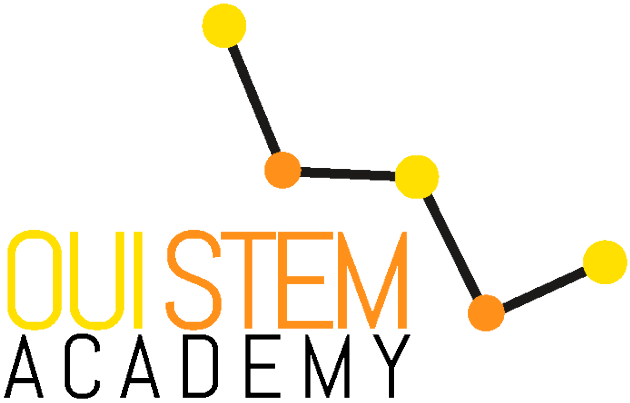

STEM & Social Issues:
Results of a National Survey

Conducted for
Oui STEM Academy's Student Who STEM Initiative

By
Dilesha Stelmach

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I. Introduction

The Glossary of Education Reform for Journalist, parents and community member describe Engagement as "the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education."[1] The belief that students require engagement is predicated on the notion that students lack issues in the world they live in. Oui STEM Academy conducted a questionnaire to determine if students need engagement in science, technology, engineering and mathematics; as well as social change.

Before embarking on this questionnaire, Oui STEM Academy conducted a series of one-on-one interviews with teachers, parents and community members in the quest to find out how to engage students. This led to the to the creation of the Oui STEM Academy's Student who STEM Student engagement questionnaire. The focus of this questionnaire is analysis, which identified the values and beliefs of the Students aged 12 to 23.

This report covers an array of student concerns and begins with a summary of key finds drawn from the analysis of this questionnaire. The recommendations are followed by detailed findings, which specifically examine:

- What issues are students concerned with;
- What supports students would like; and
- What classes, courses or programs students request.

The detailed findings are followed by a full methodology and appendix which contains the questionnaire with response totals.

II. Summary of Key Findings

The questionnaire was conducted contained the values of **53** students from across the Greater Toronto Area from May 2018 to June 2018. There was a total of nine questions posed, four of which require short answers. The Toronto District School Board report that they served 256,000 students their TDSB Students and Families: Demographic Profile.[2] This means the data set presented in this paper is indicative of the students that participate in Oui STEM Academy activities, which is a small subset of the total available students.

For the purpose of this Report Oui STEM Academy defines an engaged student as someone who;

- Is willfully engaged in their education and surroundings;
- Aware of the areas for which the need to approve;
- Able to communicate how they can be assisted; and
- Able to articulate their concerns cohesively.

The analysis of the questionnaire data has determined that students are very engaged. Not only were these students aware of the social issues that plague society, they were able to connect the issues to science, technology, engineering and mathematical to result in a possible solution.

III. Recommendations

The questionnaire indicates that the biggest barriers to students are access to program they feel expose them to skills needed to impact social change.

Students

- Find a study partner that possesses strength in areas that differ from their own;
- Source extra-curricular activities that enable education in abstract areas; and
- Seek a mentor in the area of particular interest with the STEM field.

Educators

- Utilize technology geared towards student engagement and learning games;
- Invite STEM speakers to class; and
- Seek out conference for constant professional development.

Parents

- Encourage curiosity from children interested in STEM;
- Encourage activity from children who do not outright express interests in STEM; and
- Facilitate development and encourage communication.

Lawmakers

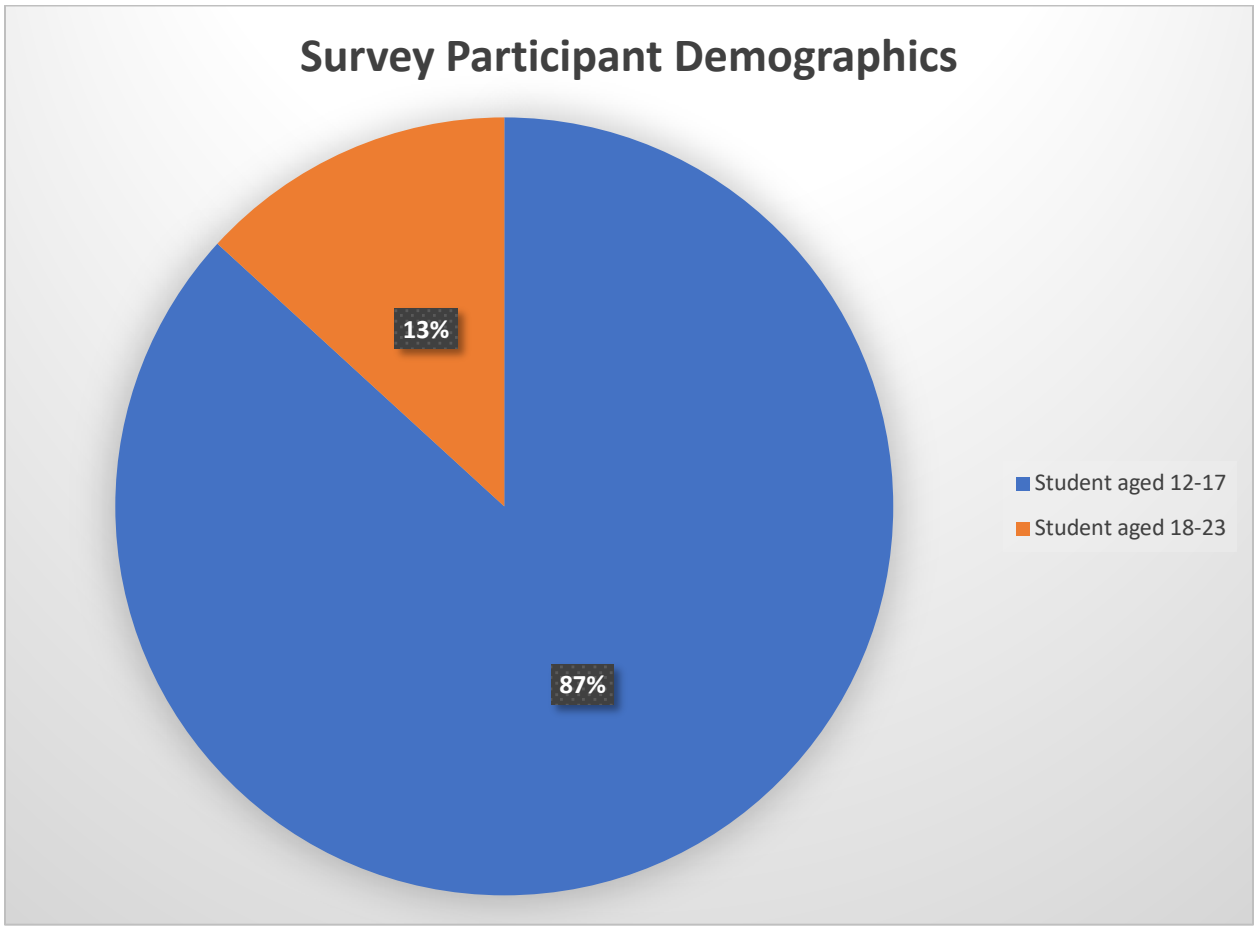
- Revised Education Act, RSO 1990 to reflect modern issues and ideology;
- Revise regulation, bylaws and legislation that marginalize students within certain groups; and
- Engage in meaningful discourse around reform, diversity and inclusion.

IV. Detailed Findings

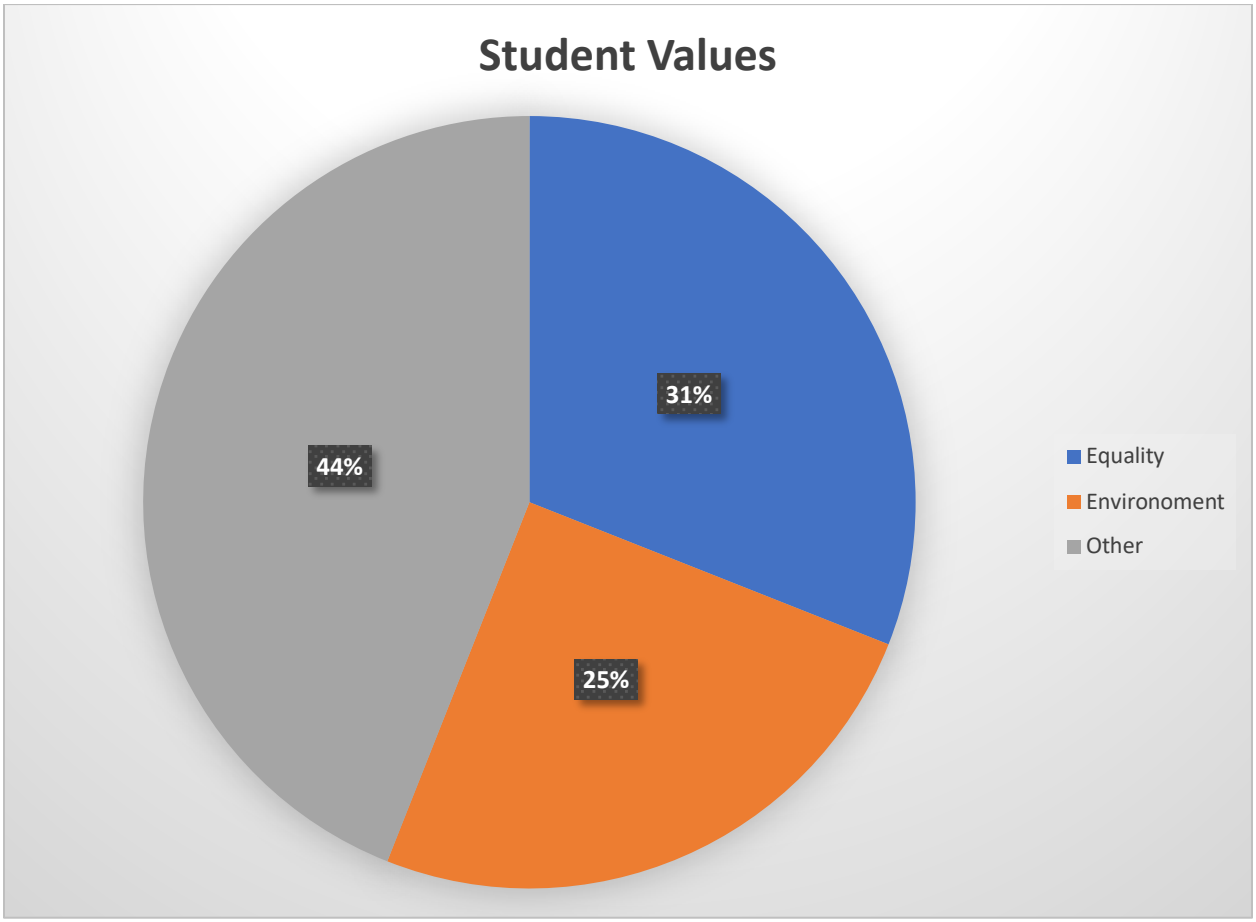
Detailed findings

A. Age: The survey conducted asked for contributions from students in three categories.

Student aged 12 – 17 accounted for 86.8% of overall responses.
Student aged 18 – 23 accounted for 13.2% of overall responses.
Student aged 24 – 29 accounted for 0.00% of overall responses.



B. When asked to identify an issue the students were interested in changing the responses varied among them Equality ranked number one with 31% saying they would like to change how people are profiled as terrorist to gender equality. Pollution/climate change ranked number two with 25% of students expressing a desire to reduce Carbon Dioxide emissions, school waste management, and renewal clean energy.



C. When asked to identify how students could use science, technology, engineering, and mathematics to correct the identified issue(s) the responses varied.

D. When asked to identify the type of STEM classes/workshop that interested the student, their responses varied.

APPENDIX

What is a problem you would love to change in society?
Equality
Homelessness
The way we handle our CO2 emissions
I find that finding extra help when you need it is very hard, especially at school.
Healthcare
minimize the long waitlists for organ transplants, improve prosthetics, research genetic diseases that will affect future generations
social discrimination
I would love to help cure cancer, this is a huge problem, as about 40% of people are diagnosed with cancer at some point in their life. The reality is that chemotherapy has a very low success rate, it is only 5%, which is definitely not high enough.
Discrimination of any kind, including "affirmative action"
Climate change
pollution
Better educational opportunities for elementary and high school students.
Poverty. Because it seems like the most expensive problems facing humanity , as well as one of the easiest to solve.
To clean school grounds
Poverty
The way that people treat animals
I huge problem is see in society is the gender bias in jobs, organizations, education and STEM communities. I have personally experienced the negative effect of females VS males in society and the stereotypes around both genders. A significant example I have seen is how women are expected to only be proficient in the arts and men are expected to take physically demanding jobs. When in reality, either gender are more than capable of having the same skills and going into the same job field.
I am really passionate about health care and would love to optimize the amount of people who are able to access health care services
Equality
I would like to decrease, or even eliminate wait times for organ transplants. The waiting lists are seemingly endless, and getting people to put their names on waiting lists takes much persuasion and are not yielding the results we would like to see.
Bullying for sure!
I wanna change the way we think of terrorist in our society. We often are racist towards particularly Muslims that wear head scarfs as being a terrorist when that's not true and another thing would be connected to language that society thinks anyone who speaks a

different language is bad. And I know I wouldn't be able to change the way someone acts but I can help educate and possible guide then in the right direction for a mind change.
Why can't school start 2 hours later?
Pollution
Pollution
How people in school are viewed differently from others based on their looks, weight, athletic ability, etc..
Mental Health
The amount of excess waste that ends up in our landfills
I would love to see people be more accepting to others
Gender inequalities
The fact that we tend to pretend that we believe in equality, however we are still marginalizing people by giving them special programs (such as affirmative action) because we as a society believe they are unable to achieve these goals without assistance.
I would love to change the shortage of cheap renewable energy sources in both third and first world countries, to replace the dependency on oil and coal.
Not enough mental health help
Poachers.
the stigma around sex ed and bring more open to children about it for the future.
Inequalities
I would love to make our society a more environmentally conscious and sustainable one.
Too much waste.
Homeless individuals not knowing where to find resources.
I would like to reduce the social stigma and romanticization of mental health
Inclusion (racial, LGBTQ, woman)
The carbon footprint and ecological destruction caused by today's agricultural practices (specifically animal agriculture).
equality for women
Better recreational facilities for families and kids of all ages
Making people get along with each other
The growing gap between the rich and poor
Racism
Financial Inequality
A problem I see and witness a lot is the communication gap between adults and adolescents. I want to raide awareness about the emotional wellbeing of teens, where their actions come from, and that their emotions and thoughts matter, since they (we) are what will shape the future.
Racism
Level of meat consumption
How we say we can't when we don't try hard enormity go and we know we can

I would like to solve the drug abuse crisis found in the majority of the homeless population in the lower mainland through utilizing bio-medical technology and chemical engineering.

How would you use STEM (science, technology, engineering, mathematics) to improve this issue?
With stats and facts
Create more services offering job placements and temporary house placements (apartment type complexes just for that)
I would propose alternatives to daily things that are better for the environment.
I would code an app to help connect students to tutors / anyone who can help them.
I would improve better healthcare by making it easier for the people that can't afford any type of healthcare to get the needs that they need. Example, dentist, braces, surgeries, and anything else you would use with healthcare.
3D organ printing technology, organs grown in labs, stem cell research, biomedical engineering involving prosthetics to make them more accessible and with more advanced features to compensate for athletic individuals, genetic disease research using CRISPR technology
i'm not sure there is a way by using these techniques.. but there could be one that i'm unaware of.
The first method that could potentially cure cancer is with CRISPR. CRISPR is a gene editing tool that can be used to cut out and edit DNA. We can use CRISPR to edit cells to make them better cancer fighters, as well as edit immune cells to specifically target only the cancer cells.
There is heavy discrimination in all kinds in STEM-related industries. Start by trying to eliminate it in the industries and community itself, which can create a big change in other places.
Social experiment
study problem solve and find a solution using science and math etc
STEM is an essential part of learning so trying to get more opportunities in schools for it could help further the education of students interested in this field.
I would incorporate STEM into the school system. Generational poverty is typically the result of lack of opportunity. I believe STEM can open new doors for underprivileged students. If STEM is incorporated into the school system it would provide more opportunities to students for higher paying jobs and success in any profession.
To put a garbage can outside the building and tell the students who were outside during lunch should pick up the garbage that's on the ground
Educate people on these issues so they can stay of the streets
I would use science to see why people treat animals the way they do. I would use technology to reach out to people on how we can change this together. I would ya engineering to build same places for animals and safer rod crossings. I'm not sure why I'd use math for but there's always something it could be used for!! These could all help me change this issue.
You could use STEM to improve this issue by taking resources and statistics collected in the STEM community to spread awareness about the gender bias. With STEM, people can come

up with practical solutions through case studies and experiments.
I would like to create an app that shows all the hospital, clinics, and other facilities on a map and have an approximate wait time for each so patients could choose a facility that best fits their needs
I would use STEM to show that all humans no matter the age, sexual orientation, beliefs, and culture.
I would use microscale 3D printing to combat this important issue! 3-D printers used to only be able to print objects out of the material plastic up until recently. Now, a team at Harvard University led by Jennifer Lewis has created 'inks' made from natural and man-made materials that can be released in micro amounts to make complex structures such as artificial human tissue. This is possible by separating the living cells and then mixing them with a mold that holds everything in place. Microscale 3-D printing will impact the future in a positive way that many will be eternally grateful for. For example, no longer will there be long, seemingly endless lists of patients waiting in line for vital organs, as we will now be able to produce them with technology!
Put anti-bullying ads online and start some classes
We could connect coding the universal language, and something that everyone can connect to.
Science shows that students are more likely to participate in class with enough sleep at night.
Designing new systems to take in pollution and turn it into something
If science and technology work together to find different ways to work in providing product for factories instead of using the burning of fossil fuels.
I would use STEM to help prove scientifically somehow that everyone is equal. We are all humans! And no one can change or alter any DNA to change who we are
I would use it to benefit more research into the causes and effects of mental illnesses and to try to find a way to improve this.
Find a way to convert this waste into a source of energy
I feel that technology can bring us closer to each other
Promote individuals who exceed in these field, without regards to gender
It's not really an issue that can be solved used STEM methods since it is all about our human mentality. Unless we created a program to find the best candidates for jobs without consideration for race or gender then realistically technology cannot solve this issue.
My solution to the issue is to create small, easy to make, easy to use, renewable energy sources like hydroelectric turbines that fit into gutters or steams, wind turbines that fit into windsocks or weathervane, or small solar panels that will maximize solar rays in a small surface space. I can use STEM to rethink, design, and build these renewable energy sources.
Create an online mental health app
Becoming a zoologist.
make a survey on who agrees
By letting everyone have access to it no matter what they look like or what they are

I would use to STEM to do research and collect data on our current consumerism and environmental impact. From that data, I would identify the main areas of concern and try to develop techniques or technologies to change what we use or reduce how much we use.
Engineering a device that turns waste into energy.
I am currently working with a group of two other girls to develop an app to help target this issue. It will help Outreach workers and homeless individuals find relevant resources quickly and efficiently. Our app is currently in the prototype stage, however we hope to expand our coding expertise to add more features to our app like a live bed count for shelters.
I would like to research and explain to the teenagers how mental health and science are directly related
By using technology to help teens become aware of these issues with social media, television, Netflix, apps
First would be to create more realistic meat and dairy alternatives by isolating the compounds that give these products their unique tastes and textures. Second would be to bioengineer plants that could grow in specific environments/grow more efficiently. Third would be to design growing operations that do not take away from the surrounding environment, but still are economically realistic.
Technology
Engineering for a place that everyone could have fun at.
Using statistics to prove everyone is equal and everyone should be treated the same
Automation through engineering to bring us closer to a point where people don't need to do menial labor.
A better representation of cultures in media and creating the technological advancements that are available to everyone to allow them to represent their culture.
Encourage people of diverse backgrounds to get involved and try any of the STEM fields. It's important that diverse perspectives are heard, especially in the modern day of rapid advancement in STEM.
I want to learn more about the human mind and mental health of kids and teens. With the accurate research I can support the points I'm trying to get across to have legitimacy in them. I've used technology to make steps towards making this a reality, like starting a campaign with help from WE to spread kindness through social media and in my school environment via sharing different positive messages to all students of my high school.
I would use this to publicly show that every race can be equally intelligent/creative, and that each race can contribute to the improvement of society.
Using food sciences and chemistry to create perfect substitute so land and resources for raising livestock, milk, eggs, (animal products) can be more efficiently used in society.
I would use stem in this problem because this problem mostly occurs in school where these subjects are taken place. Asking someone for help is the biggest help anyone can get
If I could get support from STEM mentors and community programs, through lab research and experimentation, I hope to develop a super anti-body that reduces the overdose rates and further targets the addicting sensation in the cerebral cortex and limbic system by monitoring urges for narcotics.

What sort of STEM classes/workshop would you like to attend?
Mathematics and technology
I don't know of any
Environmental
I would like to attend coding classes to learn more about it, and also post secondary options for high school students.
I would like to attend a science workshop
biomed (engineering), robotics, programming (AI), molecular genetics, and microbiology
technology classes!
Any and all of them :)
Hands-on workshops where I can experiment with various things.
Global warming, environmental studies, climate change
math and science
Astronomy classes/workshops would be interesting.
I would like to attend a Robotics building and coding workshop
Ecology
University lecture
I'd like to attend any of them! They all sound very interesting to me
I would like to attend a workshop or series of classes based on coding and computer programming. I have numerous friends who have gotten into this field and have advocated for the open-minded tech community that they are a part of!
i have many ideas but don't have the skills to make it a reality so i would love to learn how to make an app or how to prototype
Science
I would like to attend more classes on what sort of jobs are offered in the tech space! I have a general idea of what I want to do, but learning about specific jobs and how their day-to-day life looks would be ideal, perhaps on a panel.
Any kind
A coding class.
About sleep-deprivation
Science
Science and Math
All of them! I think engineering would be great because there's a lot of physics and I love physics. Science is a great tool to get your hands on things. Technology is something that I'm not familiar with but I would like to know more about it and Mathematics is something to get your brain working and I love it all
Anything to do with the brain
Information technologies workshop

Oui STEM Academy's Student Who STEM Initiative
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Science
Hands on, science demonstrations
Coding and introduction to robotics workshops.
I would love to attend any kind of workshop or class. If I had to pick one, I would probably like to attend a technology workshop. I like to design and build things, and I am fascinated by how fast advancements in STEM are going. My dream career is to attend the aerospace program at the University Of Carleton in Ottawa, and design aircraft after university.
Technology
N/A
technology
Science
I would love to attend classes on ecology, genetics, animal physiology and environmental sciences. I would also like to take a class on scientific research.
All of them!
I have a huge interest in coding. I'm also quite interested in physics and chemistry.
I would like to attend a biology course in which I can expand my knowledge of how the brain works and all the chemicals that are factors in our brain.
Science (kinesiology)
Anything.
Technology
A mathematics class
Social responsibilities
Ones about coding/ computer programming
Media Studies and Biology
Technology and Economics, and how the two intertwine.
I love Biochemistry and can see myself wanting to major in that. I want to become a Pediatric Psychiatrist so I can also see myself being interested in Psychology. These may help me further my knowledge of mental health.
Ones where you can work with others as a team (maybe a with one science student, one tech student, one eng student, and one math student) to solve a difficult life problem creatively.
Food science, engineering, chemical engineering, electrical engineering
I would like to attend an technology and engineering class/workshop
Bio-medical engineering course, bio-chemical engineering courses, and any other workshops involving cognitive neurosciences.