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Using Project Based Learning to Increase Motivation in a Seventh Grade Mathematics Proficiency Based Classroom

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Table of Contents

Abstract ……..……..……page 3

Introduction……..……..……page 4

Literature Review……..……..……..…page 5

Research Design……..……..……page 12

Research Methods……..……..…….page 18

Research Narrative……..……..……page 24

Data Analysis and Interpretation of Findings……..….page 29

Discussion…….page 36

Personal Learning Reflection……page 40

References……..page 43

Appendices……page 45

Abstract

Students learn in a variety of ways. When it comes to showing their new knowledge, a paper and pencil assessment is not the only option. Students are not always motivated to try their best, assessment after assessment. Project based learning is an alternative to paper and pencil assessments that may motivate more students to succeed. A review of literature shows the steps of implementing project based learning into the classroom, the benefits of this strategy, as well as the challenges. The research study that I will be conducting will explore student motivation during specific geometry assessments through qualitative research using observations, student surveys, and interviews. My research will focus on students motivation during work on a project, and their beliefs and attitudes about the use of this strategy in the classroom.

Introduction

The focus of this research is on using Project Based Learning to increase motivation in a seventh grade mathematics classroom. The classroom is proficiency based and the students work at their best pace to complete the learning targets set by the district at each grade level. A students success in these learning targets are dependent on many factors. The flow of the learning is set primarily by the students as they participate in mini lessons, complete worksheets, watch videos, and take assessments on the skills. This current school year, the seventh graders have 11 math learning targets to complete. With students working at their own pace, there are multiple different learning targets being worked on during any given day. The students do not have much choice in how they show their new knowledge. All assessments are paper and pencil and they complete the assessment whenever they feel they are ready to. Students who lack motivation and/or struggle with assessments, have a hard time completing all learning targets which then creates a heavier work load for their next school year.

This research is necessary because increasing motivation in all students by using a new strategy in the classroom is crucial. Paper and pencil assessments in a classroom give educators a snapshot of what they know at the moment. Whether they memorized an algorithm for the time being or if they truly have mastered the material is unknown. Allowing students to create a project of their choice to show their learning has many benefits and challenges. This review of literature will look at both.

Literature Review

Introduction

The use of project based learning is not a new concept in education. In fact, there have been advocates for this type of learning and assessing since the early 1900s. Wolk (1994) referenced as far back as William Heard Kilpatrick with his work in 1918 on projects chosen by the student to create intrinsic motivation. Grant (2002) talked about this idea dating back to John Dewey in the early 1900s who supported "learning by doing". The students should be learning "through conducting investigations, conversations or activities, an individual is learning by constructing new knowledge by building on their current knowledge" (Grant, 2002, p. 2).

The implementation of this type of assessment into the classroom is no easy task. Although there are benefits with allowing the students to choose their own project and display their knowledge in their own way, with such a heavy focus on high-stakes testing, teachers struggle with finding a place for project based learning in their curriculum. Professional development is a concern by some researchers. There are benefits associated with project based learning that would hopefully create more motivated, successful students. "When children are free to choose their own projects, integrating knowledge as the need arises, motivation - and success - follow naturally" (Wolk, 1994, p. 42).

Defining Project Based Learning

Project based learning (PBL) is a concept that is interpreted slightly different depending on each researcher. Yetkiner, Anderoglu, and Capraro (2008) state that in a PBL environment,

all students are working on a common project that has expected outcomes that are clear to the students. Whereas Blumenfeld, Soloway, Marx, Krajcik, Guzdial and Palencsar (1991) focus more on the students being the ones who create the question or problem that will be the focus of the work and then create the work to solve the problem. The main aspect of PBL is that the students should be investigating and finding answers to their questions in other ways than by teacher lectures. There are multiple different strategies to use for PBL in the classroom that are more than just a project.

> Project-based learning is a comprehensive perspective focused on teaching by engaging students in investigation. Within this framework, students pursue solutions to nontrivial problems by asking and refining questions, debating ideas, making predictions, designing plans and/or experiments, collecting and analyzing data, drawing conclusions, communicating their ideas and findings to others, asking new questions, and creating artifacts. (Blumenfeld et al., 1991, pg. 371)

Integrating the knowing and doing will create more meaningful learning opportunities for the students. They will learn the curriculum through inquiry.

Markham (2011) discusses the difference between PBL and teacher assigned end-of-the-unit projects for assessments. “Most often, teachers planned projects at the end of the semester as a reward or culminating opportunity for students to finally demonstrate what they had learned during the year” (p. 38).

Implementing Project Based Learning

The implementation of PBL into a classroom is no easy task. The teacher needs to

understand their students and how best to meet their needs. The teacher also needs to have conceptual knowledge of the curriculum and common misconceptions that the students may have or may create throughout the project. Researchers have stated that there needs to be a set of steps that the teacher follows when introducing PBL into a classroom. Markham (2011) states that you need to identify the challenge and craft the driving question first. It is crucial to the project to make sure that all students have a clear understanding on what they need to be trying to solve/answer.

According to Wolk (1994), once the students have selected their own projects, they need to write a plan of action before beginning. This plan should include questions that the students will focus on answering, resources they will be utilizing or may need access to, a timeline, how they will show their new knowledge, and how they will be presenting their project to the class. The teacher can then help guide misinformed students or make sure that students are all working on a project that will meet their needs and challenge them. "That the project emanates from the child's own interests is critical to its having purpose" (pg. 42). Students will have more buy-in and be more motivated during the project if it is one that they show interest in and choose themselves. After the project is complete, Wolk mentions having the students complete a self-evaluation of their work and understandings to make the students aware of their learning.

The Role of Teachers and Students

If PBL is implemented appropriately into the classroom, "it offers teachers the opportunity to teach, observe, and measure the growth of real world skills" (Markham, 2011,

pg. 39). The teacher also needs to trust their students and allow them to be creative in their projects and provide as much resources as possible for the students. PBL will take the focus of learning off the teacher and puts more responsibility on the students to learn this new knowledge and share it with the class. There needs to be a sense of community created in the classroom where students are comfortable working outside of the box and collaborating with others when needed. With all these different projects happening, it is critical that the teacher has strong management skills. However, if the students have chosen a challenging project for them and are motivated and on task, management should be minimal. This will allow the teacher to spend more time observing the students and conferencing/informally assessing the students successes.

> The student's role in PBL is to take responsibility for their learning and make meaning of the knowledge and concepts they encounter. To do this effectively, it is clear that students in the PBL environment must be motivated to learn and be able to focus their efforts and attention appropriately, monitor and evaluate their progress, and seek help as needed. (English & Kitsantas, 2013, pg. 131)

Benefits of Project Based Learning

Researchers have spent time looking at the benefits of PBL on the students motivation and success in the classroom. Ilter (2014) stated that educators have identified seven core skills for students which are: 1) critical thinking and problem-solving, 2) creativity and innovation, 3) cooperation, teamwork, and leadership, 4) intercultural understanding, 5) fluency in communication and information, 6) computer and communication technology, 7)

career and self-development. In a PBL classroom, these skills are all addressed and the students will develop skills in each of these areas. The students are able to take a concept that they normally would not be able to relate to and/or see the value of the knowledge outside of the classroom, and investigate the concept in their own way. Students no longer have to memorize material to pass a final assessment to show their new knowledge. PBL teaches problem solving using real world skills and application. They can show this knowledge in various ways using a learning style that fits their needs. "Projects also help students succeed because they allow them to use all their 'intelligences,' just as the 'projects' of normal day-to-day living do" (Wolk, 1994, pg. 45). When students are succeeding in the classroom, their self-esteem will also increase. This success will carry with them and build more confident, motivated students.

Another benefit to PBL is that students can take their investigations outside of the textbook and the classroom. There are multiple resources available to the students in the 21st century. Students can use the internet to research, the library, call/skype for interviews, watch a documentary, virtual realities, apps/websites to create their ideas, sketch up and 3D printers to create models, and the teacher/other students in the room or school. It is valuable to the students to have access to these resources, or at least resources that will help them be successful.

Through PBL, the students are constantly needing to assess their learning and adjust if needed. They will make mistakes and will learn how to persevere. However, the teacher needs to keep in mind their students and those who may need the extra push to stay motivated and

persevere with their project. This skill will not only help them be successful on their project but be successful in life.

Challenges of Project Based Learning

With the benefits also come challenges. It is important to keep in my mind that students respond diversely to different instructional approaches. PBL will not be the best option for all students. Those students who are not motivated intrinsically to complete school work may not thrive in an environment where the majority of the learning and responsibility is placed on them. Meyer, Turner and Spencer (1997) discuss the different approach the risk takers will have to the project versus the non-risk takers, also referred to as challenge-seekers vs. avoiders. These different groups of students will react differently to failure. The risk takers will look at a failure and try to learn from it whereas the non-risk takers may shut down and lose motivation on the project when they experience failure. When making the plan before beginning the project, students may want to include what will happen if they experience failure. It is important to keep in mind that each student is an individual and how multiple different factors like gender, ethnicity, SES, and learning style, will effect them.

Another challenge is time. With student chosen projects, a timeline is extremely important. This will help keep the students focused and motivated to work hard each day. The students may rush through the project just to finish or may not be able to complete their project due to time constraints. The projects also need to flow with the curriculum while still being interesting to the students. English and Kitsantas (2013) reference the importance of students having the skills to self-regulate their learning. The students need to be aware of their

learning and be motivated to keep learning.

A challenge that researchers are concerned about is the professional development for teachers to implement PBL into their classrooms. There are opportunities out there but not all districts are on board with the idea, can afford the PD, or have teachers who are willing to try this strategy in their classroom. There may also need to be professional development with technology and the resources that are available to the students. Not all teachers utilize technology in all its facets and would need training to make sure that the students are using the programs appropriately. This knowledge can sometimes come from the district but may need to be outsourced during workshop time.

PBL can be a very useful and beneficial strategy in the classroom for the students to show their new knowledge in a different way than a traditional classroom. In order for this strategy to be successful however, the teacher needs to know how to implement PBL so the students have a clear understanding of what is expected of them, know and understand each student and the curriculum, and see the benefits and challenges that they may come across in their PBL journey.

Research Design

Purpose of the Research

Project based learning allows the students to be in charge of their learning and how they show the teacher the new knowledge they have gained. PBL will create ownership in the students as they create their new knowledge through their individualized project. The students will be "learning through doing" and will need to be motivated to succeed. English and Kitsantas (2013) stated that the students need to acquire the skills to self-regulate their learning and know how to plan, monitor and evaluate their progress on their own project.

The purpose of this research is to implement this new strategy (project based learning) into a seventh grade math classroom that is currently proficiency based to increase motivation. At the beginning of each class period there is a mini-lesson that aligns with the "on pace target". Some students work at the pace of the teacher whereas other students work ahead through the targets, or are behind in targets. Students are learning and working on multiple different concepts in the classroom every day. Unfortunately, I can not work with each student every day so most of the work is done independently through online videos, IXL practice and worksheets. Teaching of the targets follows a similar pattern of video, online practice, worksheet and assessment. With this repetitiveness, the students know what to expect but can also get bored with the process. With project-based learning, the students will pick their own project and investigate their new knowledge through solving a real-world problem.

This year, surface area and volume are two of our seventh grade targets and lend themselves to many different real-world problems from painting a house to building a box. I

am hoping that the freedom of allowing students to pick their own project and explore it to show their new knowledge will make the students interested in their work and increase the motivation level in my classroom. Making the math "more real" and hands-on for the students will hopefully create mathematical thinkers that are successful in the "real world". "It offers teachers the opportunity to teach, observe, and measure the growth of real world skills" (Markham, 2011 pg. 38).

The research has provided me with information on the best practice for implementing project based learning into a classroom, the challenges of this strategy, and the benefits and successes for the students. Key points from Wolk (1994) such as having the the students write a plan and have the teacher approve it and completing a self evaluation at the end of the project will make students more aware of their timeline and accountable of their learning. Markham (2011) states that students who have digital tools available to them and use these advantages, will create high quality products.

Research Question

When I first started my research, I wanted to focus on the use of technology in the classroom. After completing a year of teaching in a proficiency based classroom, I decided to focus my research more on ways to increase motivation in the math classroom. Students who enjoy math tend to be really successful in PBE because they are motivated to succeed. However, they too can get bored with the same routine each day as they work through the units to become proficient in the targets.

In this research, I will focus on the effects of the implementation of project based

learning into the classroom on motivation. I will be looking specifically for students on task time and what they do when they encounter a problem or set back. Currently, students who are stuck on a problem tend to sit and wait until they are noticed for not doing anything. The question will be whether these students try to persevere and try to overcome the obstacles they may encounter as they work through their own chosen project.

Core Concepts

The concepts I will be focusing on in this research are based on the learning targets for seventh grade set by the district using the MCL standards. Students are expected to be able to find surface area and volume of three-dimensional shapes by the end of their seventh grade year. It is important to understand how a proficiency based classroom is set up and the routine each day. There are 11 math targets for the seventh grade to complete this year. Students work at their best pace to complete these targets. Each class period starts with a mini lesson that aligns with the 'on pace target'. All students participate in the mini lesson regardless of where they are in the targets. Some students work right through the curriculum at the same pace as the mini lessons, whereas some students are ahead and use the mini lesson as review and those that are behind in the targets use the mini lesson as a preview/notes to refer to in the future. There are multiple learning targets that are being worked on each day. Students who are motivated to succeed tend to complete the math targets at a quicker rate than the mini-lessons. Those students who are less motivated tend to fall behind one or two targets from the on pace target. Due to the fact that students are at multiple different places in the learning targets, an online program is used to set up activities for the students to work through to learn about the

math concepts. Math videos, worksheets, and online practice are the three forms of work that are utilized. The students work through the activities to gain the knowledge about the concept and then take the paper assessment to show their learning.

Project based learning puts more responsibility on the students to be in charge of how they acquire the knowledge about the concept. The students create the project that they want to research and complete to show their knowledge in a new way, instead of doing a paper assessment. This is different from a teacher assigned project at the end of the unit as a summative assessment. Instead, each student is working on a different project that they created. Implementing this style of learning into a proficiency based classroom will hopefully increase the motivation in students to work through the targets and stay motivated to succeed.

General Approach of the Investigation

The general approach to this investigation will mainly be a qualitative method approach with some quantitative methods. In order to effectively approach this topic, I need to first gain permission from the students and their parents, since they are minors, that they will are willing to participate in this research. I will then ask students to complete a survey that asks questions on their motivation during math class and their thoughts on the routine of the classroom. I will conduct my research by observing students during their geometry unit. Students will be working on these targets at different points throughout the school year so they may not have other students to rely on to do the work with them. I will be monitoring the students as they work through their project and their reactions when they meet a challenge. Throughout their project and at the end, I will ask them to complete another survey, same as the beginning

survey, to see the change in their motivation to show what they know. I will also ask them to complete a self-evaluation of how they did on the project.

This is an appropriate approach to the research because students tend not to be motivated to show what they know when their only option is a paper assessment. Implementing this strategy into the classroom will allow students to be creative in the way they show their new knowledge and skills. Using a mixed-methods approach will allow me to observe students as they work, focusing on their motivation to succeed and complete a product they are proud of. Using the surveys will allow me to look closer at how the students are feeling and what they are thinking as they approach the project, work on the project, and finish the project.

The potential weaknesses of using this approach for this study is that students may be facing challenges outside of the classroom that may interfere with their motivation in the classroom. This could be one day or could be multiple days depending on the situation. I would not know that the student is experiencing this and may note that the student is not motivated during class to get their work done when the problem really lies outside of the math classroom.

Method of Inquiry

My study will take place in a proficiency based classroom which has a different set up and routine than a traditional classroom. Students work at their best pace so if they are not motivated during math class, they do not progress through the targets at the pace that they should. Using both qualitative and quantitative data will allow me to really look into the

driving forces of motivation in the math classroom. The quantitative data will be gathered through the surveys. Using codes, I will look for themes amongst the responses. I will compare the students individual responses through this process and will also compare the responses as a class.

Working with these students for the first part of the school year gives me an understanding of their level of motivation before the start of this project. Gathering information on how motivated they are once they start the project and on their motivation to stay focused once a challenge arises will be used as qualitative data. I will be observing during classroom work time and student discussion while they are working. Not all students will be working on this project at the same time during the school year, whereas we are proficiency based, and will therefore show the true motivation of students to persevere on their own without relying on other students to do the work for them. However, other students will be available as resources for those students working on these targets if need be. For example, if the student wants to incorporate surveys in their project, they may need the help of the classroom to take the survey. The observations of the students as they work on their project will hopefully support the students responses in the surveys. Together, this data will allow me to analyze whether the implementation increased motivation in the math classroom or not.

Research Methods

Setting

I will be conducting my study at Mount View Middle School in Thorndike, Maine. The school serves approximately 280 students in sixth, seventh and eighth grade. The district serves 11 towns and is located in a rural community in central Maine. The study will specifically take place in my seventh grade math classes. These two classes meet during the morning (period 2 9:31-10:21 and period 3 10:24-11:14) and are fifty minutes long. These students were selected for this study because I am a middle school teacher and these years are a pivotal time in a child's education. Keeping the students interest in school and motivating them to do their best are two of my main goals every year.

Sampling/Participants

The participants in this survey are middle school students who are enrolled in my seventh grade math class. There are two math classes a day. Period 2 consists of 14 students, two of which have individual education plans. There are ten females and four males. Period 3 consists of 16 students. The class is split equally with eight females and eight males. This class includes one student who has an individual education plan. Overall, the study will include 18 females and 12 males. This could potentially be a weakness to my study as females tend to have a negative attitude towards mathematics. My study is not split evenly between males and females because I have chosen to include all the students in my classes and will observe them as they work on the particular geometry targets. I have chosen to include these students in my sample because they are students that I know and have worked with for the

past few months. I understand where they are starting as far as how motivated they are, their feelings towards math and their learning styles. Their participation in the study is completely optional but I feel like the students would be ready and willing for a change from paper-pencil assessments, worksheets and online videos to hands-on, project based learning.

Methodology

The methods I will be using in this study are surveys, observations and discussions. I chose these methods so that I will get a mix of how the student is working and how the student is feeling about their motivation. Using just observations would show me whether the student is motivated to learn and complete the new knowledge but would give me no information on how the student is feeling about their learning, their likes and dislikes about the form of assessment and their strategies to stay motivated. My question is to look at how to increase motivation and just using surveys would not give me enough information to draw conclusions on the impact project based learning has on motivation. Using a combination of the three methods will give me the best data for my study.

Operational Measures

The data collected for this study will be both qualitative and quantitative. The observations will be qualitative and the surveys will be both quantitative and qualitative. During the observations, I will be looking for on-task time, how the student is working on the problem and what they do when they encounter a problem. Are the students utilizing the entire class time to get work done? There will be three surveys conducted throughout the study. One before, one during, and one after the project is complete. Before starting the project, the

survey asks the students to rate themselves on a scale of 1-5 while answering different questions about how they learn and their motivation during math class. The questions on the surveys during the project and after completion are open-ended and asks students to analyze themselves as a learner and the impact that project based learning had on their motivation. While generating the questions for the surveys, I took into account what the research revealed about their implementation into a traditional classroom and the benefits and challenges they encountered. I wanted to make sure to address these issues in my surveys to check if my students were experiencing the same challenges and how they stayed motivated to overcome them.

Data Collection

Once the students reach the geometry targets in the curriculum, they will take the before the project survey. They will then start the project and I will observe them while they are working. They will take the during the project survey and once they finish the project, they will take the after the project survey. While collecting data using surveys, I will be utilizing www.surveymonkey.com. The questions will be put together into a survey for the students to answer digitally. I already have an account for Survey Monkey and will utilize the program to help analyze answers. The website offers multiple types of survey questions and graphs can be generated right on the site from the student answers. I will be noting observations on students in a notebook. Observations will be written down but kept anonymous. I will conduct observations on students as they work on the geometry learning targets.

Data Analysis

I will be analyzing the observation data using an ethnographic case study method. According to Crewell, (2015), this is an appropriate method for my study as I am implementing a new math 'program' and will be studying the students separately, and as a group, within the classroom. Observing the students in the math classroom they are familiar with will give me the best data results. Survey data will be analyzed both qualitatively and quantitatively. The before the project survey has questions that ask students to rate their motivation and the feelings about mathematics on a 1-5 rating scale and also asks true/false questions about how the students work on mathematics and persevere on problems. This survey will be analyzed quantitatively and will be represented using descriptive analysis by using graphs. The during and after the project surveys are open ended questions and will be analyzed qualitatively. I will be looking at student responses and how they align with the observations and discussions that I have conducted. I will also be looking for patterns amongst the entire sample of students for views of math and their motivation level.

Expected Findings

Following the research in my literature review, I expect to find that most students are more motivated when they are in charge of their learning and choosing their project. "When children are free to choose their own projects, integrating knowledge as the need arises, motivation - and success - follow naturally" (Wolk, 1994, pg. 42). However, I expect their will be variance in the motivation level based on the student. It's important to keep in mind what Meyer, Turner and Spencer (1997) stated about the difference in motivation and perseverance in academic risk-takers and non-risk takers. Academic risk-takers will show more motivation

and the drive for success when problems arise, whereas non risk-takers will be quicker to shut down. I can see that in my students currently with paper based assessments but I am hoping to find that with the ownership of their chosen project, these students will be more motivated to succeed. I am also expecting to find mixed reviews on the surveys. I expect that most students will enjoy the project based learning approach, however, some students may enjoy paper based assessments and just being able to write out the math on the before the project survey. I do not expect to change the learning style of these students, but hope that with the implementation of this new strategy, the students will enjoy showing their knowledge in a new way. Maybe even some students will change their view of math to be more of a positive one if their experience with the project is positive.

Potential Issues and Weaknesses

Being a proficiency based classroom may pose as a potential weakness for my study. Some students may find it hard to stay focused and motivated on their project while other students are working on their project or are working on a different target. An issue, based in this setting, may be that the students who are not to the geometry learning targets as quick as others, may shut down and not progress through the learning targets to reach the geometry targets. On the other hand, students who are working on the project may not feel motivated to complete the project because they may be the only one working on the project in that specific class. I am hoping to remain open to all student ideas for their projects and try not to turn away or change a students project. However, a weakness may be the number of resources available to the students for their particular project and this must be kept in mind when

students are creating their projects.

A potential issue that I may come across is getting student participation. I know that some students enjoy doing math out on paper and would rather just continue with doing the paper based assessments. Some students may not want to do the study because they are not confident in their math ability and thinking and do not want freedom in choosing their own project. These issues may weaken my study findings if my sample size is smaller than anticipated.

Research Narrative

When I was first given the assignment to come up with a topic or question that I would like to research more about, and possibly implement into my classroom, I thought about the use of technology and manipulatives in the classroom. The students in seventh grade are each assigned a laptop to use during class and I wanted to utilize it more for math. I was hoping to find a program that the students could use as a virtual manipulative. The students all have IXL math accounts, so that was my original path. The district I work in is proficiency based and I thought that the use of technology would help the students work at their best pace. They would be able to use the program to concentrate on concepts that they needed to. However, while researching technology and virtual manipulatives in the classroom, I found the idea of Project Based learning and wanted to see how the implementation into a proficiency based classroom would be. My primary focus shifted from technology integration to motivation in the classroom through the use of hands-on activities during a project.

The seventh grade students have 11 math targets they have to complete this school year. Some students are highly motivated and will complete all with time remaining in the school year. Others may finish just in time, or not at all. I wanted to implement a strategy that would get the students excited about math and motivated to succeed. Looking through the 11 targets, I found that the concept that would lend itself to a project with the most ease, covered surface area and volume. This target is actually broken down into three different targets; surface area of prisms and pyramids, surface area of cylinders, cones and spheres, and volume of prisms, pyramids, cylinders, cones and spheres. I would plan to teach these concepts over a span of

4-6 weeks depending on student understandings. I knew that this would allow time for students to work on a project.

My classroom is taught as a mix between traditional and proficiency based. The students have expressed that they enjoy it when they are taught a lesson as a class so I compromised and now start with a mini lesson. The mini lesson aligns with the "on pace" target and all students, regardless of where they are in pace for their own targets, participate and take notes during the lesson. If students are ahead of pace, the lesson acts as a review. If students are behind pace, the lessons is a preview and they then have notes to look at to guide them when they get to the target. After the mini lesson, the students do a basic skills online program (www.xtramath.org) and then they work on their independent work. The students work through activities (videos, worksheets and IXL practice) that I have put together on Empower for them. Each target is set up similar and the students complete what they need to before taking the paper assessment. They are given the option to try the assessment whenever they feel ready, and may take the assessment as a pre-assessment if they have worked on the target previously. I know this system can be monotonous but it's the only way I have found to work so that students can truly be working at their own pace through the targets, going as fast or as slow as they want/need to. I have set up the activities so that students who are ahead of pace, can learn the concepts on their own through the use of videos on Khan Academy, Learn Zillion and YouTube. If the students decided that they wanted to complete a project instead, they still had the option to work through the activities whenever they wanted to. I also provided them with a formula sheet that they could use during the project as well.

When I introduced this new idea to the students, I was expecting more excitement than I received. I figured that the students would be happy to break the routine of the classroom and try a hands-on project. The main concern for students, especially those behind pace, was the amount of time the project would take to complete and if they would have time to get through the rest of the targets. I explained that the target itself would take weeks to teach during the mini lesson time and they would then work on the project during their independent work time. I also had to clarify that the project would take the place of the Empower activities and paper based assessment which seemed to gain some interest. I had seven students of my 30 math students, return the permission forms within a week of the original introduction.

Once the projects started, a different work environment was created. I had three students start the project, who were ahead of teacher pace in the targets, before the mini lessons for surface area and volume began. The students working on their projects would do the skills work online program but would then gather their supplies and get to work on their project during the independent work time. Now this movement and noise was distracting to other students. It was primarily a bad distraction due to students being distracted by the projects that were being built. They were curious what the other students were doing and building and needed re-direction back to their seats and their own work. Some students would sit and watch others instead of focusing on their assignments. This project also created some good ‘distraction’. More of a motivator for some. These students became interested in the projects. They wanted to know when they could do the project and if I had more permission forms for them. They were motivated to complete the learning targets that were before the

volume and surface area targets that the project focused on. A total of 15 students turned in permissions forms during the time I spent researching and 14 of those students (three in one class and 11 in the other) were able to work on the project through the deadline of this research project. Some students completed the project in the time given while others were still working on or hadn't had a chance to start the project during the research time. These students did, or will, have the chance to finish their projects for the completion of the learning targets on surface area and volume.

The basis of Project Based Learning is one where more responsibility is shifted to the learners. They are the ones responsible for creating a project. They are the ones who are responsible for staying motivated. They are the ones who are responsible for persevering when they encounter a problem or set back. This concept is new to these students. They are used to following a set path that is laid out for them in order to acquire the knowledge needed to gain proficiency in a learning target. When one student started a project on making a 3D critter of their choice by using the prisms, pyramids, cylinders and cones that they needed to, the other students followed and used that project as their idea as well. It was interesting to watch students create their critter. Remember my original goal to utilize technology and manipulatives more? Well most of these students were excited to shut their laptops and create their critter using cardboard, duct tape, cans and anything else they could find to piece together. It was interesting to see the students thrive in a way that worksheets and paper based assignments do not give them the opportunity to. Some students decided to try and create their critter on SketchUp, a computer program that allows you to create in 3D and can send this

image to a 3D printer and be ‘printed’. Of the 14 students working on a project, I did have two students who chose a different project. They decided to take a cereal box and change the shape and dimensions so the shape had less cardboard (surface area) but held the same or more cereal (volume). Once they found a few new shapes that would meet the requirements, they chose one of the shapes and created their new box to scale.

The implementation of project based learning into a proficiency classroom did not go as easy as I hoped. There were some hiccups along the way. The biggest issue I faced was the distraction and noise in the classroom from those working on the project. I feel that if this method was implemented into a traditional classroom, the results would differ. Resources to build the critter were scarce at first as I wasn’t prepared to have that many critters needing to be built out of cardboard and other materials. I started gathering all the cardboard that I had at my house and bringing it in. We also used some cardboard from the art teacher. I did have a few groups bring in their own tape to use. Overall, this project gave me valuable information on the way that the students prefer to learn and show their knowledge. Based on my data, which I will go into detail in the next section of this paper, the students enjoyed the projects and being able to use their hands more in the math classroom.

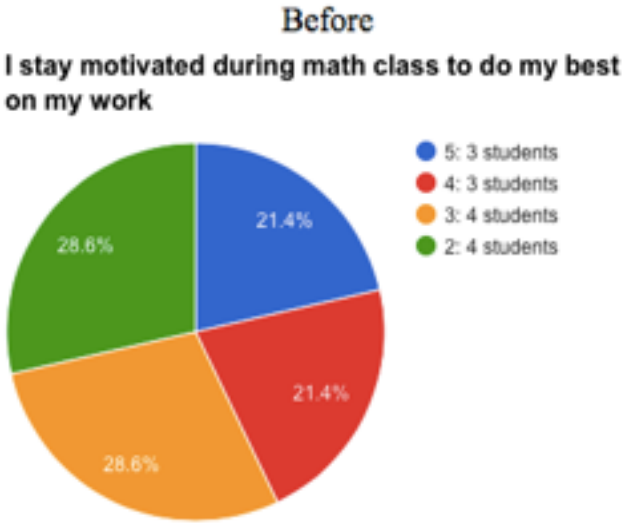
Data Analysis and Interpretation of Findings

The research questions for this study focused on motivation during a proficiency based classroom when Project Based learning was implemented. I was looking for students on task time and perseverance when they came across a challenge in their project. The independent variable in this study was the implementation of Project Based learning. The dependent variables were the effect on motivation in the students and engagement during the project. These variables were measured by survey responses before, during and after the project, as well as teacher observations. As the administrator of this study, I watched for students motivation during the project. I listened to students excitement during conversations that involved the project. I observed students perseverance to keep working and find solutions when a problem arose.

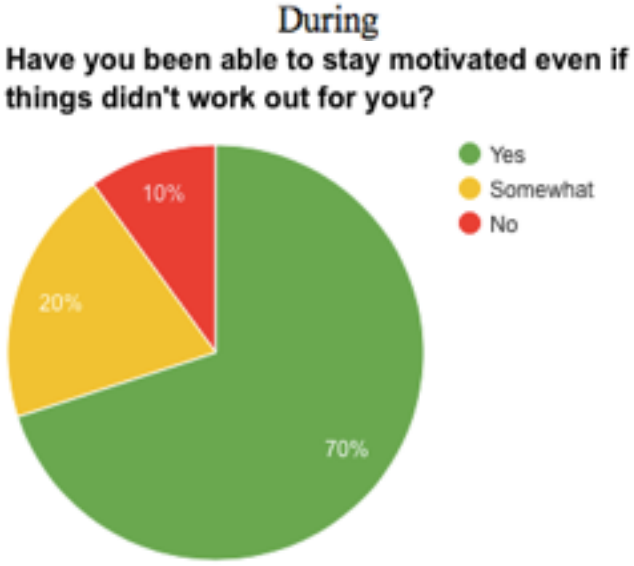
Motivation

Before implementing the project, the routine of the classroom was set. There would be a mini-lesson, skills work through an online program and then independent work time. The routine of the independent work time was also established and students knew what I expected of them during each class period. I wanted to see how motivated the students were during this process before they started the project. I asked all students who wanted to participate in the study to rate themselves on a scale of 1-5 (1 being none and 5 being all the time) on 11 questions. They were also asked to answer true/false on four questions (Appendix D). Since motivation is a variable I wanted to focus on in this study, I analyzed the questions that focused on motivation.

When I asked the students before they started working on the project if they stay motivated during math class to do their best work, 21.4% of students said all the time while 28.6% of students said not very often. No students answered not at all. What was alarming to me was that more than half of the students answered sometimes or not very often, 57.2% of the responses. The majority of the students responded that they are not motivated most of the time.

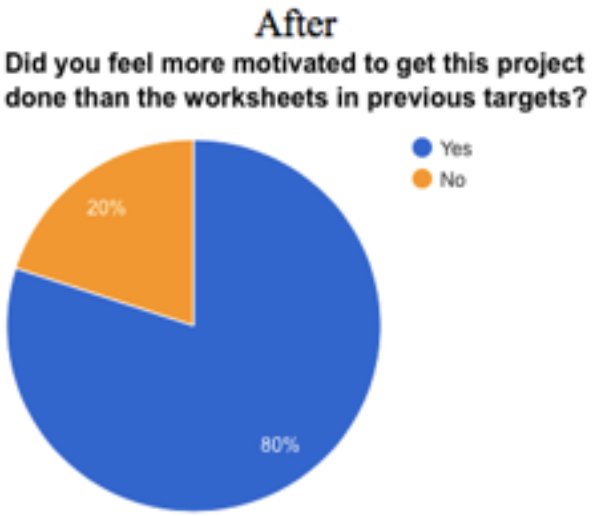


During the project, I asked the students to answer the question, have you been able to stay motivated even if things didn't work out for you? 70% of the students answered yes. Four students answered with just yes while two students included that they would rather be doing something hands on and have enjoyed this project. Two students stated that they sometimes have been able to stay focused while one student answered with just a 'no' response. The surveys were anonymous so I am unsure why this student felt this way.



My teacher observations during work time reflect the student responses. Some students got right down to work and stayed on task throughout the entire work time. They asked

constantly if they could skip the skills practice and get right to work. Some students came in during inside recess and during study hall to continue working on the project. Others, that I observed, weren't as motivated. They struggled during class time to stay on task and focused. There were days where little was accomplished on the projects for these students.

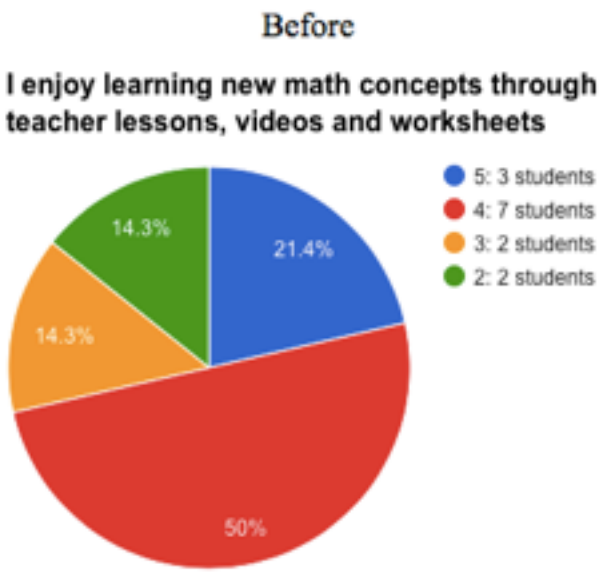


Due to time constraints, I was only able to have five students of the 14 students who started the project, finish. These students were motivated and stayed focus during class time. The other students will have the opportunity to finish the project but their answers for the after survey will not be included in this study. Of the five students who did the survey, four students answered 'yes'. They enjoyed the hands-on aspect of the project and feel that they were able to be more motivated to complete the task. One student responded with "I felt more motivated to get this project done more than the worksheets because this project was more hands on."

Overall, motivation was increased in students working on the project and this was reinforced by the survey results. However, the motivation in some of the other students in the classroom decreased. There were more distractions as the students were up and moving and building the projects. Students who were not to the geometry learning targets had a hard time focusing on their own work. The positive motivation in the other students came when they decided they wanted to complete the learning targets prior to surface area and volume so that they could start the project. This motivation was only observed in a few students.

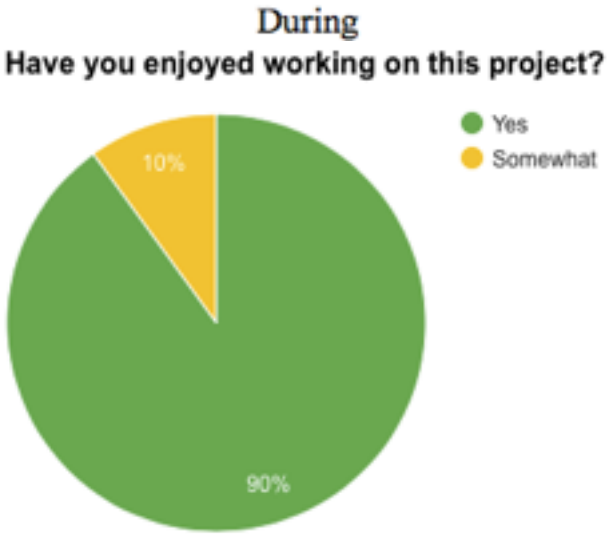
Enjoyment

As a math teacher, I am always trying to find ways to make the math more 'real' for the students so that they will enjoy coming to math class and learning. Many students dread math and do not enjoy learning the concepts. Whether it be they struggle with the operations of math or they find the concepts boring and wonder 'when will I ever use this?'. There are a few students who do well in math but they may find the work in the classroom not rigorous enough for their knowledge and may not enjoy the monotonous work. I found that implementing a hands-on activity allowed students who struggle with the math to shine in the classroom.

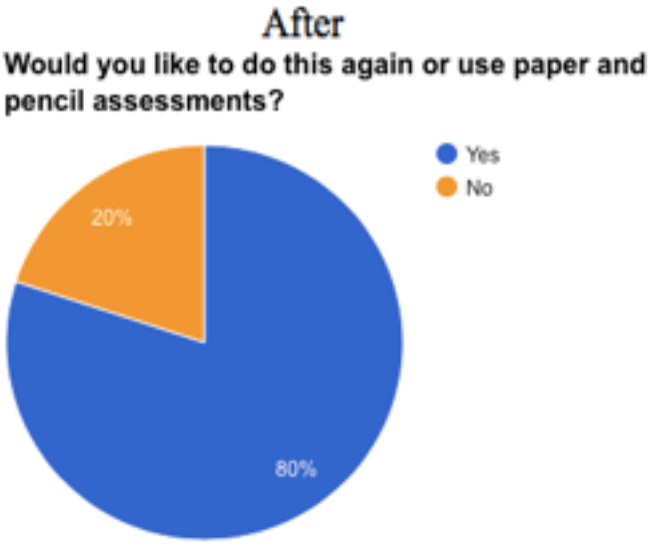


Before starting the project, I was looking for a way to engage students in the math more. The routine of the classroom has been established. The students know what is expected of them during each work time. I decided to ask the question 'I enjoy learning new math concepts through teacher lessons, videos and worksheets' because that's the way the learning is set up in my classroom. It's the best way I can meet the needs of students and stay Proficiency Based. However, I wanted to see how the students felt about the routine. Ten students answered either very often or all the time which was surprising to me. I was expecting more students to answer that they didn't like learning this way. 14.3% of the students did answer with a '2' which correlates with not very often and

14.3% answered '3' which was sometimes. Therefore, 28.6% of the students do not always enjoy learning this way.



As the projects started, I began to see more students excited to come to math class. They would enter the room and want to get right to work. Through the survey, I asked them the question 'Have you enjoyed working on this project?'. Five students answered with just yes while two students included that they think the project is fun and one student stated that they have enjoyed working with a friend. One student also added that they "think it helps me focus and remember it better." The yes category accounted for 90% of the responses.



After the students finished their projects, I asked them if they would like to do this again or stick with the paper and pencil assessments. Of the 80% of the students who answered yes (4 students), half of the students (2 students) stated that they would love to do a project again. "I loved the hands on activity and I also enjoyed doing the math of the shapes." One student stated no and that they would prefer to do a paper and pencil assessment.

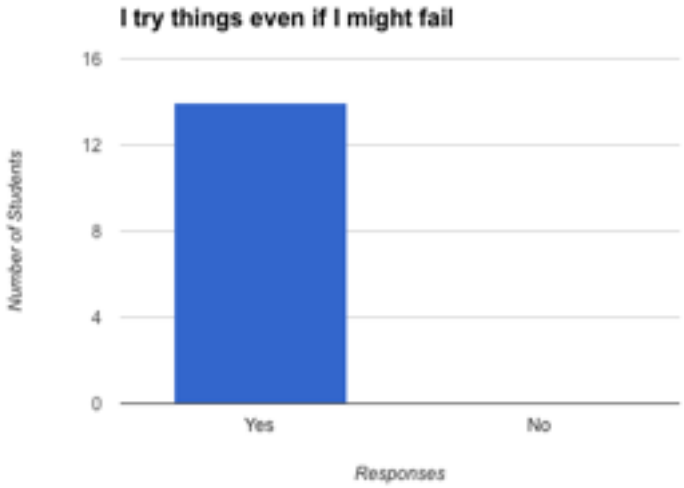
The students seemed to either really enjoy completing their project to show their knowledge on surface area and volume or they really didn't enjoy it. Based on student responses, the majority of the students enjoyed the project and would like to do something similar. I did have one student who chose to do a different project instead of building something and they struggled with staying motivated. It took a little while for him to get going but once he understood what was expected, he was able to complete the task. His final project that he handed in, with a written component, was better than any information I would have gathered from a paper and pencil assessment.

Observing students as they worked on the project, it was clear who was enjoying the project and staying motivated and who was not. The students who did not enjoy the project, struggled to complete the task. A target that could have taken them a couple weeks to complete, took them a month. I had one student who worked on the project from February 2 until March 9. We did have February vacation during the time this student was working on their project. I also had two other students who started the project on March 23 and finished the project on April 3. The motivation and enjoyment in these two students was more evident than that of the first student.

Perseverance

The proficiency based model has its pros and cons. Students who are motivated to succeed and are invested in their school work tend to thrive in this environment. When they encounter a problem during independent work time, they ask for help from the teacher or peers or they use other resources to help them continue on. Other students who are not as

motivated, do not persevere. They sit and wait for the teacher to notice that they are not working or they find something else to do instead (doodling on their paper is popular and can be a big time waster). A major part of Project Based learning is that the students are given more responsibility to complete their work. I wanted to check with students to see if they would be willing to attempt a project, even if they might stumble or fail on certain parts throughout the process. I was relieved to see that 100% of the students answered yes when ask if they would try things even if they might fail.



All students began their project ready to work and then as the project become more intense and more detailed, the students who persevered and finished the project were those who tend to persevere and stay focused during paper and pencil activities as well. “Yes I have been (motivated). Every time I can’t find something, I keep trying to find it” was a response to one of the questions in the survey the students completed after the project was done. Implementing the project had little effect or no effect on students persevering through problems who did not already exhibit this characteristic.

Discussion

Conclusion

Throughout this research project, I would state that, based on the data, the motivation and engagement of students during math did increase. The students who were working on the project were engaged and motivated to complete the project. This conclusion agrees with the research in my literature review. However, the research that has been done on Project Based learning has been largely implemented into a traditional classroom. These students are all working on a project at the same time. They use each other for resources and bounce ideas of each other. According to Grant, the students should be learning "through conducting investigations, conversations or activities, an individual is learning by constructing new knowledge by building on their current knowledge" (Grant, 2002, p. 2).

In a proficiency based classroom, students are working on different targets simultaneously, which can be distracting to others. The students who were constructing their knowledge on surface area and volume while building their projects benefited from the project. They were able to show their knowledge and stay motivated to complete the project. English and Kitsantas (2013) reference the importance of students having the skills to self-regulate their learning. The students need to be aware of their learning and be motivated to keep learning. This is a key quality more for the surrounding students that are not working on that learning targets project. These students need to stay focused on their task at hand and not be distracted by what others around them are working on.

In order to really understand the effects on Project Based learning in a Proficiency

Based classroom, more research needs to be done. I would like to see how the implementation of PBL into Proficiency Based would be if implemented at the beginning of the school year and made part of the routine of the classroom. If the classroom procedure involved more Project Based learning and the students were set up with clear and consistent expectations and guidelines for these projects, the implementation would be more successful.

When reflecting on this research in its entirety, there were some set backs. Unfortunately, I only surveyed those students who were participating in the project. It would be interesting to see the effect the project had on those students not participating. I was able to observe these students during class time but that's only my perspective. The data that would have come from their thoughts and opinions of staying motivated with projects going on around them would have given me a better idea for implementation in the future. Another set back was the amount of resources available for the students. Due to the fact that the this is a new idea for the students, they were unable to think of their own, personal project. Once they saw one project, they wanted to do the same thing. This created a shortage of tape, cardboard, and other building supplies. The students relied heavily on the teacher to bring in resources and/or had to build their own shapes from scraps of cardboard.

Overall, Project Based learning was more motivating for the students. They were able to show their learning in a different way with hands on and no worksheets. The students enjoyed coming to class and getting right to work on their project. Based upon student feedback and observations, it is clear that students were more invested in their work and accomplished more during this hands-on project. Students wanted to get to work during independent work time

and stayed motivated throughout the class period. Student responses included that they enjoyed hands-on and doing something different for an assessment then just paper and pencil. I believe that implementing more projects and having a mix of these assessments will create motivated students who are able to effectively communicate mathematically.

Recommendations

I have three recommendations for this project and further implementation. I would first recommend that the implementation of Project Based learning be often and frequent for the students. They should be comfortable with the process and understand expectations. Setting up clear guidelines and following a procedure would help the students be successful. Another recommendation would be to have open communication with the students. Constantly checking in on students would benefit the students and the teacher as they work on their projects. I was able to check in with the students during surveys but had limited time during work time to check with those students working. A final recommendation I would have for a Proficiency Based classroom would be to integrate the projects into targets that easily lend themselves to multiple different project choices. I would still offer a paper and pencil assessment which would allow students to meet their personal learning style. Some students would benefit from doing projects more and showing their math knowledge through a hands-on style. Other students may be more successful in completing paper and pencil assessments and would choose to complete this assessment for all learning targets instead. Having a choice in the classroom and a voice in the way they present their knowledge to the teacher would allow for more invested students. Keeping in mind that expectations and guidelines for those

working on the project and those students who are not working are extremely important to a productive classroom.

Implications

There are a few implications that came along with this research project. Throughout researching Project Based learning, the literature focused on implementation into a traditional classroom. With the focus of education shifting to Proficiency Based learning and diplomas, further research needs to be conducted in a Proficiency Based classroom. Trying to implement this new strategy in the middle of the school year was hard on some students as they were on different targets than those that were working on the project. The smaller size of the population that were involved in this study was helpful to this new idea but also did not provide much data to make generalizations. Since motivation was the main focus of this study, all students should have been involved in the surveys. This would have given me insight into the motivation in all students when Project Based learning was implemented. The positives and negatives for all students when implementing a new strategy is important.

The project did take more time than I expected and some students did not make it through to a point where they could take the during survey. Others did not take the after survey because they had not completed the project in time for this research study to be submitted. In the future, I would like to include a rough timeline for students who choose to complete a project. I understand that Proficiency Based learning is at the students 'best pace' so this could get tricky, but some students need guidance in setting up deadlines so that time is not wasted.

Personal Learning Reflection

Throughout the completion of this research study I have learned many things about myself as a professional and as a person. I like routine. I like things in order. I like my classroom cleaned up at the end of the day. Everything has a place. Implementing this new strategy into my classroom brought chaos, disorder, and a mess. However, the excitement in the students and the motivation that I saw in students who are not typically excited for math class, was worth all of it. The biggest take away was that the students enjoyed the hands-on activity to show their knowledge.

I like the routine of my classroom and that students know what is expected of them. They know where to find their supplies and how the class time is going to be split and used (I have students in one of my class periods that can tell you how long my mini-lesson takes and what time they will be told to do xtramath). This routine makes classroom management much easier as the expectations and standards are set for them. I've always had it in my head that the students need this structure in order to be productive and successful. One thing that really stuck out to me during this project was how this 'freedom' allowed students to be more creative in how they showed me their knowledge. I still had some structure in the way the classroom was run (mini lesson and xtramath still) but then allowed the students to be more creative during their independent work. This was definitely an eye opener to me as an educator. Even though middle schoolers struggle with discovering who they are as a person, having a balance of structure and free time in the classroom allows the students to have that independence they are craving but that structure that they need.

As I reflect on the use of Project Based learning I can't help but think of the ways that I can use this as a tool next year. I'm looking ahead at which targets would have options for multiple different project (as well as what resources would be needed) and which targets a paper and pencil assessment may be the better option. I will definitely make sure to implement this strategy at the beginning of the year to make sure that they students understand the process and the expectations.

I have also learned many things about myself as a researcher. I was nervous and a bit stressed out as I was presented with the idea of coming up with my own question to study. Throughout my research of finding articles on the use of manipulatives in the classroom, I stumbled upon the idea of Project Based learning. I found this idea interesting and one that I wouldn't mind implementing into my classroom. The actual process of implementing the tool into the classroom was a bit rockier than I thought it would be. Some students didn't jump at the idea as I thought they would (I guess they liked the routine and knowing what to expect too). Once the projects started I feel like I was more invested in the research. I was seeing students more motivated and wanting to work on their projects but the surveys really allowed me to get inside their heads and see how they felt about their motivation.

Overall, I am happy with my project and the success that I encountered. The students responded positively to the project and would want to do it again. The hands-on aspect was their favorite part. This project wasn't without its setbacks which is something I will have to iron out for next year. I am still trying to figure out how Project Based learning in a Proficiency Based classroom, where work on multiple different targets is happening at the

same time, will be smooth and motivating for all students. I look forward to the work that I will be able to develop from here forward and the implementation of this strategy in the coming school years.

References

Boaler, J. (1993). The role of contexts in the mathematics classroom: Do they make mathematics more "real"? *For the Learning of Mathematics, 13*(2), 12-17.

Blumenfeld, P.C., Soloway, E., Marx, R.W., Krajcik, J.S., Guzdial, M., & Palinscsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist, 26*(3/4), 369-398. http://dx.doi.org/10.1080/00461520.1991.9653139

Brown, F. (2000). *Computer assisted instruction in mathematics can improve students' test scores: A study.* Retrieved from ERIC database. (ED443688)

Couture, K. (2012). *Math manipulatives to increase 4th grade student achievemen*t. Retrieved from ERIC database. (ED534256)

Crewell, J.W. (2015). *Educational Research. Planning, conducting, and evaluating quantitative and qualitative research* (Fifth ed.). Lincoln, NE: Pearson.

D'Angelo, F., & Iliev, N. (2012). *Teaching mathematics to young children through the use of concrete and virtual manipulatives*. Retrieved from Bloomsburg University of Pennsylvania website: http://files.eric.ed.gov/fulltext/ED534228.pdf

English, M.C., & Kitsantas, A. (2013). Supporting Student Self-Regulated Learning in Problem- and Project-Based Learning. *Interdisciplinary Journal of Problem-based Learning, 7*(2), 128-150.

Grant, M. (2002). Getting a grip on Project-Based Learning: Theory, Cases and Recommendations. *Meridian: A Middle School Computer Technologies Journal, 5*(1).

Han, S., Capraro, R., & Capraro, M. M. (2014). How Science, Technology, Engineering, and Mathematics (STEM) Project-Based Learning (PBL) affects high, middle, and low achievers differently: The impact of student factors on achievement. *International Journal of Science and Mathematics Education, 13:* 1089-1113

Harvey-Woodall, A. (2009). *Integrating technology into the classroom: How does it impact student achievement?* Retrieved from ERIC database. (ED505984)

Hung, C.-M., Hwang, G.-J., & Huang, I. (2012). A Project-based Digital Storytelling Approach for Improving Students' Learning Motivation, Problem-Solving Competence and Learning Achievement. *Educational Technology & Society, 15*(4), 368-379.

Ilter, I. (2014). A study on the efficacy of project-based learning approach on Social Studies Education: Conceptual achievement and academic motivation. *Academic Journals 9*(15), 487-497.

Markham, T. (2011). Project Based Learning: A Bridge Just Far Enough. *Teacher Librarian, 39*(2), 38-42.

Meyer, D.K., Turner, J.C., Spencer, C.A. (1997). Challenge in a Mathematics Classroom: Students' Motivation and Strategies in Project-Based Learning. *The University of Chicago Press Journals, 97*(5), 501-521.

Moyer, P. S. (2001). Are we having fun yet? How teachers use manipulatives to teach mathematics. *Educational Studies in Mathematics, 47*(2), 175-197.

Packenham-Moyer, P., & Suh, J. (2012). Learning mathematics with technology: The influence of virtual manipulatives on different achievement groups. *Journal of Computers in Mathematics and Science Teaching, 31*(1), 39-59.

Roschelle, J.M., Pea, R.D., Hoadley, C.M., Gordin, D.N., & Means, B.M. (2000). Changing how and what children learn in school with computer-based technologies. *The Future of Children, 10*(2), 76-101.

Wolk, S. (1994). Project-Based Learning: Pursuits with a Purpose. *Educational Ledership, 52*(3), 42-45.

Yetkiner, Z. E., Anderoglu, H., & Capraro, R. M. (2008). *Research summary: Project-based learning in middle grades mathematics.* Retrieved September 19, 2017, from http://www.nmsa.org/Research/ResearchSummaries/ProjectBasedLearninginMath/tabid/1570/Default.aspx

Appendices

Appendix A-Administrator's Consent Form

Dear Dr. Austin,

As you are aware, I am working to get my masters in Educational Leadership from the University of Maine at Farmington. As the final piece, I am required to conduct a research project and have chosen to look at motivation in the math classroom through project-based learning. Research will begin pending IRB approval in November, and will conclude with a symposium presentation in May on the Farmington campus. Research will be conducted using consenting students from my seventh grade math class. For this research, students will be asked to complete a student-chosen project for one of our geometry targets (surface area of prisms, surface area of pyramids, or volume).

I would like to:
•Gather information through student questionnaires on motivation before/during/and after their project
•Start gathering information as students work on the geometry targets
•Observe student motivation while working on their projects

I will:
•Inform parents of the nature of my study and gather consent forms from the parents
•Inform students of the nature of my study and gather consent forms from them.
•Inform both parties that participation is voluntary.

I will not share identifying information about specific students involved in the study. If you have any further questions, please do not hesitate to contact me or my advisor at UMF, Dr. Chris Strople.

By signing this form you are consenting for me to gather information from students on their motivation before/during/and after the project.

_____ _____
Printed Name Date

_____
Signature

Appendix B-Parent Consent Form

Dear Parent/Guardian,

My name is April King and I am your child's math and science teacher. I am also a student in the masters program for Educational Leadership at the University of Maine at Farmington. This year I am conducting a research project that looks at student motivation and use of real world skills in math class. I believe that it is important for the students to work with the math concepts outside of worksheets and equations. If you choose to have your child participate in the study, during our geometry targets this year, they will be involved in a student chosen project that takes the math 'outside the classroom', versus a paper and pencil assessment. Your child may benefit from this research by being more invested in their math learning and more motivated to show their new knowledge. Participation in this study is voluntary. There is no punishment for your child or their grade if you choose not to have your child participate in this study. All data collected during this study will be unnamed and kept in a locked drawer in my desk.

Contact Information: If you have any questions about this study, please contact me, April King, at aking@rsu3.org or (207) 568-3255 ext. 7215. You may also reach the faculty advisor, Dr. Christopher Strople on this study at christopher.strople@maine.edu or (207) 778-7015.

Thank you again,
April King
Seventh Grade Math and Science Teacher
Mount View Middle School

Your signature below indicates that you have read and understand the above information and that you give consent for your child to participate in this study. You will receive a copy of this form.

_____	_____
Printed Name	Child's Name
_____	_____
Signature of consent	Date

Appendix C-Student Consent Form

I am doing a study on how to increase motivation during math class through the use of projects that work with real world application and skills. This is a very important topic to me because I see it as a critical part of my job as a mathematics teacher to help you become mathematical thinkers outside of the classroom and to see the importance of your math learning.

Participation in this study is voluntary. If you do agree to be in this study, you will be asked to create a project that shows your knowledge as you work through our geometry targets. You will investigate a topic and do research to expand your knowledge. You will then be asked to share your work with your classmates. You will complete questionnaires on your thoughts before/during/and after the project.

There will be no penalty for not participating in this research study. The risks involved are that you might be find some questions uncomfortable to answer. Your grade for this target will also not be negatively affected if you choose not to participate.

If you sign this paper, you are assenting to participate in these activities and to offer your opinions in the the questionnaires that I will be asking you to fill out. You may cease participation at any time if you wish.

_____ _____

Printed Name Date

_____

Signature

Appendix D-Student Questionnaire

Before Starting the Project

Rate yourself, on a scale of 1-5, 1-not at all, 2-not very often, 3-sometimes, 4-very often and 5-all the time:

I enjoy learning new math concepts through teacher lessons, videos, and worksheets

2. I always try my best on assessments

3. I stay motivated during math class to do my best on my work

4. Setbacks discourage me

5. I get excited to learn new material

6. I am a responsible student

7. I use my laptop appropriately during class

8. I am good at staying focused on my work

9. I am diligent (hard working and careful)

10.. I like to imagine new ways to do things

11. When my solution to a problem is not working, I try to figure out what went wrong

Please respond true/false to the following questions:

I feel comfortable asking my teacher for help.

I feel comfortable asking my peers for help.

One of my goals in class is to learn as much as I can.

I try things even if I might fail.

During the Project

Have you encountered any problems while working on your project? How did you solve them?
Circle: Yes or No

Are there things you might want more help with? If yes, what do you need more help with?
Circle: Yes or No

Have you enjoyed working on this project so far? Why or why not?
Circle: Yes or No

Have you been able to stay motivated even if things didn't work out for you? Why or why not?
Circle: Yes or No

One thing I would like to improve upon is ...

After the Project

How much did you know about the subject before we started?

Did you feel more motivated to get this project done than the worksheets in previous targets?

What resources did you use while working on this piece? Which ones were especially helpful? Which ones would you use again?

If someone else were looking at your project, what might they learn about who you are?

In what ways did your work meet the standards for this assignment?

If you were the teacher, what comments would you make about this project?

What are somethings you enjoyed/disliked about presenting your knowledge this way?

Would you like to do this again or use paper and pencil assessments?

What does this project reveal about you as a learner?