A Quantitative Study on

The Impact of Robots on Student Academic Success in Problem-Solving Activities

at the Intermediate School Level

Carol A. Munn

New Jersey City University

CHAPTER 1: Introduction

Introduction

Young students, pivotal members of our planet's future society are being nurtured and identified as the next "tech savvy" generation with a yearning for anything that is captivating, striking and reacts (Riedo, Rétornaz, Bergeron, Nyffeler, & Mondada, (2012). Behold the robot and its technology imploding in the field of education creating excitement in the minds of students. In education, a battleground of many fascinating learning instruments, the robot arises, rejuvenates, animates and revives 21st Century Skills in tech savvy language all to familiar with today's students such as coding, engineering, and scientific method in a fun, exciting, and engaging fashion. Learning about robots enhances the lessons in the classroom and improved students' skills. Providing educational robots such as LEGO RCX, Wedo 2.0, Mindstorms Education NXT and EV3, ignites a spark that brightens and grows allowing for additional skills to be added to the students' repertoire of digital devices. (Danahy, Wang, Brockman, Carberry, Shapiro, & Rogers, 2014).

A robot is an automatic device (machine) that performs a difficult task, by way of intricate strand of commands through a computer program (Robot, n.d.). Robots have been around in the public sector, but behind the scenes in the K-12 education field. Sneaking onto the K-12 education scene by means of before and after school programs; robot education is still struggling to be mainstreamed into the classroom, with indents and advances made within the last decade. A robot is viewed as a valued tool obtainable to all students to benefit and propagate, cognitive and social skills to support learning not only the STEM/STEAM, (Science, Technology, Engineering and Mathematics/Science, Technology, Arts, Engineering and

Mathematics), but in the non-core subjects such as world language, music, art, and physical education (Alimisis, 2013).

In step with STEM/STEAM, a robot is a natural platform when it comes to skills addressed in Bloom's taxonomy, including high order critical thinking and problem solving skills. These skills are essential for students to acquire and master to be successful in the 21st Century (Kazez & Genç, 2016). Robots have been part of our society for decades; however, have not really drawn much attention as a teaching tool within the K-12 education system. Robots and its' technology has been seamlessly invading the society, such as Amazon's Echo, SMART products, Google's Home, Fed Ex's Jefe, but really has not made significant strides in the education world (Mubin, Stevens, Shahid, Mahmud, & Dong, 2013).

With children raving for anything that is "techy", the classroom seems like an ideal place for the robot. Still not a common technology teaching tool, robots and its' accompanying technology create and produce a fine tune arrangement of interactions so desperately need in the education field. Robot and its' technological curriculum breaks down the traditional concrete walls of a classroom and allows ideas to flow freely, back and forth, in the vast open space comprised of digital learning. Each learning pathway involves teamwork, community within a classroom leadership, communication, critical thinking and problem-solving skills (Author, 2016).

Statement of the Problem

Robots have a specific niche in the education field and classroom; nonetheless are they perceived in the education field as a "toy" or are they able to advance the child's academic success in solving problems. Whichever way robot technology turns, still goes hand-in-hand with the STEM/STEAM initiatives, the main focus in today's education system. In a study conducted by Benitti in 2001, the use of robot and its technology has not been fully examined with very limited evidence and validation, therefore leaving a void in reference to the direct impact of robots on the education system (Alimisis, 2013, p. 68). The expected benefits have not been fully researched; therefore the use of a robot as a tool for measuring student academic success is still pending. Now, with this new attention to implementing robot and its' technology, exists an excellent opportunity to apply a quantitative study with measurable data to focus on the robot and its' technology applications for the tech savvy 21st Century learner to attain a solution for a real world simulated engineering problem.

Purpose

The purpose of this quantitative research study is to examine the implementation of robots as a teaching tool, on students' academic success in solving problems in comparison to students who were not exposed to robots in solving the same problem in an intermediate school environment. Robots have been part of the higher-education program for the past 20 years, as traditionally part of a college-level science and engineering classes (Danahy, Wang, Brockman, Carberry, Shapiro, & Rogers, 2014). Now, robots have moved into the lower levels of the education pyramid, by ways of the before of afterschool club, but still not part of the essential core classroom curricula activities (Karp & Maloney, (2013). This void needs to be addressed and filled with a curriculum that utilizes robot concepts and applications, which further the skills students, need in the 21st century. Therefore, this quantitative research study will provide the quasi-experimental data necessary to statistical provide evidence to sustain a robot curriculum in K-12 education.

Research Questions and Hypotheses

The following research questions will guide this specific quantitative research study:

- **Research Question 1:** Is there a significant difference in students' academic success between students' using a robot or without a robot as a tool to solve a problem?
- **Research Question 2:** Is there a significant difference in the pre and post-test scores for students using the robot or without a robot?
- **Research Question 3:** Will the implementation of using a robot impact student academic success in the solving a problem?

Independent and Dependent Variables

For this study, two classes of fifth grade students will be utilized, Group 1 will be able to use a robot and its' technology and Group 2 will be able to use the standardized traditional science lesson applications. The independent variable for this study is a robot and its' technology. The dependent variable is the measurement of the students' academic success.

CHAPTER 2: Literature Review

Based on recent years of being part of the emerging technology environment, finally a robot and its' functioning technology will be seen as a positive enrichment tool which allows for increasing interactivity along the lines of the student cognitive and personal skills to be fostered in the classroom at an early age. Over the years, robots arrived in the classroom with no direction, lesson plans, nor curriculum. The robot was more of an "entertainment toy" than an "instructional tool". After a period of playing the novelty wore off and the robot became a stagnant. Educational professionals realized that the "entertainment toy" can be applied to subject areas know as STEM/STEAM and revolutionize classroom learning. Each robot maintains and expresses specific mannerisms and within each individual unit there is a rationale derived as an asset in classroom applications (Ntemngw & Oliver, 2018).

There are the many prevalent opportunities for robots to perform in the education field. Hands-on approach to learning with tangible manipulatives, plus, add-ons which intrigue and create learning differentiated experience include creative thinking become important inferences to connect and validate the 21st Century skills attainable by students (Mubin, Stevens, Shahid, Al Mahmud, & Dong, 2013). In adopting robot curriculum at any age level the practical skills reinforce the students' natural progression in cognitive levels. The pedagogical theory that best signifies the relationship of a robot as a teaching tool, and cultivating such skills as solving a problem include hands-on applications is referred to as "the theory of constructionism" (Mubin, Stevens, Shahid, Al Mahmud, & Dong, 2013, p. 4). The basis for constructionism is building upon solving a problem which encourages students to creatively think about a solution and then experiment by hands-on applications of the tool, in this case, a robot and its' technologies.

Alimisis (2013) identifies and places unique education values on the use of the robot as an emerging and invigorating tool with the proper curriculum for teachers to follow and implement starting at the Pre-Kindergarten age group. This is where it starts and continues through with age, allowing advancement in cognitive skills while engaging, learning and having fun in school. This type of learning environment allows for interaction and involvement with real-world problems utilizing the constructionist view of learning. This type of instruction is imperative for students to develop, in order for them to thrive and compete in the workplace. The 21^{st} Century Skills important to obtain are: creative thinking, decision-making, problem-solving, teamwork, research and communication skills (Alimisis, 2013).

Noted in his study, that depended on the particular application/implementation is one way of theorizing the concepts. While the infusion of robot curriculum exposes the mind to critical analysis, planning and thinking creatively, all skills related to a robot and its' curriculum are necessary for students to be academically successful. Alimisis concludes: “The role of Education Robotics should be seen as a tool to foster essential life skills (cognitive and personal development, team working) through which people can develop their potential to use their imagination, to express themselves and make original and valued choices in life” (2013, p. 69). Clearly there is room for more studies in this area and there are certain limitations within this study such as lack of standardized indicators and methodology that should focus on the impact and not just the teacher perceptions (Almisis, 2013, p. 68).

In parallel with Alimisis’s findings about the role of robot in education, a study conducted by Kazez & Genç, concluded that robot intervention in education increases student achievement, problem-solving skills along with self-confidence, which are some of the key skills in cognitive learning. Kazez & Genç study collected data from other theses and dissertations, starting from 1991 and analyzed the findings in conjunction with LEGO robots and STEM curriculum. Interestingly the quantitative methods design was utilized 49% of the time, followed by qualitative (31%) and mixed methods (18%) (Kazez & Genç, 2016, p. 29). In earlier years of robot infusion, the emphasis was on knowing the science but as recently as 2012 the curriculum was rewritten to focus on Bloom’s taxonomy and 21st Century skills students need to procure before leaving and venturing into life in the real world. This study did find, in conjunction with Alimisis, more research needs to be attempted and data recorded in order to convincingly substantiate the findings in this study that there clearly is a route that robots and its usage are aligned with the infusion of 21st Century Skills and will benefit the education of students for success in the real world.

As previously mentioned in the previous literature reviews, focusing on the robot and its’ technology applications reinforces the introduction and fostering problem solving and critical thinking skills are young school-age children (Majherová & Králík, 2017). Robot is a device that is familiar to the 21st Century Learner and balanced with the visualization of solving a problem engages the cognitive skills obtainable with this user-friendly digital tool. Robots in the classroom lend itself to positive personalized learning conditions the next generation students thrive on (Baxter, Ashurst, Read, Kennedy, & Belpaeme, 2017). Converging, developing and building on the cognitive skill set, with robot intervention allows for in-depth and probing to maximize and provides a pathway for success starting at young age (Ortiz, Bos, & Smith, 2015). Evident throughout these studies is the connections and integration of STEM content links and opportunities to promote the familiarity of user-friendly machine (robot) to engage and cultivate the necessary cognitive skills applicable to transcribe into solving real world problems.

Interesting to note, robot and its' technology is intertwined with cognitive skills, STEM/STEAM based lessons, fostering 21st Century learners, innovation, challenges, excitement, engaging problem solving, critical thinking, and fun can be part of an education plan that moves youth and even university students into the pilot seat of the next generation of thinkers, (Karp & Maloney, 2013). With more evidence for studies such as this: "Teachers have reported that their students have improved on critical thinking and teamwork skill, and also stated that they enjoyed having the program…."(Karp & Maloney, 2013, p. 51). Unmistakably there is room and a place in education for sustaining the placement of robot and its' technology starting with pre-kindergarten all the way through the education system.

In conclusion, a robot, an instrument which can be fine-tuned to include vastly low to high-grade hands-on applications and creating innovative waves within the Pre-K-12 education field. Robots and its' technology continuously combine Blooms taxonomy and essential 21st Century skills as a necessary skillset for all students including fundamental methods which inspire and elicit positive growth. No matter what role a robot takes on in the classroom technology curriculum - a tool, peer or tutor, make no mistake the interactive teaching methodology will complete the arrangement within STEM/STEAM. With all the obstacles that come with robot education, robots have a purpose, place and importance in Pre K-12 education with the common denominator deemed applicable is the robot curriculum (robotics technology) not just the machinery and its physical parts (Alimisis, 2013).

Chapter 3: Methodology

In reviewing the literature based on robots and school-wide usage, there seems to be abundance of studies in relation to the field of robots at the university level, with less information in relation to the robot and its' application as a tool in K-12 education (Riedo, Rétornaz, Bergeron, Nyffeler, & Mondada, 2012). Concurring with this statement, Almisis's (2013) position clearly states that there is a gap in quantitative research platform on how robots can increase the learning and academic success in students. Taking this into consideration, the education curriculum geared toward younger students should be adjusted in a way that robots become an integral part at a younger age. Along these lines, infusing robot technology as a tool is a crucial impact in the growth and development of children (Mubin, Stevens, Shahid, Al Mahmud, & Dong, 2013). With the onset of robot technology into the education field, there is a need for more research studies planned to provide statistical data to infuse this as a vital piece of classroom instruction in the early years of schooling.

In this section, the quasi-experiment method for this study will be explained through research design, population & sample, materials, instruments and procedures serves as the basis for this quantitative research approach. This topic of study requires a unique style of gathering data by within specific groups that will support the methodology and focuses on the understanding when given certain parameters, how the justification with the use of a robot as a teaching tool can create an energy that spreads by way of student success (Creswell, 2015). This specific quasi-experiment will determine that a cause and effect relationship can be measured between different groups and to include an identifying motivational and success level of the participants with reference to the specific conditions set forth in this quasi-experiment.

Research Design

This study is based on the quasi-experimental study utilizing the quantitative prediction strategy. "Quantitative researchers seek explanations and predictions….establish, confirm, or validate relationships and to develop generalizations that contribute to theory" (Leedy & Ormrod, 2005, p. 95). With this in mind, this study is designed to investigate if there is a connection in the use of robot(s) as a teaching tool on student academic success in solving real world problems within an intermediate school setting. This category of research study seeks to find ways to foresee or predict future results based on the data results provided by the variables (Creswell, 2015).

Using the quantitative approach allows for a specific focus by narrowing down the questions and then the responses into a numeric data set which visually tells a current trend or story. This trend can either prove or disprove the focus of this research and provide valuable insight into the use of a robot as a teaching tool in developing students' academic success. This collected data or statistical breakdown is perceived as an unbiased objective manner and provides a neutral analysis of results of the study (Creswell, 2015). By collecting this data in quantitative methods, the results are a measurement of objective reality within a formed alliance.

According to Creswell (2015), this particular experiment exposes the research data to internal validity, complicated or tainted with threats such as: (1) maturation, (2) saturation, (3) mortality, and (4) interaction with other threats (p. 311). With these possible threats, possible controls can be implemented to minimize, carefully observe and note any irregularities in the quasi-experiment. With relations to internal validity for this study, the use of controlled variables; fifth grade students, pre-test and post-tests, and pre-built robot and construction maze. By using these factors, threats to this study will be very minimal, if any, to affect any of the data outcomes of this quasi-experiment. This quantitative design method will substantiate the relationship between variables and recognize a certain change in attitude or motivation after utilizing the tools within certain controls (Creswell, 2015)

Population & Sample

The population will be students, range nine to 10 years old, attending an intermediate school in a large school district in Central New Jersey. The sample size will be two computer technology classes. Both classes will be comprised of fifth grade students. The sample size will consist of 48 students. The population makeup will be 23 females and 25 males. The classes have been pre-determined by the school guidance counselor at the beginning of the school year. Unless there are unique circumstances like student moves out of district or new student starts or there is an internal switch, both classes cannot be changed. If there are any of these circumstances do play out then the action could warrant a threat to the study's data. The existing class list will be used for this quasi-experiment.

Materials

In this study, Group 1 will be supplied with a pre-built basic robot along with an expansion kit containing various additional pieces. Group 2 will be provided with the standard lesson materials. Both groups will be provided with the exact pre-built construction site maze, the obstacles and the construction materials to be moved from one place to another. Both groups will be provided with external devices.

Instrument

A pre-test will be administered to both groups to determine their background knowledge. The experimental group, (Group 1) will receive the experimental treatment (the use of the robot). Then both groups will be given the post-test. For both tests, a letter will be submitted to the developer for permission to modify and use for this study. Sample copy for each developer is in the attached (see Appendix A: ii & B: ii). The pre-test questionnaire will be modified once approval granted in use of this instrument; Teacher Revised TOSRA (see Appendix A i). In addition, questionnaire based on Student Engagement, Motivation & Beliefs (see Appendix B i) will be administered to the students to identify and measure their inspiration and views before and after the project. This questionnaire will be revised and customized, upon permission, to reflect use of different tools and lessons/instructions within the focus of this quasi-experiment.

Lastly, a questionnaire dedicated to the use of specific individual lesson's tools, will measure specifically which tools the students were successful using to complete the task. This instrument will be able to gauge the data received categorized by the specific tool and/or application provided during the lesson. These collections of data responses are very important because this will have implications that designate the impact of the robot as the tool for student academic success. Along with the surveys, additional valuable research tools will be journal entries by the observer, facilitator and students, video and audio recordings of the activities and interviews. There will be questions for the interviewee to answer in written and recorded format. The results from all these indicators will relate back with values that will either support or not support the relationship between use of robot, as a teaching tool, and the academic success of students in solving a problem.

Procedure

In order to proceed with this quasi-experiment, and gain access to participants, classroom, and equipment the following official documents are necessary: (1) formal letter to the Superintendent (see Appendix C) describing my research topic and setting up a meeting to go over and answer any specific questions; (2) formal letter to the principal (see Appendix D) and setup a follow-up meeting to answer any question(s); and (3) letter/permission form to the parent(s)/guardians of the students for permission/consent for their child to participate in the research project and have it returned to school (see Appendix E). After all these official documents are completed and in the possession of the researcher, the project can begin.

This research procedure is a quasi-experiment conducted with two computer classes. These classes are part of a district intermediate school that houses fifth and sixth grade students from a diverse population. The population of the entire school is 736 students. The focus is on two fifth grade computer classes. Each class is comprised of 24 students. Each class comes to computer class as a heterogeneous homeroom. Both classes come at the exact time period in the morning with one class on Wednesday and the other on Thursday. Each class is 40 minutes in length and scheduled weekly. Wednesday's class has 13 females and 11 males, while the Thursday's class has10 females and 14 males. The representation of groups, are as follows: Wednesday's group is the experimental group or G1; Thursday's group is the control group or G2. G1 students will be able to complete the project using the LEGO EV3 Robot, accompanying lesson and the programming software. G2 students will be able to complete the project using standardized traditional science/engineering applications. Both groups will be given the identical real world problem to solve. Each group will take a pre-test and a post-test.

This study period will last for two marking period for a total of sixteen 40-minute classes. Each class will focus on a specific area or function of the lesson. Both classes will start off with a pre-test. Next, each group will be exposed to the exact same lesson. The lesson, one period in length, is an introduction to engineering with a video and accompanying review questions in a Kahoot. After this, both groups will be given exact instruction on what the next sessions encompass, including directives on the same real-world problem for each groups and time to do research. Next class, Group 1 will be introduced to the robot and its' technology. Group 2 will have access to materials provided in the standardized lesson plan. The next 12 sessions will be hands-on working activities for both groups. One class period for Group 1 will be dedicated to learning the software program. Weeks 13 & 14 are practice weeks. Weeks 15 & 16 are real demonstrations. After the 16-week implementation period, both groups of students will be given a post-test, in which the data results will determine the validity of the study, if the students attained success in the solving the problem and by which method; robot or standard science lesson.

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Appendix

Appendix A (i): Tool 1: Teacher Revised TOSRA [see details in Appendix A (ii)] [adapted from: Ebelt, K., (2012)]

1. Were you involved in robotics? Yes No

2. If you answered yes, circle the answer that best describe you.

a. It sounded like fun.
b. My brother / sister participated in it and said it was fun.
c. My friends were in robotics.
d. My parents wanted me to be in it.
e. Other reason:

3. If you answer no, circle the answer that best describe you.

a. I didn't want to.
b. I was in too many other activities.
c. I wasn't allowed to.
d. My friends weren't in robotics.
e. Other reason:

4. When working on a problem, how long do you stay focused on it?

a. If I don't get it right away, I quit.
b. I keep working, but after 2 or 3 failures, I quit.
c. I keep working on it until I get the answer.
d. Other:

5. What do you know about using robots to learn about science?

a. I know a lot about how to use robots to learn science?
b. I know a little about how to use robots to learn about science.

6. What do you know about programming a robot using the computer?

a. I know a lot about how to program a robot.
b. I know a little about how to program a robot.
c. I don't know anything about how to program a robot.

7. What do you know about using robotics computer software?

a. I know how to use robotics software.
b. I know a little about how to use robotics software.
c. I don't know anything about how to use robotics software.

8. What do you know about building an NXT robot?

a. I know a lot about how to build an NXT robot.
b. I know a little about how to build an NXT robot.
c. I don't know anything about building an NXT robot.

9. How do you feel about learning science?

a. I am excited to learn science.
b. Science is alright but not my favorite subject.
c. I don't like science that much.

10. What do you know about researching a science topic?

a. I know a lot about how to research a science topic.
b. I know a little about how to research a science topic.
c. I don't know anything about how to research a science topic.

Appendix A (ii): Letter of Permission to Use Tool 1: Teacher Revised TOSRA

March 04, 2018

K. Ebelt
Target Range School
4095 South Avenue West
Missoula, MT 59804

Dear Ms. Ebelt:

I am a doctoral student from New Jersey City University, located in Jersey City, New Jersey. I am conducting dissertation research to examine the connection between the use of robots as a teaching tool and students' academic success in solving problems in intermediate school environment.

I would like your permission to use the "Revised TORSA" survey instrument in my research study. I would like to use and print your survey under the following conditions:

- I will use the surveys only for my research study and will not sell or use it with any compensated or curriculum development activities.
- I will include the copyright statement on all copies of the instrument.
- I will send a copy of my completed research study to your attention upon completion of the study.

If these are acceptable terms and conditions, please indicate so by replying to me through e-mail: cmunn@njcu.edu

Sincerely,

Carol A. Munn
Doctoral Candidate

Appendix B (i): Tool 2: Student Engagement, Motivation, & Beliefs Survey [see details in Appendix B (ii)] [adapted from: Ebelt, K., (2017)]

Student Engagement, Motivation, & Beliefs Survey

V2.0 ENGLISH VERSION

Marking Instructions: You may use pen or pencil.
Please completely fill-in the bubble for your response.

This survey is confidential and anonymous.

Read each of the following statements and decide how much you agree or disagree with them.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I work hard at school	○	○	○	○	○
It's important to me that I improve my skills this year	○	○	○	○	○
I concentrate on my schoolwork	○	○	○	○	○
I feel proud of my school	○	○	○	○	○
I am a responsible student	○	○	○	○	○
I am treated with as much respect as other students	○	○	○	○	○
I complete my schoolwork regularly	○	○	○	○	○
In my school, I feel that I belong to a group of friends	○	○	○	○	○
I take responsibility for working on my goals	○	○	○	○	○
There's at least one adult in this school I can talk to if I have a problem	○	○	○	○	○
I am good at staying focused on my goals	○	○	○	○	○
I am comfortable asking my teacher(s) for help	○	○	○	○	○
I know I will graduate from high school	○	○	○	○	○
I have a clear sense of my ethnic background	○	○	○	○	○
I have a plan for what I want to do after high school	○	○	○	○	○
I feel good about my cultural or ethnic background	○	○	○	○	○
I am hopeful about my future	○	○	○	○	○
I respect other points of view, even when I disagree	○	○	○	○	○
I pay attention to how I feel	○	○	○	○	○
I work well in a group or team	○	○	○	○	○
I can resist doing something when I know I shouldn't do it	○	○	○	○	○
It is easy for me to communicate my thoughts and ideas	○	○	○	○	○
I can calm myself down when I am excited or upset	○	○	○	○	○
I can discuss a problem with a friend without making it worse	○	○	○	○	○
I am a hard worker	○	○	○	○	○
I feel bad when someone gets their feelings hurt	○	○	○	○	○
I finish whatever I begin	○	○	○	○	○
I am diligent (hard working and careful)	○	○	○	○	○
I can come up with new ideas	○	○	○	○	○
Setbacks don't discourage me	○	○	○	○	○
I like to imagine new ways to do things	○	○	○	○	○
I can do almost all the work in class if I don't give up	○	○	○	○	○

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am a creative person	○	○	○	○	○
I can learn the things taught in school	○	○	○	○	○
When my solution to a problem is not working, I try to figure out what went wrong	○	○	○	○	○
What we do in school will help me succeed in life	○	○	○	○	○
I try to think of many solutions when I have a problem	○	○	○	○	○
How smart I am is something that I can change	○	○	○	○	○
I am good at figuring out the best solution to problems I'm facing	○	○	○	○	○
One of my goals in class is to learn as much as I can	○	○	○	○	○
I solve problems by first breaking them into smaller steps	○	○	○	○	○
I try things even if I might fail	○	○	○	○	○

Appendix B: (ii): Letter of Permission to Use Tool 2: Student Engagement, Motivation, & Beliefs Survey [Youth Development Executives of King County (2012)]

March 04, 2018

Youth Development Executives of King County
801 23rd Ave S STE A
Seattle, WA 98144
info@ydekc.org

Dear Sir/Madam:

I am a doctoral student from New Jersey City University, located in Jersey City, New Jersey. I am conducting dissertation research to examine the connection between the use of robots as a teaching tool and students' academic success in solving problems in intermediate school environment.

I would like your permission to use the "Student Engagement, Motivation, & Beliefs Survey" survey instrument in my research study. I would like to use and print your survey under the following conditions:

- I will use the surveys only for my research study and will not sell or use it with any compensated or curriculum development activities.
- I will include the copyright statement on all copies of the instrument.
- I will send a copy of my completed research study to your attention upon completion of the study.

If these are acceptable terms and conditions, please indicate so by replying to me through e-mail: cmunn@njcu.edu

Sincerely,

Carol A. Munn
Doctoral Candidate

Appendix C: Letter of Permission to Superintendent to Conduct Survey in District

March 04, 2018

Russell Lazovick
Superintendent
Bridgewater-Raritan Regional School District
P.O. Box 6030
836 Newmans Lane
Bridgewater, NJ 08807

Dear Superintendent Lazovick:

I am a doctoral student from New Jersey City University, located in Jersey City, New Jersey. I am conducting dissertation research to examine the connection between the use of robots as a teaching tool and students' academic success in solving problems in intermediate school environment.

I would like your permission to be able to conduct the research at Eisenhower Intermediate School, Bridgewater, NJ 08807. I will follow all district policies set forth for implementing the survey in a non-intrusive manner. I will share all finding from this research with the district. If you would like further information, please feel free to contact me. If this is acceptable, please indicate so by replying to me through e-mail: cmunn@njcu.edu.

I am looking forward to hearing from you.

Sincerely,

Carol A. Munn
Doctoral Candidate

Appendix D: Letter of Permission to Principal to Conduct Survey in School

March 04, 2018

Joseph P. Diskin
Principal
Eisenhower Intermediate School
791 Eisenhower Ave.
Bridgewater, NJ 08807

Dear Mr. Diskin:

I am a doctoral student from New Jersey City University, located in Jersey City, New Jersey. I am conducting dissertation research to examine the connection between the use of robots as a teaching tool and students' academic success in solving problems in intermediate school environment.

I would like your permission to be able to conduct the research at Eisenhower Intermediate School, Bridgewater, NJ 08807. I will follow all district policies set forth for implementing the survey in a non-intrusive manner. I will share all finding from this research with the district. If you would like further information, please feel free to contact me. If this is acceptable, please indicate so by replying to me through e-mail: cmunn@njcu.edu.

I am looking forward to hearing from you.

Sincerely,

Carol A. Munn
Doctoral Candidate

Appendix E: Letter of Permission to Parents/Guardians to Grant Permission Child to Participate in Study

March 04, 2018

Dear Parents/Guardians:

I am a doctoral student from New Jersey City University, located in Jersey City, New Jersey. I am conducting a research project at Eisenhower School. The focus of the research study that I am conducting is to examine the connection between the use of robots as a teaching tool and students' academic success in solving problems in intermediate school environment.
In order to carry out this research, the investigation will take on various forms and techniques of gathering data. The techniques are surveys, notes, interviews with videotaping and audio transcriptions of the class discussions.

While doing the research study, I will follow all district policies set forth for implementing the survey in a non-intrusive manner. The strictest confidentially will be enforced; district and children's names will not be named.

The main focus is the robot as a teaching tool for student success in solving problems. I need the cooperation of the children and your granted permission to carry out this research and study. All tapes and conversations will be kept in the utmost respect and confidentially.

You have the right to refuse permission for your child to participate in this research project. If you wish to not have your child participate, I guarantee that it will not under any circumstances affect any part of the daily classroom activities. Please feel free to contact me with any questions or concerns at cmunn@njcu.edu.

Thanks in advance for you cooperation.

Carol A. Munn
Doctorate Student

I grant permission for my child ____________________________________ to collaborate in this research project.

Print Parent/Guardian
Name:____
Parent/Guardian
Signed:____
Parent/Guardian Date:_______________________________________