

**Creativity inspires exploration**

**Shelby Bryant**, *Mount Royal University*

[Link to Digital Story](#)

**Abstract**

In today's society there is a growing problem around students and their hatred towards math. This research explored the various ways of how to make the math classroom a creative and engaging place for students. For this research, the guiding question was "How can teachers use technology in a creative enough way to make students more interested in the subject of mathematics?" The final findings for this research were slightly different than expected. When conducting the research for this project it was done through a Google Forms survey and through an interview with an expert (see Appendix A). Many of the people who responded to the survey had not experienced technology when studying math before. The survey results regarding the question if teachers should use more technology when teaching math was mainly positive. This research project will help me in my future math classroom to foster a love for math. Too many children develop a great hatred toward the subject of math and I would like to help contribute to the change of this growing problem and this research will help guide me.

## Introduction

Math is a topic that many people grow to dislike. I want to investigate why this is and if there is an effective way to construct the classroom so that this is less likely to occur. Math is a subject that I have found a great passion in and this is my main reason to inquire about math and the use of technology. When I think back on my experiences in the math classroom I find that there has been a lack of technology present. However, technology is a very hard word to define when talking about a classroom. Technology is anything that the students can use to extend their learning and knowledge. This could be something as simple as a pencil and paper or something as extensive as mathematical computer programs. For my math specific inquiry project I am looking into the more extensive uses of technology in the math classroom and how these forms of technology can help keep students interested in this subject so they do not grow to dislike math. The specific question that I explored for this research is: “How can teachers use technology in a creative enough way to make students more interested in the subject of mathematics?”

Math is a subject that students feel they will never use in everyday life but students will soon learn that math skills are very important to their daily lives. I’m not talking about how to find the value of  $x$  in an equation. I am talking about the skills such as problem solving skills, analytical skills, communication skills, and investigation skills. All of these skills are extremely useful to children and if a child is able to learn how to use these skills early on then they will be able to build on and grow these skills every day. Personally, I feel that if teachers received the necessary knowledge of how to use technology effectively then they would be able to implement technology into their classrooms more; specifically the math classroom. This research project

will help give me more insight on how to use technology effectively in the math classroom as I do not feel I have the proper technology skills.

### **Background**

The background of a project is very important to understand because the background provides the foundation in which all other information is stacked upon. For the reader to understand the information in your research they must first of all understand the foundation. The foundation for this research could be traced back to the misconceptions that some students have about math. This misconception is: “To do well in math class, children know that they have to suspend reality and accept the ridiculous problems they are given. To do well in math class, children know that they have to suspend reality and accept the ridiculous problems they are given” (Boaler, 2015, p. 98). Technology can help students to see that math does not have to be this way. Math can be made exciting through the integration of technology in such a way that they do not have to “suspend reality” (Boaler, 2015, p. 98). Technology can allow teachers to enhance math by bringing real life situations right into the classroom. This could be through computers or even by allowing students to use the SMARTboard to be more connected with the math problems.

In direct relation to Boaler (2015) speaking about how students feel that they have to “suspend reality” (p. 98), Dan Meyer (2010) speaks of this in relation to text books. When students are only given the access to a textbook they may very well start to lack interest in what the subject is about. Textbooks are the same thing over and over and can get very repetitive and lack creativity. Meyer (2010) does an excellent job of explaining this near the end of his video when he states: “I encourage math teachers I talk to to use multimedia, because it brings the real world into your classroom in high resolution and full color; to encourage student intuition for

that level playing field; to ask the shortest question you possibly can and let those more specific questions come out in conversation; to let students build the problem, because Einstein said so; and to finally, in total, just be less helpful, because the textbook is helping you in all the wrong ways: It's buying you out of your obligation, for patient problem solving and math reasoning, to be less helpful" (n.p.). When you bring technology into the classroom you give your students a chance to expand their reality and their creativity, not suspend it. If you do not allow your students the ability to explore they will begin to get bored and disinterested in what you are teaching. Some of the best knowledge a student can obtain is through exploration.

Traditional teaching could be an example of a teaching style that usually restricted students from exploring. When individuals talk about the math classroom, or any classroom, they often refer to the teaching style as either traditional or technology based. When a classroom is following the "rules" of the traditional methods of teaching math, the classroom tends not to be as engaging as one that offers technology integrations. Technology is a tool that is present everywhere in life today. As Furman (2014) puts it: "Thinking about technology versus traditional math is like thinking about technology versus traditional life" (n.p.). Not only will technology bring real life experiences into the classroom it will also allow students to use tools and methods that they are able to relate to and that they enjoy using. When a student is able to use tools that they enjoy and love using they will begin to develop a better understanding of the subject and begin to foster a love for the subject as well.

When becoming a teacher you have to remember that each student is unique. Not one student will be the same and this goes for the learning styles of students as well. All students have different learning styles and for a teacher to meet all of these learning styles is quite difficult. When a teacher brings technology into the classroom it opens up all sorts of doors to

meet the learning styles of the students present in the classroom. Kelly Gary (n.d.) is a grade 1 teacher that speaks about this: “Incorporating technology in all aspects of curriculum has allowed me to meet the different learning styles of my students. I know it's working as I watch my students continue to develop higher level thinking skills each day in my classroom” (para. 8). Through her blog post the reader can see how she is aware that students are very diverse in the way that they learn and that technology might be the answer to helping her meet the needs of all of her students. Meeting multiple learning styles without technology is a very difficult thing to achieve.

As well as meeting students’ learning needs a teacher also needs to assess their students work. This can be a very tedious task that can take many hours. Some students rely on feedback from the teacher to judge where they are in the class and how close they are to meeting their personal goals. With the use of technology this tedious task can be made easier and faster. There are many websites that teachers can use, depending on what subject, to access this helpful way of assessment. Pronovost (n.d.) explains how he uses websites like this to help with his assessment: “Planet turtle is a program that allows them to play games, and these games, they are being asked math questions. Planet turtles gives them immediate feedback whereas I would have to walk around the entire room to give them feedback” (n.p.). When students are engaged in these games that are helping their learning process the teacher is then able to walk around and help the students who may require additional help. This also helps the students who are working ahead because they can get their marks back right away and also work ahead if they want to.

Even though technology provides teachers, students, and the classroom with many advantages, some people still have negative feelings towards the use of technology while in school. Having a negative view about technology is very common and can be valid if technology

is not being used in the correct way in the classroom. Conrad Wolfram (2010) spoke about these issues in his TED talks. Wolfram (2010) states: “We can engage so many more students with this, and they can have a better time doing it. And let's understand: this is not an incremental sort of change. We're trying to cross the chasm here between school math and the real-world math” (n.p.). Wolfram speaks to this notion of how technology in the math classroom can help students to be excited and engaged through how it can connect them to the real world; instead of, for example, just some problem involving Joe and Sue who want to buy a ridiculous amount of watermelons or something non-relatable like that type of question that students often see in textbooks.

### **Research Context**

The research for this manuscript was collected from students, a professor, friends, and family. The research that I conducted through these people was a mix of a survey and also an interview. The other information that I found for researching my big question was through a mathematics novel, some online videos, and a teacher's blog. The reason I selected my participants for my survey was due to either being part of the Bachelor of Education program at Mount Royal University or friends and family that I thought would benefit my research. I chose the expert that I interviewed based on her experience with the mathematics subject. All participants of the survey were informed that they were all participating anonymously and to protect my CORE certificate they were also informed that they had to be 18 years of age or older. The expert that I interviewed gave me permission to use her name in my write up. Each individual of the survey, and as well the expert, were aware that all information that was provided was being used toward a research project.

### **Methods of Investigation**

The methods of investigation that I used for this research include an online survey and an interview with an expert. The Google Forms survey that I conducted was completed by classmates and friends/family off of my Facebook. With this survey I received 15 responses. The interview with an expert was conducted with a professor at Mount Royal University that is a professor in the math department. The survey was completed using a variety of questions that I presented using a Google Forms survey (Appendix A). For the interview I went in and had a personal face to face interview so that I could get very in depth answers to the questions that I wanted to ask my expert.

After collecting all of my data from the Google Forms survey I had Google generate the results into a spreadsheet and graphs depending on what type of answers were required by the questions. After Google generated these results for me I was able to take screenshots of these results to place into this manuscript. The results of the interview that I had with my expert are all paraphrased into a paragraph that helped conclude my findings section of this paper.

### **Findings**

The focus of my study was how to make math creative through the use of technology. From doing research and through a survey that I created I found that this was a very broad question. Each student is unique just like each of my future classrooms will be unique. The results of this survey better answer the question of if technology should be more present in the math classroom and if technology helps students in the math classroom. The responses below are the responses that were generated through Google Forms based on the survey that I created (see Appendix A). All answers were generated into graphs, charts, and word clouds. The findings from my interview with an expert are organized and paraphrased in a paragraph at the end of this section.

Please specify your status/role (check all answers that apply) (14 responses)

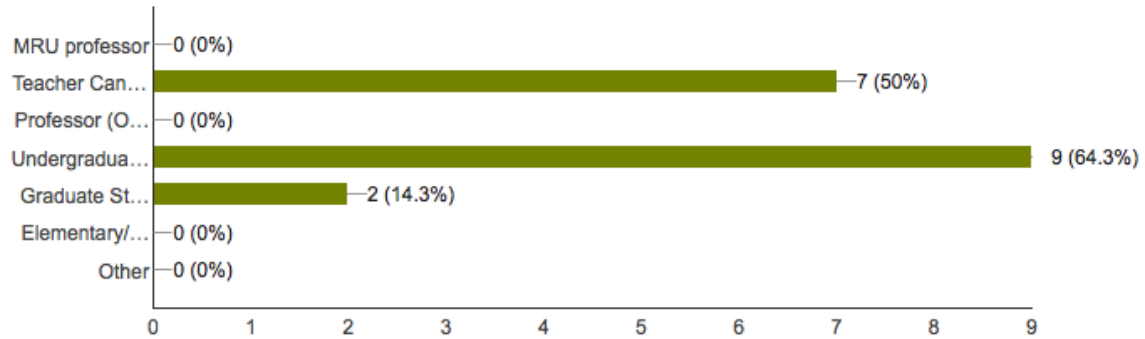


Figure 1. Status and role of survey participants.

As seen in Figure 1 I asked each of the participants to state their role/status so that when I was assessing the data I could keep in mind who my participants were and where they were coming from. All of the data was otherwise anonymous and no minors were able to participate in this survey. This ensured that I was following all of the regulations of my CORE certificate.

How well do you feel you understand the technology present in today's society and classrooms?

(15 responses)

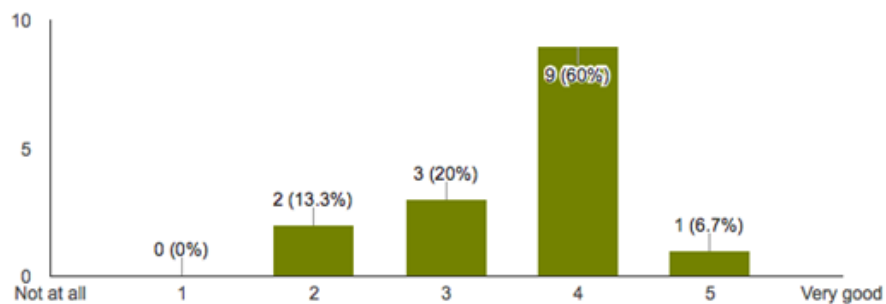
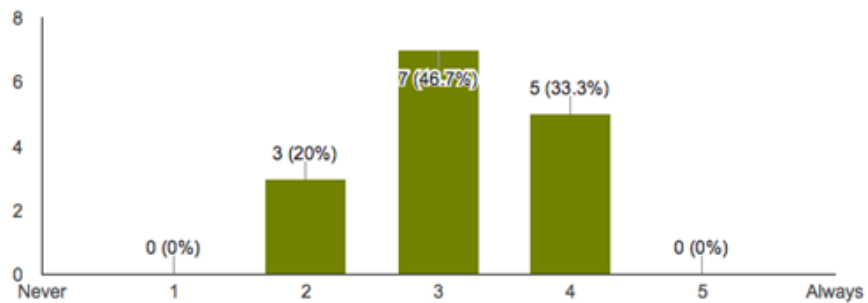


Figure 2. The participants' understanding of technology.



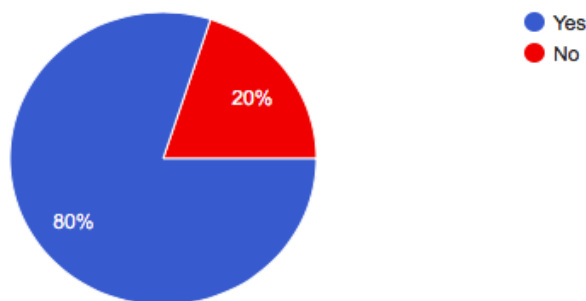
**In your experience and/or classroom how often is technology used when learning about math?**  
(15 responses)



*Figure 3.* The participants experience with math and technology.

Figure 2 & 3 show the data results from asking the participants how well they feel they understand technology and also how often they have seen technology used in the math classroom. This data helped me to understand my results better by being able to see where my participants were coming from with their knowledge and experience.

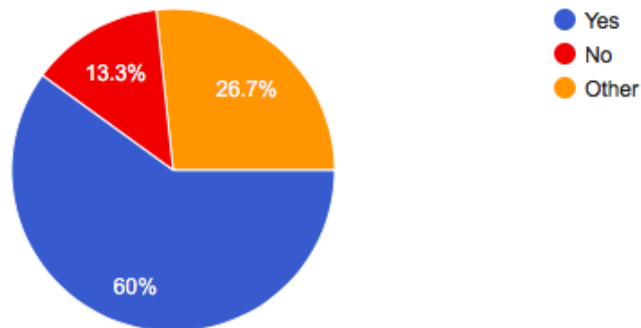
**If you have seen technology used in the classroom, did you feel this helped keep you interested in the math content being presented?**  
(15 responses)



*Figure 4.* The participants opinion on if technology helped keep them engaged.

## Do you think teachers should use more technology in the classroom when discussing math?

(15 responses)



*Figure 5.* The participants' opinion if there should be technology in the classroom.

The data results collected in *Figure 4 & 5* helped me to understand when and/or if they have seen technology in the math classroom and how they felt about technology being used when they had experienced this. Overall, from these results, I feel like a lot of people have seen technology as a beneficial instrument to the math classroom.





other words that stand out are pencil and paper. I found this very interesting because many people don't think of a pencil and paper as technology but it definitely can be considered technology. When I think of technology I like to think of it as anything that extends a person's abilities or knowledge.



*Figure 8.* Participant recommendations.

Figure 8 is a word cloud generated by suggestions my participants gave me for my future teaching career in regards to technology in the math classroom. Since math is the minor I am studying I was very interested in the suggestions my participants left for me. Many of the suggestions will help a lot when trying to integrate technology into the math classroom to try to

help students see math in a more creative and fun light.

During an interview with Dr. Pamini Thangarajah, I was able to ask many questions pertaining to my research project. Dr. Thangarajah is one of the mathematics professors at Mount Royal University. During this interview I asked her questions such as “What are the disadvantages of technology to math?”. Dr. Thangarajah had many things to say about why technology can have many disadvantages to the math classroom and one of the reasons that she explained that really caught my attention was pertaining to how students lose their ability to conduct math. When a student has technology that they can rely on, such as a calculator for example, they start to only use that technology to answer the question. If a student does not know how to conduct mathematical formulas and equations by hand and is always relying on some form of technology to help them they will struggle when they are not able to use these kinds of technology. For example, Dr. Thangarajah does not allow calculators to be used in her MATH 1150 and MATH 1160 classroom. A student who was not able to do math by hand would have a very hard time in this class. Another question that I asked Dr. Thangarajah was “What advantages does technology bring to the math classroom.” Although Dr. Thangarajah had many ways that technology can be disadvantageous to the math classroom, she also had ways in which it could help the math classroom. These ways include how students are able to create images or graphs, for example, that they would not be able to draw on their page. As the children get into the higher grades these graphing technologies become very helpful for their understanding.

### **Conclusions and Recommendations**

When I started this research I wanted to know how to be creative with technology and it turned out that this question was a very hard question to answer. From researching this question I have found that technology allows teachers to bring real life situations into the classroom and

this is creative and engaging. However, this was the only creative technique I found. Although I only found one creative way, I found out a lot about how people feel about technology in the math classroom and I found this just as informative. I was able to find out information that I wasn't even aware that I wanted more knowledge on.

One of the sources that I used for this research project, Boaler (2015) explained how many people grow to dislike the subject of math. Since math is the minor I have chosen to study I have developed a deep passion and love for it and can only hope to inspire my future students to look at math in a non-hateful way. From Boaler (2015) it is made clear that the reason people grow to dislike math is from the way they have been taught math. When a teacher is not teaching to accommodate for the advances in everyday life, they are not using all the tools that they could be to make a creative learning environment.

From this study I was able to see the ways that math is taught in both beneficial and non-beneficial ways. These ways were mainly referred to as traditional and nontraditional teaching. From this research my future teaching career has been greatly influenced. Before doing the research for this project I was on the fence about technology in the math classroom. I had similar views to that of Dr. Thangarajah in that, I feel that students should know how to do their work by hand. However, I also understood that not all students learn through this teaching style. Another reason that I was on the fence about technology in the math classroom, or any classroom, was because I did not feel I had the proper technology skills to use it as a tool to teach a class. I have since learned that a low self-efficacy is one of the main reasons that teachers do not use technology in their classroom and now I will definitely better educate myself on technology so that I will be able to benefit my students learning through technology tools.

I want my future students to grow to love math not to hate it and I found that one of the

ways to do this is through tools that your students will love. Since technology is growing so rapidly children are exposed to technological tools everyday. My future students will more than likely know how to use the tools better than I will and they will love using them. By teaching your students through methods and tools they love they will be more likely to enjoy what you are presenting to the class.

I feel that this study requires a lot of trial and error on how to be creative because each class that I have the opportunity to teach may react differently to each creative approach that I use. This will raise the question of: How can I fix this to ensure that each and every student is understanding this lesson to the highest potential? The students may be the ones who are able to help me answer this question best. I want to give students the chance to be creative and to explore the topics that are presented to them. Students don't want to be talked at, they want to be inspired and talked to and sometimes it's not the teacher that has to do the talking, but the information they find through exploration.

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## **Appendix A: Online Survey Questions**

## Math and Technology

Important information about this survey:

I am a second year student at Mount Royal University in the Bachelor of Education program. One of the classes that I am enrolled in is a Emerging Technology class and in this class we are encouraged to do a research project on something we are passionate about. Since I have chosen to pursue math as my program minor I have also chosen to focus my research project on this subject area as I feel I am most passionate about this topic. This survey is to help me in my research inquiry project. The question for my project is: How can teachers use technology in a creative enough way to make students more interested in the subject of mathematics? This survey is completely voluntary and anonymous and can only be completed by individuals who are 18 and over. I greatly appreciate the

Please specify your status/role (check all answers that apply)

- MRU professor
- Teacher Candidate
- Professor (Other than MRU)
- Undergraduate Student
- Graduate Student
- Elementary/Middle/High Sci
- Other...

How well do you feel you understand the technology present in today's society and classrooms?

	1	2	3	4	5	
Not at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good

In your experience and/or classroom how often is technology used when learning about math?

	1	2	3	4	5	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Always

If you have seen technology used in the classroom, did you feel this helped keep you interested in the math content being presented?

- Yes
- No

If no why?

Long answer text

What technology devices have you found most useful in keeping you focused and interested in the subject of math?

This could be a pencil and paper

Long answer text

Do you think teachers should use more technology in the classroom when discussing math?

- Yes
- No
- Other...

In your opinion, why?

Long answer text

What recommendations and strategies can you provide me with for my future teaching practice about how digital technologies can be used to help students learn mathematics?

Long answer text