Education is the most powerful weapon you can use to change the world.

- Nelson Mandela
Guest Editor of the youth issue of JASTE

Mirjan Krstovic
mirjan.krstovic@peelsb.com
Peel District School Board

Editors of JASTE

Steve Alsop
salsop@edu.yorku.ca
Faculty of Education, York University

Larry Bencze
larry.bencze@utoronto.ca
Ontario Institute for Studies in Education (OISE), University of Toronto

Jesse Bazzul
jesse.bazzul@utoronto.ca
Ontario Institute for Studies in Education (OISE), University of Toronto

Contributing Student Authors

Nasteha Abdullahi
Nadia Abdullahi
Fahad Atif
Richard Chu
Haley Gabel
Adriel Gobin
Maryam Heba
Sabrina Hundal
Emma Jameson
Vijey Jeevakumaran
Asalat Kamal
Michael Kang

Shawn Khan
Cameron Lago
Benjamin Mong
Mike Pham
Kate Sheppard
Mahnoor Shah
Zahra Sina
Jeremy Sklarzyk
Claire Snowden
Tehjae Tsukada
Ashley Yip

Artistic Design and Layout

Evan Gerber
gerbercreative@gmail.com
gerbercreative.ca

Cover Page Art

Shawn Khan
Grade 12 Student
Erindale Secondary School
SCIENCE AND TECHNOLOGY EDUCATION, WE BELIEVE, GROWS WHEN IT HELPS LEARNERS AND TEACHERS COME TOGETHER TO LOOK OUTWARD TO THE WORLD AND INWARD TO THE NEEDS, HOPES AND THE POSSIBILITIES OF CHANGE.

*Alsop and Bencze (2009)*
Editorial: Facilitating students’ research-informed actions on complex socio-scientific issues

The gene patenting controversy

Energy conservation at school and home

Learning about energy consumption habits of our peers and advocating for installation of solar panels in our school

“No car day:” Reducing our carbon footprint

Every bite counts!

Raising awareness about birth control

Consumer action: Learning about lip balms

Modern day Trojan horse: the story of body lotions

Addressing the issue of underrepresentation of women in chemistry

Coltan mining and internet privacy

Mirjan Krstovic

Jeremy Sklarzyk, Emma Jameson, Nasteha Abdullahi and Mahnoor Shah

Cameron Lago and Mike Pham

Tehjae Tsukada, Kate Sheppard and Ashley Yip

Richard Chu and Vijey Jeevakumaran

Maryam Heba

Haley Gabel and Claire Snowden

Nasteha Abdullahi

Zabra Sina and Nadia Abdullahi

Asalat Kamal, Michael Kang and Benjamin Mong

Fahad Atif, Shawn Khan, and Adriel Gobin

CONTENTS
EDITORIAL: Facilitating students’ research-informed actions on complex socio-scientific issues

Mirjan Krstovic
Peel District School Board
mirjan.krstovic@peelsb.com

Humanity faces many grave environmental and ecological challenges. Intense discussions in the public sphere focus on climate change, growing energy demands, access to clean water, population growth, food shortages, social inequality, genetic modification and other critical socio-scientific issues of our times. The latest report from the Intergovernmental Panel on Climate Change (IPCC) warns that climate change is threatening global food stocks and human security, and that the cost of inaction is too high. In his Carbon Manifesto\(^1\), Canadian environmental activist, David Suzuki, blames politicians for ‘intergenerational crimes’ and accuses both the government and corporations of ‘immoral activity with devastating consequences.’ Suzuki calls on everyone to take immediate action. While most socio-scientific issues are left to adults to debate, negotiate and hopefully resolve, little consideration is given to what young citizens in schools can do in response to deepening social and environmental injustices.

Christopher Emdin, Science and Technology Professor at Columbia University, has spoken eloquently at Tedx Talks\(^2\) about re-positioning education as vehicle for social and political action. Powerful voices of other transformative scholars in the field of science and technology education (e.g., Hodson, 2011; Bencze & Carter, 2011; Lester et al., 2006; Alsop & Bencze, 2012), whose work has inspired me, have supported this viewpoint.

Three years ago, I was faced with a series of questions about the purposes of science education in response to growing local and global concerns and started to think more critically about my practice and role as a science teacher. What would our classrooms look like, and feel like, if we let our students voice their opinions and positions on critical socio-scientific issues? How do we create conditions in which students would be learning science in the context of real issues and gain a greater sense of purpose through education, other than merely earning grades? How do we equip our students with the capacity and commitment to take responsible and effective actions on matters of social, environmental and moral-ethical concern?

Reflecting on these questions guided my teaching in ways that would allow my students to implement research-informed actions to address critical socio-scientific issues in their school and community. Fortunately, I had an

---

\(^1\) David Suzuki’s Carbon Manifesto http://www.youtube.com/watch?v=h-WP6I8V5uM
\(^2\) Christopher Emdin’s video: Empowering children through urban education: http://www.youtube.com/watch?v=ouudXr-csZg
instructional coach on this journey, Larry Bencze, from the Ontario Institute for Studies in Education (OISE), who introduced me to the STEPWISE framework, which is an acronym for Science & Technology Education Promoting Well-being for Individuals, Societies and Environments.

My engagement with issues-based, action-oriented science education came shortly after the 2008 revision of the Ontario science curriculum, which gave science, technology, society and the environment (STSE) education greater prominence. More attention to STSE in the science curriculum broadens students’ understanding of science, helps them develop better critical thinking and decision-making skills and prepares them for active and responsible citizenship now and in the future.

I slowly became committed to building a more transformative and socio-politically engaged science curriculum and in the process I became an advocate of STSE education. I believe that learning science (i.e., development of cognitive skills by mastering content knowledge) should be balanced with doing science (e.g., learning to perform studies and controlled experiments) and learning about science (e.g., learning about socio-scientific issues and complex interactions among science, technology, society and environment). Hodson (1998) defined the multi-dimensionality of critical scientific literacy in terms of these three major elements, which are the critical components of a holistic science education. I would argue that our current practices are successful at helping students learn science and, to some extent, do science although more emphasis should be placed on student-led, open-ended inquiries. Enacting a new vision of the revised Ontario science curriculum therefore requires even more work if teachers and students want to realize substantial social and environmental transformations. In the words of Steven Alsop and Larry Bencze:

This is not a call to abandon the laws and theories that have occupied our hearts and minds for so long. It is an argument, nevertheless, against the boy with his old chemistry set engaged in solitary pursuit of knowledge, self absorbed and entirely disconnected with modernity. Our practices cannot afford to repeat the same experiments over and over again, mixing those same chemicals, when everything else has changed around us; we should not let our sphere of influence slip to a semi-historical re-enactment of our own educational experience - reducing our remit to efficiently covering dislocated facts and leaving all matters of concern to the politicians, the popular media and other moralisers (Alsop & Bencze, 2009, p.ii).

Five years ago, Alsop and Bencze introduced the first issue of the Journal of Activist Science and Technology Education (JASTE) for audiences (mainly academics and scholars) interested in fundamental changes to science and technology education that would improve the well-being of individuals, societies and environments. Recognizing that young people also want to contribute to these improvements, I am delighted to introduce the first Youth Issue of the Journal of Activist Science and Technology Education (JASTE). At the heart of this issue is the desire to highlight student projects that awaken solidarity, peace, justice, and responsibility, and celebrate relationships between people, communities and life on earth.

I invited all interested secondary school students in the Region of Peel to submit their original research-informed activist projects to the Journal via a letter sent from Harpreet Neelam, Science and Technology Instructional Coordinator, to all the science department heads in the Peel District School Board. Since the idea of conducting student-led activist projects is a relatively new form of pedagogy in science, it was mostly my students, who were exposed to the issues-based, action-oriented science curriculum, that submitted their work. One project was submitted by students from the class of a colleague who, for the first time, led her Grade 10 Academic Science students through research-informed STSE action projects.

When all the students submitted their projects, I organized a peer-editing group to revise each other’s submissions in light of my pre-determined criteria. Finally, I edited their work and submitted all projects to Evan Gerber, a former student from Fletcher’s Meadow Secondary School whom I had the pleasure of teaching five years ago. Evan used his creative talent and his degree in art and design to develop a layout for the journal. Countless hours were invested by many people to make this issue of JASTE come to life!

---

1 For a fuller description of STEPWISE, please visit www.stepwiser.ca
Students have put their brains and their hearts toward addressing global issues through their local actions. They learned to engage in student-directed, open-ended, primary (e.g., experiments and correlational studies) and secondary (e.g., Internet searched) research as bases for developing and implementing plans of action to address socio-scientific issues. Students’ action projects featured in this issue of JASTE address a multitude of socio-scientific issues such as:

- Creating a prominent energy source for the future
- Standing up against gene patenting
- Lobbying for solar panels in schools
- Organizing a ‘No Car Day’ at the school
- Raising awareness about birth control
- Encouraging healthier diets
- Opening ‘the Trojan horse’ of beauty products (e.g., lip balms and lotions)
- Addressing the issues of underrepresentation of women in science, coltan mining, and privacy invasion on the Internet.

Figure 1 illustrates the pedagogical sequence I took when first starting to implement issues-based, action-oriented science curriculum.

As I became more experienced with the STEPWISE instructional framework, I provided students with more ‘basic’ and ‘advanced’ research-informed action (RiA)
apprenticeship activities (e.g. teacher demonstrations and guided student practice). Eventually, students developed expertise and confidence to self-direct RiA projects and tackle STSE issues of interest and concern to them. Figure 2 illustrates my current pedagogical sequence in a Grade 10 Academic Science class.

For teachers interested in orienting science and technology education towards promoting the common good, I have prepared ready-to-use resources and they are freely available at http://mrkrstovic.pbworks.com/w/browse/#view=ViewFolder&param=STEPWISE.

I hope that the RiA projects featured in this journal will be a source of motivation to teachers, administrators and students. As Alsop and Bencze (2009) write in their first editorial for JASTE: “Science and technology education, we believe, grows when it helps learners and teachers come together to look outward to the world and inward to the needs, hopes and the possibilities of change.”

In his article “What would Ghandi do,” Petric (2012) applies the three pillars of Ghandian educational philosophy: i) resisting injustice through constructive conflict resolution, ii) the importance of educating the ‘whole’ individual – mind, body and soul, and iii) seeing ourselves as part of our broader community. I believe that the projects in this issue of JASTE demonstrate all three pillars of Ghandian educational philosophy. These projects also illustrate examples of valuable student character attributes in action, such as care, compassion, integrity, responsibility, and courage.

Wolff-Michael Roth writes in great detail about the importance of students becoming active citizens and campaigning for social and environmental transformations. Roth (2009) wrote that:

Not only does the world change when students participate in activism, but they change as well. With activism as a practice, therefore, we set up the potential for a system that snowballs, one that develops exponentially, because the rate of the evolution increases when more and more students become activists in a world that they inhabit and that they shape themselves (Roth, 2009, p.29).

Activism, viewed through the lens of Ghandian educational philosophy, is an incidental (though not accidental) result of a holistic science education. My hope is that this issue of JASTE will inspire growth and change toward a more transformative, inclusive and action-oriented science education. Here we see the contributions that students can – and want – to make to our world, and how they can learn about the complex interactions among science, technology, society and environment. I call on my fellow colleagues to join me on a journey to individual and collective transformation in hopes of providing an education to our students that will allow us – adults and youth together – to stand against personal, social, and ecological injustices.

References


The gene patenting controversy

Jeremy Sklarzyk, Emma Jameson, Nasteha Abdul-lahi and Mahnoor Shah

Abstract

Genes are found in every living thing. They make us who we are. In the modern age of rapid technological advances, it is common for new discoveries to be patented for profit. A question arises. Does finding and isolating a human gene make it patentable by a company? This question has spurred much controversy over the last few years. Last year, a medical company called Myriad Genetics tried to patent the human gene that is responsible for breast cancer. To further understand the opinions of the public with regards to the issue of gene patenting, we conducted a study in one high school in Mississauga. Our results showed that the majority of teenagers are against gene patenting. However, we learned that teens knew very little about this issue. This motivated us to take action by making two informational videos on gene patenting to spread awareness among our peers and the wider community. In addition, we reached out to a group called Breast Cancer Association (BCA) by writing a letter to express our solidarity. We received a ‘thank you’ reply for BCA shortly after the U.S. Supreme Court ruled against gene patenting.
Introduction

In the 1990s, Myriad Genetics patented the BRCA1 and BRCA2 genes (De Vouge, 2013). BRCA genes are linked to breast, ovarian, and many other types of cancers. In general, women have a 12% chance of developing breast cancer at some time in their lives; however, women who carry the mutated BRCA1 and/or BRCA2 genes have about a 60% chance of developing cancer (Fisher, 2013). In other words, women carrying this mutation will be about five times more likely to develop breast cancer.

Having patents on the BRCA1 and BRCA2 genes gives Myriad the ability to enhance methods of isolating and studying the genes. Accordingly, scientists and companies that have devoted their time to studying the BRCA genes will have to focus their attention onto new research as they are currently and legally not allowed to conduct studies on the BRCA genes (De Vouge, 2013).

Gene patenting harms the credibility and wellbeing of society. One of the main issues with gene patenting is whether or not the patent itself is valid; a gene is a discovery, not an invention (Franco, n.d.). Myriad claims they only have patents on the man-made isolated copies of the BRCA genes, making them patentable because they are not naturally occurring. The synthetic copies of the genes are indeed ‘copies,’ making them no different from the natural genes. Therefore, our opinion is that the gene is not patentable because Myriad Genetics did not create the gene as it already existed. In relation to this, Myriad argues that they determined the process of isolating the gene and the technology to create copies of the gene. Myriad should patent the technology for isolating genes and not the genes themselves (Huffington Post Live, 2013).

Another big issue in the gene patenting controversy is the pricing of the testing of the BRCA genes conducted by Myriad Genetics. The patent has a big impact on society as people are legally not allowed to be tested for the BRCA genes by anyone other than Myriad Genetics or companies that have purchased rights from Myriad to test for the genes. Many individuals may not be able to afford this test as it costs $3,340 (De Vogue, 2013). This means that only rich in our society could afford to be tested, and this is not fair to the rest of the population.

Our Study

On June 3, 2013 we conducted a study including 60 students from Erindale Secondary School concerning the gene patenting issue. The main purpose of this study was to determine whether or not there was a correlation between gender and levels of awareness on the issue of gene patenting. In order to accurately determine if there was a correlation, an equal number of males and females participated in our study. The study was conducted to learn how a group of teenagers viewed the controversial issue of gene patenting. The format of the study was a survey, which included a series of statements and questions asking teens about their opinion on the issue. The participants first circled whether they are male or female and then read the statements and questions to circle the answer that they felt was correct depending on their knowledge and/or opinion. We analyzed and interpreted the results.
Data Analysis and Interpretation

The graph in Figure 1 shows that there is no correlation between gender and one’s opinion regarding Angelina Jolie’s preventative surgery. 80% of females and 73% males agreed with Angelina Jolie’s decision. There is only a slight difference (7%) between the genders meaning that both genders have relatively the same opinion. A possible reason for the small difference, however, may be connections that females have towards Angelina Jolie and understand the circumstances and risks of breast cancer more than boys. However, males with breast cancer and males carrying the BRCA gene mutations are becoming more prevalent in society (Adams, 2013). Both genders support Jolie’s decision probably because they both think that preventative surgery will save her life. Not getting the surgery may be worse for her.

The graph in Figure 2 shows some correlation between gender and one’s opinion on the subject of gene ownership by companies. 43% of females think that companies can own human genes through patents while only 26% of males think the same. According to Myriad, they do not own the natural gene but instead the man-made copy that they make. The two are completely identical, but they are not “extracting” the gene directly from a person. This may be what some girls are thinking and why more agree that companies can patent a part of the human genome. Sources argue that it does not matter how the gene is found, it is still not an invention (“Why are gene,” 2013). This may well be the opinion shared by more boys who disagreed with corporations patenting genes.

Lastly, graph in Figure 3 depicts no correlation between gender and one’s opinion about profit generated by Myriad from BRCA gene testing. 80% of teenage girls surveyed believed that it is wrong that Myriad is the only company offering and profiting from testing while 73% of boys thought the same. The other 20% of girls and 27% of boys may agree with the opinion that Myriad spent $500 million dollars in research for this and therefore they deserve the profit (“Patents save lives, air innovation,” 2013). This data allows us to make the assumption that for this particular question, there is no gender correlation.

Based on our study we feel that our peers still need more education about this issue. Although teenagers have opinions, we still need more education about this issue. We decided to raise awareness about the issue of gene patenting through several actions that are discussed next.

Figure 1: Results showing the number of female and male students who agreed and disagreed with Angelina Jolie’s decision to undergo preventative surgery based on the results of the BRCA gene testing.

Figure 2: Females and males opinion on whether companies can own a human gene.
Taking Action!

We produced two informational videos. The first video shows individuals being interviewed around the school (https://www.youtube.com/watch?v=I-FAEAvWKEs). We asked similar questions as in the study. The same individuals were given a document showing both pros and cons of the issue and were asked the same questions again. This was done to see whether or not more information on the topic would change the minds of our subjects from their previous statements. It also acted as means of raising awareness and educating our peers. This in itself is worth studying further – if the opinions of our peers changed after learning more about the issue.

The second informational video explains what gene patenting is by going further into the Angelina Jolie case and explaining that she had to pay a large sum of money to Myriad in order to get her BRCA1 and BRCA2 tests done (https://www.youtube.com/watch?v=dLGpRxZ3Rho).

We also decided to write a letter to Breast Cancer Association (BCA) who opposed gene patenting. We wanted to show our solidarity with BCA. We received a reply from them, which came shortly after the U.S. Supreme court ruled against gene patenting. We felt proud that BCA recognized our learning and involvement in this critical socio-scientific issue.

![Figure 3: Female's and males' opinion on whether it is right or wrong for Myriad to profit from BRCA gene testing](image-url)
The Issue of Gene Patenting

In the 1990s, a company called Myriad Genetics got patents for the BRCA 1 and BRCA 2 genes and diagnostic procedures. Patients who have mutations in these genes are at a very high risk of developing ovarian and breast cancer compared to people that don’t have the mutation. Myriad Genetics checks if a person has mutations of these genes and if so that person should undergo a surgery to lessen their chances of developing breast and ovarian cancer.

Points For and Against Patent

<table>
<thead>
<tr>
<th>For Patent</th>
<th>Against Patent</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Myriad is not patenting genes &quot;as they occur in nature,&quot; nor do they own something that is a part of you. They can’t do that. However, according to current gene patenting laws, they CAN patent isolated DNA and cDNA (complimentary DNA) which they make in the laboratory, not take from the body. In simpler terms, they create a man-made copy of the gene and do not just take the gene out from a person.</td>
<td></td>
</tr>
<tr>
<td>* Myriad spent $500 Million in Research over 17 years to discover these genes. To pay off that research, they must make that amount through testing for the gene. This may not be possible without the patent. Also, with the profit they make, they can fund more research for these genes to better understand them and the origins of these gene related cancers. This is also why testing is so expensive.</td>
<td></td>
</tr>
<tr>
<td>* Because money and recognition fuel the medical industry, gene patenting puts pressure on companies to make new medical discoveries faster. This will further change and make our medical treatments and understandings much better in a shorter period of time. Without gene patenting, companies may feel less motivated as it could mean less money and recognition. This would slow down medical discoveries.</td>
<td></td>
</tr>
<tr>
<td>* Myriad makes actual copies of the BRCA 1 and 2 genes which are identical to the ones naturally occurring in the body. Anyone who has the gene in their body can’t check, test or examine the gene unless they pay to Myriad. If they are patenting man-made copies of the gene then why do patients have to pay Myriad to see their naturally occurring genes? The patent should only be on the man-made copies not the naturally occurring genes.</td>
<td></td>
</tr>
<tr>
<td>* Myriad claims they can patent the genes because of isolation. Separating something that is entirely a copy of NATURAL GENES doesn’t transform it into something 'new.' Only new inventions, products or methods can be patented. Myriad made a discovery, they did not invent something.</td>
<td></td>
</tr>
<tr>
<td>* Myriad already has a valid patent on diagnostic and isolation methods. These are most definitely patentable. Myriad can make money on these patents to pay off their research and fund new projects.</td>
<td></td>
</tr>
<tr>
<td>* Prevents any other companies from testing and researching (meaning no one can get a second opinion) on the gene without paying money to Myriad. This stops life altering research that could save others.</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4: Informational chart shown to peers to educate them more about the two sides of the issue before reassessing their opinions.
Reply E-mail from BCA

From: Zoe Christopher <zchristopher@bcaction.org>
To: Mahnoor Shah
Sent: Monday, June 24, 2013 2:50:09 PM
Subject: RE: Gene Patenting

Dear Mahnoor, Jeremy, Nasteha, and Emma,

Thank you so very much for taking the time to write your very thoughtful letter about gene patents to Breast Cancer Action! As you know, shortly after you sent your letter the U.S. Supreme Court ruled in our favor and conclusively said human genes cannot be patented! This is truly a victory for all.

We applaud your involvement and work on this topic. I hope you let us know when your video is ready for viewing as we would be most interested in seeing it.

Thank you again for contacting BCAction!! Keep up your good work.

All the best,

Joyce (for Zoe)

Zoe Christopher, M.A.
Resource Liaison
Breast Cancer Action

References


Energy conservation at school and home

Cameron Lago and Mike Pham

Abstract

We do not always think of the impact we are making on the climate every time we turn on a light, use a computer or watch T.V. For this research-informed action research project we studied how electricity usage can impact the climate. We conducted a mini correlational study at Erindale Secondary School to learn more about our peers' electricity consumption. We asked our peers how many fluorescent light bulbs they use in their homes, and how often they turn off their lights when they leave the room. Our mini study reveals that the majority of boys and girls do not know how many light bulbs in their homes are energy efficient. In addition, equal proportion of girls and boys always or sometimes turn off the lights when they are not in use. For the action portion of our project, we organized the Earth Hour at our school to lower the energy consumption and to raise awareness about the importance of energy conservation. The Principal of our school also agreed to turn off the lights in the cafeteria every night to save more energy. We also challenged David Suzuki Secondary School in Mississauga to a friendly competition to see which school will save more energy. We still await the electricity usage data from the board to see who won the challenge.
Introduction

Much of our developed world has become an increasingly consumer-based society. Consumers want more and more electronic devices to keep up to the modern times. Between the year 2008 and 2030, it is estimated that the world’s energy consumption will increase by 55%. (“55 Interesting Facts,” 2012) Citizens, corporations, and governments all have a responsibility to ensure that our planet is not harmed by the greenhouse gases emitted as a result of increased energy demand.

Currently, there are various methods by which energy can be generated. For example: hydroelectricity, solar, wind, nuclear, geothermal, petroleum, coal, and biofuels are the most common renewable and non-renewable methods. Each method has its own advantages and disadvantages for the well-being of individuals, societies and environments. The emission of greenhouse gases by combustion of non-renewable fossil fuel is a major concern for the environment as addition carbon dioxide may cause increased average global temperatures. The effects of climate change are well known. For example, droughts are becoming more common in the world as a result of sever heat waves in places like Kenya, Ethiopia and Somalia. As a result of droughts, crops will not yield properly due to lack of water. Some families depend on agriculture to survive. Therefore, droughts cause food shortages and loss of income for many families dependent on agriculture. Entire communities can be affected, and in many cases, children, who are the most vulnerable, die of hunger.

Much of our energy in Ontario comes from nuclear power. Although nuclear energy is efficient, it has some negative effects, too. The nuclear waste is put into storage tanks for long periods of time to ensure no humans or other living things come in contact. Some quantities of radioactive and other types of nuclear waste take between 200-500 thousand years to decompose (Shedroff , 2003). The possibility of nuclear waste leaking into our ground and contaminating our water is a concern.

Alternative methods to electricity generation, such as solar and wind power, may be cleaner and safer. The problem of efficiency and environmental concerns (especially over wind power) need to be addressed. Presently, our society and our environment can benefit greatly if we all become more conscious of how much electricity we use. By simply cutting down on our energy consumption we can limit the amount of GHGs emitted and slow down the effects of climate change.

Focus Of Our Study

We conducted a mini study involving 50 girls and 50 boys at Erindale Secondary School to learn more about their energy consumption habits. We designed a simple survey consisting of two questions. First, we asked the participants to identify their gender. Then we asked them to answer two questions: i) how many compact fluorescent bulbs do they have at home, and ii) how often do they turn off lights after they are not in use. We collected the data over lunch periods and tallied it after to produce bar graphs.
Results Of The Study

Figure 1 shows the results from the first question that we asked. The data shows that 16 males and 19 females do not know if their home is supplied with compact fluorescent light bulbs. In addition, 15 males and 7 females knew that they had all fluorescent light bulbs; 14 males and 13 females reported that half of their light bulbs were compact fluorescent; 6 males and 4 females had a quarter of their bulbs as compact fluorescent; and 6 students, 3 of each gender, did not have any compact fluorescent light bulbs in their home.

Figure 2 shows how often students turn off their lights when the lights are not in use. The majority of the students either sometimes or always turn off the lights when they leave a room. To be exact, 25 males and 20 females sometimes turn the lights off; and 23 males and 29 females are in the habit of always turning off the lights. However, 3 males and 6 females never turn off the lights when they leave a room.
Discussion

There appears to be no correlation between gender and one's awareness of how many light bulbs are present in one's home. In fact, it appears that the majority of the students, males and females, are not aware of how many light bulbs in their home are energy efficient. Since teenagers do not generally buy light bulbs, it makes sense that they would not have too much awareness. We argue that teenagers should be more proactive. They should become more aware of how energy efficient their homes are. They should discuss this with their parents/guardians and make their homes (and schools) more energy efficient.

Furthermore, there is no correlation between gender and how often one turns off lights when lights are not in use. Most girls and boys reported that they turn off lights sometimes or always. A slightly greater number of girls turn off lights more often than boys. This could possibly be the case because teenage girls are stereotypically more responsible than boys. We think that a greater portion of girls and boys should always be turning off their lights when they leave a room. This would conserve more energy and benefit the environment.

Taking Action

We took several actions to address the issue of energy consumption, primarily at school. We hope that the actions we take will have an effect on one's energy consumption at home as well.

First, we lobbied our school Principal to turn off the lights in the school cafeteria when cafeteria was not in use. Given that our school is an eco-friendly school, our Principal supported our initiative in hope of conserving energy.

Second, with the help of our teacher and our Principal, we obtained electricity usage data for our school for the last five years. Our Principal phoned another principal at David Suzuki Secondary School and challenged the school to a friendly competition to see which school could save more energy by the end of the 2013 school year. We still need to obtain the most current data from the board to see who won the challenge.

Third, we encouraged all teachers to participate in the Earth Hour. We made regular morning announcements prior to the Earth Hour date. Also, we created an information slip for all teachers outlining facts and conversation starters about electricity usage. Teachers would share this information with their students during the Earth Hour, if they wished.

In conclusion, we hope that we were able to inspire at least one person to begin their own journey for a more aware society when it comes to energy consumption. Even if we reached one person, we would feel as if we have completed our goal in the end. We wish that everyone will become aware of our deteriorating Earth and that everyone will take an action towards a more desirable Earth to live in.

Citizens, corporations, and governments can all say that change will take place; however, words can't change a problem, taking action can!

References

Learning about energy consumption habits of our peers and advocating for installation of solar panels in our school

Tehjae Tsukada, Kate Sheppard and Ashley Yip

Abstract

Energy consumption has become an extremely prevalent problem in modern society. As the need for energy grows the impacts of that need begin to grow as well. My team surveyed students at Erindale Secondary School to inform ourselves on the usage of energy amongst high school students. The results from the study indicated that high school students use four to five hours of energy outside of school on weekdays, which is worrisome considering that students are at school for six hours a day. We found that over three hours per day are spent on computer by both boys and girls, and that boys spend more than 3 hours per day on game consoles. Considering that it would be harder for us to impact what our peers do at home, we decided to take action in our school. First, we wrote a letter to our school principal to request assessment of our school for installation of solar panels. The principal agreed to the idea. Then, we wrote a letter to Pure Energies asking the company if they would be interested in installing solar panels at our school. We received a reply from the Vice President informing us that his subcontractors have asked if they can help on this project. This was great news for us and we hope that our efforts will contribute to a more energy efficient school.
Introduction

Energy is an essential commodity of modern culture. Large quantities of energy are required to fuel the technology needed for learning, working and other activities. But this energy produces vast amounts of pollution. In the western world energy is readily available and is taken advantage of, which makes it easy to forget that overuse of energy results in negative impact on the societies and environments.

In order to diminish the effects of energy consumption society would have to alter its lifestyle in order to maintain a decrease in pollution due to, mainly, combustion of fossil fuels. Energy is produced by a fuel (natural gas, coal, oil, etc.) which is where the source of the controversy stands. For example, in 2010 just over 81% of Canada’s greenhouse gas emissions were strictly from this form energy (Wu, 2010). Concerning this, the industries that provide fuels are damaging the physical environment.

Political powers in North America have recognized that energy consumption is a problem and the strongest political support comes from the Green Party of Canada and the Democratic party of the United States. Both parties have proposed ways to fix their respective countries’ energy problems and garner the support from notable activists and scientists such as Canada’s David Suzuki who for years has supported the movement for a greener planet.

On the opposite side of influential people in energy consumption, there are the energy companies such as Husky Inc., Canadian Natural Resources and Imperial Oil Ltd. These companies market themselves to be more appealing. The companies state that “the energy sector of Canada’s economy employs 280,000 Canadians and accounts for 6.8% of Canada’s GDP” (Energy Council of Canada, 2007) so appropriate compromises need to be made.

Focus of the Study

Our group investigated the correlation between gender and the amount of energy consumed on various types of devices (e.g. computer, T.V., etc). We also looked at the correlation between gender and their knowledge of energy consumption (e.g. what consumes more energy: watching T.V. for 2 hours or doing a load of laundry).

We handed a mini survey to 50 boys and 50 girls at Erindale Secondary school. We collected the completed surveys, tallied the data and graphed it for analysis. The questions on the survey were:

- How many hours do you spend on an average day using each of these devices: the computer, TV, game console and hair tools?
- In your opinion, which of the following uses the most energy: a thirty minute hot shower, using the computer for two hours, watching TV for two hours or doing one load of laundry?

![Figure 1: Erindale students’ average daily hours spent using various electronic devices (e.g. computer, T.V, game console and hair tools).](image-url)
Summary and Discussion of Results

We learned that many students did not realize how much time they spend on electronic devices until we asked them about it. The results of our study showed that there is some correlation between gender and which devices are used (e.g. boys spend more time on game consoles that girls), but no correlation exists between gender and how much time (on average) students spend on various devices (see Figure 1). We should note that this study is biased due to a small sample size. The results of our study also show that students have knowledge of which devices consume a lot of energy (see Figure 2), but at the same time, our peers use an enormous amount of energy. Both males and females were equally well informed on which actions use more energy. Though computer and TV may not use as much energy as a shower or laundry, over duration of time computers and televisions contribute to mass quantities of wasteful energy. Students spend a great deal of their time on devices and often do not think about how this is impacting their wellbeing or the wellbeing of environment.

Students are capable of change if they are given a push because they need more awareness as to how they are affecting the planet. We hope to set an example as a group of teenagers who inspire others to become more aware of issues, such as energy consumption, while we also learn from this process. This project also inspires others to take action on things they feel strongly about. If everyone is more passionate about positive change for community, and ultimately for our planet, then attainable goals for change can be set and achieved. This project steps over the constraints of a mark. It goes to show the importance of action. It empower teens who often feel powerless.

Taking Action

My team will continue to follow up with our e-mails to Pure Energies regarding installation of solar panels on Erindale Secondary School. We also hope that our principal will also continue to speak with us about the possibility of solar panels on our school. In regards to this action, we hope that our peers will benefit from this example and consider taking similar actions in their schools or homes. The best thing we can wish for is that another student will be inspired to create positive change. One action can lead to many others, and that chain of events is essential for the possibility of making a positive difference in this world.

Figure 2: Erindale students’ opinions of energy consumption— which activity uses the most energy?
Email to Pure Energies

Dear Pure Energies,

I am a Grade 10 student currently enrolled at Erindale Secondary School. The first unit of Grade 10 science focused on climate change and every group in the class was tasked to take action against it. My group decided to persuade our school to be outfitted with solar panels. Since making that decision, we have written a letter to our principal referencing your company as a potential group to do the job. Our principal is interested in learning more about your company and your past experiences with installing solar panels on schools. We would be interested in knowing if you have ever installed solar panels at a school. If so, how many? Also, can you name any schools in or near Mississauga that have your solar panels installed?

Thank you for your assistance.

Sincerely,
Kate Sheppard, Tehjae Tsukada and Ashley Yip

Pure Energies Response:

Hi,

Thanks for your note.

We appreciate your kind support and your concern on climate change.

PURE energies has not installed solar panels on a school yet, but some of our subcontractors have and we are asking if they can help on this project. We have installed panels on hundreds of homes and several businesses and churches.

As soon as I hear back, I will get in touch with you.

Best regards
Chris Stern
Vice President

Letter to the Principal:

Dear Ms. Turner,

We would like to propose taking action against climate change in the form of renewable energy. We are focusing on the issue of energy consumption and we would like you to consider the option of getting the school assessed for the instalment of solar panels.

As part of our Grade 10 Science assignment we would like to propose action against an activity that contributes to climate change. As a group we have noticed that students and teachers often use a lot of electricity in the school, and by installing solar panels we would be able to support our electronically based education system in an environmentally friendly way. By using a renewable source of energy, the whole school becomes eco-friendly. We contacted a company called Pure Energies, who are willing to asses a school to be fitted with solar panels. The assessment and installation of the solar panels can potentially be free if we lease the access energy to the company.

We would be very happy if we could have a short meeting with you concerning this issue.

Sincerely,
Kate Sheppard, Tehjae Tsukada and Ashley Yip

References


"No Car Day:"
Reducing our carbon footprint

Richard Chu and Vijey Jeevakumaran

Abstract

Transportation is the major factor contributing to climate change. We decided to address the issue of transportation in relation to climate change for this research-informed action (RiA) project. The purpose of our RiA project was to learn about transportation and climate change, conduct a mini-correlational study, and address the issue by encouraging students and their parents to limit car use. After learning that a larger portion of the boys and girls that we surveyed rely on cars to get to school we decided to organize an event called “No Car Day” at Erindale SS on March 22, 2013. This coincided with Earth Hour. In addition, we made announcements from Monday to Thursday to inform students about this specific event. We counted the number of cars prior to the event and found that an average of 156 cars dropped students off in the morning. On the morning of the event, we counted the number of cars again. This time, the number of cars was 115. We think that our campaign made a difference. We want to encourage students in other schools to organize similar events. We encourage our peers and our teachers to carpool, take the bus, bike or walk. If we all do our part, then we may be able to alleviate the negative effects that transportation has on climate change before it is too late.
Introduction

Many people own cars and depend on them. Cars help people get around, but cars emit the most greenhouse gases. The main greenhouse gas that cars emit is CO2 - one of the products of hydrocarbon combustion reaction. Carbon dioxide and other greenhouse gases are also emitted by trucks, trains and airplanes which are all contributing to climate change through an anthropogenic greenhouse effect. This results in more frequent, longer-lasting, and more intense extreme weather events and natural disasters, such as larger storms, floods, heat waves, droughts, and wildfires.

Cars also emit other gases that are bad for our health and for the well-being of our environment. Cars have become a dominant form of transportation in our society. Some people who drive become dependent on cars. They drive everywhere even if a place is within walking distance. Our environment is affected by cars, not just in that they emit greenhouse gases, but also more roads may be constructed in areas where trees grow and animals live. The massive construction of roads, parking lots and urbanization have their own issues.

Powerful actors can support or oppose this issue. The powerful actors that support the use of cars would be the fuel and oil companies such as Tesco, SANASCO, gas station companies such as Shell or Esso, the car manufacturers such as Honda or Ford and the government. Unfortunately, all of these powerful actors want us to continue with this fuel-based economy. There are also groups that oppose the issue. Many environmentalists such as Green Fleet, Reclaim the Streets and others are concerned about the harm that massive amount of cars on the street inflict on the environment. We think that there need to better alternatives and that powerful stakeholders should explore those alternatives.

Focus Of Our Study

The focus of our study was to determine if there was a correlation between gender and the use of transportation, in this case cars. The independent variable was gender and the dependant variables were the form of transportation used to get to school. We also asked how often our peers travelled overseas per year. The method we used to gather data for our study was a short survey that contained these questions. We distributed the surveys to an equal number of boys (n=50) and girls (n=50) at Erindale SS. We tallied the data and put into a bar graph for analysis.

Richard Chu presents his ‘No car day” idea to Erindale students to promote more environmentally conscious transportation alternatives.
Summary and Interpretation

The data reveals that more females get to school by a car than males, who rely more on walking and biking to school. However, the highest ranking mode of transportation was cars for both the boys and the girls. This poses a concern as cars are one of the most significant contributors of carbon dioxide and other pollutants. The data for the number of times travelled overseas reveals a slight correlation in that females said that they travel more times a year than males. However, the zero category for the number of times travelled overseas still ranks highest. This is good because airplanes emit the most greenhouse gases out of any form of transportation.

We speculate that more females take cars to school in the morning because more females may take showers in the morning, and thus do not have time to get to school by walking or biking. Also parents are more concerned about the well being of girls – that is, parents are more protective of girls than boys. The fact that most students that we surveyed take cars could also be because many students do not live within the walking distance to school, and therefore they do not have the time to walk in the morning. Instead, their parents drop them off to school.

The car usage is very alarming - according to the U.S. Environmental Protection Agency, more than half of the air pollution in the nation is caused by mobile sources, primarily automobile.

Taking Action

In our study we found that most people travel by car to get to school, so our action was to promote ‘No Car Day’ which was held on March 22, 2013. On this day, we encouraged students to go to school and back home by walking, taking a bus, by a bike or by carpooling with two or more friends. We hung two different types of posters - one as an eye catcher and another explaining in more detail why people should walk on this day. These two posters were hung close together so that students and teachers can look at them both. We hung them in the main foyer and in the cafeteria which is where most students can see them. We explained our action plan to the school principal and made announcements to the whole school. On the day before the ‘No Car Day’, we stood outside in the morning next to the two main car entrances and raised our billboards to let parents know that tomorrow is ‘No Car Day’ at Erindale. In addition, we counted the number of cars that dropped off students in the morning on a regular day and found out that over 150 cars come each morning from 8 am to 8:30 am to drop off students. We also counted the number of cars that came on ‘No Car Day’ and found out that 115 cars came, a difference of about 35 cars. We feel that we made a difference with our campaign and we encourage other schools to run the same event.
Overall, we are very pleased with our RiA project. We learned that it takes a lot of work to make a difference, but it is worth the effort. We also learned a lot about transportation and its effects on climate change by doing this project. We were surprised by many interesting facts we found and were even more motivated to make a difference. We found that by not taking cars, it can save a lot of money. We encourage people to find other ways to travel besides by a private car. People should also limit their travel by airplanes as they contribute a lot of carbon dioxide, too.

This project was different from our previous science projects in that we felt that we made a positive impact on our community and helped address issues that impact climate change. One improvement to our study would be to have a larger group to survey. Due to the limited amount of people surveyed, the study is biased. Our action have reduced GHG emissions for one day in the community and might have even influenced this day to become a yearly event. We plan to run it again in the future and hope to make an even bigger difference. We encourage people to join us in alleviating the effects of climate change before it is too late. Ultimately, we believe that our action project was successful and that we have now become the pioneers of what could be an annual event at Erindale or even around the world.

References


Abstract

The global food system is a major contributor to climate change, producing 19 - 29 per cent of greenhouse gas emissions (Vermeulen, et al., 2012). This system is entirely controlled by humans, and therefore, we are responsible for the negative effects of this system on the well-being of our planet. The large amount of greenhouse gas emissions occurs mainly due to food miles — the distance that food is transported from producer to consumer — and our meat consumption. In this research-informed action report I conducted a study to: i) determine if there was correlation between gender and meat consumption; and ii) if there was a correlation between gender and purchasing of locally grown foods. I learned that 67 per cent of high school boys and 71 per cent of girls that I surveyed consumed meat more than 4 times a week. Based on this data, I concluded that there was no correlation between gender and meat consumption amongst teenagers that I surveyed. However, I felt that meat consumption was rather high. Also, about 40 percent of boys and girls sometimes buy locally grown food, which is great, but a third of them did not know if the food they, or their parent, purchase is locally grown. Once again, I concluded that there was no correlation between gender and habits of purchasing locally grown foods. In repose to this, I decided to take an action and develop a video to make my peers more aware of global food systems and their relationship to climate change. I posted the video on FaceBook™ where my family and friends can view it and comment. I hope that this project inspires everyone to be more conscious about their diets and that we can collectively reduce the GHGs through reduced meat consumption.
Introduction

Food is necessary for our survival, but have we gone too far in terms of our food consumption, especially in the Western Hemisphere? Are we causing more harm to our planet through our increased global food consumption?

Transporting food is one of the fastest growing sources of greenhouse gas emissions. Each year 817 million tons of food is shipped around the planet releasing a colossal amount of greenhouse gases, specifically CO2 (Diet for a Hot Planet, n.d.). The average meal travels 1200 kilometers from a farm to plate (Centre for Environmental Education, 2008). The combustion of fossil fuels releases greenhouse gases in our atmosphere and this contributes to the anthropogenic greenhouse effect. Furthermore, meat consumption contributes significantly to GHGs and climate change. Livestock alone are responsible for 18% of all greenhouse gas emissions (David Suzuki Foundation, n.d.). Human beings cannot blame livestock for this, as it is a part of their natural digestive system. In fact, through industrial farming, many farmers have altered the digestive system of livestock thus concentrating livestock’s emissions of methane. I recommend the video encoded in the QR to better understand the negative impacts of of industrial farming. The video contains several disturbing scenes that may not be suitable for everyone. Negative consequences of climate change, such as heat waves, droughts and floods may be reducing crop yields leading to starvation and malnutrition to individuals in developing or underdeveloped countries, especially in Africa. This crop reduction may induce economic stagnation in numerous countries due to people losing their jobs in the food industry, such as cotton farmers in India. Moreover, excessive farming of crops, especially corn, causes loss of topsoil 17 times faster than the regular rate (Food & Agriculture - ChartsBin.com., n.d.) This not only decreases possibility of plant life, but it also affects the soil’s efficiency as a carbon sink.

We need a collective approach to address some of the issues related to global food production. We need our governments, food industries and other key stakeholders to work together and recognize that we need a change. As high school students, we can alter our food consumption. We can become more aware of what we eat and how it affects not only our wellness, but also the well-being of our entire planet. I call for action! Every bite counts when it comes to the well-being of individuals, societies and environments.

Focus Of Our Study

The focus of my study was to find out if there is a correlation between gender and daily diet habits at our school. I devised a survey asking my peers about their weekly meat consumption and the purchasing habits of locally grown foods. I collected the data over lunch break from 50 girls and 50 boys who attend Erindale Secondary School.
Table 1: Students' Frequency of Meat Consumption in Erindale Secondary School: 50 boys and 50 girls were asked how often they consume meat per week. 67 per cent of high school boys and 71 per cent of girls that I surveyed consumed meat more than 4 times a week. This represents a high weekly meat intake for both genders.

<table>
<thead>
<tr>
<th></th>
<th>0 times</th>
<th>1-3 times</th>
<th>4-6 times</th>
<th>7 times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>3</td>
<td>11</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>Boys</td>
<td>3</td>
<td>12</td>
<td>24</td>
<td>9</td>
</tr>
</tbody>
</table>

Summary and Interpretation

The results of this study reveal that boys' and girls' meat eating habits at Erindale Secondary School do not contrast that much from one another. Surprisingly, more girls reported that they consume meat every day compared to boys. However, I should note that this study is biased. One thing is for sure: over two thirds of boys and girls consume meat more than 4 times per week. Perhaps at this age, when we are growing and developing, it is normal to consume so much meat; however, I would argue that this still represents a large number of students whose diet is meat-based.

Furthermore, there appears to be no correlation present between male and female purchasing habits of locally grown foods. 71% of the male teens at Erindale are aware of where their groceries come from, while 73% of the female teens at Erindale are also aware. Overall, 14% of the students are not aware whether their groceries are local or not. Although the number may not appear alarming, efforts should be made to raise awareness of the correlation between diet and climate change so that students are also engaged to buy locally more often. Students should be engaging their parents about this critical issue as well, as most parents buy food for their kids at this age.

By doing this project, I became aware about the issue of diet and climate change. If one was to ask an average teenager what we should do to mitigate the effects of climate change, they may provide a list of actions, including riding a bicycle instead of a car, turning off lights, etc., but most likely they will not mention purchasing local groceries or eating less meat. This may be due to lack of awareness, or even maybe denial by powerful stakeholders, who do not necessarily announce to the public the negative consequences that food industry is having on climate change. Although I did not question the level of awareness of my participants with regards to how diet and climate change relate, I speculate that those who consume meat 0-3 times per a week and often purchase locally grown foods have a well-founded awareness of the influences of their dietary choices on the environment.
Taking Action

One of the other goals of this project is to raise awareness about this issue through action! This project serves to promote personal, social and ecological well-being. Watching what we purchase and eat will improve our health, support your communities financially, and reduce the destruction of our only planet. Decreasing meat consumption, especially meat that has been imported from factory farms, starting a community garden that will bring people together, and buying more locally grown food are some ways in which we can begin to have a positive impact on our individual, social and ecological wellness. These actions should be our duty. As the citizens of the developed countries, we tend to have an abundance of technology and resources, meaning we have the tools to reverse the negative impacts of climate change. As part of my effort to make a difference, I developed an awareness video summarizing what I learned in this project. I shared the video with my friends and family of FaceBookTM, and I received some encouraging comments that made me feel that my efforts have started to pay off.
“Earth provides enough to satisfy every man’s needs, but not every man’s greed.” — Mahatma Gandhi
Raising awareness about birth control

Haley Gabel and Claire Snowden

Abstract

The socio-scientific issue that we studied was methods of birth control and how they may be influenced by political, ethical and religious controversies. In our study we uncovered how much knowledge an average person has about such a common and crucial issue. We concluded, based on our mini study, that 74% of high school students attending Catholic school in 2012 did not receive any education about methods of birth control. In addition, 85% of the general public that we surveyed are supporters of birth control. We feel that young people need more education about birth control. We would like to spread awareness about primary types of birth control methods. We wrote letters to six popular teenage and young adult magazines. We also created a video featuring an interview with our health education teacher, which we posted to YouTubeTM with her permission. Educating youth can help change the rates of teenage pregnancy and avoid any unnecessary controversy about emergency methods such as abortion.
Introduction

Birth control is an ongoing issue in today’s society. The controversy is mainly surrounds the use of emergency birth control known as Plan B and abortion. The knowledge about primary types of birth control to avoid the use of emergency methods should be known by teenagers and young adults. If teenagers and young adults are aware of the methods provided and the possible effects on their body, then they will make wiser choices.

Birth control is successful in preventing unwanted pregnancies and some may also protect against sexually transmitted infections (STIs) for both partners. The most common methods of birth control are male condoms and the pill. One of the issue may be that the users of birth control are not properly educated on how to use the birth control method. This may result in possible unwanted outcomes. The pill, and the patch, are both hormonal methods of birth control. They alter the female ovulation cycle to make it more challenging for the egg to be fertilized. They are not guaranteed and they do not offer protections against STIs. A safer and more reliable way to prevent pregnancy and STIs is by using a combination of hormonal and barrier birth control (male or female condoms). The issue is that this information is not as common knowledge as it should be, which may be surprising to some.

By raising more awareness about birth control methods, less teenage pregnancies will occur and the spread of sexually transmitted infections could be lessened. This would have a positive impact on individuals and society. The government, ‘pro life’ organizations and ‘pro choice’ organizations are powerful stakeholders in this controversy. We are encouraging the side that it is up to the individuals to decide what to do with their body. However, individuals need to be educated when making decisions, especially decisions that may leave them with unwanted consequences.

Focus of our Study

The goal of our study was to identify any relationships in opinions between females and males, different generations, different religions, and how informed the average person is on different methods of birth control. On Saturday May 25th, 2012, we walked around Square One mall from 11:00 AM to 3:00PM and surveyed 50 girls (ages 13-19), 50 boys (ages 13-19), 50 women (ages 20 and up) and 50 men (ages 20 and up). We used a survey App on an iPad to accurately record our results.

We asked the following questions:

- Are you Male or Female?
- Are you Teenager (13-19) or Adult (20 and up)?
- Were you educated at a Public school or Catholic school?
- How many different types of birth control methods can you name?
- Are you a supporter of birth control methods (hormonal, barrier, emergency)?
We learned that approximately 85% of the people that we surveyed were in support of birth control (see Figure 1) that approximately half of those individuals used birth control (see Figure 2). However, we cannot tell if the other half of the people were not using birth control or if they were simply not sexually active. Furthermore, most participants (approximately 70%) who attended Catholic schools reported that they were not educated about birth control in school. Regarding one’s knowledge of birth control methods, on average, females can name four different types of birth control and males can name three. As we were conducting the study, we also observed that the topic of birth control is still very taboo. Not many people were comfortable talking about it. We found this surprising considering it is a responsibility placed on millions of young adults everyday.

In our survey, we found that girls in general knew more about birth control; however, we feel that the knowledge should be equal between both genders, because it is both partners’ responsibility to make sure they are safe if they decide to be sexually active. With growing teen pregnancy rates and media sharing their stories on shows such as Teen Mom or 16 and Pregnant it is important that teenagers and young adults are not influenced by the publicity these girls are receiving. Had the girls in these popular shows been educated about safe sex (or abstinence for that matter), they could have altered the outcome of their unplanned pregnancies.

Our hope is that accessing birth control will eventually become as simple and easy as getting cough medicine at a drugstore. Whether or not people want to take advantage of its availability is out of our control, but the options should be there.

For the purpose of this publication we will report results for only a few of the questions above. However, we will discuss the results of other questions more broadly in the ‘summary of results’ and ‘discussion’ sections of this report.

Summary of Results

We learned that approximately 85% of the people that we surveyed were in support of birth control (see Figure 1) that approximately half of those individuals used birth control (see Figure 2). However, we cannot tell if the other half of the people were not using birth control or if they were simply not sexually active. Furthermore, most participants (approximately 70%) who attended Catholic schools reported that they were not educated about birth control in school. Regarding one’s knowledge of birth control methods, on average, females can name four different types of birth control and males can name three. As we were conducting the study, we also observed that the topic of birth control is still very taboo. Not many people were comfortable talking about it. We found this surprising considering it is a responsibility placed on millions of young adults everyday.

Discussion

The most prominent discovery for us about the topic of birth control is that it is still extremely taboo. The controversy between religious, political and ethical groups is continuously growing. From our secondary research we came across websites and blogs for young women asking about methods of birth control. If birth control was more openly discussed in school and at home, we believe that we could help further prevent the spread of STIs, unplanned pregnancies and abortions.

In our survey, we found that girls in general knew more about birth control; however, we feel that the knowledge should be equal between both genders, because it is both partners’ responsibility to make sure they are safe if they decide to be sexually active. With growing teen pregnancy rates and media sharing their stories on shows such as Teen Mom or 16 and Pregnant it is important that teenagers and young adults are not influenced by the publicity these girls are receiving. Had the girls in these popular shows been educated about safe sex (or abstinence for that matter), they could have altered the outcome of their unplanned pregnancies.

Our hope is that accessing birth control will eventually become as simple and easy as getting cough medicine at a drugstore. Whether or not people want to take advantage of its availability is out of our control, but the options should be there.
Taking action

Our actions were to write to popular teenage and young adult magazines about the importance of this issue. We ask that they highlight methods of birth control in their upcoming magazine issue. This will spread information to the audience of young women who may not feel comfortable openly talking about birth control. We hope that spreading the awareness of birth control methods such as the pill, condoms etc. will avoid the possible use of emergency birth control methods (i.e., abortion) which can be harmful to the body.

Another action we took was to interview our school gym/health teacher. We asked her opinion on how girls in high school react to the information of birth control and shared it with students in our school to help students realize they are not alone. We sent letters and emails to the following magazines: Seventeen Magazine, GL magazine, Teen Vogue, Elle, Vogue and Glitter.

The video can be found here:
http://www.youtube.com/watch?v=yDOSN7hiQ1E&feature=youtu.be

Copy of the letter

Dear (name of Magazine),

Our names are Haley Gabel and Claire Snowden. We are grade 10 students at Erindale Secondary School in Mississauga, Canada. Our summative assignment for our Grade 10 Science course consists of selecting a controversial issue that is related to human health and learning more about it through secondary and primary research. Our commitment in these projects is on actions. We decided to write you this letter as part of our action plan to raise awareness about the controversial issue that we studied.

The issue we chose is birth control. We chose a topic that is not typically talked about openly in school and/or home environments. We wanted to learn about the issue and why it is avoided in schools/homes. After conducting on-line research we discovered that there are over 15 types of birth control. The four main types of birth control include the pill, condoms (female and male), the patch, and vaginal rings. Since this was new and surprising information to us, we based our study on surveying the general public about their knowledge and opinion of birth control. We went to a popular Mall in our area and surveyed 50 girls (ages 13-19), 50 boys (ages 13-19), 50 women (ages 20 and up) and 50 men (ages 20 and up). We asked them questions such as:

- Were you educated at a public school, catholic school or a different specialty school?
- How many different types of birth control methods can you name?
- Are you a supporter of birth control methods (barrier, hormonal, emergency)?
- Have you ever used any methods of birth control?
- Have you been educated on different methods of birth control through school?
- Are you religious? If yes, what religion?

After completing our survey and analyzing the data we collected, obvious correlations began to form. It was shocking to us that 74% of people that attended Catholic schools did not learn about methods of birth control in school. This was surprising because if young women do not have a strong relationship with their parents and they do not learn this information in school, how are they preventing unwanted pregnancies and protecting themselves from STIs?

We also learned that 93% of people support birth control; however, if the issue is so strongly supported why is it still an awkward topic to bring up? This is why we chose to write a letter to this magazine.

(Title of the magazine) has the power to reach a much larger audience of young women than we ever could on our own. We think it would be a great article in your next issue to break down and simplify birth control in your health section, so that girls can protect themselves and learn reliable information from a trusted source.

Sincerely,

Haley Gabel and Claire Snowden
References


Birth Control Options | Options for Sexual Health. (n.d.). Retrieved from


Consumer action: Learning about lip balms

Nasteha Abdullahi

Abstract

Many people wear lip balm to moisturize their lips. In this research-informed action project I investigated some of the hidden issues associated with lip balms by examining some of the living and non-living components that are involved during the life cycle of lip balm. Each stage in the life cycle of a product (from extraction to disposal) has some negative impacts on the wellbeing of individuals, societies and environments (“Story of Stuff,” 2007). In addition, I conducted a study involving 40 teenage girls to learn more about their frequency of use of lip balms, the features of lip balms that appeals to girls the most, and what brands the girls preferred. My study reveals that 50% of the girls surveyed use lip balm on a daily basis. Fragrance appears to be the most preferred feature when selecting a lip balm. There are no specific colours or brands that stand out as most popular. Corporations use fragrance, colour and fancy packaging to attract consumers and, at times, distract them from some of the negative impacts of their product. I suggest alternatives to lip balms and tips to stay lip balm-free.
Introduction

As the holy grail of comforting dry lips, lip balm is one of the most frequently used consumer products in the world. Lip balm, like most products, goes through the stages of extraction, production, distribution, consumption, and disposal (“Story of stuff,” 2007). Although people and other living things are impacted in all stages of the product’s life cycle, the major issue in the life cycle of lip balm is hidden behind the creative and bold brand imaging that is used to sell the product at an accelerating rate. The images associated with lip balms can include girls applying the product for advertisements. Most of the time the girls have styled hair and small figures, which are components that are not relevant in presenting the product’s effectiveness. These images affect teenage girls even if the girls are not immediately aware of it. The media greatly influences consumers’ decisions and presents the girls with the ideal look that society “accepts”. Adolescents girls are likely to perceive and believe that “fitting in” is a contending priority in everyday life.

Lip balms can vary tremendously depending on colour, scent and texture. Often, various chemicals are used to obtain these characteristics. The addition of sun protection factor (SPF), one of the seemingly positive benefits of certain lip balms, also results in exposing sensitive skin to octinoxate. Studies have shown that octinoxate causes a disturbance in the endocrine system (“Octinoxate,” n.d.). Various fragrances, which encourage a more frequent use of lip balms, are almost always made from petroleum and contain toluene, a chemical linked to nervous system damage and illnesses like cancer (“No perfume means healthier air,” n.d.). In addition, colours used to tint lips are derived primarily from coal tar in a process that releases harmful chemicals and fumes into the environment. The chemically produced colour may suggest links to attention deficit hyperactivity disorder (ADHD), and surprisingly, different types of cancer (Rachel Hennessey, 2012).

Carbon emissions from production plants along with distributing stages contribute to global warming and climate change. With innumerable lip balm purchases being made constantly around the world, it is critical to understand lip balms’ possible negative impacts on individual, social and ecological wellbeing.

Nasteha Abdullahi takes on a 5-day challenge to go lip-balm free. She also proposed an alternative to the commercial product, which is developed from more natural and locally available ingredients. She encourages her peers to try the alternative lip balms that are better for the well-being of individuals, societies and environments.
The Lip Balm Study

Questions arise regarding the different features used in a lip balm to mask some of the negative effects and ultimately gain lifelong customers. The purpose of this study was to learn how often girls use lip balm, and what scent, colour and brand they prefer the most. Surveys were handed out to forty girls at Erindale Secondary School. Males were not asked to participate as they use lip balm considerably less than females.

Summary of Results

The data shows that 50% of the girls wear lip balm daily and 35% wear it on most days of the week (see Figure 1). Out of the forty girls that were surveyed, only two answered that they never wore lip balm.

In addition, 65% of the girls picked out lip balms according to scent, and surprisingly, none of the girls said that they selected the product based on the advertising that was done for the product (see Figure 2).

In addition, more girls like a pink lip balm than any other choice, although a range of colours were selected by the girls surveyed (see Figure 3). Some noticeable choices of colour include red-tinted lip balms and nude lip balms.

Almost all girls prefer having scents in their lip balms, and the most popular choice was anything fruity—the choice of minty scents was only two votes behind anything fruity choice (see Figure 4).

Finally, most girls use lip balms from the brands Maybelline™ and EOS™ (see Figure 5). The amounts of votes for other brands were similar to each other, except for the brands Vaseline™ and Burt’s Bees™, which only had one vote each.

Discussion

Along with the quantitative answers, interpretations can be made from the qualitative answers that were gathered. Concerning the frequency of lip balm use, the results may have sparked one way or the other because lip balm can be very addictive to wear and wearing it most days will most likely lead to an addiction; thus, creating the barrier between inconsistent users and avid users. Moreover, applying lip products may be accustomed to a teenage girl’s cosmetic routine to complete and finish off looks. It can also act as a protective measure against weather for any male or female consumer.

Marketers use fruity and fresh scents to attract consumers to keep buying more unique lip balms, and consumers tend to buy more than they should own. They incorporate scents and even tastes that relate to fruits since consumers often consider them in purchases, which allows for partial intakes of lip balm over time. Brands, such as Maybelline and EOS, attract customers the most because they use eye-catching shapes and bright colours for their packaging. The amount of votes for the brands Vaseline and Burt’s Bees, which give the message of either being natural or soothing, are very small in comparison.

A major issue of conflict stretches along the chemical intake of consumers. According to the website SteadyHealth, lip balms have the ability to cover up early signs of life-altering lip cancer by hiding the dry characteristics of actinic keratosis which can develop into skin cancer (Robert Rister, 2010). It is crucial for teens and adults to inform themselves on the dangers of the unknown when it comes to personal health.

Figure 1: How Often Girls Wear Lip Balm in a Week?

Figure 2: What Features Appeal to a Girl in a Lip Balm the Most?
Projects such as this one promote the wellbeing of individuals, societies, and environments – where some aspects may seem more directly affected than others, but their ulterior connections prove otherwise – by divulging the greater consequences of simple actions in the life of the average person. It is encouraged to be active in comprehending the way the world works and getting involved to improve the mistakes of past generations for a brighter future. Starting with the teen audience is just an idea to grow a society of curious thinkers and innovative doers who are the soon-to-be leaders of the world. [This paragraph might be too general. Concluding remarks – what are your hopes? What action are you recommending? Also needs one more secondary research reference]

Taking Action

It is certain that there is a lack of knowledge on healthier and safer alternatives to lip balm. The research gathered involving the issues concerning lip balms was translated into an informational video with an added personal challenge of going lip balm-free for a five-day school week. It was titled “The Issues with Lip Balm and the Ditch the Chapstick” (see Introduction). The purpose of this video was to encourage teenagers to reduce use of lip balms.

References


Modern day Trojan horse: The story of body lotions

Zahra Sina and Nadia Abdullahi

Abstract

Personal hygiene products are used on a daily basis by many people. Many are comparable to the Trojan horse. On the outside, they appear to be harmless. They are contained in attractive bottles and they rely on misleading ads to attract consumers. However, these products may contain potentially harmful chemicals and many people are unaware of how individuals, societies and environments are affected in the various stages of the life cycle of many personal hygiene products. Our STSE issue deals with an everyday product that falls under the Trojan horse analogy—lotion. We are concerned that our peers and other young adults are purchasing lotions without the knowledge of how they came to stand on the shelves of a store. We conducted a correlation study between gender and popular lotion brands among teenagers and the reasons behind their choices. We came to the conclusion that more females than males were interested in popular lotion brands due to enticing features that targets mainly feminine interests (e.g. scent is an aspect of lotion that more females than males consider when purchasing the brand). For our actions, we prepared an educational mind-map on our issue and a video compilation where we interviewed female students on their reactions to various lotion brand commercials. Our actions are meant to inform the public about the controversies surrounding our issue and the techniques companies use to gain the attention of potential consumers.
The Irony of a Gift

In Virgil’s Latin epic poem, The Aeneid, the tale of the legendary stratagem that ended the Trojan War is told through the eyes of Aeneas. The fatal error that the Trojans made was that of allowing the wooden horse into their bastion which led to the eventual downfall of Troy (Encyclopedia Britannica, 2013). Similarly to how the Trojan horse was perceived as a gift from the Greeks to symbolize their capitulation, everyday household products may also be regarded as modern day Trojan horses. In today’s society, human beings are developing ways to reduce manual labour and maximize efficiency and profit. However, the fact is that there are negative consequences attached to the life cycle that most products go through. These negative consequences can have serious environmental, societal, and individual impacts.

Body lotion is a product that many individuals use whether it is to reduce skin dryness, or for the aroma that a particular brand offers. To a typical consumer, there would seem to be nothing questionable about the packaging, ingredients, or all the living things and non-living things that were involved in the life cycle of body lotion. To the average consumer, a low price of a lotion may perhaps suggest a lower quality product. But to a wise consumer, this may suggest that the company outsourced the product development to an emerging or developing country to externalize the cost. A more perceptive individual might even infer that some companies evaded some human rights either directly or indirectly as a result of outsourcing to some poverty-laden countries. This polemical outlook may be seen as cynical, absurd, and outrageous to some, but what if everything assumed was true? How would people react then?

In the same way as the church’s supremacy pervaded in Medieval England, today in the 21th century, corporations are becoming the power-players and making the world’s wealth their monopoly. In order for corporations to maintain their status, some compromises have to be made in order to increase revenue and continue mass production. These compromises come in the form of the ingredients you see on the back of many products, or the outsourcing that occurs as a result of the great discrepancy between workers pay-checks in different countries—making it cheaper to set up a factory in Mexico and evade regulations than it would be in an advanced western nation. The consumer more often than not falls prey to the antics that companies contrive and buy into the false facet. Some ingredients are increasingly being linked to cancer and other illnesses that are becoming ubiquitous in the 21th century. Parabens are an example of an allegedly carcinogenic ingredient found in some cosmetic products, lotion being one among others. However, since only a small percentage of the population is affluent, most families would choose the cheaper alternative and ignore the plausible long-term consequences.

The environmental corollary of buying lotion on a daily basis or any personal hygiene product for that matter is even worse. 80% of the planet’s original forests are gone, every minute 2000 trees are irrevocably lost in the Amazons, and 4 billion pounds of toxic chemicals are leaving the factories every year as by-products (Leonard, 2007). This is the result of a linear system that goods follow in the life cycle of products. This pattern is to blame for the slow depletion of Earth’s natural resources. By the time our children’s children inherit this planet, there might be a vestigial amount to survive on. All the signs point to this dismal future, nevertheless people can turn this downward spiral into an upward spiral by caring and doing their part to reduce their carbon footprint in order to achieve a better future.
Focus of the Study

The focus of our study was to determine whether there was any correlation between lotion brands and gender and if there are specific brands that are more popular compared to other brands of lotion. The independent variable was gender and the dependent variables were the chosen brands and the reason for selection.

Method

We administered a survey to 50 students at Erindale Secondary School. An even number of boys and girls were asked to complete the survey questions. The first question solicits the brand of lotion they preferred and the second survey question was regarding the particular reasons for their decision.

Summary of Results

The graph in figure 1 shows that males have no particular interest in lotion brands as 56% do not use lotion at all. Unlike males, the data for females concerning the lotion brands they prefer is more diversified and indicative of a broader understanding of the different types of lotion. Females tend to favour Bath and Body Works (28%), whereas none of the males we questioned chose this category. It is proven through the high amount of females who chose ‘other’ (32%) that they are not as interested in the well known brands as one might assume. Males buy Nivea more than females, but females are shown to prefer Vaseline over males (none of these differences are to a significant amount). Our results can be adverted back to the issue of lotion companies advertising their products to grab the attention of female consumers rather than male individuals. This can be witnessed in everyday lotion commercials as they not only use female actors but target concerns that females might have and decide to act upon by buying lotion (e.g. skin irritations, dry skin, etc.)

The graph in figure 2 displays the results derived from both female and male students as to why they chose their brand. There are several correlations one can discern from first glance between issue and gender. Over thirty percent of females value the lotion’s ability to moisturize their skins above all other options, while the factor that influences males on their decisions is family in the sense that they are the providers of personal hygiene products. Most males can be found in the ‘other’ category as many do not use lotion and their reasons may range from not being able to afford to simply not caring. Surprisingly, popularity is fairly low for both genders, but our study is biased because of the sample size (twenty-five students from both genders). In the future we will choose a larger sample size in order to obtain more accurate results. We concluded that many teenage males do not concern themselves with personal hygiene products, or they do not admit to it. Females on the other hand enjoy these products for their many favourable aspects and recognize their value in reducing dry skin.

Figure 1: Lotion brands preferred by students: A comparison of the popular lotion brands in relation to gender. The relationship of gender to lotion brand is greater for females than males.
Discussion

With the completion of our study, we recognized the important factors involved in the selling of lotion. We found that more than half of the males we studied do not use this product at all. Females may be the ideal consumers for this product. Companies use this to their advantage by having female actors in their commercials as well as targeting concerns females might have (e.g. hair growth and dry skin). Companies that use these strategies include Aveeno, Nivea and Vaseline—these brands showed the most popularity in our study. According to The Statistica Portal, Aveeno Active Naturals Daily Moisturizing Lotion had 41.8 million dollars in sales in 2012, one of the highest sales among other brands (Statistica Portal, 2013). Vaseline had around 34 million dollars in sale, which still categorized them as one of the top brands in America.

The fact that Canada is a neighbouring country to the U.S. suggests that Canada might have similar results as the majority of Canadian media is similar to that of the United States.

Lotion is not all that it seems on the outside. There are many detrimental aspects of it that consumers are unaware of. One such aspect is the common ingredients found in most hand lotions which include parabens, alcohol, mineral oils, and other petroleum based substances. These chemicals are percolated into the blood stream and bio-accumulates in the liver, breasts, and fatty tissues. A study was conducted on September 2008 on girls who used cosmetics that contained parabens and those who did not. They found that girls, who were exposed to the chemical, had higher rates of cancer than those who were not (Corriher, 2007). In addition, everyday beauty products are purportedly the cause of the rise in skin allergies. The preservatives used in some Nivea and L’Oreal creams are being linked to acute allergic contact dermatitis-mostly in women over forty (Hope, 2013).

Our project advises others about the hidden components of manufactured products such as lotion. There are a lot of other issues that can be discussed in relation to the various stages in the life cycle of many consumer products. Our actions may influence individuals to invest money into products that are less harmful to the environment, our society, and to our personal wellbeing. We hope this project will promote a collective awareness among our peers and have an influence on the way they view the world. Those who make the decisions might not always make them in the best interest of all living things. It is up to us as citizens to dig out the truth and address the wrongs in order to promote the wellbeing of societies, environments, and individuals across the globe.
Our Actions

We made a large scale mind map to educate our peers on what is beyond the exterior of a lotion bottle—there is more than meets the “eye”. We used the eye to represent that message and reflect back on the analogy of the Trojan horse. We included the five steps of the lifecycle of the product: extraction, production, distribution, consumption, and disposal (“Story of Stuff,” Annie Leonard, 2008). We placed this poster outside of the science classroom so students passing in the halls may stop to read a few of the points on the mind map. Here is a picture of the mind map we created:

In addition, we created a video as part of our action and study. We interviewed 10 female students about how they felt after watching different lotion brand commercials. They gave us their feedback and then we asked if they would still use lotions that may contain parabens in them. We posted this video on Facebook™ to spread awareness.

References


Addressing the issue of underrepresentation of women in Chemistry

Asalat Kamal, Michael Kang and Benjamin Mong

Abstract

We conducted a study in two different high schools in Mississauga to see if there was a correlation between gender and interest to study Chemistry after high school. A vast number of adolescent females reported no interest in studying Chemistry (65%) compared to adolescent males (26%). Our research suggests that disproportionally of women to men in Chemistry may originate as early as high school. We recommend that high school Science/Chemistry curriculum must be more inclusive to help young girls develop an interest in Chemistry, and Science in general. Teachers must combat stereotypes in the classrooms and introduce young women to more female role models in Science/Chemistry to empower them to pursue Chemistry in post-secondary years.

Benjamin Mong, Asalat Kamal and Michael Kang present their research-informed action project about the underrepresentation of women in chemistry during the 2012-2013 STSE fair at Erindale Secondary School.
Introduction

At the 2010 TedGlobal conference, Pulitzer Prize winner Sheryl WuDunn stated that gender inequality is becoming the leading injustice of the 21st century. Similarly, in 2007, when presenting to a segregated audience in Saudi Arabia, business mogul Bill Gates was asked if it was realistic for Saudi Arabia to aim to be one of the leading country in the field of technology by 2010. Gates’ response was simple: “Well, if you’re not fully utilizing half the talent in the country, you’re not going to get too close to the top…” (Associated Press, 2007).

WuDunn and Gates are just a fraction of the influential activists that are forcing the international community to recognize the underrepresentation of women in Science, Technology, Engineering and Mathematics (STEM) fields and the inequalities they face compared to men. Even though women fill half of the job positions available in the U.S, and, consequentially, constitute half of the U.S. economy, they fill 24 percent of STEM positions. In addition, women with a STEM undergraduate degree are less likely to pursue a career in STEM fields. These women are more likely to acquire positions in education and healthcare (“Women in STEM: A Gender Gap to Innovation”, n.d.).

No definite answer can be given to explain the underrepresentation of women in STEM fields. Social scientists have brainstormed some possible factors such as a lack of role models for females in the STEM fields, gender stereotyping in the media, and family obligations that women are struggling to fulfill because of the non-flexible schedule of STEM positions (“STEM Fields And The Gender Gap: Where Are The Women?”, 2012).

A lack of women entering STEM fields is a hindrance to our nation’s economy as well. Women in STEM positions earn 33% more than women in non-STEM positions (“Women in STEM: A Gender Gap to Innovation”, n.d.). With little women entering STEM fields, a nation’s economy is not at its highest potential. Powerful nations like Canada have a responsibility to send a positive message to the international community about the incorporation of women in STEM fields. Girls in high school need to be empowered by their teachers and their parents. Teachers play a central role in empowering young women to pursue STEM fields. Women have great potential in these fields. Their success can lead to our nation’s success and to a more equitable and inclusive society for all.

Focus of the Study

We conducted a study to investigate whether a correlation existed between an individual’s gender and an interest to study Chemistry at a post-secondary level in two high schools in Mississauga. In addition, we also asked how well Chemistry is taught in high school and if our peers think that gender bias exists in Chemistry.

Research Method

We asked 240 senior students (120 male and 120 female) from two high schools in Mississauga, Ontario, to complete a short survey consisting of six questions. These individuals had to have completed, or were in the process of completing, one senior Chemistry course. We followed this criterion when selecting individuals to participate in our study because the questions we asked required experience in a Chemistry classroom. We asked the following questions:

- What is your gender? Male or Female
- Are you interested in studying Chemistry at a post-secondary level? (Yes or No)
- Why or why not? Please explain briefly.
- One a scale of 1 to 10 (with 10 being the highest quality), how well is Chemistry taught in high school?
- What can be improved? Make one suggestion.
- Do you think that there exists a gender bias in Chemistry? Circle one. (Yes or No)
Summary of Results

The data collected in this investigation shows a positive correlation between gender and an interest in studying Chemistry at post-secondary levels. Out of the 120 males surveyed, 89 of them intended to study Chemistry at a post-secondary level (74%); however, out of the 120 females surveyed, only 42 of them did (35%). More than double the amount of males compare to females plan to study Chemistry. When asked about the quality of teaching, the data fitted the Gaussian distribution (Figure 3). Approximately 65% of girls reported the quality of chemistry teaching as 7 or higher compared to 40% of the boys. When asked if they believed that there was a bias and a lack of gender representation in the field of chemistry, 63% of boys believed there was bias compared to only 27% of females (Figure 4).
Discussion & Implications

Our research indicates that a gender gap exists in Chemistry, in addition to the other STEM fields. The study suggests that only 35% of females in two secondary schools in Mississauga have an interest to study Chemistry after high school. This complies with our secondary research, which shows that there is an underrepresentation of women in STEM fields. However, we recognize that our data is biased as well.

The subjects these females intend to study are ones that the media has stereotypically labeled “female”. What may be most troublesome is that women are becoming comfortable with the idea of pursuing non-STEM related fields and fail to see the gender disproportionality that exists in their classrooms, whereas men have identified and noticed this inequality. Two interesting findings in this study are that more girls reported higher quality of teaching of Chemistry; and secondly, more boys find that there is gender bias and underrepresentation of women. It may be that adolescent girls are more compliant and less critical of the teaching quality than boys. Also, girls may have accepted that Chemistry is a more male-dominant field, and thus, they do not perceive it as problematic. However, we see this as a problem in our society. Girls must see themselves as equal with boys when it comes to STEM fields. Teachers play an important role in empowering girls and allowing them to feel equal to boys.

We think that Chemistry curriculum should be more inclusive. Influential female scientists must be introduced to young girls as role models and the imperative roles that females played throughout the history of science must be highlighted. Chemistry classrooms and school hallways need to display women scientists. Teachers need to highlight contributions of women scientists. Young girls must be shown that the potential to study STEM disciplines exists within every girl.

For the action portion of this project, we created posters with female scientists and a description of their accomplishments. We placed the posters in our school and in other locations such as the middle school, the local community centers and local libraries. We wanted to spread the message to a great number of girls.

The following are a few of the posters that we designed. The scientists below are Marie Curie, Rosalind Franklin, and Gertrude Elion. We suggest that other, more contemporary, women scientists be included. And, there should be women representing different races, ethnicities and cultures. Our society will become equal when women are valued just as much as men and we should stand united as we fight for greater gender equality in our world.
References


Coltan mining and internet privacy

Fahad Atif, Shawn Khan, and Adriel Gobin

Abstract

This research-informed action project focuses on coltan mining and online privacy. In particular, the atrocities being carried out in foreign countries in pursuit of coltan and the risks of privacy invasion one faces when browsing the internet. Although at first it may appear that coltan mining and internet privacy are entirely separate issues, we recognize that these issues are part of larger network, and thus, they are related to each other via many intermediate actants. Through surveys taken at Erindale Secondary School, we learned that most people are significantly uninformed in regards to both topics. In response to these appalling results, the research team created three YouTube™ videos about coltan mining and internet privacy which included numerous facts about the issues and the actions that one can take. Additionally, a Facebook™ page was created to draw attention to the issues. The Facebook™ page has over 100 likes and the YouTube™ channel has over 1400 views.
Introduction

Citizens of North American society and in many other societies around the world have access to vast amounts of information at their disposal in a matter of seconds. In an ideal world, this fruitful availability of knowledge would keep the average person informed about vital issues occurring around the world and on the net. Regrettably, this is not the case as many people are unaware of the current controversies regarding coltan mining and online privacy. Coltan is a dull metallic ore mined in numerous countries including Canada and Australia. The most notorious location of coltan mining is in the Democratic Republic of Congo. In the Democratic Republic of Congo, illegal and unregulated coltan mining has fuelled both sides of the civil war, forced people of all ages to undergo slave labour, dislocated local human populations, polluted water supplies, destroyed wildlife habitats, and aided surrounding countries in gaining revenue from smuggling coltan (“Coltan, gorillas and cellphones,” n.d.). Coltan is extremely sought after as when refined, tantalum is produced. Tantalum is heat resistant; it holds a high electrical charge; and thus, tantalum is great for manufacturing capacitors which store electrical charges in circuits that are used in many electronic devices such as phones, computers, game consoles, etc.

Powerful actors in this issue are multi-national corporations such as Bayer who have been known to purchase illegal coltan and environmental activists who fight against the destruction caused by unregulated and illegal coltan mining. Another matter requiring attention is the issue of online privacy which involves internet ad-tracking and packet sniffing. Online advertisement agencies use cookies which are small pieces of data sent by a web server to store on a web browser for ad-tracking (“What are cookies?” n.d.). Cookies themselves are tolerable as they allow websites to store website personalization information, online shopping carts, and login information; however, when they are used for ad-tracking, privacy becomes a huge concern. Advertisement agencies use cookies to track the online advertisements that users view the most and build profiles on users to personalize advertisement data. The most threatening part of ad-tracking is the possibility of advertisement agencies to sell browsing habits to other advertisement agencies, insurance companies, and employers.

The issue of packet sniffing was also explored. Packet sniffing programs collect network data so that the user can monitor its target. Packet sniffing programs are similar to telephone wiretapping devices as they can be used to monitor what an individual is doing on the internet (“Sniffing,” n.d.). The use of these programs is not always unjustified; for example, a corporation or school could monitor their networks to make sure people are on task. However, these programs considerably easier to acquire than telephone wiretapping devices since numerous packet sniffing programs can be downloaded online and is possible for any educated internet user to acquire one to spy on an unprotected or public network. Powerful actors in this issue include advertisement agencies who invade privacy for revenue and internet privacy advocates (on the opposing side). These matters are far too important to be left ignored and awareness needs to be raised, such is the purpose of this research informed action project.
Focus of the Study

The primary focus of the public opinion poll was to determine the public’s interest and concerns regarding internet privacy, coltan mining and the environmental impact of computers.

Summary of Results

The results of the public opinion poll have shown a general lack of understanding on the issues of internet privacy and coltan mining. The majority of students (65%) reported that they felt safe when browsing the internet (Figure 1) and most reported to be moderately concerned with internet privacy (Figure 3). These results were alarming as the majority of students do not have a decent understanding of what is packet sniffing and adtracking (Figure 2), yet both are key ways through which people’s privacy is invaded. Additionally, about 73% of students reported not knowing how to protect themselves from being vulnerable to ad-tracking and packet sniffing (Figure 4). It is crucial that students become more aware of online privacy as online tracking continues to increase and packet sniffing programs are becoming easier to attain. Although 93 out of 140 students claimed they know some of the environmental impacts of computers (Figure 6), only 26% of students reported knowing about the negative effects of coltan mining (Figure 5). With the significant use of coltan in technological devices and the numerous negative impacts that coltan mining has in the Democratic Republic of Congo and surrounding countries, it is crucial that students become more aware of coltan mining. The lack of public interest regarding online privacy and coltan mining is worrisome.
Most technological devices ten years ago have been rendered obsolete as a result of advancements in science. Between 1997 and 2007, it has been estimated that 500 million computers became obsolete in the United States and it is projected that 2 billion computers will be in use by 2015 worldwide (Yates, Daley & Gray, 2007). The researchers and engineers who make modern day technology have to solve several problems that essentially could not have been solved ten years ago. This can be attributed to the incentives to find new solutions; however, the main problems that are being solved are not the problems that need solving. The focus needs to be redirected from cheaper and newer technologies to solutions that are healthier, safer and more fair. It is the modern consumers of developed countries that are purchasing and using these technologies that have the biggest potential impact on corporations. Unfortunately, youth today do not have the incentive to become aware of several environmental and social issues and subsequently take action. With a random sample of 140 teenage students at Erindale Secondary School, the results of the study conducted demonstrate the extent to which current issues are overlooked. The data shows that the majority of teenagers ages 14-18 are relatively unconcerned of internet privacy, with a minority educated in cookies, packet sniffing and ad-tracking. While the sample size had access to this information it is the lack of concern that is alarming. With an increase in awareness, this project attempts to invoke social activism in others, as there is not only an issue with online privacy but a growing ecological problem.

Coltan mining has severe impacts in developing countries, and while youth in developed countries have the ability to make a significant difference with respect to these issues, they remain unaware. Eastern Congo, where a civil war killed 4 million people over the past decade, has 80% of world's coltan (“Coltan, gorillas and cellphones,” n.d.). The UN has published a report and are making efforts to regulate the mining and sale of coltan through the employment of stringent policies (United Nations, 2001). Coltan is heavily
relied on by the Rwandan army; it has been reported that they earned over $250 million in less than 18 months (United Nations, 2001). In addition, the military forces of Uganda and Burundi are also involved in smuggling coltan out of Congo for resale in Belgium. A report to the United Nations Security Council has called for a pause on purchase and trade in of resources from Republic of Congo, due to the civil war in progress that has dragged in the surrounding countries (“Coltan, gorillas and cellphones,” n.d.). Unfortunately, consumers in developed countries only see the finished product, and tend to forget that goods require resources; for example, according to a study conducted by the UN, 240kg of fossil fuels, 22kg of chemicals and 1.5 tonnes of water are required in the manufacturing process of a computer and its screen (United Nations, 2001). This lack of concern and social activist stagnancy can largely be attributed to a diffusion of responsibility. Students do not recognize the impact they can have and believe that others in the macrocosm will solve the issues; as a result, they are less likely to attempt to take direct action themselves. While a short phone battery life may indeed be a problem, the goal needs to be redirected to prolonging current life on this planet. We cannot buy a better life, but we can take measures to ameliorate conditions by educating ourselves and taking action.

![Chart 4: Students who do not know how to prevent packet sniffing or ad-tracking](image)

![Chart 5: Students who are know about the negative effects of coltan mining](image)

![Chart 6: Students who are aware of environmental impacts of computers](image)

**References**


TIME TO TAKE ACTION

To raise awareness on internet privacy and coin mining, the team produced three YouTube videos that educate people about internet privacy and coin mining and suggest actions that one can take to help solve these issues. A Facebook page was also created to spread awareness.

YouTube: https://www.youtube.com/miningintopriva
What do you know about the Chemistry of Computers and Online Privacy? https://www.youtube.com/watch?v=Br1BKEcCVvE
What do you know about Coin Mining? https://www.youtube.com/watch?v=ZhgNXPESZI
What do you know about Online Privacy? https://www.youtube.com/watch?v=awdcG-a02a
Facebook: https://www.facebook.com/MiningIntoPrivacy