CALIFORNIA STATE UNIVERSITY SAN MARCOS

THESIS SIGNATURE PAGE

THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE

MASTER OF ARTS

IN

EDUCATION

THESIS TITLE: Student Feedback into Common Core Math Instruction

AUTHOR: Alexa Scheidler

DATE OF SUCCESSFUL DEFENSE: May 9th, 2017

THE THESIS HAS BEEN ACCEPTED BY THE THESIS COMMITTEE IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN
EDUCATION.

Carol Van Vooren THESIS COMMITTEE CHAIR	Carol Van Vooren SIGNATURE	5-9-17 DATE
Vidalia Resendes THESIS COMMITTEE MEMBER	 SIGNATURE	5-9-17 DATE

Student Feedback into Common Core Math Instruction

Alexa Scheidler

California State University San Marcos

May 9th, 2017

Abstract

The adoption of the Common Core State Standards (CCSS) has created quite a bit of media attention offering opinions from parents, teachers and administrators about the new standards and the resulting changes to curriculum. There is limited research on the student perspective. The research question used to guide this study is: What instructional strategies and supports do students perceive are effective in motivating them to succeed in high school Integrated Math classes based on the CCSS? The research defines motivating factors that affect student success such as connecting content to real world situations, student-centered classrooms, group collaboration and frequent formative, process-oriented feedback.

The current study uses a survey of students in Integrated Math classes (n=132) including statements with responses on a Likert scale and additional open ended questions. The data was disaggregated by program, Special Education (n=12) and English Language Learners (ELL) (n=11), separating the students who are not receiving services for those programs (n=109) and also by gender, males (n=64) and females (n=68). A t-test for statistical significance was used with a significance level $p<.05$. The initial findings of the survey indicate that teacher-directed instruction, technology use, elements of student-centered learning, and group collaboration all contribute to the success and motivation of students in Integrated Math classes. ELL students indicate that they want more tools that other populations, females indicate they prefer note-taking more than males, and males are more likely to agree that they would like to start a problem before being told how to do it. Further research is needed to gather information linked to student achievement and gather more data from Special Education and ELL populations.

Keywords: Common Core State Standards, English Language Learners, Group collaboration, Special Education, Student-centered instruction, Teacher-directed instruction, Technology

Acknowledgements

Thank you to Carol Van Vooren for your constant encouragement and feedback throughout the whole program. Thank you for believing that I could do this, even when I didn't think I could. Thank you to Vidalia Resendes for being an incredible mentor and for your support throughout this program. Thank you for always making the time to help me. Thank you to my colleagues in the Education Administration program for your insight and inspiration. I have learned so much and I am thankful for my time working with all of you. Finally, thank you to my family and friends for being there every step of the way. I couldn't have done this without all of you.

TABLE OF CONTENTS

List of Tables

List of Figures

Chapter One: Definition of Problem

With the creation and widespread adoption of the Common Core State Standards (CCSS) across the United States, there has been a significant amount of change that administrators, teachers, parents and students have encountered. Currently, 42 states, the District of Columbia and four U.S territories have adopted the CCSS. The adoption of the new standards has, in many cases, required the implementation of new curriculum and other changes, particularly in mathematics. Many districts have been faced with the challenge of creating or adopting curriculum aligned to the CCSS. The placement of topics in different courses as well as the introduction of the Standards of Mathematical Practices (SMPs) has given teachers the opportunity to try new strategies. The expectations for students, in many cases, have been redefined and there is a focus on depth of understanding as a way to better address college and career readiness. Some districts and schools have adopted curriculum that have incorporated increased use of technology, inquiry-based lessons and group work. As students work toward developing skills in these areas along with mastering the content standards, it is important to know what is working for students in the classroom. Understanding what instructional strategies are working for students is important to improve academic performance and foster their motivation to learn.

The adoption of the CCSS has created quite a bit of media attention around the new standards and the approaches that have resulted from the changes made. The majority of this attention has been focused on the opinions and experiences of administrators, teachers and parents. Education needs to address the student perspective on what is working for them. Particularly, students are being exposed to challenges that require motivation and perseverance. The limited amount of research about student motivation during the transition to CCSS is addressed in the current study.

Many students are being exposed to a significant amount of change in the expectations of their learning and performance. Not only is there an increased level of rigor with the CCSS, but a focus on literacy across all subject areas presents further challenges. These challenges are heightened for ELL and Special Education students. Particularly, looking at the differences in instructional strategies that identified subgroups such as ELLs, Special Education students, and different genders indicate work best; will offer educators and administrators valuable student feedback. Gathering data from a variety of students is important in the consideration of student perceptions of successful instructional strategies.

Purpose of Research

The research question used to guide this study is: What instructional strategies and supports do students perceive are effective in motivating them to succeed in high school Integrated Math classes based on the CCSS? The adoption of CCSS has sparked change in curriculum for many schools. With this new curriculum, both new and traditional strategies are being used to support students. The CCSS focuses on application of knowledge through higher order thinking skills. Administrators, teachers and parents have ideas about what will work in the classroom, either from their experience or what they have gathered from media sources. The purpose of this research is to gather student feedback about what is helping them and what they would like to see more of to be successful in the classroom and to feel motivated to learn.

The research defines some motivating factors that affect student performance such as connecting content to real world situations, creating a student-centered classroom and providing frequent formative, process-oriented feedback. In a class where many of these are being used more frequently than previous classes, the current study aims to add additional strategies and preferences from students. Particularly, the current study looks at instructional strategies and

classrooms supports that they find most effective and that help them feel motivated in a CCSS based math class. To address this research question, a survey will be conducted to gather information directly from students. The mixed-methods design of this study allows for quantitative data from a survey given to a sample of ninth and tenth grade students, and also includes qualitative data to uncover individual student perspectives. The results of this study are analyzed with a focus on perceived effectiveness of current research based practices and differences in the responses of students in various subgroups. Additionally, the results will be disaggregated by different subgroups to add more specific information to the research.

Preview Literature

Teachers are working to address the deeper levels of understanding that the CCSS demands of students (Murphy & Marshall, 2015). Teachers need support from districts and administrators in the form of time and resources during the transition to the rigor demanded by CCSS (Teuscher, Tran & Reys, 2015).The focus on real-world application can help students make connections to the material and increases their motivation (Popvic & Lederman, 2015). The shift resulting from the CCSS has opened the door for districts to adopt new curriculum and teachers to implement new strategies.

Instructional feedback is an important aspect of classroom procedures that affects student achievement (Neria, 2014). Increasing the frequency of assessments, both formal and informal, as well as providing process-oriented feedback can help to positively affect student achievement (Hattie, 2009) (Harks, Rakoczy, Hattie, Besser & Kileme, 2013). Creating an environment where students are encouraged to engage in group collaboration assists students in getting consistent feedback from group members (Havnes, Smith, Dysthe & Ludvigsen, 2012). Additionally, allowing students to work in groups provides more opportunities for students to turn into

teachers, encouraging a student centered learning environment (Hattie, 2009). Baeten, Dochy, Struyven, Parmentier and Vanderbruggen (2016) found that students prefer a balance of student-centered and teacher-directed instruction. Hattie (2009) suggests that when assigning homework, length and level of difficulty should be carefully considered. Length affects student motivation and higher order thinking problems on homework were least effective.

The research provides limited information about student feedback relating to what is working for them in Integrated Math classes. Further, the focus on differences between different groups is missing from the body of research currently available.

Preview Methodology

The current study uses a survey to gather information from a sample of 132 students from a school about strategies they have seen used in their Integrated Math classroom and questions about what motivates them to learn. The survey also includes demographic questions such as gender, ethnicity, program (Special Education and ELL), and grade. The survey is a mix of statements that students respond to on a Likert scale and other questions are open ended. Both parts of the survey address perceived successful instructional strategies and sources of motivation. The Likert scale statements also address the degree to which students feel current research based practices are effective in practice.

The mixed-method design of this study allows for a greater number of responses from a variety of students. The statements on the Likert scale allow for collection of data about the instructional strategies that students agree are working for them and the sources of motivation that drive their work in class and at home. The follow up open-ended questions allow for more in depth responses to these questions and further details into the student perspective. For the responses from all participants, the mean (M) and standard deviation (SD) are reported for

various statements relating to the research question. Additionally, important findings and themes from the open-ended questions relating to the statements are reported. Finally, the demographic data questions allow the researcher to analyze data based on different focus groups. The data was disaggregated by program (Special Education and ELL), separating the students who are not receiving services for those programs. The mean (M) and standard deviation (SD) for each population was recorded. The data was also disaggregated by gender and the mean (M) and standard deviation (SD) for each population was recorded. A t-test was performed to test for statistical significance in responses to the statements and p-values are recorded.

Significance of Research

Changes to curriculum that have resulted from the adoption of CCSS have posed challenges to administrators, teachers, parents and students. In many cases, the expectations for students have changed and as a result, there has been discussion about the challenges teachers and students are facing as they interact with the curriculum daily. Instructional strategies have been suggested and teachers have attended professional development to integrate more instructional support for students, as they find motivation to persevere through this time of change and in moving forward. Student performance has measured the effectiveness of these strategies, but it is not clear what the student perceptions of these strategies are and which ones they find affect their motivation and success. The results of this study inform teachers of the strategies they should focus on most. Further, the study breaks responses down by focus group to see if different types of classes and learners find specific strategies more useful than others. Educators, administrators and parents can benefit from pairing their own perceptions with the feedback from students in order to provide learning opportunities that encourage motivation and ultimately student success.

The research about the student perspective is limited. The current study adds more information about student views of instructional strategies that work for them, particularly in math classes using the CCSS. Additionally this research adds information about differences in student responses between different demographic groups of students.

The results of this study suggest important strategies and supports that students find helpful as well as information about who or what motivates them to learn. The study informs teachers of instructional strategies that successfully allow students to feel motivated to learn and prepared to use or display their knowledge on projects or assessments. A focus on students' depth of understanding is an important aspect of the changes to the curriculum that have resulted from the adoption of the new standards. The instructional strategies that support students in this transition are important for administrators, teachers and parents to know as most states reach full implementation.

Summary of Chapter

The goal of this study is to gather more information about which instructional strategies and support techniques students find beneficial to their learning and motivation during a time of transition and change to the CCSS and new Integrated Math curriculum. The study focuses particularly on secondary Integrated Math classes and compares groups of individuals to reveal any differences in strategies that work for certain groups of students. Research suggests instructional strategies that have historically been successful in raising academic performance in students. Understanding the current methods and strategies that are being used in classrooms provides background for what students include in what works best for them in the classroom.

Definitions

Process-oriented feedback: “feedback on achievement, motivational (interest) and metacognitive (self-evaluation) variables”

Chapter Two: Literature Review

With the adoption of the Common Core State Standards (CCSS) there have been a variety of opinions, experiences and thoughts shared by parents, educators, administrators, policy makers and community members (Reys, Dougherty, Olson, & Thomas, 2012). Curriculum changes resulting from the adoption of new standards has led researchers to focus on instructional practices that support student success during this time of change and moving forward (Dingman, Teuscher, Newton & Kasmer, 2013). Research has placed less emphasis on student perceptions of CCSS and the implementation of the curriculum changes and instructional practices.

The purpose of this study is to gather data from students in grades nine and ten, of varying ability levels, ethnicities and program services including ELLs and Special Education students. Students will provide information about what instructional strategies and supports they find the most useful, particularly in Integrated Math classes centered on the CCSS. The study aims to answer the following research question: What instructional strategies and supports do students perceive are effective in motivating them to succeed in high school Integrated Math classes based on the CCSS? The research shows that curriculum change requires support, time and dedication from districts, administrators and teachers. A review of the research on instructional strategies and student motivation provides insight into what produces positive outcomes for students.

Curriculum Change

The CCSS are a voluntary set of standards that have been adopted by 42 states, the District of Columbia and four U.S territories. The CCSS have been implemented in an “effort to establish consensus on expectations for student knowledge and skills that should be developed in

Grades K-12" (Porter, McMaken, Hwang & Yang, 2011, p. 103). Dingman et al. conducted an analysis of the differences in standards prior to CCSS and noted the following key changes "(1) changes in grade level(s) at which some mathematical content is taught, (2) changes in the number of grade levels in which particular mathematical topics appear, (3) changes in emphasis (increased/decreased) on particular mathematical topics, and (4) changes in the nature and level of reasoning expectations" (p. 555). In many states, curriculum changes have resulted from the adoption of the new standards. The fourth reason has been the focus of many discussions in the media and among educators with the shift to more depth in understanding of topics. Supporting students in the transition to the rigor demanded by the CCSS requires time, resources and dedication from school districts, administrators and teachers (Teuscher et al., 2015). Gutierrez and Rainbolt (2014) present the structural view of the CCSS, stating that "in consideration of implementation and then sustainability of the Standards, educational leaders need to pay attention to the goals, strategies, people, environment, and technology to support the integration of the Standards' learning goals into the school" (p. 76). In order for the students to succeed, administrators and teachers need to align goals with the standards.

Murphy and Marshall (2015) discuss pre-service teacher education with CCSS, finding that teachers feel confident about instructional strategies to address the changes, but are having more trouble with fostering the deeper understanding. Further, Yonezawa's (2015) work highlights that "Students and educators agree that linking high-level curricular materials to students' lives is a productive way to address the Common Core's goals" (p. 43). This richer level of thinking focused on real-world applications is what challenges teachers and students to adapt classroom strategies to fit their needs. In a study of teacher's knowledge and use of CCSS for English Language Arts (ELA), Ajayi (2016) suggests that teachers were eager to learn more

about how to incorporate the standards into their classes, but felt that "professional development and curricula materials were inadequate to meet the high standards of the CCSS" (p. 16). Professional development for current teachers and preservice teachers focusing on the identification of mathematical modeling of real world phenomena can help teachers feel more confident developing depth of understanding for students.

Incorporating more real-world applications of mathematical concepts and evaluating their success was the model of a study by Popovic and Lederman (2015). Teachers reported feeling more comfortable incorporating these activities as they saw students make connections to the material that they hadn't thought of themselves. November (2012) argues that encouraging critical thinking about how course topics can relate to the real world gives students a sense of purpose and foster's their motivation. Adopting or creating a CCSS based curriculum that incorporates these real-world connections for students is a challenge for districts and teachers but one that can be beneficial to students in the future.

Another aspect of the CCSS that is new is the introduction of the Standards of Mathematical Practice (SMPs). These SMPs "rest on important 'processes and proficiencies' with longstanding importance in mathematics education" (Standards for Mathematical Practice). These standards focus more on the skills that students use to solve problems and communicate their results, such as pattern recognition, conceptual understanding, critiquing the reasoning of others, and focusing on precision. Even with these additions, the work of Porter et al. reveals that the top-achieving countries they compared the CCSS to still "...put a greater emphasis on (the student task to) 'perform procedures' than do the U.S. Common Core standards" (p. 115).

These changes have created a lot of attention and discussion about the CCSS. Gutierrez and Rainbolt (2014) investigate four of the views of the CCSS including structural, human

resources, political and symbolic views, concluding that "Each piece of the (CCS) Standards Initiative should be connected to the core aspects of organizational improvement, growth, and sustainability of the change initiative in viewing the supports, resources, and impact on the structural, human relations, political and cultural spheres/paradigms of understanding schools as organizations" (p. 80). Changes to the curriculum used in schools to foster deeper understanding and make more connections to real-world problems have encouraged teachers to evaluate the effectiveness of old strategies and also try new instructional strategies and classroom practices.

Instructional Practices

The instructional practices that most drastically affect student achievement are included in Hattie's (2009) meta-analysis of over 800 studies. One of the most recurring practices in this research was about instructional feedback. Hattie's (2009) work reveals that testing accompanied by feedback had a greater effect on student performance than testing with no feedback. Further, the frequency of testing made a difference, with a more frequent amount of shorter tests having a better impact on student performance than longer, less frequent tests. Harks et al. (2013) found that process-oriented feedback was perceived to be more useful to students and had a positive effect on achievement and motivation in students when compared to grade-oriented feedback. The connection to the higher frequency of this process-oriented feedback that Hattie found in the meta-analysis supports the need to for more consistent, detailed feedback for students to reach the learning goals, particularly when working on challenging tasks. Focusing on and providing feedback can change the process by which students approach their work. Vollmeyer and Rheinberg (2005) found that "the announcement alone that they would receive feedback led participants to use a more systematic strategy, even before they received any actual feedback." (p. 599) The SMPs that are included in the new CCSS address these mathematical strategies that

students are encouraged to use on a daily basis. Giving frequent feedback to students encourages them to put these strategies to use.

The way that feedback is presented also affects students. Havnes et al. (2012) indicates that "students appreciated personal communication with teachers about their learning." (p.26). Additionally, Neria (2014) emphasizes the importance of general feedback and encouragement stating, "Tangible encouragement coupled with social and emotional support allow students to believe in themselves as they master the tasks implicit in the Common Core State Standards" (p. 6) Teacher feedback can come in many forms and personal connections can make for more positive student results. Pat-El, Tillema, and van Koppen (2012) found that interpersonal teacher feedback positively affected student willingness to engage in classroom activities.

Consistent, personal feedback assists students in working toward the goals of the course, but feedback doesn't have to always come from the teacher. The work of Havnes et al. (2012) concludes that group work was considered as an effective form of feedback for students as they work through challenging tasks. November (2012) states "Students often learn better from other students; they listen more intently, understand more completely, and participate more readily" (p. 20). The use of group work helps to encourage collaboration among students which is a goal of the CCSS SMPs and the focus on college and career readiness. Providing students the opportunity to work in groups has the potential to enhance their learning experience, but also has the potential for student distraction. Creating an environment where students can easily work together to accomplish challenging projects can help improve student performance. Sofroniou and Poutos (2016) found that students who were struggling in math felt less stress and increased self-esteem when working in groups because they had the opportunity to collaborate with fellow

group members. Increasing the interactions between students provides feedback and more confidence with content.

A student centered approach to classroom instruction encourages students to be the pilots of their own investigation and instruction. Hattie (2009) reports that teaching is successful when teachers can create experiences for students where they see themselves as their own teachers. Pink's (2009) study of motivation leads to a similar conclusion, that in schools, "A classroom of teachers is a classroom of learners" (p. 196). The student-centered approach puts responsibility on the students to be active participants in their learning. Neria (2014) emphasizes the need for the teacher to set clear expectations while also offering ample opportunities for student expression to engage them in classroom activities. Baeten et al. (2015) studied the preferences of students and teachers when it came to student-centered versus teacher- directed classrooms. The study found that "...students prefer not only the teacher-centered features of teacher direction, but also the student-centered features of cooperative learning and knowledge construction" (p. 57) The blend of teacher-direction and student-centered learning was most successful for students in helping them stay motivated to reach the learning goals.

The increasing use of technology in the classroom has put teachers in a position to incorporate computer based programs or lesson tools. "The fact that the number of male students indicated in higher numbers that they would work harder if computers were used more is an indication that discovering and exploring the computer is a classic norm for male students" (Mims-Word, 2012, p. 275) "CCSSM has therefore reduced the number of standards that explicitly call for calculators or technology to be used in grades K–8" (Dingman et al, 2013, p. 555)

A shift in the CCSS goal of increasing the depth of understanding and the subsequent curriculum changes have also continued the discussion about homework. While Hattie's meta-analysis (2009) reports overall positive effects of homework on student achievement, there are some considerations with regard to content and length that he highlights. Yonezawa (2015) states that "Often students complained of inordinate amounts of homework that lacked a meaningful purpose or objective" (p. 45). Hattie's research agrees that the length of the homework assignment affects students' achievement and motivation. The difficulty level was also something that Hattie (2009) reported needed to be evaluated because homework requiring higher levels of conceptual thinking was found to be the least effective. These concepts would be better addressed during class time in order to motivate students to persevere through the more challenging concepts. Özcan (2015) found that homework assignments of adequate length and difficulty increases student confidence with the material and leads to success but cautions that long assignments assigned too frequently negatively affects student performance as students willingness to participate.

November (2012) discusses the use of technology to create a digital learning farm where students take ownership of their learning and create materials that incorporate multiple sources of learning while collaborating with each other and with the community. The combination of technology use, student-centered classroom and group collaboration produces learning experiences that students connect to and can relate to their own lives. These types of classroom practices align with the goals of the CCSS to prepare students for college and career.

Student Motivation and Interest

Motivating students to persevere through challenging problems and tasks is an important topic in schools and increasingly important with the CCSS. Urdan and Schoenfelder (2006)

found that “Seemingly ‘unmotivated’ students can become willing participants in academic tasks if the tasks are tailored to their interests, or if students are given the opportunity to fulfill social needs by working with friends on the task” (p. 345). Relating content to student interest and real world situations helps them to develop an understanding of content material while also fulfilling a sense of purpose. Purpose is one of three aspects of motivation that Pink (2009) studied, along with autonomy and mastery. An analysis of studies found that the most deeply motivated, productive, and satisfied individuals are those who understand their work has a purpose that is larger than them.

Marzano’s (2003) analysis of factors that affect student success reveals that “students develop drives for success or failure avoidance and that those drives affect their willingness to engage in classroom tasks” (p. 148). Marzano also points out that while these tendencies to strive for success or avoid failure can vary from student to student or even day to day, the students who tend to strive for success have more positive outcomes than students who achieve in order to avoid failure. Understanding why students choose to strive for success is important in fostering positive change in their academic achievement and levels of motivation.

Both internal and external motivators exist to create drive for success in students. Swinson’s (2010) research shows that student involvement in school and classroom decisions can help them to feel motivated to behave and perform. Yonezawa’s (2015) research reveals that students find “Engaging classes are those in which the students assumed active roles as creators and communicators of knowledge rather than as a passive receptacles receiving teacher-generated content” (pg. 49). Classes that students feel motivated to learn in are those in which they feel they are actively participating in the learning. Marzano (2003) agrees and suggests that allowing students access to classroom material that is inherently engaging and interesting

increases student motivation and interest. Additionally, November (2012) describes a classroom model, the digital learning farm which fosters student interest in the material and gives purpose to the work students are doing in the classroom. “Internal motivation was the most significant predictor of self-regulated learning and could alone explain 13% of the mathematical problem-solving scores” (Ozcan, 2016, p. 415). Intrinsic motivation is the largest predictor of success. Providing rewards for completing tasks will produce short term results but will affect long term intrinsic motivation associated with the content (Pink, 2009).

Summary of Chapter

Overall, the research suggests that changes to the math curriculum as a result of CCSS adoption have created the need for a classroom that looks different from the traditional math classroom. “Educators can directly enhance student motivation by altering controllable factors such as teaching style, curricula, and school or classroom policies” (Urdan & Schoenfelder, 2006, p. 345) This research shows that changes to the curriculum and instructional practices can affect student motivation. Students need to engage in the learning process and persevere through challenges in order to access the material at the depth that the standards require. Consistent and timely feedback, as well as meaningful homework assignments is shown as factors that contribute to students’ academic success. As a result of looking into the current research available on the best practices for educators in the classroom and the effects on student achievement and motivation, a study was conducted to see what students value most.

Chapter Three: Methodology

The adoption of the CCSS has required students and teachers to adapt to changes to curriculum. With these changes, new curriculum and instructional strategies are being implemented in many cases. In order to understand the instructional strategies and supports that are most beneficial with the transition, the current study focuses on student responses to what they find helps them feel motivated and successful.

The study used a mixed-method designed to collect quantitative data and qualitative data about successful instructional strategies and motivating factors contributing to student success. The survey used to collect this data included statements that students responded to on a Likert scale as well as students' open responses related to their experience with the new standards and the classes that have resulted from them. The sample of students was a convenience sample from the researcher's two different levels of Integrated Math classes.

Design

This study used a mixed methods design. This design approach was chosen because the Likert-scale questions allow for quantitative results about the instructional strategies and levels of motivation. Open-ended questions follow these statements to gather more specific information about what students find most helpful. Included in the survey was demographic information so that results can be analyzed by focus group and differences reported. This design allowed students to respond to statements about instructional strategies that work for them as measured by their own perceptions about how it relates to their success. The students also responded to statements about their motivation levels and perceived usefulness of feedback. Then, students were also asked to answer additional follow up questions about their preferences and perceptions about what motivates them and anything not specifically addressed in the statements.

Students are not likely to formally share their opinions about curriculum and instructional practices as adults do. The design of this study provides a method for students to share their perspective. The open-ended questions of the survey provide an opportunity to gather specific feedback from students. The length of the survey makes it accessible to many students.

Participants

This survey was conducted with a sample of 132 students, including 9th and 10th graders in two levels of Integrated Math classes. The survey will be given to 132 students total, 64 males and 68 females. The students surveyed are between ninth and eleventh grade. There are 58 ninth graders, 65 tenth graders, nine eleventh graders participating in the survey. Out of the total amount of students surveyed, 11 are English learners, 18 are Redesignated Fluent English Proficient students and 12 students are receiving special education services. Out of the students surveyed, 55 students are enrolled in IM1 Honors and the remaining 77 students are in IM2 college prep. This was a convenience sample of the researcher's classes. Every student in each class was surveyed, including students who are English learners, students who are receiving special education services, and students in a variety of ethnic groups.

This sample is a convenience sample of students assigned to the researcher's courses. The two courses that the surveyed students are enrolled in are the IM1 Honors level and the IM2 College Prep level. Students were surveyed during regular class time as a part of the usual class routines and students were made aware that their responses may be used anonymously for this research.

Setting

This study was conducted at a large high school located in an affluent, coastal area of southern California. Within the student population of approximately 2700, the demographic breakdown is as follows, 60% Caucasian, 25% Asian, 11% Hispanic, 1% African American and 3% other. Of the total school population, 5% are considered economically disadvantaged. There is a culture of high-performance within the school and the community. Approximately 76% of students participate in the Advanced Placement program at the school. Parents in the area tend to be highly educated and highly involved in the school community. Also, many families from other countries move to the area to attend the school, creating a fairly large population of English learner students. The classes surveyed represent this population of students. The variety of the sample including males, females, English learners, students receiving special education services and different level of class (honors vs. college prep) is important for the analysis of the results by demographic group.

The school where the research was conducted has an Integrated Math program with three core courses, Integrated Math 1 (IM1), Integrated Math 2 (IM2) and Integrated Math 3 (IM3). There are different levels at each course. IM1 has three levels, the lowest is called IM1 Readiness and is for students who are below ninth grade level. The grade level options for ninth graders are IM1 College Prep and IM1 Honors. These same two options College Prep and Honors are offered for IM2 and IM3. The participants for this study were enrolled in the researcher's IM1 Honors and IM2 College Prep classes creating a convenience sample of the population at the school.

Instruments

A three part survey was conducted electronically. The first part of the survey contained statements answered on a five point Likert-scale, the second part of the survey was a series of open-ended questions and the third part collected demographic data about the students.

For each statement in the survey, students answered along the five point Likert-scale including strongly agree (5), agree (4), undecided (3), disagree (2) or strongly disagree (1) (Mertler & Charles, 2011, pg. 114). The statements gathered information about the perceived usefulness of different instructional strategies, such as "Taking notes helps me understand topics", "I would rather work through something first before I am told how to solve a problem" and "I find homework is a helpful tool to support my learning in this class". Also included in this part of the survey were questions about sources of interest and motivation such as, "I can easily motivate myself to complete my work in class." Part two of the survey included open-ended questions about what students find are the most useful strategies teachers use in the classroom and what they consider the most motivating factors. For example, "How would you describe what best motivates you to succeed in this class?" and "How would you describe what does not motivate you to succeed in this class?" The survey will also include demographic questions to gather information about each student's age, grade, gender, ethnicity and program services (Special Education and English Language Learner). Using the survey as my data collection tool allowed me to gather responses from a larger sample and a wide variety of students. The survey was created to address the research question and allowed students multiple ways to provide their feedback.

Procedures

This study used a one-time descriptive survey completed by students during class time. (Mertler & Charles, 2011, pg. 232) The survey was created and then was piloted with a small sample of students. Once the survey was ready, it was administered during each class period on the same day. If students were not present in class on that day, they took the survey during the following class period.

In order to get the most responses from students, I conducted the survey during regular class time. It was not appropriate to make this a voluntary survey that could have been taken outside of class time, as that would have limited my sample and significantly affected the type of responses I would have gotten. Once the surveys were collected, all responses were kept confidential and responses were made anonymous.

Analysis

The survey administered was first analyzed using all of the responses, to determine the most valued instructional strategies and most common motivating factors among all students. The Likert scale statements were analyzed by observing the most frequent responses as well as the average response (M) and the standard deviation (SD). For the open-ended questions, student responses were analyzed for common themes relating to the research question. Additionally, the data were analyzed to explore differences in responses from different focus groups. The average responses (M) and the standard deviation (SD) for the Likert scale statements of special education students, ELLs and the participants not receiving services in these programs were compared. A t-test was used to reveal statistically significant differences in responses. The data were disaggregated by gender as well. The mean (M) and standard deviation (SD) for various

statements are recorded for males and females. A t-test was also used to determine statistical significance.

The validity of this survey was addressed by considering the other variables involved and modeling the survey after other, more established surveys. The reliability of this survey was addressed by using the test-retest method. A smaller sample of students was asked to repeat the survey to verify the reliability. Also, results were compared with other research.

Summary of Chapter

This study used a survey to gather information from a sample of students that represented the population of one Southern California high school. The mixed methods design of the survey allowed for variety in the responses and multiple analysis options. Further, demographic data was collected to ensure that various focus groups could be analyzed to reveal any differences in preferences. The results of the survey will inform the research question, providing answers to what instructional strategies and supports students find most beneficial and how their motivation is affected by classroom practices and factors outside the classroom. The analysis of results for different groups provides more specific information for teachers about how they might tailor instructional strategies to fit the needs of a larger number of students.

Chapter Four: Data Analysis

The adoption of the CCSS has created some change in curriculum and encourages a focus on depth of knowledge especially in mathematics. With this change, it has opened the doors for educators to try different strategies and instructional practices. The student perspective on these changes has not been the focus of the media attention and it is important to get the feedback from students on what they feel helps them stay motivated to persevere through challenges. The present study offers more of the student perspective on what instructional strategies motivate them to work hard to achieve understanding of the material. Additionally, the data was disaggregated to reveal differences in responses to statements from different subgroups. Data from males and females were separated as well as data from students in special education and ELL programs. The data revealed differences in student preferences when it comes to motivation and the perceived usefulness of certain instructional strategies.

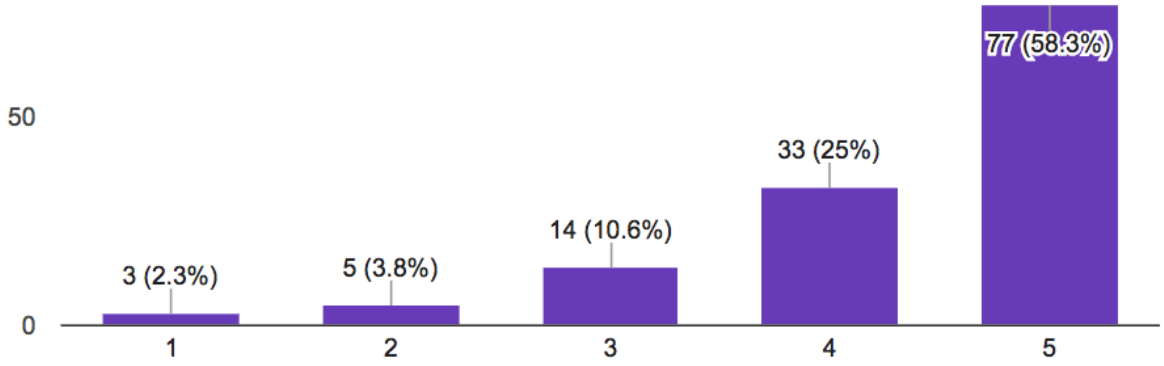
The data collected in the present study included responses to various statements about current research based instructional practices and levels of motivation. Additionally, students were asked follow up questions about specific strategies they find most useful. The data are presented according to the participants that the analysis focused on. The Likert scale statements for all participants are presented first, followed by reports of the most common responses to open-ended questions. Following the results of all participants, the average responses or mean (M) and standard deviation (SD) to various statements for focus groups are presented. In order to test for statistical significance in the responses of the groups compared, a t-test was conducted and p-values are stated.

Data Presentation and Analysis

All participants.

All students responded to statements on a 5-point Likert scale and answered follow up open-ended questions. In response to "Taking notes helps me to understand topics" (S1) students responded with an average answer of 4.3 (M=4.3, SD=1.0) which indicates that they strongly agree that taking notes helps them feel successful. Figure 1 below displays student responses.

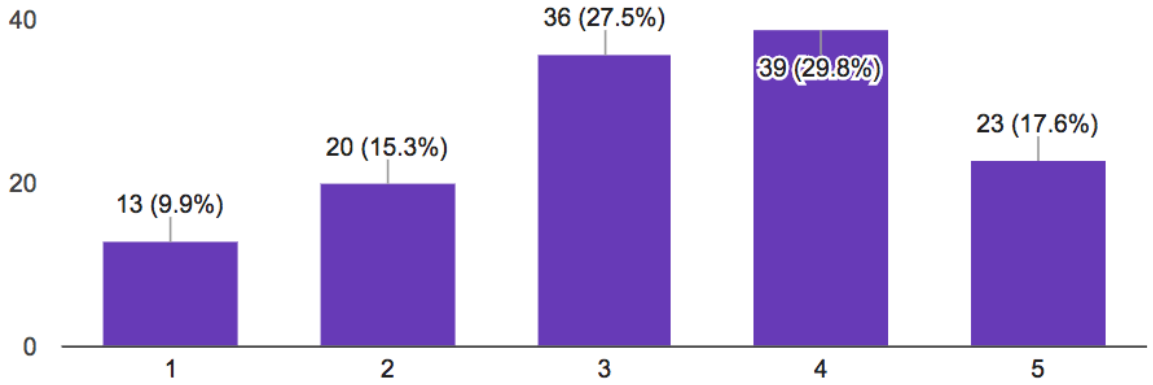
Figure 1. **Responses to "Taking notes helps me understand topics."**



Additionally, when asked the follow up question about what specific learning experiences have contributed to their learning in the class, 43% of students mentioned that notes help them to understand the topics. Students made statements such as, "There is nothing better than having all the correct definitions, formulas, and explanations in notes to study from," and "Notes help me the most in understanding material in class."

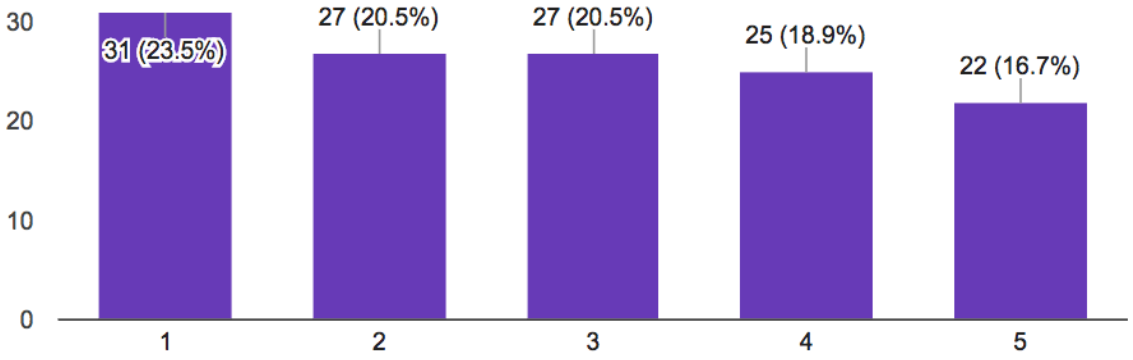
In response to the statement, "Online learning tools enhance my learning" (S2) students gave an average response of 3.3 (M=3.3, SD=1.2). The spread of responses shows that students tend to lean toward agreement that online learning tools enhance their learning. The results show that 25.2% of responses either strongly disagree or disagree, while 47.4% either agree or strongly agree. Figure 2 below shows student responses.

Figure 2. **Responses to "Online learning tools enhance my learning."**



When asked to respond to "I would rather work through something first before I am told how to solve a problem" (S3) the average student response was 2.8 (M=2.8, SD=1.4), indicating that students feel mixed on this topic, as there is no clear trend in responses. The SD is high, as student responses vary quite a bit. The data skews slightly to the right, with 44% responding that they disagree, they would not like to work through a problem or task before they are told how to solve it. Conversely, 35.6% indicated that they agreed, they would like to work through something before solving. The most frequent response was that students strongly disagree, 23.5%, indicating that students lean toward a preference of teacher-directed instruction and guidance prior to working through problems. Figure 3 below displays student responses.

Figure 3. **Responses to "I would rather work through something first before I am told how to solve a problem."**



Participants agree that group work helps them and they indicated they feel productive when working in groups. Figure 4 below shows the most frequent response to "I learn more from working with my classmates in groups" (S4) is strongly agree, at 28.8% of total responses. The average response was 3.6 (M=3.6, SD=1.2), indicating that students feel they gain more knowledge from working in groups. Figure 5 below displays the responses to "I am productive when working in groups". The average response is 3.8 (M=3.8, SD=1.1), which closely matches the most frequent response of 4 (44.7%), indicating that participants agree they are productive working in groups. The responses of students indicate that group collaboration has a positive effect on their learning and productivity.

Figure 4. **Responses to "I learn more from working with my classmates in groups"**

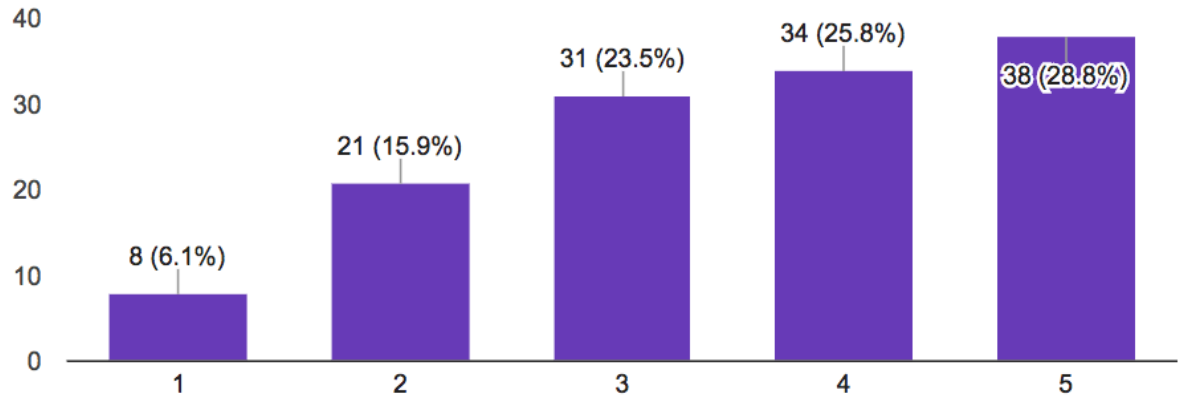
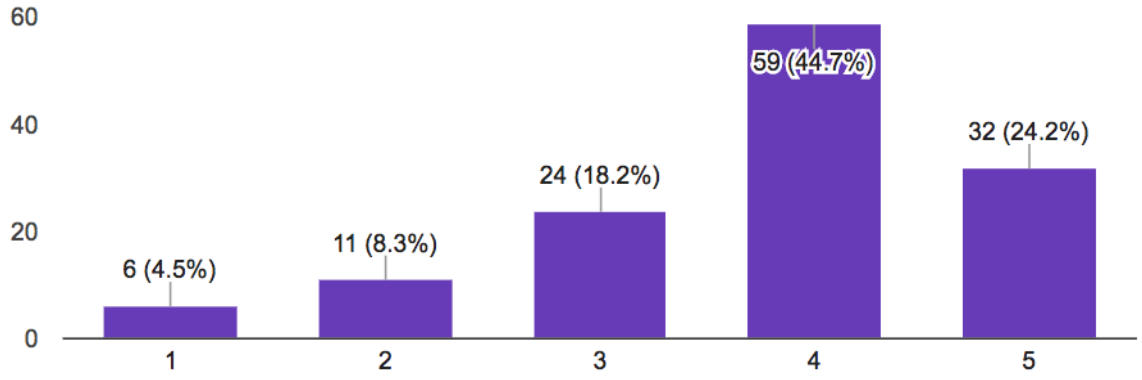


Figure 5. **Responses to "I am productive when working in groups."**

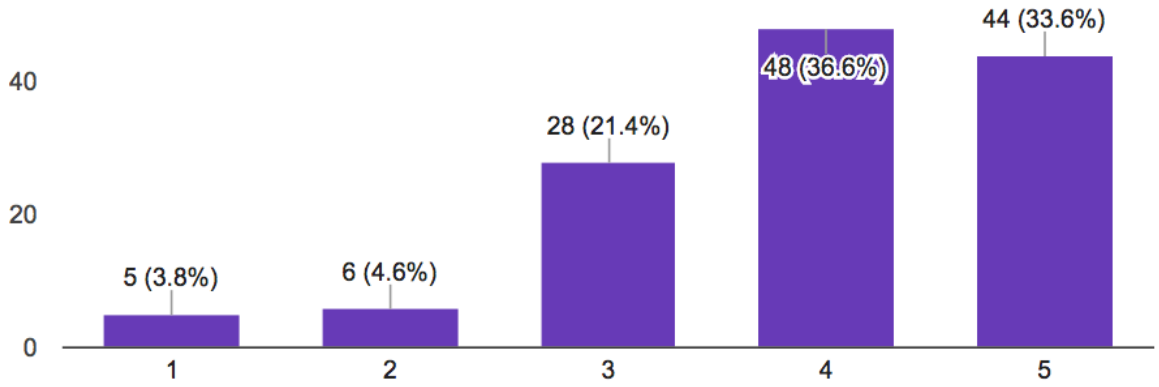


Students also discussed groups in response to the open-ended question about learning experiences that have contributed to their understanding. Students included responses such as, "I like working with my table and comparing answers" and "Working with partners is useful because they all show their ways of how to solve a problem." One student summed up the benefits and also the drawbacks of group work with the following response, "Being in good groups that are productive but still fun. At my last table I was able to connect really well with two of my previous group members and I had some of the best grades in this class yet. I find it difficult when other kids are talking and laughing around me, talking about things outside of class, I find it hard to concentrate." While there are risks to allowing students to collaborate and work in groups, more students discussed the benefits of increased understanding and more feedback.

When asked to respond to the statement "I can easily motivate myself to complete my work in class." (S6), students indicated they agree with an average response of 3.9 (M=3.9, SD=1.0). Although the statement does not reveal the sources of motivation for students to complete work in the class, 70.2% of students indicate that they can easily motivate themselves

to complete their work, by choosing agree or strongly agree. Figure 6 below depicts student responses.

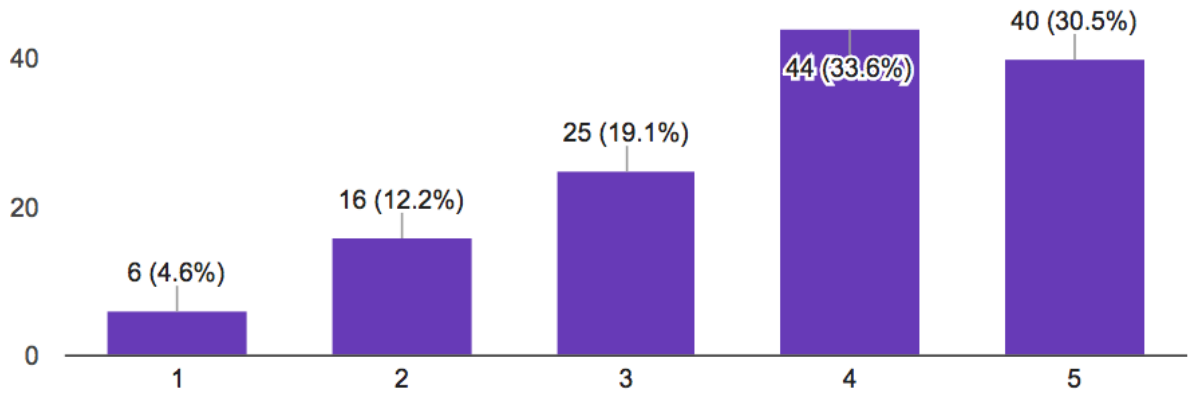
Figure 6. **Responses to "I can easily motivate myself to complete my work in class."**



Students indicate that their primary motivation to succeed is grades. Responses to "How would you describe what best motivates you to succeed in this class?" included, "Getting an A", "Achieving a high GPA", "Wanting to get good grades to go to college". Out of all of the responses to this question, 72% of students specifically mentioned that they are motivated by grades, their GPA or college admission. These results reveal that the majority of students feel that they are most motivated by these external factors.

In response to the statement "I get feedback about my work in this class" (S7), the average student response was 3.7 (M=3.7, SD=1.2), indicating that students agree that they get feedback about their work in the course. Figure 7 below shows the frequency of student responses.

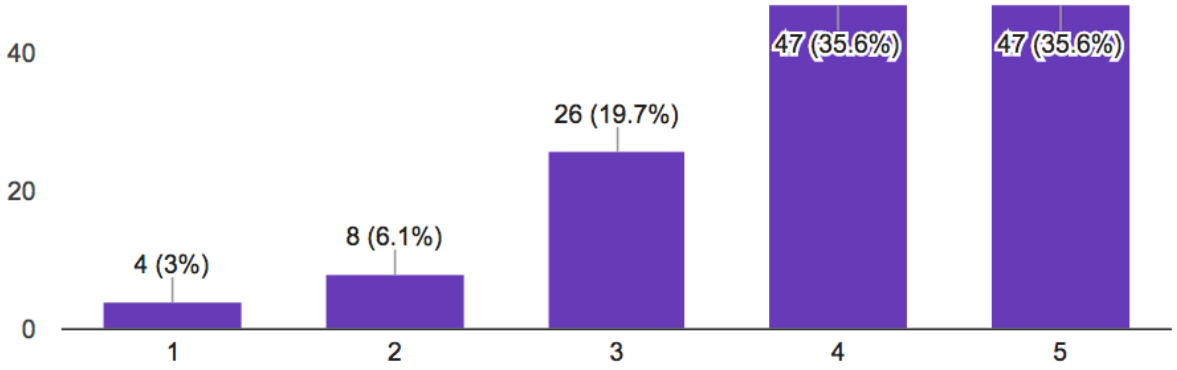
Figure 7. **Responses to "I get feedback about my work in this class."**



More specifically, when asked the follow up question "What is the most useful feedback that you get in this class?" students mainly answered with one-on-one help from the teacher and also homework questions and review of correct answers. Students stated "When we go over homework because I learn from my mistakes and I can understand the concept better", "The most useful feedback I get in class is just to ask the teacher directly about the problems I don't understand." and "Going over homework problems that we didn't understand the night before as a class also helps to get the most useful feedback."

When asked "I find homework is a helpful tool to support my learning in this class" (S8), students responded with an average of 3.9 (M=3.9, SD=1) indicating that they agree homework assists their learning in the class. Figure 8 below depicts student responses.

Figure 8. **Responses to "I find homework is a helpful tool to support my learning in this class."**

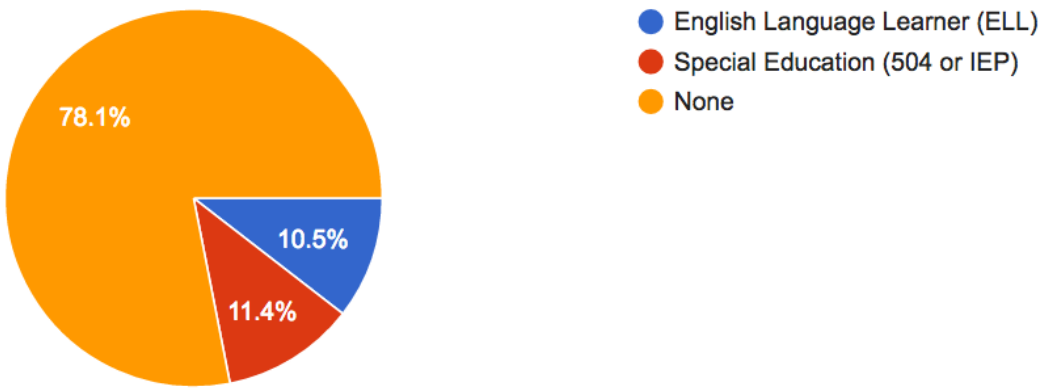


When asked the following open-ended question about homework, “How can homework be a more helpful tool for feedback on your progress with understanding material?”, students responded with an array of suggestions for change and insight into what already works for them. Responses such as “Having less of it would help because I mostly just feel stressed about it and rather get it done than actually learn from it”, “Assign the key details, but not excess things”, and “I think for the homework problems there should be more focusing on what we are learning in class then review or preview. I appreciate the time to refresh myself on previous topics, but it is sometimes frustrating having to waste time doing problems that are review”. Also, students responded “If there were more difficult homework problems, I could really see if I truly understand the concepts and can apply them to different situations that I am not used to seeing”. Students indicate that the length and level of difficulty of the homework affects how helpful they find it is for their learning. Students also responded with statements such as, “When the teacher answers homework questions thoroughly, homework becomes a more helpful tool.” and “I feel that the homework is only helpful to me when we review it in class”. Additionally, students indicate that the feedback they get from correcting the homework and asking questions in class is valuable to their learning.

Data disaggregated by programs.

Students were asked to indicate programs that they receive that they receive services for, either ELL or special education. Of the 132 participants, 11 (10.5%) are ELLs and 12 (11.4%) receive services for special education. Figure 4 below shows this breakdown by program.

Figure 9. **English Language Learner and Special Education populations.**



The results for special education and ELL students were separated from the remaining participant population. The average response (M) and standard deviation (SD) for each statement is included in table 1 below.

Table 1. **Results of student response means and standard deviations disaggregated by program.**

Statement	Special Education n=12	ELL n=11	Students not receiving Special Education or ELL services n=109
Taking notes helps me to understand topics (S1)	M=4 SD=1.3	M=4 SD=1.4	M=4.4 SD=.9
Online learning tools enhance my learning (S2)	M=3 SD=1.3	M=4 SD=1.2	M=3.2 SD=1.2

Statement	Special Education n=12	ELL n=11	Students not receiving Special Education or ELL services n=109
I would rather work through something first before I am told how to solve a problem (S3)	M=2.6 SD=1.4	M=4.2 SD=1.0	M=2.7 SD=1.4
I learn more from working with my classmates in groups (S4)	M=3.4 SD=1.2	M=4 SD=1.5	M=3.5 SD=1.2
I am productive when working in groups (S5)	M=3.6 SD=1.4	M=3.5 SD=1.4	M=3.8 SD=1.0
I can easily motivate myself to complete my work in class (S6)	M=3.7 SD=1.2	M=4.1 SD=.8	M=3.9 SD=1.0
I get feedback about my work in this class (S7)	M=3.3 SD=1.1	M=4.3 SD=1.1	M=3.7 SD=1.2
I find homework is a helpful tool to support my learning in this class (S8)	M=3.5 SD=1.4	M=4.3 SD=.9	M=3.9 SD=1

The results of t-tests for statistical significance comparing special education with the students not receiving special education or ELL services are presented in table 2 below. None of the values indicated the differences in responses were statistically significant. The students receiving special education services did not respond significantly higher or lower than the students not receiving special education or ELL services. The results of t-tests for statistical significance for ELL and remaining students not in special education or ELL programs is also included in table 2 below. ELL students responded significantly higher for 25% of the statements. The difference in the responses of ELL students to the statement “Online learning tools enhance my learning” was found to be significantly (p=.0372) higher than that of the students not receiving services. Additionally, ELL students responded significantly (p=.0008)

higher that they would rather work through a problem on their own before they are told how to solve it. The results of the t-tests comparing each program to the students not receiving special education or ELL services are presented in table 2 below. A p-value of less than .05 indicates significance ($p<.05$).

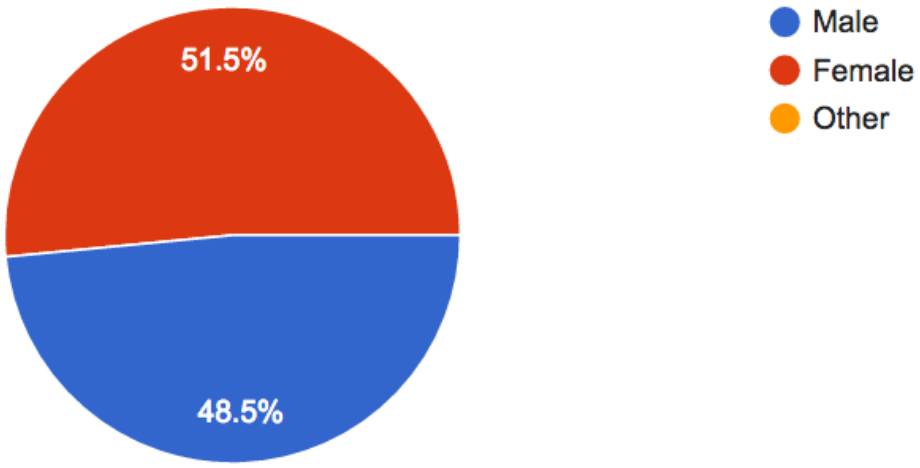
Table 2. **Results of t-test for statistical significance.**

Statement	Special Education and students not receiving Special Education or ELL services	ELL and students not receiving Special Education or ELL services
Taking notes helps me to understand topics (S1)	p=.1662	p=.1870
Online learning tools enhance my learning (S2)	p=.5877	p=.0372
I would rather work through something first before I am told how to solve a problem (S3)	p=.8147	p=.0008
I learn more from working with my classmates in groups (S4)	p=.7846	p=.2007
I am productive when working in groups (S5)	p=.5298	p=.3637
I can easily motivate myself to complete my work in class (S6)	p=.5204	p=.5221
I get feedback about my work in this class (S7)	p=.2100	p=.2049
I find homework is a helpful tool to support my learning in this class (S8)	p=.2718	p=.1142

Data disaggregated by gender.

Of the 132 participants, 64 (48.5%) are male and 68 (51.5%) are female. Figure 9 below shows the demographics by gender.

Figure 10. **Male and Female populations.**



The responses of males and females were separated to study differences in gender preferences. The average response (M) and standard deviation (SD) for each statement is included in table 3 below.

Table 3. **Results of student responses disaggregated by gender.**

Statement	Male n=64	Female n=68
Taking notes helps me to understand topics (S1)	M=4 SD=1.1	M=4.7 SD=.6
Online learning tools enhance my learning (S2)	M=3.3 SD=1.2	M=3.3 SD=1.3
I would rather work through something first before I am told how to solve a problem (S3)	M=3.1 SD=1.4	M=2.6 SD=1.4
I learn more from working with my	M=3.7	M=3.4

Statement	Male n=64	Female n=68
classmates in groups (S4)	SD=1.2	SD=1.3
I am productive when working in groups (S5)	M=3.8 SD=1.0	M=3.7 SD=1.1
I can easily motivate myself to complete my work in class (S6)	M=3.8 SD=1.0	M=4.1 SD=1.0
I get feedback about my work in this class (S7)	M=3.9 SD=1.1	M=3.6 SD=1.2
I find homework is a helpful tool to support my learning in this class (S8)	M=3.9 SD=.9	M=4.0 SD=1.1

The results of the t-test for statistical significance for each statement are included below in table 4.

Table 4. **Results of t-test for statistical significance**

Statement	Males and Females
Taking notes helps me to understand topics (S1)	p<.0001
Online learning tools enhance my learning (S2)	p=1.000
I would rather work through something first before I am told how to solve a problem (S3)	p=.0423
I learn more from working with my classmates in groups (S4)	p=.1714
I am productive when working in groups (S5)	p=.5864
I can easily motivate myself to complete my work in class (S6)	p=.0873
I get feedback about my work in this class (S7)	p=.1375

Statement	Males and Females
I find homework is a helpful tool to support my learning in this class (S8)	p=.5699

The most significant difference is in the response to “Taking notes helps me to understand topics”. Females (M=4.7) responded significantly (p<.0001) higher than males (M=4.0). These findings suggest that females prefer taking notes more than males and feel it is a better tool. Although both genders agree it is helpful, the results reveal a gap in perceived usefulness. Additionally, the results reveal that males (M=3.1) responded significantly (p=.0423) higher than females (M=2.6) to the statement “I would rather work through something before I am told how to solve a problem”. These results indicate that males are more willing to start a problem or task before being told how to solve a problem. Another notable difference, although not quite statistically significant (p=.0873) is that females (M=4.1) agree more strongly that they can motivate themselves to complete work in the class than males (M=3.8). No difference in any other statement was observed to be statistically significant.

Summary/Conclusion

The findings in this chapter address the research question: What instructional strategies and supports do students perceive are effective in motivating them to succeed in high school Integrated Math classes based on the CCSS? The results of this study reveal that students agree taking notes, using online learning tools, group collaboration and feedback, particularly on homework, all help them feel successful in the Integrated Math class. When separating the data by special education and ELL services, significant differences included ELL students reporting

they find online tools helped their learning more than students not receiving services. Additionally, ELL students are more interested in starting a problem before being told how to solve it. No significant differences were found for special education when compared to students not receiving special education or ELL services. When disaggregating by gender, females indicated they found taking notes was significantly more helpful than males did. Males responded with significantly more agreement to working through a problem before being told how to solve it.

Overall, the results of this study provide educators with valuable student feedback about classroom practices that can be enhanced or introduced to help students feel motivated. Providing rich learning opportunities for students to prepare them for college and career readiness is an important aspect of the CCSS that educators can focus on. Teacher-directed instruction, technology use, elements of student-centered learning, and group collaboration all contribute to the success and motivation of students in Integrated Math classes. The limitations of the student and directions for the future are addressed in Chapter 5.

Chapter Five: Thesis Recommendations

Many teachers, administrators and parents have experienced or heard about changes to content and curriculum as a result of the adoption of the CCSS. Students are aware of the changes to curriculum and the shifts in content and the introduction of the Standards of Mathematical Practice (SMPs). As a teacher, I have noticed that the changes in curriculum have sparked conversation and policy changes affecting instructional strategies. Teachers are increasingly being encouraged to use group work in their classes to offer opportunities for collaboration to prepare students for the ever increasing globally connected workforce. Classroom environments are becoming more student-centered with opportunities for students to create their own questions to answer. The discussion about homework length and difficulty continues. Technology and online learning tools are incorporated into daily instruction to prepare students for their work in the future. This study was inspired by these changes and aimed to gather information from students about their perceptions of the effectiveness of instructional strategies being used in a high school Integrated Math class and their motivation. The results of the study confirmed much of the research, including positive impact of group work, usefulness of teacher feedback on process, and a balance between teacher-directed and student-centered instruction.

Finding Summary/Interpretations

Overall, the results of this study both affirm and conflict with current research on instructional practices and student motivation. The participants of the study agree that taking notes is helpful to their learning in the class. While this conflicts with some research on the success of student-centered classrooms, it is affirmed by research that students do better in a classroom where both teacher-directed instruction and student-based activities are used (Baeten

et al., 2015). This study did not find differences in responses about taking notes for students receiving special education and ELL services. However, there was a significant difference in the response of males and females. While both populations agreed that taking notes is helpful to their learning, females tend to agree at a significantly higher rate than males. These results indicate that all students, especially females, find that taking notes, a form of teacher-directed instruction is effective in supporting their learning.

Students agree that online learning tools enhance their learning. Although the research indicated that males were more motivated by the use of technology (Mim-Word, 2012), the results of this study did not find a significant difference between males and females. However, the results did find that ELL students agree more strongly that online learning tools enhance their learning than students not receiving special education or ELL services. These results indicate that ELL students want more tools to help aid their understanding of material. The findings suggest that students, especially ELL students find online learning tools support their learning in Integrated Math classes.

When asked if students would rather work through a problem before being told how to solve it, students provided inconclusive results. The responses had no clear trend, although a higher percentage of students disagreed. This indicates that students would rather take notes or be guided through a problem prior to working on it individually. While many students indicated that they enjoy working through challenging problems, they indicated the desire for teacher direction and feedback. ELL students responded significantly higher that they would rather work through something before they are told how to solve the problem. Additionally, males responded significantly higher than females. This indicates that ELL students and males would like to work through a problem prior to being told how to solve it. Hattie (2009) found that teaching is most

successful when teachers create experiences for students where they see themselves as their own teachers. According to Yonezawa (2015), students feel more engaged when they can create their own understanding and further when they can choose what questions they want to answer. The findings suggest that this is true for ELL students and is truer for male students than female students. There may be other aspects or measures of student-centered classes that better predict if it is a strategy that students feel motivates them succeed.

Students agree that they learn more from group collaboration and that they work productively in groups. The combined works of November (2012) and Havnes et al. (2012) suggest group work is an effective form of feedback for students and also that students often work more diligently and listen more intently when collaborating in groups. The results of this study show that participants find group work helps them feel that they can connect with other students to get feedback and solve challenging problems. There were no significant differences in special education, ELL, male or female student responses to the usefulness of group work.

Students agree that they can motivate themselves to succeed in the class. The research says that students feel motivated when the content is tailored to their interests or real world situations (Urdan & Schoenfelder, 2006) and also when they feel the work has a purpose (Pink, 2009). Responses to questions about what motivates them reveals that most students instead feel motivated by external factors such as grades or GPA, rather than feeling the work they are doing relates to their interest. Marzano (2003) found students striving for success had more positive outcomes than those avoiding failure. Further research is needed to determine how many students strive for success in their grades, rather than avoiding failure.

Feedback is an important aspect of the learning process. Students agree that they get feedback about their work in the Integrated Math class, suggesting that feedback and help on

homework assignments is one of the most useful instructional strategies that helps them learn and feel motivated. These findings confirm the work of Harks et al. (2013) which found that process-oriented feedback had a greater effect on student performance and motivation than grade-oriented feedback. The daily feedback on homework helps students to understand where they need to improve before the summative assessments. Additionally, students indicated that individual help from the teacher during class time is a great way to make sure they are on the right track. Finally, students confirmed the research of Havnes et al. (2012) which found that group work is considered an effective form of feedback. Students in the Integrated Math classes are encouraged to work in groups to complete challenging tasks and practice problems. The responses from students in this study confirm that students feel motivated when they can work with a group of students to complete problems and can use the opportunity to check their answers with peers. There were no significant differences in special education, ELL, male or female student responses to whether they get feedback on their work in the class. Providing multiple sources of feedback for students is an instructional strategy that students feel is helpful to their learning and keeps them motivated.

In the Integrated Math classes, homework is assigned each night for students to practice the skills they gained during the class. Students indicated that they agree homework is a helpful tool to support their learning, however when asked about what does not motivate them some responses included that homework assignments can be too long and others asked for homework assignments that had less problems but more challenging questions. The research of Özcan (2016) found that homework assignments of adequate length and appropriate difficulty are the most beneficial for motivating students and increasing confidence. While students find that homework is a helpful tool to support learning, they confirm the research that the length and

level of difficulty are important to consider. There were no significant differences in special education, ELL, male or female student responses to if they find homework is a helpful tool.

Lessons Learned/Educational Implications

Overall in this study, students prefer a balance of teacher-directed and student-centered classroom environments. Teachers need to incorporate time for notes and formalizing of ideas in a student-centered environment in order to support the most students. Females agreed more than males that taking notes was helpful to their learning while males answered with a higher average that they would like to start a problem before being told how to solve it. These results suggest that females may have less confidence starting a problem on their own and would rather take notes and then practice concepts. Students, particularly females, may need more support when it comes to working through problems before teacher-guided instruction.

Students need feedback to feel successful in the class. Feedback on homework and other process-oriented feedback is more helpful that grade-oriented feedback. The structure of teacher feedback is important- providing opportunities for one-on-one feedback is valuable to students. Additionally, students feel that working in groups helps them to get feedback from their peers that also offers this individual feedback while they are working through problems. Group work also provides opportunities for students to collaborate and creates social experiences for students that are productive.

English learner students indicated they want more tools and opportunities than any other group. These students want support with online learning tools and also teacher and group feedback. ELL students prefer to work through a problem before being told how to do it, so allowing this freedom for students is suggested.

The majority of students feel motivated by grades and other extrinsic factors. There is a disconnect between the process-oriented feedback that students want and the grade-oriented feedback that they value. Working toward incorporating more real-world connections to student interests may help shift their motivation as they feel a more purposeful connection to the material.

Limitations of Research

A limitation of this study is that the researcher is the teacher of the classes participating in the survey and may have bias towards the data. She may also influence the student results. Additionally, strategies included in the survey may not be used in every Integrated Math class.

One more of the limitations to this study is the participants selected. The participants for this study were a convenience sample in order to pilot this type of survey for students. In order to expand the results, it is necessary to gather data from more students in Integrated Math classes such as in the department at the same school or even in the classes throughout the district. This would allow more variety of students, including more students who are in readiness (below grade level) classes, higher level Integrated Math classes, more ELLs and more students receiving special education services. With unlimited resources and time, I would have loved to give the survey to more Integrated Math classes at the school and throughout the district.

Another limitation of the study is the limited number of participants in the ELL and Special Education programs. The limited number and unique population of ELL students could have affected results. The population of ELL students surveyed is unique in that it does not reflect the usual breakdown of ethnicities for ELLs in California. With a larger sample of students, more balance in the ELL population would occur. Additionally, the sample size of special education students was small and is mostly from an Integrated Math 2 class where

students have already passed at least one high school math course. More data from a range of special education in below grade level or lower classes could add more information to answer the research question.

This research is not generalizable to all schools and populations. The surrounding affluent community where this study was conducted could have influenced the results. The high performing culture of the school could have also contributed to the results. Therefore, the results of this study should be generalized with caution.

Future Research Directions

Future research could include looking more at the balance of teacher directed instruction and a student-centered classroom. Research shows, and this study confirms, that this balance is preferred by students. More information needs to be collected about the length of time teachers should spend on notes or guided instruction to keep students attention. How long is too long for taking notes? When do students lose focus? Or, do students prefer note-taking because it is a passive way to engage in the class? Possibly female students tend to be more visual learners while males are more kinesthetic learners and would like to try something first? Additionally, looking into specific strategies for perseverance in starting and exploring a problem could offer more insight into how to support students in a student-centered class.

For future research, it would also be interesting to collect more data about student achievement related to this study. If you remove the anonymity of the survey, it would be possible to link the students' responses to their test scores and or grades in the class. Teachers and administrators can use this information to help make decisions about classroom practices and areas of focus.

Summary/Conclusion

The current study aimed to answer the research question: What instructional strategies and supports do students perceive are effective in motivating them to succeed in high school Integrated Math classes based on the CCSS? The results of the study provide insight into the instructional strategies that students find effective. Students find that teacher-directed instruction paired with student-centered learning in a collaborative environment helps motivate them and provides them with the most feedback toward learning goals. Additionally, students agree that homework is a helpful tool, but can act as a negative factor for motivation if it is too long, not relevant, or too difficult. Students need some more support in making choices to work through problems and practice perseverance in solving difficult problems. Teachers and administrators can implement these results and plan classroom activities and create classroom environments accordingly.

References

Ajayi, L. (2016). High school teachers' perspectives on the English Language Arts Common Core State Standards: An exploratory study. *Educational Research for Policy and Practice 15*(1), 1-25.

Baeten, M., Dochy, F., Struyven, K., Parmentier, E., & Vanderbruggen, A. (2016). Student-centered learning environments: An investigation into student teachers' instructional preferences and approaches to learning. *Learning Environments Research, 19*(1), 43-62.

Dingman, S., Teuscher, D., Newton, J. A., & Kasmer, L. (2013). Common mathematics standards in the united states: A comparison of K-8 state and common core standards. *Elementary School Journal, 113*(4), 541-564.

Gutierrez, K. J., & Rainbolt, J. (2014). An exploration and understanding of the U.S. Common Core State Standards: A multi-perspective organizational theory analysis. *The Journal of Human Resource and Adult Learning. 10*(1), 74-81.

Harks, B., Rakoczy, K., Hattie, J., Besser, M., & Klieme, E. (2014). The effects of feedback on achievement, interest and self-evaluation: The role of feedback's perceived usefulness. *Educational Psychology, 34*(3), 269-290.

Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning*. London: Routledge.

Havnes, A., Smith, K., Dysthe, O., & Ludvigsen, K. (2012). Formative assessment and feedback: Making learning visible. *Studies in Educational Evaluation, 38*(1), 21-27.

Marzano, R. J. (2003). *What works in schools: Translating research into action.* Association for Supervision and Curriculum Development (ASCD), 1703 N. Beauregard Street, Alexandria, VA 22311

Mertler, C. A., & Charles, C. M. (2011). *Introduction to educational research.* Boston: Pearson.

Murphy, M. R., & Marshall, K. J. (2015). Common core preparation in special education teacher education programs: Beginning the conversation. *Teacher Education and Special Education, 38*(3), 167-185.

Neria, C. M. (2014). An educator's perspective: Five "E's" to success with common core standards. *Odyssey: New Directions in Deaf Education, 15*, 4-8.

November, A. C. (2012). *Who owns the learning: Preparing students for success in the digital age.* Bloomington, IN: Solution Tree Press.

Özcan, Z. Ç. (2016). The relationship between mathematical problem-solving skills and self-regulated learning through homework behaviours, motivation, and metacognition. *International Journal of Mathematical Education in Science and Technology, 47*(3), 408-420.

Pink, D. H. (2009). *Drive: The surprising truth about what motivates us*. New York, NY: Riverhead Books.

Popovic, G., & Lederman, J. S. (2015). Implications of informal education experiences for mathematics teachers' ability to make connections beyond formal classroom. *School Science and Mathematics, 115*(3), 129-140.

Reys, B. J., Dougherty, B. J., Olson, T. A., & Thomas, A. (2012). Common Core State Standards for middle grades mathematics: Implications of curriculum and instruction. In Hirsch, C. R.,

Sofroniou, A., Poutos, K. (2016). Investigating the effectiveness of group work in mathematics. *Education Sciences, 6*(30).

Standards of Mathematical Practice. (2017). Retrieved from http://www.corestandards.org/Math/Practice/

Swinson, J. (2010). Working with a secondary school to improve social relationships, pupil behaviour, motivation and learning. *Pastoral Care in Education, 28*(3), 181-194.

Teuscher, D., Tran, D. and Reys, B. J. (2015), Common core state standards in the middle grades: What's new in the geometry domain and how can teachers support student learning?. Sch Sci Math, 115: 4–13. doi:10.1111/ssm.12096

Yonezawa, S. (2015). Student voice and the common core. *Teachers College Record,117*(13), 39-58.