	28
					33	34	24	7	41	36	38	70	12	25	17	61	28	31	65	22	25	26	37	57	58	18	29	23	67	72	86	33	69									

	b8	b9	b10	b11	b12	b13	b14	b15	b16	b17	b18	b19	b20	b21	b22	b23	b24	sum	Question 20	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	sum	Question 21	If yes, wl	If yes, ho	If yes, w	If yes, ho	Have you t
									1	1		1	1	1	1	1	1	9	Power, Useful in everyday	1							1	1	1			4	Flagpole (Zelzah)					No
																		0	Difficult to understand, Doing experiments						1	1						2	Flagpole (Zelzah)					No
					1		1		1	1	1	1		1	1			11	Destructive and dangerous, Difficult to und			1			1	1	1					4	Flagpole (Zelzah)					No
		1								1						1	1	5	Helping the poor, Difficult to understand, Doing experiments, Useful						1	1	1	1	1			5	Flagpole (Zelzah)					No
		1	1		1			1		1	1					1		11	Doing experiments, Useful in everyday life, Important for Society, Interesting							1	1	1				3	Flagpole (Zelzah)					Yes
							1											1	Difficult to understand						1				1			2	Flagpole (Zelzah)					No
											1	1		1	1	1		7	Power, Doing experiments	1						1						2	Flagpole (Zelzah)					No
is, an		1										1				1		3	Power, Difficult to underst	1					1	1			1			4	Flagpole (Zelzah)					No
						1	1							1		1		7	Easy to understand, Difficult to un		1				1	1	1	1				5	Flagpole (Zelzah)					No
	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1		20	Difficult to understand, Doing experiments, Important for Society, Int						1	1		1	1			4	Flagpole (Zelzah)					No
		1	1			1			1		1	1		1		1	1	12	Power, Destructive and da	1		1			1	1			1			5	Flagpole (Zelzah)					No
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24	Power, Destructive and da	1		1	1		1	1	1	1	1			8	Flagpole (Zelzah)					No
	1		1	1	1		1			1				1				14	Power, Most suitable for b	1				1	1	1	1	1	1	1		8	Flagpole (Zelzah)					No
	1							1	1	1		1	1	1		1		11	Power, Most suitable for b	1				1	1	1						4	Flagpole (Zelzah)					No
	1		1			1			1			1	1		1	1		11	Difficult to understand, Doing experiments, Useful in everyday life, I						1	1	1	1				4	Flagpole (Zelzah)					No
	1		1		1	1	1			1	1		1					11	Power, Difficult to underst	1					1	1	1	1				5	Flagpole (Zelzah)					Yes
	1	1	1					1		1								8	Power, Doing experiments	1						1	1	1	1			5	Flagpole (Zelzah)					Yes
	1	1	1	1	1	1	1			1	1		1					14	Power, Doing experiments	1						1	1	1	1			5	Flagpole (Zelzah)	Math tut	6 years	science	6 years	Yes
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24	Power, Doing experiments	1						1	1	1	1			5	Flagpole (Zelzah)					Yes
Sounds and music from birds and ot							1	1	1					1		1		5	Easy to understand, Doing experir		1					1	1		1			4	Flagpole (Zelzah)					Yes
		1	1			1										1		7	Power, Most suitable for b	1				1		1			1			4	Flagpole (Zelzah)					Yes
	1	1	1	1	1		1	1	1					1				14	Power, Difficult to underst	1					1	1	1		1			5	Flagpole (Zelzah)					Yes
	1	1	1	1				1		1	1	1	1	1				13	Power, Helping the poor, I	1					1	1	1	1	1			6	Flagpole (Zelzah)					Yes
	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21	Power, Easy to understan	1	1					1	1	1	1	1		7	Flagpole (Zelzah)					Yes
																		0	Important for Society									1				1	Flagpole (Zelzah)					Yes
	1	1	1	1	1	1			1	1				1	1	1	1	18	Power, Easy to understan	1	1	1	1		1	1	1	1	1		1	10	Flagpole (Zelzah)					Yes
	1	1	1	1			1	1		1		1	1	1				12	Power, Helping the poor, I	1		1				1	1	1	1	1		7	Flagpole (Zelzah)					Yes
	1			1	1		1	1				1		1				12	Difficult to understand, Interesting and Exciting						1				1			2	Flagpole (Zelzah)					No
		1	1	1				1	1	1		1		1			1	13	Power, Helping the poor, I	1						1	1	1	1			5	Hiawatha Lot (P. E. Field)					No
and w		1						1				1		1	1			5	Difficult to understand, Doing experiments, Useful in everyday life, I						1	1	1	1			1	5	Hiawatha Lot (P. E. Field)					No
		1	1	1		1	1	1	1		1	1		1	1		1	14	Power, Easy to understan	1	1					1	1	1	1			6	Hiawatha Lot (P. E. Field)					Yes
	1	1	1						1	1	1	1	1	1	1			14	Difficult to understand, Doing experiments, Interesting and Exciting						1	1			1			3	Hiawatha Lot (P. E. Field)					Yes
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24	Power, Doing experiments	1						1	1	1	1			5	Hiawatha Lot (P. E. Field)					Yes
	1		1									1	1	1	1			7	Power, Helping the poor, I	1		1			1		1	1		1	1	7	Hiawatha Lot (P. E. Field)					No
													1		1			4	Creates problems for society, Most suitable for boy				1	1			1					3	Hiawatha Lot (P. E. Field)					Yes
s in tec		1	1															2	Doing experiments							1						1	J Gate					No
						1					1		1				1	5	Power, Easy to understan	1	1		1		1		1		1	1		7	J Gate					No
radioactivity			1	1		1					1		1				1	6	Difficult to understand, Doing experiments, Useful in everyday life, I						1	1	1		1			4	J Gate					No
							1											1	Doing experiments							1						1	Kingsbury (Main Gate)					No
in medicine			1								1			1	1			4	Helping the poor, Doing experiments							1						1	Kingsbury (Main Gate)					No
	1			1					1			1		1		1		8	Power, Difficult to underst	1					1	1		1	1			5	Kingsbury (Main Gate)					No
		1	1		1	1	1			1								11	Power, Doing experiments	1						1	1	1	1			5	Kingsbury (Main Gate)					Yes
	1	1	1			1		1	1	1		1	1	1	1	1	1	17	Power, Easy to understan	1	1					1	1	1	1			6	Kingsbury (Main Gate)					Yes
		1	1				1	1	1			1		1				8	Power, Difficult to underst	1					1	1	1	1	1			6	Kingsbury (Main Gate)					No
								1				1	1	1	1			6	Easy to understand, Helping the p		1					1			1			3	Kingsbury (Main Gate)					No
w do we see different colors, AIDS: What it is and how it spreads													1	1			1	3	Helping the poor, Destructive and dangero			1			1	1	1	1	1			6	Kingsbury (Main Gate)					No
				1		1				1	1		1	1	1			8	Easy to understand, Doing experir		1					1	1	1	1			5	Kingsbury (Main Gate)					No
	1	1	1	1			1			1		1		1	1	1	1	14	Helping the poor, Destructive and dangero			1				1	1	1	1			5	Kingsbury (Main Gate)					Yes
	1	1	1	1	1	1	1	1			1		1	1				17	Difficult to understand, Useful in everyday life						1		1					2	Kingsbury (Main Gate)					No
			1					1				1	1	1				6	Power, Doing experiments	1						1	1	1	1			5	Kingsbury (Main Gate)					Yes
	1	1	1	1	1			1	1	1	1	1	1	1	1	1		19	Power, Easy to understan	1	1	1	1		1	1	1	1	1	1		10	Kingsbury (Main Gate)					Yes
						1							1					3	Difficult to understand, Doing experiments, Boring						1	1					1	3	Kingsbury (Main Gate)					No
	1	1		1	1		1			1					1			11	Difficult to understand, Doing experiments, Important for Society						1	1		1				3	Kingsbury (Main Gate)					No
													1	1				3	Difficult to understand, Boring						1						1	2	Kingsbury (Main Gate)					No
							1		1			1	1			1	1	9	Power, Doing experiments	1						1						2	Kingsbury (Main Gate)					No
	1	1	1	1			1	1	1	1		1	1	1	1	1		18	Power, Most suitable for b	1				1	1	1	1	1	1			7	Kingsbury (Main Gate)					Yes
	1	1	1	1	1	1	1	1		1								14	Easy to understand, Doing experir		1					1	1	1	1			5	Kingsbury (Main Gate)					No
			1															1	Doing experiments, Important for Society							1		1				2	Kingsbury (Main Gate)					Yes
	1				1													4	Difficult to understand, Boring						1						1	2	Kingsbury (Main Gate)					No
			1															1	Power, Difficult to underst	1					1			1				3	Kingsbury (Main Gate)					No
	1						1	1			1	1	1	1	1	1		10	Doing experiments, Useful in everyday life, Interesting and Exciting							1	1		1			3	Kingsbury (Main Gate)					No
		1	1	1	1	1	1			1	1					1	1	14	Power, Easy to understan	1	1					1	1	1	1			6	Kingsbury (Main Gate)					No
											1				1	1		4	Useful in everyday life, Important for Society, Interesting and Exciting								1	1	1			3	Service Road East (Boy's P.E. Side)					No
		1			1	1	1			1								9	Doing experiments, Important for Society, Interesting and Exciting							1		1	1			3	Service Road East (Boy's P.E. Side)					No
		1	1		1	1				1	1							7	Power, Easy to understand, Doing		1					1	1	1	1			5	Service Road East (Boy's P.E. Side)					Yes
rces of energy from the sun, wind, ect, How bird									1	1						1		3	Power, Helping the poor, Doing experiments, Useful in everyday life, Importa							1	1	1	1			4	Service Road East (Boy's P.E. Side)					No
																		0	Doing experiments, Boring							1					1	2	Service Road East (Boy's P.E. Side)					No
	1	1			1		1	1	1	1				1	1	1		13	Power, Destructive and da	1		1	1			1	1	1	1	1		8	Service Road West (Girl's P.E. Side)					No
			1	1			1		1			1	1	1	1			13	Power, Creates problems	1			1		1	1		1	1			6	Service Road West (Girl's P.E. Side)					No
						1	1		1							1		9	Doing experiments, Interesting and Exciting							1			1			2	Service Road West (Girl's P.E. Side)					No
		1	1															4	Power, Creates problems	1			1			1	1	1		1		6	Service Road West (Girl's P.E. Side)					No
			1	1										1	1			5	Difficult to understand, Doing experiments, Useful in everyday life, I						1	1	1	1				4	Service Road West (Girl's P.E. Side)					No
	1	1	1		1		1	1	1	1		1	1	1		1	1	18	Power, Creates problems	1			1		1	1	1	1	1			7	Service Road West (Girl's P.E. Side)					Yes
	1			1		1							1					6	Power, Easy to understand, Doing		1					1		1	1			4	Service Road West (Girl's P.E. Side)					Yes
			1				1	1		1		1				1		9	Power, Doing experiments	1						1	1	1	1			5	Service Road West (Girl's P.E. Side)					No
		1						1			1	1		1	1	1	1	11	Easy to understand, Doing experir		1					1	1	1	1			5	Service Road West (Girl's P.E. Side)					No
		1	1	1		1	1	1	1		1		1			1	1	15	Power, Destructive and da	1		1	1		1	1	1	1	1	1		9	Service Road West (Girl's P.E. Side)					No
	1	1	1	1	1	1	1		1	1		1				1	1	18	Power, Easy to understan	1	1					1	1	1	1			6	Service Road West (Girl's P.E. Side)					Yes
	1	1	1	1	1	1	1	1		1			1				1	15	Power, Easy to understan	1	1	1				1	1	1	1			7	Zelzah Teacher Parking I	Math Co	3 years	CyberPa	1 year	Yes
		1		1	1	1	1				1	1	1	1	1		1	17	Difficult to understand, Useful in everyday life, Interesting and Exciti						1		1		1			3	Zelzah Teacher Parking Lot					No
	1	1				1							1					6	Power, Difficult to underst	1					1	1		1	1			5	Zelzah Teacher Parking Lot					No
															1			1	Boring												1	1	Zelzah Teacher Parking Lot					No
	1	1	1	1	1		1		1	1		1		1	1	1		16	Power, Doing experiments	1						1	1	1	1			5	Zelzah Teacher Parking Lot					No
											1							1	Doing experiments, Useful in everyday life, Important for Society							1	1	1				3	Zelzah Teacher Parking Lot					No
						1				1	1	1	1	1		1	1	9	Difficult to understand, Doing experiments, Useful in everyday life, I						1	1	1	1	1			5	Zelzah Teacher Parking Lot					No
ink and work, X-rays and ultra						1		1			1		1				1	5	Destructive and dangerous, Doing experim			1				1	1	1		1		5	Zelzah Teacher Parking Lot					No
	1	1	1			1	1	1	1		1	1	1	1	1	1	1	21	Power, Easy to understan	1	1	1				1	1	1	1	1		8	Zelzah Teacher Parking Lot					No
	1	1								1					1		1	5	Doing experiments, Useful in everyday life, Important for Society							1	1	1				3	Zelzah Teacher Parking I	Honors E	1 year	math	4 years	No
		1				1			1		1			1		1		9	Doing experiments, Useful in everyday life, Important for Society, Interesting							1	1	1	1			4	Zelzah Teacher Parking Lot					No
											1				1			3	Easy to understand, Difficult to un		1				1		1	1				4	Zelzah Teacher Parking Lot					No
	1	1	1		1	1	1			1	1		1			1	1	15	Power, Easy to understan	1	1					1	1	1	1			6	Zelzah Teacher Parking Lot					Yes
		1	1								1	1	1	1			1	8	Power, Difficult to underst	1					1	1	1				1	5	Zelzah Teacher Parking Lot					Yes
	1	1	1		1	1			1	1	1	1	1	1		1	1	17	Power, Doing experiments	1						1	1	1	1			5	Zelzah Teacher Parking Lot					Yes
														1				5	Destructive and dangerous, Creates proble			1	1			1				1		4	Zelzah Teacher Parking Lot					Yes
	1	1	1				1	1	1	1		1	1	1		1		14	Difficult to understand, Useful in everyday life, Important for Society						1		1	1	1			4	Zelzah Teacher Parking Lot					No
		1				1		1		1								5	Destructive and dangerous, Difficult to und			1			1	1	1	1	1			6	Zelzah Teacher Parking Lot					Yes
							1											1	Difficult to understand						1							1	Zelzah Teacher Parking Lot					No
	1	1		1			1		1	1	1		1	1	1		1	16	Difficult to understand, Doing experiments, Important for Society, Int						1	1		1	1	1		5	Zelzah Teacher Parking Lot					No
colors and how do we see different colors, Clouds, rain, and snow												1		1	1			3	Most suitable for boys, Difficult to understand, Doing experi					1	1	1		1				4	Zelzah Teacher Parking Lot					No
																		0	Boring												1	1	Zelzah Teacher Parking Lot					Yes
	41	51	51	33	30	38	43	34	35	44	37	43	44	53	37	41	31			46	20	16	11	6	47	82	65	67	64	13	9	446						

Question 22	Question 23	Question 24	Question 25	Question 26	Have you taken AP Calcu	Have you taken any AP S	Have you or are you takin	Have you taken AP Calcu	Have you taken AP Statis	Have you or are you takin	What grade did you recei
4	4	3	3	1		No					
2	1	1	2	2		No					
4	4	4	5	3		No					
3	3	3	3	3		Yes					
2	4	4	3	2	No	No		No	No	No	
2	2		2	2		No					
3	3	2	2	1		No					
2	2	2	4	3		No					
1	1	1	1	1		No					
3	3	2	3	3		No					
3	4	3	4	5		No					
4	3	3	3	3		No					
3	3	3	4	3		No					
4	4	4	4	4		No					
2	3	2	3	2		No					
3	3	3	3	3	Yes	Yes		Currently Enroller	Currently Enrolled	No	
5	5	4	4	4	No	No		No	No	No	
5	5	5	5	5	Yes	Yes		Yes	Currently Enrolled	No	
5	5	5	5	5	Yes	Yes		Yes	Currently Enrolled	No	
5	5	5	5	5	Currently Enrolled	No		No	No	No	
4	5	4	5	2	No	No		No	No	No	
5	5	5	5	5	Yes	Yes		Yes	Currently Enrolled	No	
5	5	5	5	5	Yes	Yes		Yes	Currently Enrolled	No	
5	5	5	4	5	Yes	Yes		Yes	Currently Enrolled	No	
3	3	3	3	3	Yes	Yes		No	No	No	
4	4	3	3	4	Currently Enrolled	No		No	No	No	
4	4	5	4	4	Yes	Yes		Currently Enroller	No	No	
4	4	3		4		No					
2	2	2	3	3		No					
1	1	1	1	1		No					
5	5	5	5	5	No	Yes		Yes	Currently Enrolled	No	
4	4	4	4	5	Currently Enrolled	No		No	No	No	
5	5	5	5	5	Yes	Yes		Currently Enroller	Currently Enrolled	No	
1	1	1	1	1		No					
5	4	5	5	5	Yes	Yes		No	Currently Enrolled	No	
1	1	2	1	1		Yes					
5	5	5	5	5		No					
5	5	5	5	5		Yes					
3	3	3		3		No					
4	3	3	3	4		No					
3	4	4	5	4		No					
4	4	3	3	4	Yes	Yes		No	No	No	
3	3	3	3	3	No	No		No	No	No	
3	4	2	3	3		No					
4	3	2	4	3		No					
3	3	3	3	3		No					
5	5	5	5	5		No					
3	4	4	2	2	Yes	Yes		Yes	Currently Enrolled	No	
5	5	5	4	5		Yes					
5	5	5	5	5	Yes	Yes		No	Currently Enrolled	Currently Enrolled	A
5	5	5	5	5	Yes	Yes		Yes	Currently Enrolled	Currently Enrolled	
3	1	1	1	1		No					
3	3	3	3	3		No					
1	1	1	1	1		No					
4	4	4	4	4		No					
5	5	4	5	5	Yes	Yes		No	No	No	
4	4	4	4	4		Yes					
4	4	4	4	4	Yes	Yes		No	No	Currently Enrolled	A
1	1	1	1	1		Yes					
4		3	3	3		No					
3	4	3	3	4		Yes					
5	5	5	5	5		Yes					
3	4	3	2	4		No					
5	5	4	4	5		No					
5	5	5	5	5	Yes	Yes		Currently Enroller	No	No	
2	2	3	3	3		No					
2	2	2	2	3		No					
3	4	2	2	1		No					
5	5	5	5	5		No					
3	3	3	3	3		No					
4	5	5	5	4		No					
5	5	4	4	1		No					
5	5	5	5	5	No	No		No	No	No	
5	5	4	5	5	No	No		No	No	No	
3	3	3	3	3		No					
5	5	5	5	5		No					
5	5	4	5	5		Yes					
5	5	5	5	5	No	Yes		Yes	Currently Enrolled	Currently Enrolled	A
5	5	5	5	5	No	Yes		No	No	No	
5	4	3	4	3		Yes					
1	1	1	1	1		No					
1	1	1	1	1		No					
5	5	5	5	5		No					
4	4	4	4	4		No					
3	4	2	2	3		No					
3	4	3	5	3		No					
1	1	1	1	1		Yes					
5	4	4	4	4		No					
4	4	4	4	5		No					
3	2	3	3	3		No					
5	4	4	5	4	Currently Enrolled	No		No	Currently Enrolled	No	
3	5	4	5	3	No	No		No	No	No	
4	4	4	4	4	Yes	Yes		Yes	No	No	
4	4	3	3	4	No	No		No	No	No	
5	5	5	5	5		No					
5	5	5	5	5	No	No		No	No	No	
3	3	3	3	3		No					
5	5	5	5	5		No					
1	1	1	1	1		No					
5	5	5	5	5	No	No		No	No	No	

What grade did you recei	What grade did you recei	What grade did you recei	Have you taken AP Comp	What grade did you recei	What grade did you recei	What grade did you recei	What grade did you recei	What grade did you recei	What grade did you recei	Have you taken AP Biolog	Have you taken AP Chem
										No	No
			Currently Enrolled								
			Currently Enrolled	A	B					No	No
			Currently Enrolled								
			No	B	B	B	B			No	Yes
			No	A	B	B	A			No	Yes
			No								
			Yes								
			Currently Enrolled	A	A	A	A			Yes	Yes
			No	B	A	A	A			Yes	Yes
			No	A	A	A	A			Yes	Yes
			No	A	B					No	No
			No								
			No	A	A					No	Yes
			No			A	A			Yes	Yes
			No								
			No	A	B					No	No
			No	A	A					No	Yes
										Currently taking	No
										No	No
			No	C	C					No	Yes
			No								
			Currently Enrolled	A	A	A	A			No	No
										No	No
A			Yes	B	B					No	No
			No	A	A	A	A			Yes	Yes
			No	B	B					No	No
										No	No
A			Yes	C	B					No	No
										No	No
										No	No
										No	No
			Currently Enrolled	B						Yes	No
			Currently Enrolled								
			Currently Enrolled								
										No	No
A			Yes			B	A			Yes	Yes
			Currently Enrolled							No	No
										No	No
										No	No
			No								
			No								
			No	B	B	B	A			No	No
			Currently Enrolled								
			No								
			No								

Have you taken AP Envir	Have you taken AP Physi	Have you taken AP Physi	Have you taken AP Physi	What grade did you recei	What grade did you recei	What grade did you recei	What grade did you recei	What grade did you recei	What grade did you recei	What grade did you recei	What grade did you recei
No	No	Yes	No					B	B		
No	No	Yes	No					C	C		
No	No	Yes	No					C	B		
No	No	Yes	No					A	B		
No	No	Yes	No	B	B			A	A		
No	Currently taking	Yes	No	B	A			B	A		
No	Currently taking	Yes	No	A	A			A	A		
No	No	No	No								
No	No	Yes	No					A	A		
Currently taking	No	Yes	No	A	A			B	B		
No	Currently taking	Yes	No					A	A		
No	No	Yes	No					A	A		
No	No	No	No								
No	No	Currently taking	No								
Yes	No	No	No								
No	Currently taking	Yes	No					A	A		
No	No	Currently taking	No								
Currently taking	No	Yes	No					B	B		
No	No	Yes	No	B	B			A	A		
No	No	Yes	No					A	A		
No	No	Currently taking	No								
No	No	Yes	No					B	B		
No	No	Currently taking	No								
No	No	Currently taking	No								
No	No	Currently taking	No								
No	No	Currently taking	No	B	B						
No	No	Currently taking	No								
No	No	Yes	Currently taking	B	B			A	A		
No	No	Currently taking	No								
No	No	Currently taking	No								
No	No	No	No								
No	No	Yes	No					C	B		

What grade did you recei	What grade did you recei	What grade did you recei	What grade did you recei	Email A	Have you taken AP Physi	Have you taken AP Biology
				j29348@student.ghchs.com		
				a32680@student.ghchs.com		
				n32727@student.ghchs.com		
				s30100@student.ghchs.com		
				j31200@student.ghchs.com		
				n28985@student.ghchs.com		
				a32256@student.ghchs.com		
				v29391@student.ghchs.com		
				m34327@student.ghchs.com		
				a31954@student.ghchs.com		
				j35124@student.ghchs.com		
				s32581@student.ghchs.com		
				k34655@student.ghchs.com		
				a33421@student.ghchs.com		
				g32479@student.ghchs.com		
				j29194@student.ghchs.com		
				r31833@student.ghchs.com		
		C	C	e29651@student.ghchs.com		
		B	B	n29190@student.ghchs.com		
				l31335@student.ghchs.com		
				c32404@student.ghchs.com		
		A	B	c29650@student.ghchs.com		
		A	A	c30087@student.ghchs.com		
		A	A	a29514@student.ghchs.com		
				c29378@student.ghchs.com		
				m32323@student.ghchs.com		
		A	A	s31198@student.ghchs.com		
				m34093@student.ghchs.com		
				a33965@student.ghchs.com		
				c33463@student.ghchs.com		
		A	A	m29338@student.ghchs.com		
				a31211@student.ghchs.com		
				t29326@student.ghchs.com		
				s29210@student.ghchs.com		
		A	A	h29304@student.ghchs.com		
				p34237@student.ghchs.com		
				n34957@student.ghchs.com		
				u32352@student.ghchs.com		
				a34658@student.ghchs.com		
				m33778@student.ghchs.com		
				d33198@student.ghchs.com		
B	A	A	B	b28862@student.ghchs.com		
				x31627@student.ghchs.com		
				l30994@student.ghchs.com		
				x34648@student.ghchs.com		
				d30130@student.ghchs.com		
				a33978@student.ghchs.com		
				a29473@student.ghchs.com		
				l34751@student.ghchs.com		
				j28696@student.ghchs.com		
		A	A	t29420@student.ghchs.com		
				s31484@student.ghchs.com		
				c34134@student.ghchs.com		
				t30993@student.ghchs.com		
				a34830@student.ghchs.com		
				m30065@student.ghchs.com		
				j34069@student.ghchs.com		
				s29472@student.ghchs.com		
				s31598@student.ghchs.com		
				h32089@student.ghchs.com		
				a33046@student.ghchs.com		
				g32664@student.ghchs.com		
				k33419@student.ghchs.com		
				s33857@student.ghchs.com		
				c30103@student.ghchs.com		
				f32141@student.ghchs.com		
				b32393@student.ghchs.com		
				c33809@student.ghchs.com		
				m32353@student.ghchs.com		
				d35111@student.ghchs.com		
				a31772@student.ghchs.com		
				s31814@student.ghchs.com		
				c31081@student.ghchs.com		
				c32860@student.ghchs.com		
				e33321@student.ghchs.com		
				k33664@student.ghchs.com		
				z32574@student.ghchs.com		
		A	B	n29573@student.ghchs.com		
				v33738@student.ghchs.com		
				m32582@student.ghchs.com		
				s34198@student.ghchs.com		
				a33837@student.ghchs.com		
				s31167@student.ghchs.com		
				t33120@student.ghchs.com		
				k32216@student.ghchs.com		
				j33194@student.ghchs.com		
				k34733@student.ghchs.com		
				j34438@student.ghchs.com		
				l34439@student.ghchs.com		
				h32089@student.ghchs.com		
				m31802@student.ghchs.com		
				a34546@student.ghchs.com		
				a29386@student.ghchs.com		
				h34938@student.ghchs.com		
				d34447@student.ghchs.com		
				y32720@student.ghchs.com		
				e32792@student.ghchs.com		
				g32796@student.ghchs.com		
				a34261@student.ghchs.com		
				h33210@student.ghchs.com		