Chapter 36: The Impact of Using Technology Tools in the Areas of Science and Math

Ghadeer Aljohani

Arizona State University,Tempe, AZ 85281, United States.

Abstract: This paper explores how using simple technology tools such as Makey Makey and Little Bits motivate and increase student achievement in the area of science and math. A review of the literature finds that teachers need to incorporate innovative methods through technology in math and science classrooms to make the students enjoy the learning experience. The research also discusses the advantages of using technology, such as Makey Makey, in the classroom to keep students engaged which will help in increasing student achievement. In other words, with the use of certain technologies, increased student attendance, and increased engagemwill create and conduct monthly workshops to train teachers about these tools. The principal will observe teachers and students to measure the success of the use of these technology tools used to enhance the instruction needed to benefit student engagement and achievement. The initial focus will be on Makey Makey and Little Bits tools due to their ease of use and the enjoyment that students have while engaged in them.

1 Introduction

The Impact of Using Technology Tools in the Areas of Science and Math

In science and math classes, the use of technology is very limited because the current teaching strategies depend on books more than using technology, which may lead students to feel bored and unengaged in their learning. Some students fail in math and science because of this traditional type of teaching. This can also cause discipline problems and lower achievement. This study looks at how using technology in math and science classes will motivate and increase student engagement and achievement in the classroom. These technology tools could make the class/lessons more interesting and relevant to the students.

They may also motivate students to be more engaged, enjoy their classes, and achieve more.

The question I am exploring is, "How will using simple technology tools, such as Makey Makey and Little Bits, motivate and increase student achievement in the area of science and math?"

2 Literature Review

In traditional math and science classrooms, teachers explain and have students solve problems individually. However, the use of technology can change that. Chen and Lo

(2019) conducted a study and found that the "usage of Makey Makey...results in enhanced collaborative creativity performance in an idea generation process compared to groups without exposure" (p. 1). Working in groups using technology, such as Makey Makey, in math and science classes makes students more collaborative and creative.

Technology can also create a fun classroom, which will help students to be more creative and engaged. Siemon et al. (2016) found that "with the Makey Makey invention kit, a group has a tool on hand that allows to effectively prime the participants for a subsequent creativity task as well as to provide a fun and enjoyable group experience" (p. 8). Teachers need to implement fun methods with the use of technology in a math and science classroom to

make the students enjoy the learning experience. With this type of learning environment, student engagement improves and attendance will mostly likely go up.

Using technology can raise student achievement. Protheroe (2005) emphasizes that "recent study of the impact of electronic field trips...found participating students exhibited significantly higher levels of knowledge on three social studies units than students who had not participated" (p. 47). In this study, groups who used technology demonstrated more learning than those who did not. While this study focuses on student achievement in social studies, this can be extended to math and science classes.

Traditional math and science classrooms often do not use technology. However, Eyyam, Ramadan, Yaratan, and Hüseyin (2014) reported that "the mathematics posttest results of the students who were instructed using technology were significantly higher than the posttest results of the groups who were instructed without technology" (p. 31). That means that using technology in math will create a significant difference in students' learning new math concepts.

There is some evidence of a link between using technology and student performance. In their study, Cheung and Huang (2005) stated that those students who used technology well reported that they had "higher levels of constructive and general learning (as cited in Nora & Snyder, 2009, p. 6). This self-reporting seems to indicate a possible connection between technology use and improved student attainment.

3 Discussion

Current teaching strategies at my school in math and science depend more heavily on books than on technology. These strategies do not engage the students at my school. Teachers need to use new techniques and tools to motivate students in the classrooms. This means that to enhance students' learning, teachers need new technology-based tools, such as Makey Makey and Little Bits, to encourage student engagement and achievement. Therefore, how will using simple technology tools, such as Makey and Little Bits, motivate and increase student achievement in the area of science and math? One of the most important benefits technology makes for teachers is how it affects students' attitudes toward learning. When students are more engaged and involved in their learning process, grades improve. This is what technology can do for our math and science classes.

The research shows that there is a positive impact on learning when students and teachers are allowed to use technology tools instead of traditional methods of instruction. The research represents the advantage of using technology in the classroom to motivate students and keep them engaged. Also, the research includes a study about two groups of students, one of them using a Makey Makey and the other group not. The results support that those students using Makey Makey achieved at a higher level than those that were not engaged in using technology.

I noticed in my school immersion classroom that students are familiar with using technology. In addition, teachers require students to do research using technology and other apps. This is a goal in their teaching, so students are regularly utilizing technology in the classroom. Students enjoy technology and see the importance and benefit it has on their learning. The proper use of technology has a significant impact on high achievement with these students.

4 Conclusion

Based on the information presented in this study, I conclude that students who are taught skills using technology based tools, like Makey Makey and Little Bits, will make better grades,

have higher achievement, and be more motivated than those who do not use it in math and science classes. In my school, I will work with teachers to teach them how to use certain technology tools to enhance their instruction to benefit student engagement. I will initially focus on the Makey Makey and Little Bits tools. I have selected these tools to begin the changes on my campus due to their ease of using them, and the enjoyment that students have while engaged in them. I will then create and conduct workshops that will benefit teachers in how they instruct and engage their students.

In today's society, teachers are continually faced with additional tasks. They feel the ever-increasing pressure to get their students to be engaged during instruction. The use of technology tools is a creative way to meet those demands. Through these apps and tools, students will be encouraged to think creatively and critically, while at the same time, enjoy the process.

References

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Plan of Action Worksheet

Create and give a teacher survey to see if teachers are using Makey Makey and LittleBits Gather information to see if they see the benefit of using these tools in the classroom	Myself and team	August 2020 April 2021	Meeting time and room with the team 10-question survey to give to all teachers who are using Makey Makey and LittleBits Do this two times a year to see the growth in their usage
Create and give a parent survey to see if they are aware of the usage of technology in their students' classroom	Myself and team	August 2020 April 2021	Meeting time and room with the team to create an electronic survey to give to all parents Do this two times a year to see the growth that parents are seeing their students experience
Share with the district my Action Research plan	Myself	September 2020	Make an appointment with district Science and Math Supervisors Have copies of my Action Research paper to share with them
Share my research plan and discuss the implementation of new technology with my staff	Myself and team	September 2020	Meet with team before faculty meeting to go over presentation
Share with students and parents the use of technology in the school	Myself and teachers	September 2020	Schedule a parent meeting to share new uses of technology that the students will be using at the school

Prepare workshops for science and math teachers on how to use Makey Makey effectively in the classroom	Myself and team	October 2020-February 2021	Create a presentation that shows Makey Makey at the school level, and also allow staff to practice this during our workshops together
Give workshops for math and science teachers in Makey Makey and LittleBits	Myself	October 2020-February 2021	Reserve a room to hold workshops
Conduct classroom observations	Myself, supervisor and vice principal	Throughout the year	During classroom observations, it is an expectation to see teachers having students use Makey Makey and LittleBits in their classroom
Have one on one meetings with teachers	Myself, supervisor and vice principal	Throughout the year	We will meet with teachers one on one to see if they have noticed an increase in student

What steps or actions need to be done?	**Who will do this step or action?**	**Timeline** **When will you do this step? How long will it take to complete this step?**	**What do I need to do this step or action?** **Other teachers, Staff, supplies and materials, Time, PLC time**	**Date completed** ✓ and write date when completed

Prepare workshops for teachers for Makey Makey and Little Bits	Myself	May-June 2020 Workshop will be within the first two months of school	Create presentations using video and PPT to share information regarding Makey Makey and Little Bits Provide time during the workshop to allow teachers to practice using Makey Makey Little Bits before using it in the classroom with students	
Prepare materials to help teachers see the importance of the use of technology in the classroom	Myself	May-August 2020	It is important for us to create the reason as to WHY we are adding technology into our math and science classrooms I will need to create a presentation with what my hopes are for the school year with the use of these tools This will be the background information before we have teachers attend the workshops on Makey Makey and LittleBits	
Train in Makey Makey and LittleBits (online courses & watch YouTube videos)	Myself and team	July 2020 (4 days; 1 hour/day)	My team and I will train ourselves through YouTube videos We will use these during our presentations for	

			professional development for our staff	
Create and give an Attitude Survey to all students regarding how they feel about using technology in the classroom	Myself and team	August 2020 January 2021	Work with my team to create a 10-question survey asking all 9th grade students how they feel about using technology in the classroom We will make this survey electronically and use the results of this survey to make necessary changes in instruction for math and science	

The Results and Interpretation and Conclusion are to be completed in Saudi Arabia

Results and Interpretation

Make sense of the data to answer the question "so what?"
Organize using webs, graphs, charts, numbers etc.

Make observations about the data. Non-judgmental statements of facts.

- Search for themes and patterns
- Ask questions ● Look for gaps
- Display the data

Interpret, summarize, and describe the findings. Share the results.

Conclusion

Now that you have analyzed your data...

- What have you learned?
- How do you feel about what you have learned?
- How do your conclusions differ from what you thought you would learn?
- Do the conclusions seem believable?
- What actions might you take based on your conclusions?
- What new questions emerge for you from the data?
- Who else might be interested in these conclusions?
- What are strategies to share your conclusions with others?