

Rowan University

Rowan Digital Works

---

Theses and Dissertations

---

4-24-2007

## Professors' perceptions of student readiness for college-level mathematics

Tara L. Pedrick  
*Rowan University*

Follow this and additional works at: <https://rdw.rowan.edu/etd>



Part of the [Science and Mathematics Education Commons](#)

---

### Recommended Citation

Pedrick, Tara L., "Professors' perceptions of student readiness for college-level mathematics" (2007).  
*Theses and Dissertations*. 832.  
<https://rdw.rowan.edu/etd/832>

This Thesis is brought to you for free and open access by Rowan Digital Works. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Rowan Digital Works. For more information, please contact [graduateresearch@rowan.edu](mailto:graduateresearch@rowan.edu).

PROFESSORS' PERCEPTIONS OF STUDENT READINESS  
FOR COLLEGE-LEVEL MATHEMATICS

by  
Tara L. Pedrick

A Thesis

Submitted in partial fulfillment of the requirements of the  
Master of Arts Degree  
of  
The Graduate Division  
at  
Rowan University  
May 1, 2007

Approved by \_\_\_\_\_  
Advisor

Date Approved 4/24/07

© 2007 Tara L. Pedrick

## ABSTRACT

Tara L. Pedrick

### PROFESSORS' PERCEPTIONS OF STUDENT READINESS FOR COLLEGE-LEVEL MATHEMATICS

2006/2007

Dr. Eric Milou

Master of the Arts in Subject Matter Teaching: Mathematics

Students are not performing well in their freshman year in college mathematics classes. More incoming college freshman are being required to take remedial mathematics coursework. The purpose of this research is to determine if professors feel that traditional incoming freshmen students are prepared for college-level mathematics, and what factors they feel contribute to this level of preparation. To research this topic, professors from chosen two- and four-year colleges were contacted and asked to respond to a survey. The researcher created a survey using a likert scale to obtain information on the views of college professors pertaining the topic. The instrument was sent to two-and four-year professors from selected New Jersey colleges. The entire surveyed population's answers were analyzed by comparing response percentages while a chi-squared test examined the difference in responses of two- and four-year college professors and conclusions were drawn. It is clear from the research that college professors feel that students are not ready for postsecondary mathematics. It seem logical that public schools and higher education institutions communicate and work closely together to improve students' college readiness for mathematics.

## ACKNOWLEDGEMENTS

I would like to thank my late grandfather for having faith in me and pushing me to continue my education. Without him, none of this would have been possible.

## TABLE OF CONTENTS

Acknowledgements	ii
List of Figures	v
List of Tables	vii
CHAPTER	PAGE
I. Introduction to the Study	
Background	1
Statement of the Problem	3
Research Questions	3
Need for the Study	3
Limitations	4
Definition of Terms	4
II. Review of Related Literature and Research	
Introduction	5
Review of Related Literature	5
III. Methodology	
Introduction	19
The Population	19
Experimental Design and Methods	20
Methods of Analysis	24
Timeline	24

IV.	Analysis of Data	
	Introduction	25
	Survey Results	25
V.	Summary, Conclusions, and Recommendations	
	Summary	53
	Conclusions	55
	Recommendations	56
	References	58
	Appendix Sample Survey	60

## LIST OF FIGURES

FIGURE	PAGE	
Figure 1	Survey Question 16	26
Figure 2	Survey Question 1	27
Figure 3	Survey Question 2	28
Figure 4	Survey Question 3	29
Figure 5	Survey Question 4	30
Figure 6	Survey Question 5	31
Figure 7	Survey Question 6	32
Figure 8	Survey Question 7	33
Figure 9	Survey Question 8	34
Figure 10	Survey Question 9	35
Figure 11	Survey Question 10	36
Figure 12	Survey Question 11	38
Figure 13	Survey Question 12	39
Figure 14	Survey Question 13	40
Figure 15	Survey Question 14	41
Figure 16	Survey Question 15	42
Figure 17	Survey Question 12 Filtered Data	44
Figure 18	Survey Question 14 Filtered Data	45

Figure 19	Survey Question 1 Filtered Data	46
Figure 20	Survey Question 2 Filtered Data	46
Figure 21	Survey Question 3 Filtered Data	47
Figure 22	Survey Question 4 Filtered Data	47
Figure 23	Survey Question 5 Filtered Data	48
Figure 24	Survey Question 6 Filtered Data	48
Figure 25	Survey Question 7 Filtered Data	49
Figure 26	Survey Question 8 Filtered Data	49
Figure 27	Survey Question 9 Filtered Data	50
Figure 28	Survey Question 10 Filtered Data	50
Figure 29	Survey Question 11 Filtered Data	51
Figure 30	Survey Question 13 Filtered Data	51
Figure 31	Survey Question 15 Filtered Data	52



## LIST OF TABLES

TABLE	PAGE
Table 1 Comparison of Data Between 2- and 4-year College Professors	43

## CHAPTER I

### Introduction to the Study

#### Background

A trend has emerged concerning students' ability to perform well in their freshman year in college (Betebenner, 2006; "Students Not Ready", 2005; HSSSE, 2005; Callan et al., 2006; Stride, 2006). In August 2005, an annual report by one of the leading college admission test, the ACT, found that about half of high school graduates are not prepared to succeed in college academics. To be more specific, many college professors feel that students are not well prepared for college level mathematics (Clapp & Demske, 1999; Gordon, 2006; HSSSE, 2005; Risher, 2003; Callan et al., 2006).

The number of incoming college freshmen required to take remedial coursework is on the rise ("Student Readiness", 2006; Gordon, 2006; Callan et al., 2005; HSSSE, 2005; Risher, 2003). College professors typically feel that either the students have become academically worse, or that high schools are to blame for this decline in performance (Clapp & Demske 1999; "Students Not Ready", 2005). Is this a fair assumption? For quite some time, secondary curriculum and college curriculum were on the same page. Teachers in the high school classrooms were aware of what students should expect in the college classroom, and college professors knew what the high school mathematics curriculum entailed. This does not seem be the case anymore (Gordon, 2006; "Students Not Ready", 2005). Over the past two decades, high school curriculum has been undergoing a serious overhaul as recommended by NCTM's

*Curriculum and Evaluations Standards for School Mathematics* (Cebulla, Schoen & Winsor, 2001; Gordon, 2006; “Students Not Ready”, 2005). This shift in emphasis, for the most part, has not filtered into college classrooms making the K-12 standards disconnected with college readiness standards (Cebulla, Schoen & Winsor, 2001; Gordon, 2006). This, and the reasons stated below, has lead to students performing poorly on college placement test for mathematics putting them at an academic disadvantage from the start of their college experience (Cebulla, Schoen, Winsor, 2001; Gordon, 2006, Risher, 2003; “Students Not Ready”, 2005).

Other factors that are impeding students’ success in college-level mathematics are under debate. Many feel that students are not adequately prepared for the academic challenge associated with a college curriculum, especially when study habits are called into question (Callan et al., 2006; HSSSE, 2005; Risher, 2003). Some experts feel that high school seniors have not been introduced to rigorous coursework that is commonplace in college mathematics (Callan et al., 2006; “Students Not Ready”, 2005; HSSSE, 2005; Risher, 2003). Another view is that high school students do not see the relevance or significance of learning certain mathematical skills, and high school seniors do not take their final year of high school seriously. Consequently, they are not ready for the academic endeavors of college mathematics (Callan et al., 2006; HSSSE, 2005; Risher, 2003).

The literature and research reviewed suggest that students are not prepared for college-level mathematics (Clapp & Demske, 1999; Callan et al., 2006; Gordon, 2006; HSSSE, 2005; Risher, 2003). Some school districts are trying to find a way to fix the problem at hand. Suggestions have been offered by educators and administrators at both

levels of education. Most feel that the first step is for communication to occur between high school and college faculty in order to seek common ground (Callan et al., 2006; Gordon, 2006; “Student Readiness”, 2006; “Students Not Ready”, 2005).

### Statement of the Problem

The purpose of this study is to determine if professors feel that traditional incoming freshmen students are academically prepared for college-level mathematics and to determine what factors they feel contribute to this level of preparation.

### Research Questions

When reviewing the literature obtained pertaining to the topic of college professors’ thoughts on student readiness for postsecondary mathematics, several research questions became obvious, and they are as follows:

1. What factors contribute to students’ readiness for college-level mathematics, and do the factors have a positive or negative effect on students?
2. Do professors feel college placement test scores, HSPA scores and Advanced Placement scores adequately indicate students’ readiness for postsecondary mathematics?
3. Do professors feel that the mathematics portion of the HSPA and mathematics Advanced Placement tests have a positive effect on student preparedness for college-level mathematics?
4. Do college mathematics placement tests accurately place students in entry-level college math courses?
5. Do the use of calculators in K-12 mathematics have a positive effect on students’ achievement in postsecondary mathematics?
6. Are students prepared for the demands of college-level mathematics?
7. Do the thoughts of two-year and four-year college professors differ pertaining to the topic of student readiness for postsecondary mathematics?

### Need for the Study

If you were to ask the mathematics faculty at any college, the consensus is that students are not prepared for college-level mathematics (Clapp & Demske, 1999). Because adequate preparation in math is a strong predictor of student achievement in

college, the issue at hand affects all students aspiring to attend post-secondary institutions (HSSSE, 2005; Schoen, Cebulla & Winsor, 2001). Over the past decade or so, there has been an increase in the number of students who have not performed well on mathematics placement tests and are subsequently required to enroll in non-credited basic math courses during their freshmen year. One factor that may contribute to this is that the traditional curriculum of high school mathematics has shifted to a standards-based curriculum as suggested by The National Council of Teachers of Mathematics *Curriculum and Evaluation Standards for School Mathematics (1989)*, and currently many high school and college curriculum are unaligned (Cebulla, Schoen & Winsor, 2001; Gordon, 2006). College professors blame high school teachers for not preparing students for the rigors of post-secondary level mathematics, while high school teachers point the finger at colleges citing lack communication between the two institutions (Clapp & Demske, 1999; “Students Not Ready”, 2005). Testing agencies are also under scrutiny for not assessing concepts that are now a point of focus in the high school curriculum (Gordon, 2006).

#### Limitations

This study will be limited to two and four-year colleges in Central and Southern New Jersey. Also, since the emphasis of this study is on mathematics, it will be limited to the views of college mathematics professors.

#### Definition of Terms

NCTM – National Council of Teachers of Mathematics

HSSSE – The High School Survey of Student Engagement

HSPA – New Jersey High School Proficiency Assessment

## CHAPTER II

### Review of Related Literature and Research

#### Introduction

Are students prepared for college level mathematics? According to literature and research, the answer is no. The fact is that numerous high school students find it very difficult to make the transition to college-level mathematics. There is not a plethora of information available on the topic at hand because it is a relatively new concern. The main research used in this study consists of journal and Internet articles.

#### Review of Related Literature and Research

A 2005 study conducted by the ACT testing company identified that well over half of high school graduates are unprepared for college algebra. (“Students Not Ready”, 2005) So, who or what is to blame for this epidemic? Many college and university professors typically feel that either the students are not as academically inclined or that the blame is to be placed solely on the high schools. Is this a fair assessment? (Gordon, 2006)

#### Alignment of Curriculums

Over the past decade or so, public school mathematics curriculum has made a major shift in scope as suggested by NCTM’s *Curriculum and Evaluation Standards for School Mathematics* (1989). These standards are impacting the content being taught in high schools as well as the way the material is taught. This shift in emphasis has altered the smooth transition from high school to college math (Cebulla, Schoen & Windsor, 2001; Gordon, 2006). NCTM’s standards “call for a fresh approach to mathematics that

provides students with very different content and very different teaching and learning environments” (Gordon, 2006, p. 174). The two curriculums no longer mesh together as once thought. New curriculum standards call for the early introduction of many new mathematical ideas. These concepts include statistical reasoning and data analysis, matrix algebra and its applications, and some probability. On the other hand, the standards downplay the role of formal algebraic manipulation (Cebulla, Schoen & Windsor, 2001; Gordon, 2006). In principal, many college professors should welcome students with these new backgrounds in mathematics, but the fact remains that it appears new college students do not possess the manipulative skills and information considered relevant to perform well in college-level mathematics. College faculty members are aware of these changes, but not many have paid increased attention to them (Gordon, 2006). According to Sandy Shugart, president of Trinity University, the reality is that high schools are “loosely coupled to the post-secondary world, and the engine that produces the curriculum and expectations for high school is very different from the one that produces expectations in colleges and universities” (“Students Not Ready”, 2005, p. 6).

More than twenty years ago, it was logical for states to have educational policies and control structures that separated K-12 and postsecondary education into components of the educational system because only a small percentage of high school students went to college. The times have now changed, and many high school students plan to attend college and educators and policymakers have sent out a consistent message encouraging high school students to attend college. Students have responded to this challenge (Callan et al., 2006; Cebulla, Schoen & Winsor, 2001). A study conducted by The National

Center for Public Policy and Higher Education (2005) found that students have higher academic aspirations than ever before since almost 90% of high school students of all racial and ethnic groups plan to attend college. Despite this, educators and policymakers have not developed a consistent state systems of education that sufficiently prepare high school students for the academic expectations of college (Callan et al., 2005). The study also found that even if students do not plan on attending college, the “increasing technological and educational demands of the contemporary workplace...require knowledge and skills that students need to succeed in postsecondary education are equivalent to the ones they need in the workforce” (Callan et al., 2005, p.6).

#### Definition of College Readiness

Another factor that impedes students’ performance in college-level mathematics is the vague definition of college readiness. The sole blame should not be placed on high school principals and teachers because there is no single definition of what it is meant to be ready for college-level work. Each institution is free to define that for itself. This confuses high school educators and administrators as well as students. It seems that college readiness is open to interpretation and the difficulty for high schools resides in preparing students for institutions different placement standards, which constitute readiness for those first credit-bearing courses in mathematics at the college level (“Student Readiness”, 2006). This is seen readily at the community college level where they enroll about 44% of undergraduate students. Community colleges possess multiple missions and most of them will admit any student over 18 years old who will benefit from instruction. Because there are no straight forward admission requirements, high schools students tend to feel they do not require rigorous academic preparation. Students



do not recognize that community colleges, too, have academic standards for taking college-level courses. This unclear message sent to high school students often leads to them taking remedial courses. Given the need to improve student achievement in high school and college, it would seem logical for college and university systems to correspond extensively with high schools about what students need to know and be able to do to succeed in college, but the fact remains that many high school teachers receive no information from colleges about their admissions and placement standards and policies (Callan et al., 2005).

#### Academic Rigor and Study Habits

Some college professors feel that many students have not been subjected to the rigorous coursework or the study habits needed to succeed in college (“Student Readiness”, 2006; “Students Not Ready”, 2005; HSSSE, 2005). According to Charles B Reed, chancellor of the California State University System, one of “the single biggest obstacle[s] to the school-college transition is establishing rigorous standards and high expectations in the public schools” (“Student Readiness”, 2006). This is key since students who participate in a rigorous curriculum throughout their high school careers are typically ready for college, but those who choose to take the less challenging path, many times, require additional help (Betebenner, 2006; “Students Not Ready”, 2005).

Another belief on why students are not prepared academically in large numbers for college-level mathematics is they do not possess the proper study habits to succeed in the courses (“Students Not Ready”, 2005; HSSSE, 2005; Risher, 2003). In April 2004, greater than 90,000 students nationwide participated in the first annual High School Survey of Student Engagement. It was found that there appears to be a significant gap

between high school students and those attending both four-year and two-year colleges in terms of study habits. Typically, students should spend two to three hours outside of the classroom preparing for class for every one hour spent in the classroom in order to do well in college (“Students Not Ready”, 2005; HSSSE, 2005). But, fifty-five percent of the HSSSE respondents said they spent a total of three hours or less per week preparing for all of their classes whereas half of the first year college students said they devoted more than ten hours a week studying for a class and only eight percent of HSSSE seniors did the same. Despite this large difference in study habits, HSSSE respondents said that they do not have to work very hard to succeed in high school because they did not have to work very hard to receive good grades. Students do the minimal amount in order to receive fairly good grades and only 52% percent of those polled felt that they were challenged to do their best work in high school. The HSSSE report also shows that current students are taking less math courses in their senior year than they took in previous years causing the senior year to be labeled as unproductive (HSSSE, 2005). This is detrimental because, as Shugart feels, “math is like a foreign language, if you take a year off, you’re going to lose your vocabulary pretty quickly” (“Students Not Ready”, 2005, p.6).

### Epistemological Messages of Textbooks

An interesting contributor to students’ performance in college level mathematics is the epistemological messages conveyed by textbooks at both the secondary and post-secondary levels. These messages are inclined to greatly influence the way mathematics is taught and learned (Raman, 1998). A study by Manya Raman (1998) titled Epistemological Messages Conveyed by High School and College Mathematics

Textbooks compared the way that a typical high school precalculus book and a typical college calculus book handled the topic of continuity. In particular, the study looked at the use of informal and formal reasoning and the way that definitions, theorems and problems are presented in different leveled textbooks. It was found that the precalculus books confuse formal and informal reasoning. The limitations of informal definitions are not apparent, and solutions seem to be more formal than they are. This, in turn, could possibly make it difficult for students to recognize when formal and informal reasoning is appropriate although formal reasoning is used very little. This uncertainty may hinder the student once he/she ventures into the more advanced college courses. Also, the precalculus text provides little motivation for the concepts being discussed. Students may not understand why a particular topic like continuity is important if all they are required to do is make a classification. This can sometimes send conflicted messages to students confusing them.

As far as a typical college textbook is concerned, there is little motivation for formal reasoning, yet it is required in the problems. Students are unprepared and unaware for the need to shift from and between using informal and formal definitions. Questions seem confusing since they do little to help motivate the need for formal definition because many of them can be answered informally. The reasoning required in college level calculus is significantly different from that in precalculus. Many times, students are asked to satisfy definitions and questions are mostly syntactic. Students feel that the purpose of the formal definition is to make an easy task unnecessarily difficult. It is the students' responsibility to make the leap between what is required of them in a high

school textbook as opposed to a college text, and this is a difficult task for a young mathematical mind.

### Inherent Nature of High School Students

The last factor that is considered in contributing to students not being ready for college-level mathematics is the inherent nature of high school students. Kathryn Risher, a twenty-year veteran of teaching mathematics in South Carolina Low Country schools, wrote an editorial in the February 2003 issue of Mathematics Teacher. In this article, she discusses how the average teenager is not an organized individual. Students often lack the logical skills needed to succeed in mathematics. Risher (2003) feels that most high school students are “striving to break the chains of childhood that hamper the expressions of their new-found independence” and “logical, orderly thought and actions are contrary to their emotional way of thinking and acting” (p. 102). She also notes that the average teenage is rebellious. When a teacher insists equations to be solved in a certain way and that all steps should be shown knowing that these processes must be established for success in higher-level mathematics, students often resist to adhere to directions. Often, students rebel and do not practice using formulas that are necessary to complete problems of higher difficulty, and they doom themselves for failure in the years to come. Risher (2003) indicates that students must do more than observe the teacher in the classroom. They must be engaged in the lessons mastering techniques to become mathematically sound.

### College Placement Tests

Sheldon Gordon, professor of mathematics at Farmingdale State University of New York, believes that the link between high school and college mathematics is the

college placement test (2006). Colleges use the scores on these tests to assess what students know, and to place them in classes during their freshman year. A recent trend indicates that the number of students required to take remedial courses in math is on the rise (“Students Not Ready”, 2005; HSSSE, 2005). Gordon (2006) feels that this is a major issue because “unfortunately, placement decisions ... can effectively close doors leading to careers in virtually every quantitative field today” (p.174). In 2004, The National Research Council found that

“three-fifths of students in public two-year colleges and one-fourth in four-year colleges and universities require an average of one or more years of remedial coursework because they are not adequately prepared for the level of academic challenge presented in the college curriculum” (HSSSE, 2005, p.1).

This causes a problem since about one-fourth of the students attending a four-year college who are required to enroll three or more remedial classes end up leaving college after the first year. Students may not attain the adequate drive to perform the mathematics needed to obtain a bachelor’s degree in a variety of fields (HSSSE, 2005).

There is speculation into why students perform poorly on college placement tests in mathematics. One reason reverts back to standards-based movement and the breakdown of the smooth transition from school to college mathematics (HSSSE, 2005; Schoen & Winsor, 2001). Most colleges in the country use the same type of placement tests that have been used for an excess of twenty years. They test the degree to which students’ master traditional skills of algebra. The students who go through the traditional route of mathematics courses in high school may perform well on the placement tests because they tend to have stronger manipulative skills. These students are often lacking

in conceptual abilities (Gordon, 2006). Gordon (2006) cites that now, a “large and growing number of students having been exposed to very different mathematical ideas and emphases but [they are] assessed [on their] ability and knowledge on the basis of a curriculum that is rapidly disappearing” (p 175). It seems that the standard placement tests do not assess a student's non-manipulative skills associated with conceptual understanding and contextual application. The tests do not assess whether students understand what a slope represents. They only test if a student has the ability to calculate the slope of a line containing two given points. So, it should not be shocking when a standards-based student taking the traditional placement test is placed into a developmental math course because it seems their algebraic proficiency is too weak to succeed in a college-level mathematics course despite having two, three or four years of mathematical experience. Previously, the dropout rate from high school mathematics courses was on the order of 50% each year, but recent evidence suggests that the dropout rates have been reduced to around 10-15%. Conversely, the fastest growing component of college mathematics enrollment for the last decade or more has been at the developmental level (Gordon, 2005).

#### Graphing Calculators

NCTM's *Curriculum and Evaluations Standards for School Mathematics* (1989) require that graphing calculators play an intricate role in the learning process. Yet, the widely used standardized placement tests, the College Board's ACCUPLACER and ACT's Compass, do not allow the use of technology despite the fact that technology has played an important role in students' mathematical endeavors in high school (Gordon, 2005). While attending an articulation meeting on January 9, 2007 between mathematics

teachers of Salem County High Schools and professors at Salem Community College, it became clear that the ACCUPLACER consists of many problems that are direct and non-conceptual. If a calculator were to be permitted on these types of tests, it would be used as a crutch, answering the questions for the students. Conversely, the HSPA contains problems that align with the NCTM standards requiring the calculator to be used a tool. The fact that calculators are not permitted on mathematics placement tests tends to put incoming freshmen at a disadvantage from the start (Gordon, 2005).

#### Need for Reform

An adequate predictor of student performance in college is a sound background in mathematics. The need for reform pertaining to preparing students for college-level mathematics is greatly needed (HSSSE, 2005). All parties involved in this academic struggle are aware that steps needs to be taken to fix the problem at hand (Gordon, 2006). Many professionals feel that the first step to get students prepared for college-level mathematics is for high schools and colleges to open communication lines and align their mathematics curricula (“Student Readiness”, 2006; “Students Not Ready”, 2005; Callan et al., 2006).

Because of the current need for a more highly educated workforce, and the shifts in secondary education standards, states now need policies that will demand the partnership of K-12 and postsecondary educations in order to ameliorate the college readiness of all high school students (Callan et. al., 2006). A report given by The National Center for Public Policy and Higher Education in March 2006 titled Claiming Common Ground: State Policymaking for Improving College Readiness and Success identifies four state policy areas for increasing college readiness and success. These four

dimensions include the following: the alignment of coursework and assessments; state finance; statewide data systems; and accountability (Callan et. al., 2006). It is also felt that students must be involved in a rigorous mathematics curriculum in order to be ready for the next level of mathematics (“Student Readiness”, 2006; “Students Not Ready”, 2005; HSSSE, 2005). Lastly, test-making companies should consider the many complaints made by high school administrators and teachers and develop new placement exams that actually test the concepts being taught in today’s high school mathematics classroom (Gordon, 2005).

The first recommendation presented by The National Center for Public Policy and Higher Education suggests that states should require K-12 and postsecondary education to align their coursework and assessments (Callan et. al., 2006). College standards should be integrated into the secondary curriculum and be available to all students (Callan et. al., 2006 ; “Student Readiness”, 2006). Improvements in these areas entail that colleges and universities join in the new high school mathematics reforms to ensure the curricula and standards in high school are in conjunctions to what students need to know in college. Directly related to this, the report makes a second commendation that poses states should develop financial influence and aid to impel K-12 and postsecondary education to work together in order to improve college readiness and success. This will force state legislative committees that are in control of the budget processes to work together to in order to acquire common (Callan et. al., 2006). High schools could offer professional development of math teachers to integrate college readiness standards into mathematics courses in the eighth through twelfth grades (“Student Readiness”, 2006). As of right now, the majority of states sustain detached legislative committee frameworks



that oversee K-12 and postsecondary education. School and college systems will remain divided until these legislative structures align (Callan et al., 2006).

The next advisement from The National Center for Public Policy and Higher Education suggests that states should develop the capacity to track students across educational institutions statewide. This is needed for two reasons. First, to determine the influence of programs and reforms in improving student achievement, and second, to gain a better understanding between the correspondence between student readiness in high school and student success in college. As of right now, the data retrieved from state information systems is used to support apportionment rather than tracking the progress of students throughout their education. The states that possess data systems only track students to grade 12 and start over again at grade 13 with little or no connection between the two. Thus, states do not possess adequate information to discuss the efficiency of K-12 reforms in improving students' performance in college (Callan et al., 2006). While tracking student progress throughout their education, the National center for Public Policy and Higher Education recommends that state information systems should

“standardize and report data on high school academic courses and assessments; high school graduation; college and work readiness; transitions between high school and college; transfers between colleges; student progress while in college; and completion of postsecondary education and training programs” (Callan et al., 2005, p. 16).

The last direction offered by The National Center for Public Policy and Higher Education pertains to accountability. States should publicly report on students' progress

and success from high school through postsecondary education. The report finds that in order “to be effective in improving college readiness, states should establish student achievement objectives that require the educational systems to collaborate to achieve them” (Callan et al., 2006, p. 18). All levels of education should be held accountable for improving student performance from high school to college. States need to work jointly with leaders in education to establish clear and concise achievement targets. This is an essential component to the development of combined efforts to further student readiness reforms (Callan et al., 2006).

The other area needing attention pertaining to preparing students for college mathematics concerns college mathematics placement tests. Test makers have been under the gun to develop new tests that are aligned more towards the standards-based curriculum being taught in many high schools. Unfortunately, the process of developing, testing, and validating test like these is a long process and costly; new placement tests will not be available in the immediate future. Departments in institutions often rely exclusively on placements test because they are easy to administer to vast numbers of students. So, not much can be done to fix the problem until the tests are revamped. The placement industries do hear the complaints made by high school educators and NCTM pertaining to the poor placement of students with standards-based mathematical backgrounds, but the colleges and universities are the paying customers. The truth is that sales representatives are in contact with college administrators, who like tests that are easy to administer and appear to be a good assessor of mathematical ability. When colleges do make their voices heard, they tend to complain to people who are not senior personal, and do not make the corporate decisions (Gordon, 2005). Gordon mentions that

because “the situation at colleges is likely a function of the placement tests used”, a better solution may be “for departments to rethink some of the remedial courses they offer [and] see if they are reasonable, based on the overall mathematical backgrounds of the students” (Gordon, 2005, p.176). Then, maybe enrollment in college-level math courses will increase.

## CHAPTER III

### Methodology

#### Introduction

The purpose of this chapter is to detail the methods used by the researcher. The construction of the instrument of the investigation, a college questionnaire, is explained in detail. College professors' views on traditional freshman students' preparation for college-level mathematics and the factors that affect their level of preparation were the main ideas examined in the study.

#### The Population

College professors from two- and four-year colleges in Central and Southern New Jersey were chosen as the population. These institutions include the following two-year colleges: Atlantic Cape Community College, Camden County College, Cumberland County College, Gloucester County College, Mercer County Community College, Ocean County College, Salem Community College, and the following four-year colleges and universities: Rowan University, The Richard Stockton College of New Jersey, Rutgers University, and The College of New Jersey

## Experimental Design and Methods

To determine whether professors of two- and four-year colleges in New Jersey feel that students are ready for college-level mathematics, the researcher used a revised version of the method developed by the Charles A. Dana Center at the University of Texas at Austin titled Mathematics in the Fourth Year of High School: Information Relevant to Proposed Changes to Mathematics Requirements for Graduation in Texas and received input from colleagues at Schalick High School in Pittsgrove Township for suggestions (Charles A. Dana Center, n.d). The researcher compiled a list of potential questions based on the research questions posed. These research questions are as follows:

1. What factors contribute to students' readiness for college-level mathematics, and do the factors have a positive or negative effect on students?
2. Do professors feel college placement test scores, HSPA scores and Advanced Placement scores adequately indicate students' readiness for postsecondary mathematics?
3. Do professors feel that the mathematics portion of the HSPA and mathematics Advanced Placement tests have a positive effect on student preparedness for college-level mathematics?
4. Do college mathematics placement tests accurately place students in entry-level college math courses?
5. Do the use of calculators in K-12 mathematics have a positive effect on students' achievement in postsecondary mathematics?
6. Are students prepared for the demands of college-level mathematics?
7. Do the thoughts of two-year and four-year college professors differ pertaining to the topic of student readiness for postsecondary mathematics?

The result was a survey consisting of sixteen questions pertinent to the study. The survey was developed using Internet survey software provided by SurveyMonkey.com at <http://surveymonkey.com>, and sent to the population via an email generated by the researcher inviting individuals to follow a link to the survey. This email was sent to

members of the mathematics departments of institutions mentioned above explaining the purpose of the study.

The first fifteen questions asked in the survey were designed specifically to address the research questions presented in this study. The first five questions posed on the survey address the first research question, “What factors contribute to students’ readiness for college-level mathematics, and do the factors have a positive or negative effect on students? All five questions had the following possible responses: strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree or strongly agree. Survey question one has professors respond to whether or not they feel that the implementation of NCTM’s *Curriculum and Evaluation Standards* have a positive effect on student readiness for college-level mathematics. Students’ involvement in standards-based instruction is the next factor that was presented in the survey. Survey question two asks professors if they feel that this type of instruction has caused students to underachieve in college-level mathematics classes. The third survey question investigates whether college professors feel that students’ lack of exposure to academic rigor causes them to perform poorly in postsecondary mathematics classes. The vague definition of college readiness is the next portion of research question one that is addressed in the survey. Question four was designed to determine if professors feel that the vague definition has had a negative influence on student performance in college-level mathematics. The fifth survey item is the final one pertaining to the factors effecting student readiness. It prompts professors to share their feeling on whether the lack of alignment between high school and college curricula has had an adverse effect on student performance in college-level mathematics. The second research question is posed as

follows: “Do professors feel college placement test scores, HSPA scores and Advanced Placement scores adequately indicate students’ readiness for postsecondary mathematics?” Since all three tests are considered in this query, there exist three questions applicable to this topic on the devised instrument. Survey questions six, seven and eight are constructed in the same way. Each has professors give their opinion on whether high scores on the mentioned tests indicate that a student is well prepared for college-level mathematics. Questions six pertains to the NJ High School Proficiency Assessment while seven deals with college mathematics placement tests and eight with College Board Advanced Placement mathematics tests. Professors choose from five possible answers that range from agree strongly to disagree strongly.

Research question three, “Do professors feel that the mathematics portion of the HSPA and mathematics Advanced Placement tests have a positive effect on student preparedness for college-level mathematics?” is researched using survey questions nine and ten. These queries are presented in the same manner. The latter requires professors to indicate the type of impact the NJ High School Proficiency Assessment has had on student preparation in college-level mathematics while the former does the same but cites the College Board Advanced Placement mathematics tests. Professors may choose answers that range from substantial negative impact to substantial positive impact.

The eleventh survey question asks professors to ascertain whether college mathematics placement tests such as ACCUPLACER and Compass adequately place students in entry-level math courses. Professors were asked to strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree or strongly agree. This

question was presented to answer research question four: “Do college mathematics placement tests accurately place students in entry-level college math courses?”

The fifth research question, “Do the use of calculators in K-12 mathematics have a positive effect on students’ achievement in postsecondary mathematics?” is the focus of survey question twelve. The population was asked if the use of calculators in the K-12 curriculum has had a positive effect on student performance in postsecondary mathematics. Professors could chose from answers ranging in spectrum from strongly disagree to strongly agree. Research question six, “Are students prepared for the demands of college-level mathematics?”, is intended to be answered with the next three survey items. Question thirteen is straightforward and asks professors how well they feel students are prepared academically for college-level mathematics. Survey question fifteen prompts professors to determine whether they feel freshman students are ready for the demands of postsecondary mathematics. Possible answers for both of these questions include the following: extremely well prepared, very well prepared, somewhat well prepared and not well prepared. Next, question fourteen has the population indicate how much time they spend reviewing materials and skills that should have been learned in high school. Professors could choose from the following responses: more than 80%, 61-80%, 41-60%, 21-40%, 1-20%, or none.

Lastly, research question seven, “Do the thoughts of two-year and four-year college professors differ pertaining to the topic of student readiness for postsecondary mathematics?” was addressed. The questions was devised when it became of interest to compare the responses of two- and four-year college professors and determine if they



have the same views on student preparation for college-level mathematics. So, a question was introduced having professors indicate the type of college employing them.

### Methods of Analysis

It became apparent that the most efficient way to analyze the data gathered from the submitted surveys was to present the finding in bar graph and table format. To ascertain whether views on the questions posed differ between two-and four-year college professors, a chi-squared test was conducted since the data obtained is discrete

### Timeline

An email containing an introduction to the survey and a link to the actual questionnaire will be send out during the week of January 15<sup>th</sup>. Results will hopefully be compiled and analyzed through the month of February.

## CHAPTER IV

### Analysis of Data

#### Introduction

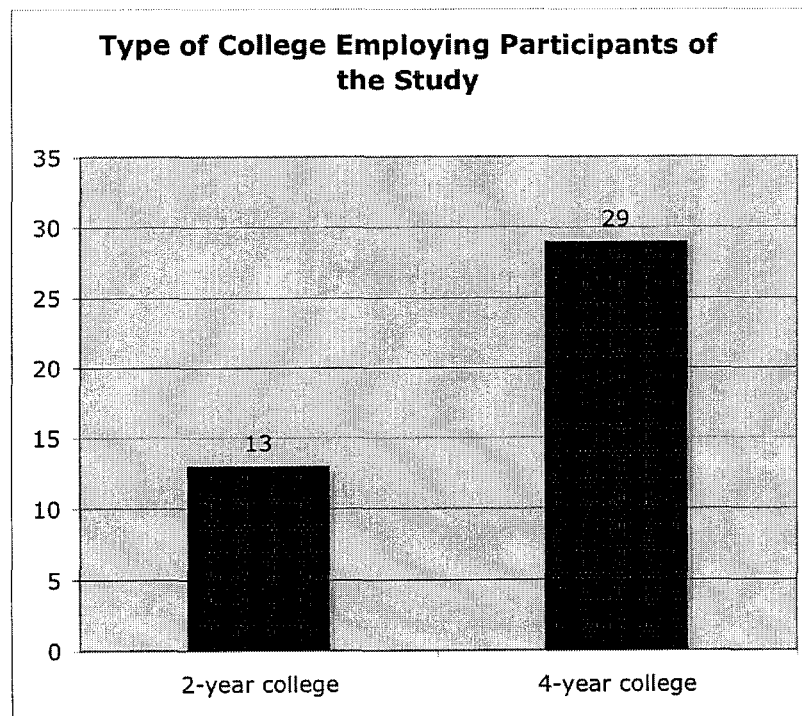
The data obtained from a survey sent to predetermined two- and four-year college math professors in New Jersey is described in this chapter. The information gathered represents 37% of the potential participants. Professors from the following two-year colleges were invited to partake in the study: Atlantic Cape Community College, Camden County College, Cumberland County College, Gloucester County College, Mercer County Community College, Ocean County College, Salem Community College, as well as professors from the following four-year colleges and universities: Rowan University, The Richard Stockton College of New Jersey, Rutgers University, and The College of New Jersey. Results of the data obtained will be described in two sections. The first section will consider the population as a whole. Professors' views on the traditional freshman student and the factors that affect their performance in mathematics classes will be analyzed. The second section will compare the responses of two- and four-year college professors using a chi-squared test.

#### Survey Results

The researcher emailed links to the survey to 7 two-year colleges and 4 four-year colleges in New Jersey. One hundred thirteen emails were sent to four-year college professors and 48 were sent to two-year college professors. A total of 42 surveys were completed. Figure one depicts the breakdown of two- and four-year college professors participating in the study. This was obtained from question 16 of the survey, which had

individuals indicate the type of college at which they are employed. This was necessary in order to answer research question #7: “Do the thoughts of two-year and four-year college professors differ pertaining to the topic of student readiness for postsecondary mathematics?” This data indicates that 31% of the population responding to the survey was employed at a two-year college while 69% percent of the participants were teaching at four-year colleges. The analysis of this comparison will be discussed in section two.

Figure 1 Survey Question 16

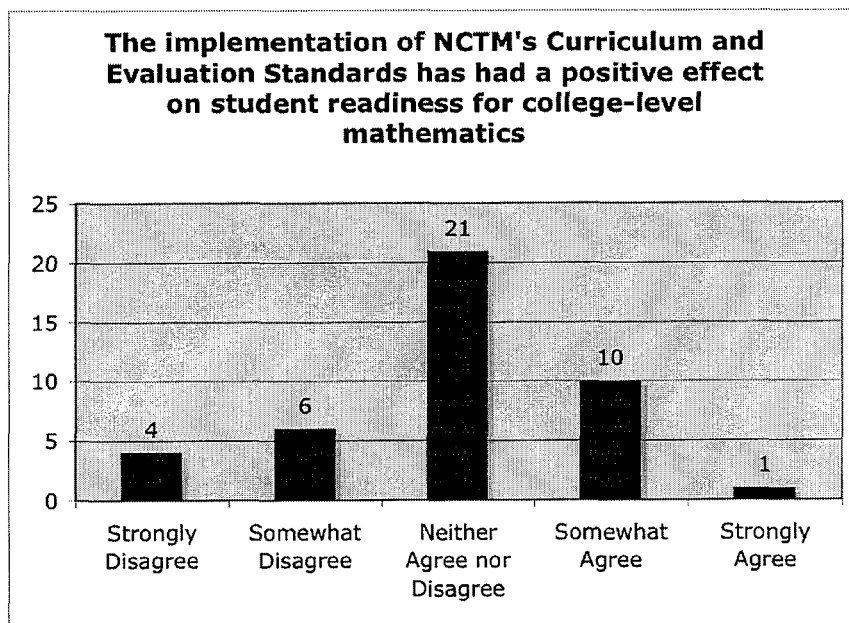


### Section 1

The first five questions posed on the survey address the first research question, “What factors contribute to students’ readiness for college-level mathematics, and do the factors have a positive or negative effect on students?” Figure 2 shows the analysis of survey question one, which deals with the implementation of NCTM *Curriculum and*

*Evaluation Standards*, and whether they have a positive effect on student readiness for college-level mathematics. A total of 42 responses were gathered. The data indicates that the majority of the professors, 50%, neither agree nor disagree with the given statement. Twenty-four percent somewhat agree, 14% somewhat disagree, 10% strongly disagree and 2% percent strongly agree.

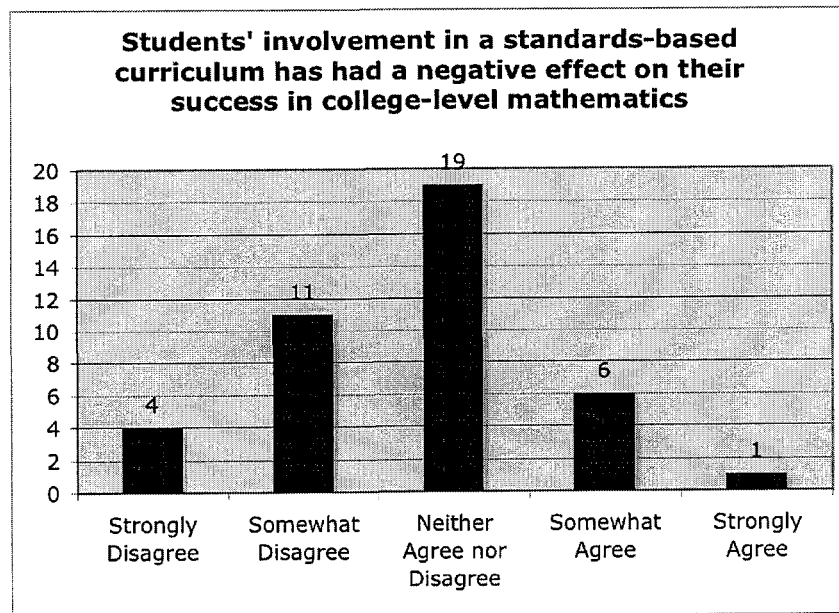
Figure 2 Survey Question 1



Students' involvement in standards-based instruction is the next factor that was considered to effect student performance in postsecondary mathematics. Survey question two asks professors if they feel that this type of instruction has caused students to underachieve in college-level mathematics classes. Figure 3 displays the results acquired from this question. Forty-one participants responded to this question, while one person chose to skip it. Analysis shows that the bulk of college professors surveyed neither

agree nor disagree with the statement. Forty-six percent responded in this manner. Twenty-seven percent somewhat disagree that a students' involvement in a standards-based curriculum has a negative effect on their success in college-level mathematics. Fifteen percent feel that they somewhat agree and 10% strongly disagree. Only two percent of the participating population strongly agree with the statement presented. One person chose not to respond to this item.

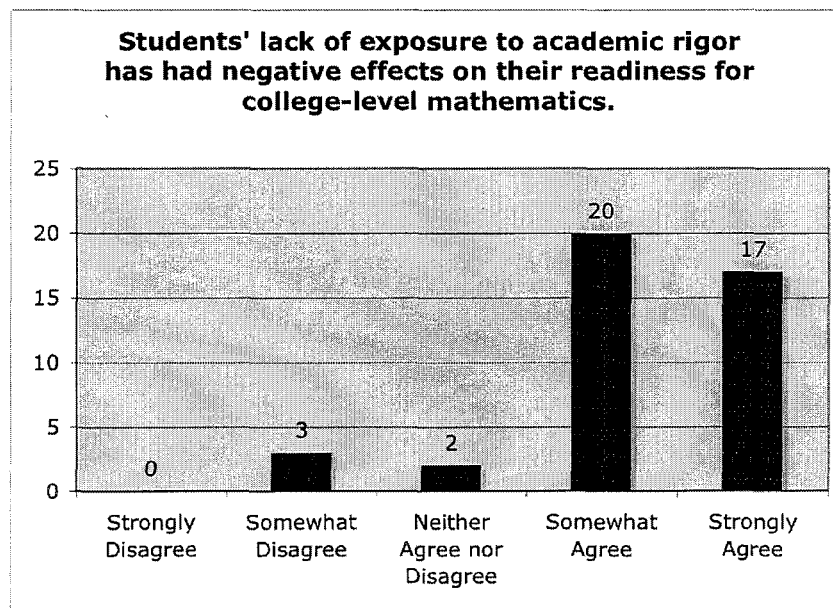
Figure 3 Survey Question 2



The third survey question investigates whether college professors feel that students' lack of exposure to academic rigor causes them to perform poorly in postsecondary mathematics classes. Figure 4 shows the data obtained for this survey item. The response percentages indicate that all but 12% of the professors agree at some level with the statement presented to them. Forty-eight percent of the respondents somewhat agree with the statement whereas 40% strongly agree. Only 7% of the professors somewhat disagree, 5% neither agree nor disagree and no one strongly

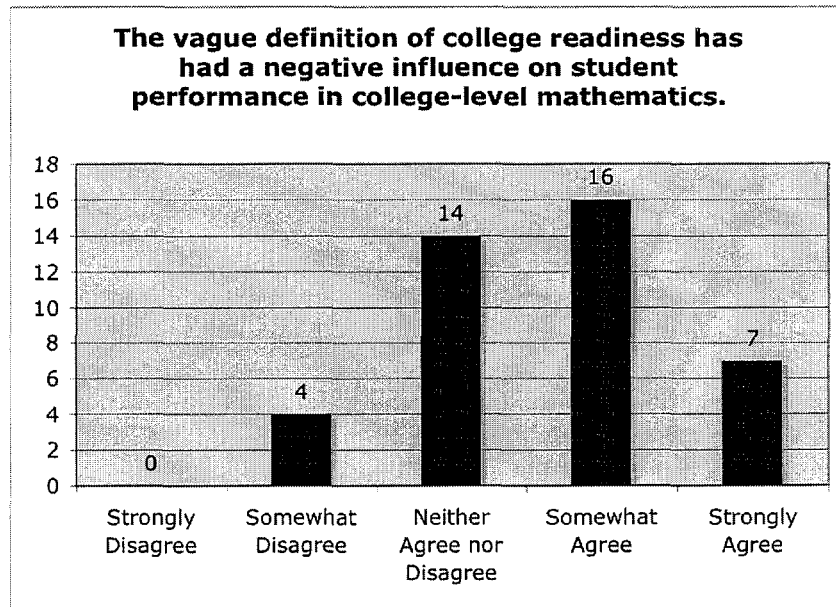
disagrees that students' lack of exposure to academic rigor causes them to perform poorly in postsecondary mathematics classes.

Figure 4 Survey Question 3



The next survey question had professors determine whether the vague definition of college readiness is a factor that effect students' preparation for college-level mathematics. Specifically, they were asked if the vague definition had a negative effect on student performance. A slight majority, 39%, of the college professors answered the statement in this manner. Thirty-four percent of the participants felt that they neither agree nor disagree with the posed statement. Seventeen percent of the respondents strongly agree while 10% somewhat disagree. No one strongly disagreed with the statement while one participant chose not to respond. Figure 5 gives a visual of the results obtained from the survey.

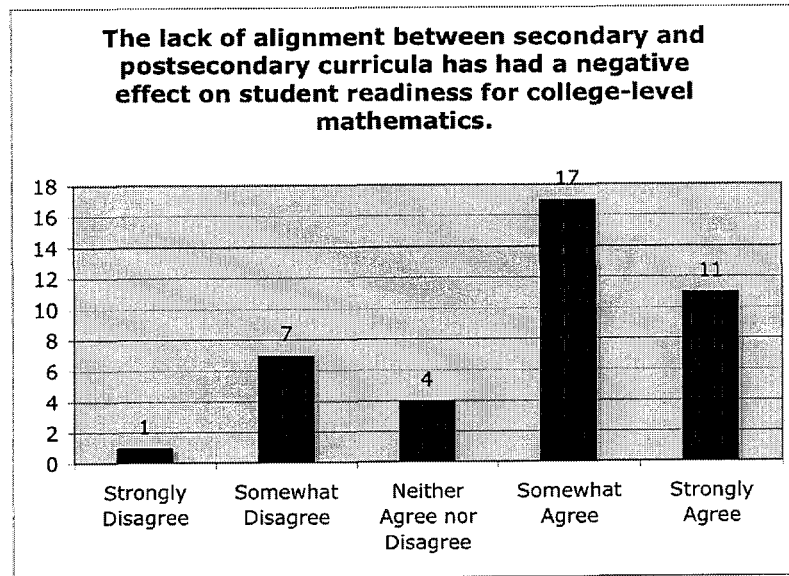
Figure 5 Survey Question 4



The last factor considered in contributing to the decline of student performance in college-level mathematics deals with the alignment between secondary and postsecondary curricula. Survey participants were given the following statement: “The lack of alignment between secondary and postsecondary curricula has had a negative effect on student readiness for college-level mathematics.” They were asked to respond with the level at which they agree with the statement. The outcome of responses is depicted in Figure 6. As you can see from the graph, the majority of the professors indicated that they somewhat agree with the statement. In fact, 43% answered in this manner. Twenty-eight percent of the contributors to the study indicated that they strongly agree with the statement presented to them. Feedback also showed 17% felt that they somewhat agree, 9% neither agree nor disagree and 3% strongly disagree that the lack of alignment between high school and college curricula has a negative effect on

student performance in their entry-level mathematics courses. Two survey participants skipped this item.

Figure 6 Survey Question 5



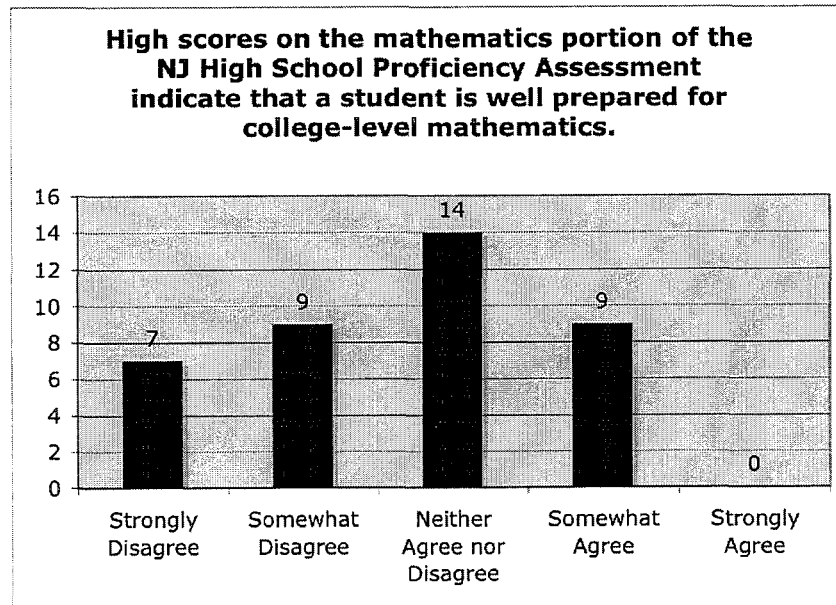
Overall, three out of the five factors seem to have an effect on student achievement in college-level mathematics. Two- and four-year college professors polled feel they at least somewhat agree that the lack of exposure to academic rigor, the vague definition of college readiness and the lack of alignment between secondary and postsecondary curricula have at negative effect on student readiness for postsecondary mathematics. Eighty-eight percent answered that they somewhat agree with the statement that students' lack of exposure to academic rigor has had a negative effect while 73% at least somewhat agree that the vague definition of college readiness adversely effects students' readiness. A response percentage of 71 of the professors polled feel they at least somewhat agree that the lack of alignment between secondary and postsecondary



curricula has had a detrimental effect on student readiness for postsecondary mathematics.

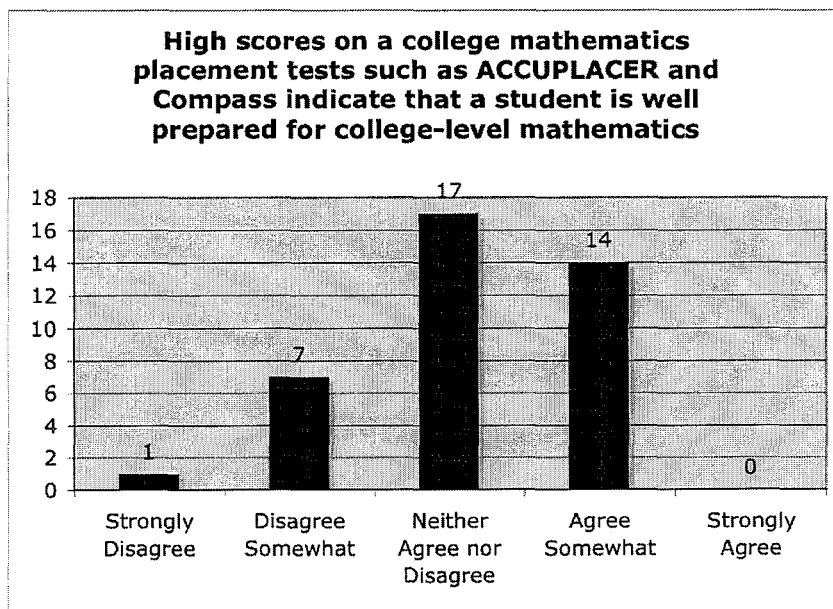
The second research question is posed as follows: “Do professors feel college placement test scores, HSPA scores and Advanced Placement scores adequately indicate college performance in mathematics?” Since all three tests are considered in this query, there were three survey items constructed. The first survey question asked participants to indicate whether high scores on the mathematics portion of the HSPA indicate that a student is well prepared for postsecondary mathematics. The data acquired is shown in Figure 7. The greater part of the professors, 36%, feel that they neither agree nor disagree with this declaration while 23% somewhat disagree, 23% somewhat agree and 18% strongly disagree. Zero percent of the professors that took the survey strongly agreed. Three people chose not to answer this question.

Figure 7 Survey Question 6



The next survey question is similar to the previous one, the only difference being in that college mathematics placement tests were questioned rather than HSPA testing. This information is presented below in Figure 8. Two participants did not respond to this inquiry. Forty-four percent of the respondents neither agree nor disagree that high scores on college mathematics placement tests indicate that a student is well prepared for college-level mathematics. Coming in a close second with a percentage of 36 was the response of agree somewhat. Eighteen percent felt that they disagree somewhat with the statement, while 2% indicated that they strongly agree. None of the professors strongly agreed.

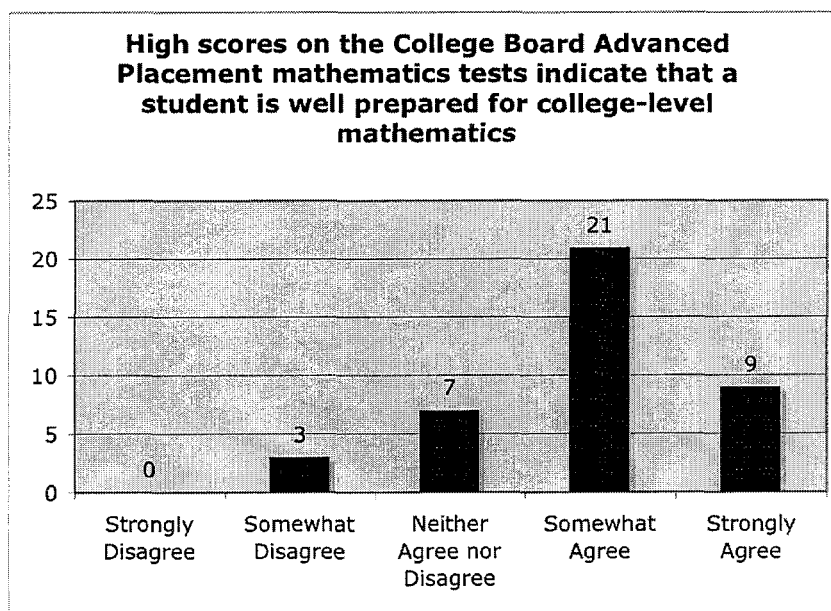
Figure 8 Survey Question 7



The last survey question focused on research question two had respondents indicate whether high scores on the College Board Advanced Placement mathematics tests indicate that a student is well prepared for postsecondary mathematics. The

majority of the polled population felt that they somewhat agree with this. In fact, 53% of the professors chose this response while twenty-three percent strongly agree. The choice of neither agree nor disagree was preferred by 17% of the participants. Seven percent pointed out that they somewhat agree and 0% strongly agreed with the statement. These results can be seen in Figure 9. Two professors skipped this item.

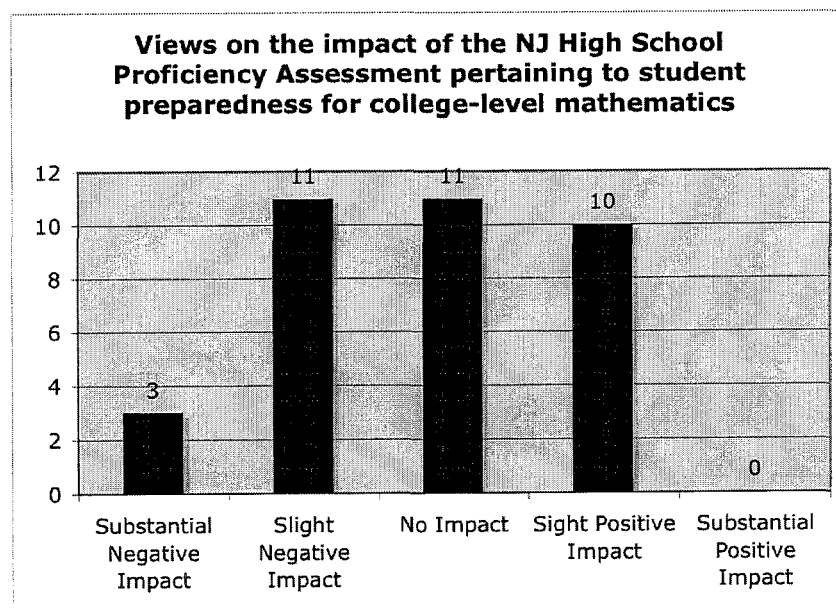
Figure 9 Survey Question 8



So, professors feel high scores on the College Board Advanced Placement mathematics tests predicted student success in college-level mathematics. Eighty-eight percent of the professors at least somewhat agree with this statement. High scores college mathematics placement tests and the HSPA do not seem to indicate the same conclusion because there was not a response that overwhelmingly prevailed.

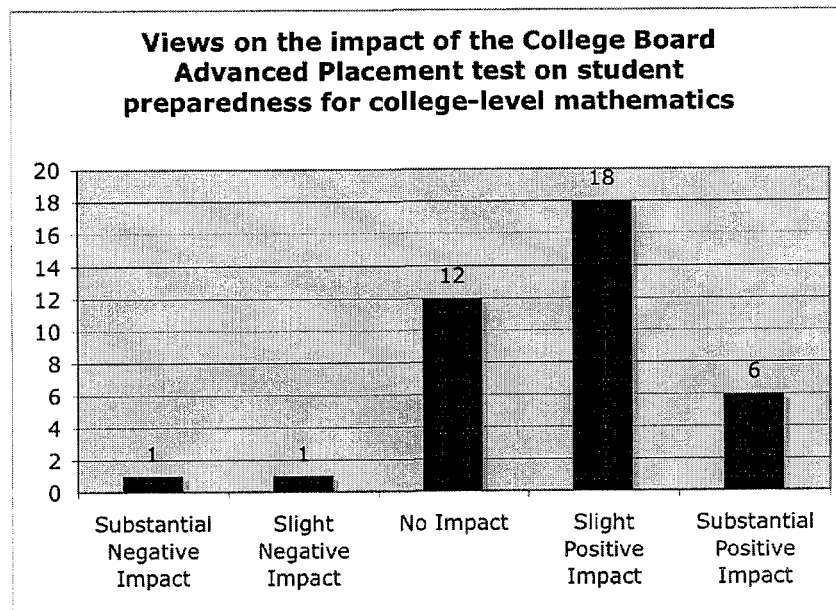
Research question three, “Do professors feel that the mathematics portion of the HSPA and mathematics Advanced Placement tests have a positive effect on student preparedness for college-level mathematics?” was explored using survey questions nine and ten. Figure 10 shows responses to the survey item that had participants give their opinion on the impact of the HSPA testing on student readiness for college-level mathematics. Thirty-five of the 42 professors polled provided a response to this item. Thirty-two percent of the feedback gathered indicated that professors see that HSPA testing has a slight negative impact. The same percentage of respondents indicated that there is no impact on student readiness for postsecondary mathematics. Twenty-seven percent acknowledged a slight positive impact, and 9% felt that there was a substantial negative impact. No one felt that HSPA testing had a substantial positive influence on whether or not students are prepared for postsecondary mathematics. Seven participants chose to abstain from this item.

Figure 10 Survey Question 9



Survey item ten is very similar to the previous item. The difference is that the impact of the College Board mathematics tests is considered as opposed to HSPA testing. The majority of the responses, 47%, cited that the tests have a slight positive impact. . Thirty-two percent of the participants felt that the College Board mathematics tests had no impact on student preparedness for college-level mathematics, and 16% said that they had a substantial positive impact. Two and a half percent of the professors indicated that the College Board mathematics tests have a slight negative impact on student preparedness. The same response percentage was given for the choice of substantial negative impact. Five people did not respond to this item. Figure 11 displays the data obtained from survey question ten.

Figure 11 Survey Question 10

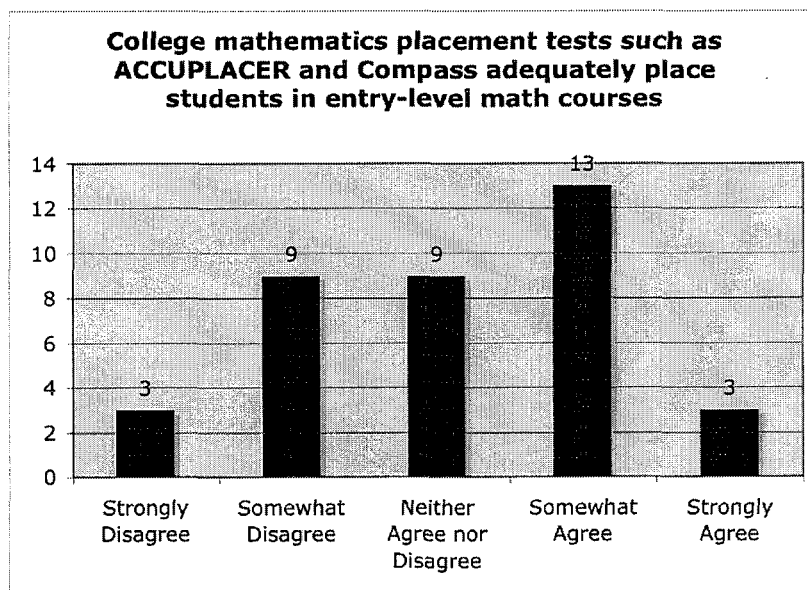


Upon analyzing the data associated with research question three, it was found that 63% of two-and four-year college professors feel that College Board Advanced

Placement mathematics testing has had at least a slight positive impact on student preparedness for postsecondary mathematics. The other survey item pertaining to this research question dealt with professors' views on the impact of HSPA testing. Since similar response percentages were tallied for three different response choices: slight negative impact, no impact and slight positive impact, no conclusion can be drawn on whether high scores on the test indicate that a student is well-prepared for college-level mathematics.

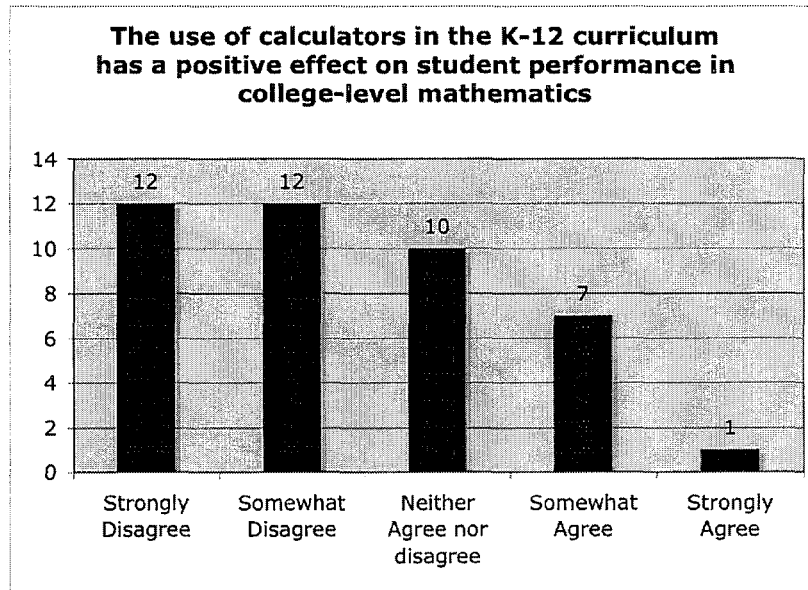
The next research question posed in this study: "Do college mathematics placement tests accurately place students in entry-level college math courses?" is answered in survey question eleven. The data gathered from this item is shown in Figure 12. This survey item asks professors to determine the how well they agree to with the statement that college mathematics placement tests place students in the appropriate entry-level mathematics course. This data shows that similar response percentages were obtained for the choices of somewhat agree, neither agree nor disagree and somewhat disagree. Professors' view that the placement tests do accurately put a student in an entry-level course was the most favored response by a slight margin. Thirty-six percent of the participating professors responded in this manner. Both somewhat disagree and neither agree nor disagree received a 24% response percentage, and both strongly agree and strongly disagree received an 8% response percentage to this survey item. This survey question was not adequately answered by the data obtained from survey item 11. This data was not conclusive since 44% of the professors at least somewhat agree, 32% at least somewhat disagree and 24% neither agree nor disagree that students are properly placed.

Figure 12 Survey Question 11



The use of calculators and their effect on student performance in college-level mathematics courses was researched next. Survey item twelve posed the following statement to participants: "The use of calculators in the K-12 curriculum has had a positive effect on student performance in postsecondary mathematics." Twenty-eight and a half percent of the polled population felt that they strongly disagree with this declaration. This same percentage of people chose the response of somewhat disagree. Twenty-four percent answered that they neither agree nor disagree. Nineteen percent indicated they at least somewhat agree that the use of calculators has had a positive effect on student performance. From this data, one cannot conclude that calculators have either a positive or negative effect on how well students perform in postsecondary mathematics since there is no clearly favored response.

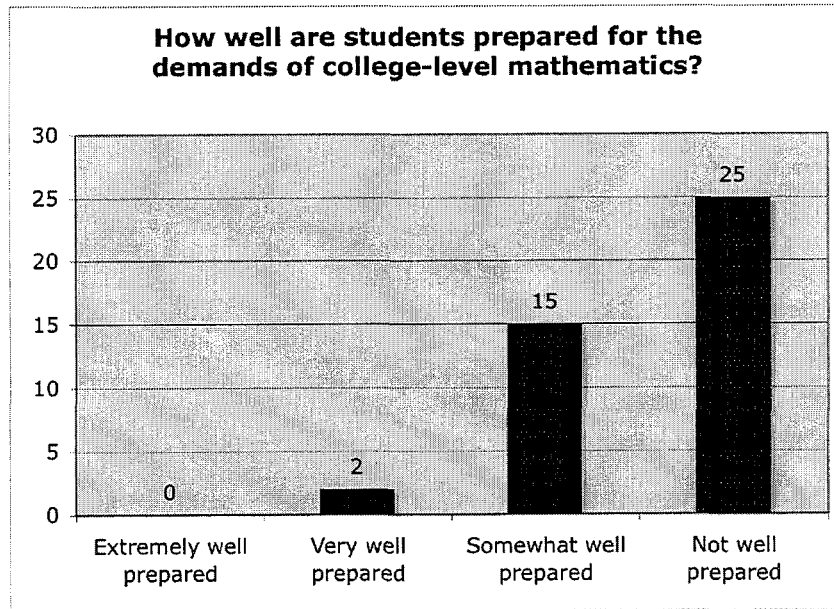
Figure 13 Survey Question 12



The next three survey items attempt to answer research question six, “Are students prepared for the demands of college-level mathematics?” with three subsequent inquires. Question thirteen is straightforward and asks professors how well they feel students are prepared academically for college-level mathematics. Figure 14 shows the data analysis on responses to survey item 13. The majority, 59%, of the professors polled believes that students are not well prepared. Thirty-six percent feel that students are somewhat well prepared while 5% says that the students are very well prepared. No one responded that students were extremely well prepared for the demands of postsecondary mathematics.

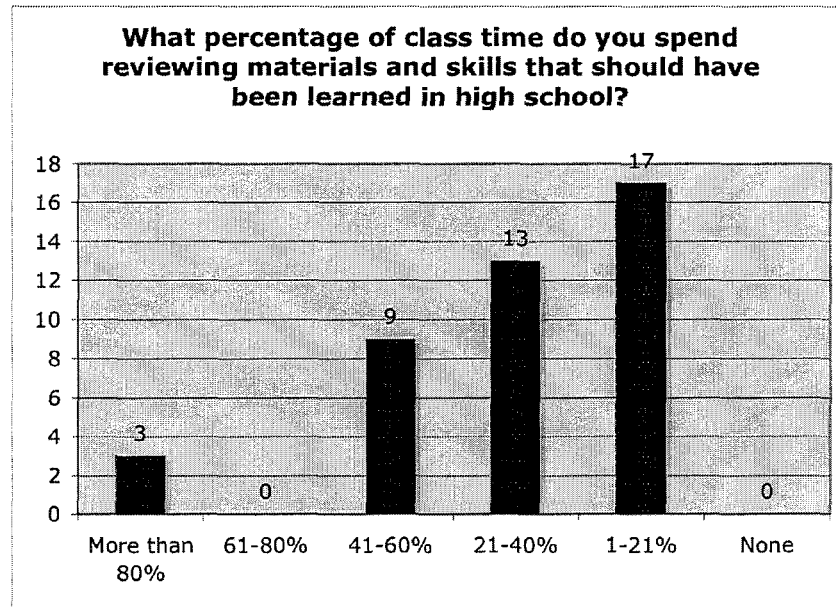


Figure 14 Survey Question 13



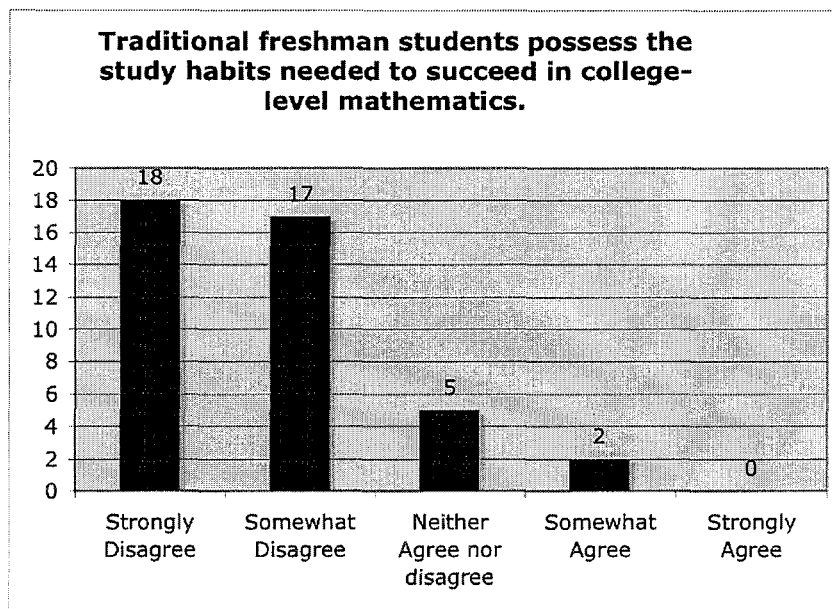
The next survey item that probes into research question six had the respondents indicate how much time they spend reviewing materials and skills that should have been learned in high school. Surprisingly, 41% indicated that they spend 1-21% of class time reviewing material and skills that should have been learned in high school. Thirty-one percent revealed that 21-40% of class time is spent reviewing, and 21% spent 41-60% going over material that should have been learned in secondary school. Seven percent of the professors spend more than 80% of class time reviewing. No one indicated that they use 61-80% of their class time to review math concepts. Figure 15 shows the table form of this data.

Figure 15 Survey Question 14



Survey item fifteen had college professors give their opinion on whether traditional freshman students possess the study habits needed to succeed in college-level mathematics. Figure 16 illustrates the data obtained from this survey item. Forty-three percent of the professors strongly disagree with the statement posed. Coming in a close second with a response percent of 41 was the choice of somewhat disagree. Twelve percent neither agree nor disagree while 5% somewhat agreed. None of the respondents strongly agree that students possess the proper study habits.

Figure 16 Survey Question 15



So, do college professors feel that students are prepared for the demands of college-level mathematics? The results to survey questions 13 and 15 suggest that this is not the case. An overwhelming amount of the total college professors participating the survey, 96%, feel that students are not well prepared or somewhat well prepared for college. In fact, 60% say that their students are indeed not sufficiently prepared at all for the demands of college mathematics. According to the professors polled, traditional freshman students do not possess the study habits needed to be successful in college-level mathematics. Eighty-four percent of the professors feel this way. The data analysis in Figure 15 seems to contradict this conclusion unless professors choose not to review material when students are in need of it.

## Section 2

This section of the chapter will compare results between two- and four-year college professors. A chi-squared test was used determine if there is a significant

difference between the way that two-year and four-year college professors answered each survey item. The null hypothesis,  $H_0$ , for each item analyzed is the following: there is not significant difference between the responses of two-year and four-year postsecondary instructors. The alternative hypothesis,  $H_a$ , is that there exists a significant difference between the responses of two-year and four-year college professors. The probability that the null hypothesis should be accepted was chosen to be the standard .05. Table 1 shows the chi-squared values and the p-values for survey questions 1-15.

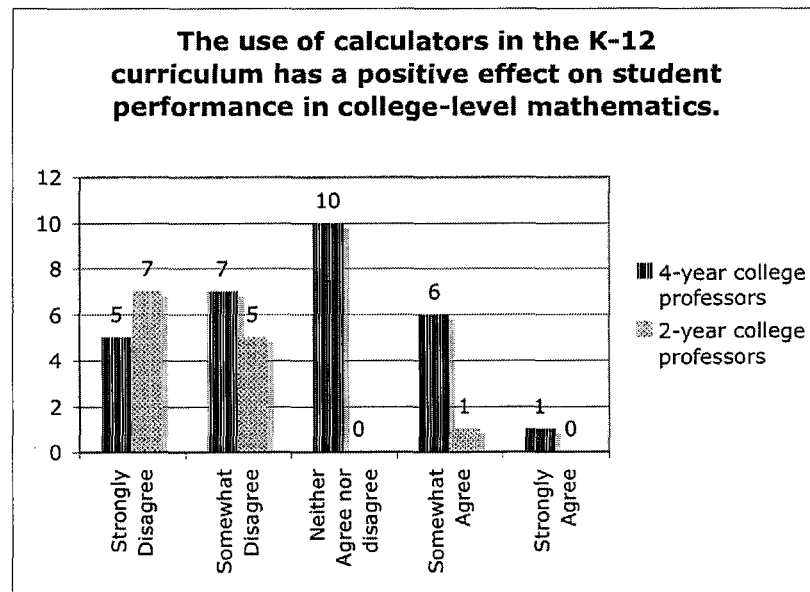
Table 1: Comparison of Data Between 2- and 4-year College Professors

Question	$\chi^2$	p-value	Question	$\chi^2$	p-value
1	1.203	.878	9	3.353	.340
2	3.579	.466	10	2.332	.675
3	1.856	.602	11	7.898	.095
4	1.857	.603	12	12.822	.012
5	3.014	.555	13	.949	.622
6	2.429	.488	14	9.98	.019
7	5.704	.127	15	1.727	.631
8	4.256	.235			

Upon comparing the responses of two-year and four-year college professors using the chi-squared test, only two question show a significant different in responses. The first item showing a difference in opinions is question twelve. It asked professors whether calculator use in the K-12 curricula has a positive effect on student performance in

college-level mathematics. A chi-squared value of 12.882 and a p-value of .012 were obtained. A p-value greater than the alpha value of .05 indicates that the null hypothesis is rejected. It can be concluded that there is a significant difference in the data analyzed. Thirty-five percent of the 4-year college instructors neither agree nor disagree with statement posed. Twenty-four percent somewhat disagree, 21% somewhat agree, 17% strongly disagree, and 3% strongly agree. This difference in opinion is clear since 54% of the 2-year college professors strongly disagree and 39% somewhat disagree that calculators have a positive effect on student performance. The two groups of professors also seem to contrast each other when choosing the answer of somewhat agree. This comparison of raw data can be seen in bar-graph format in Figure 17.

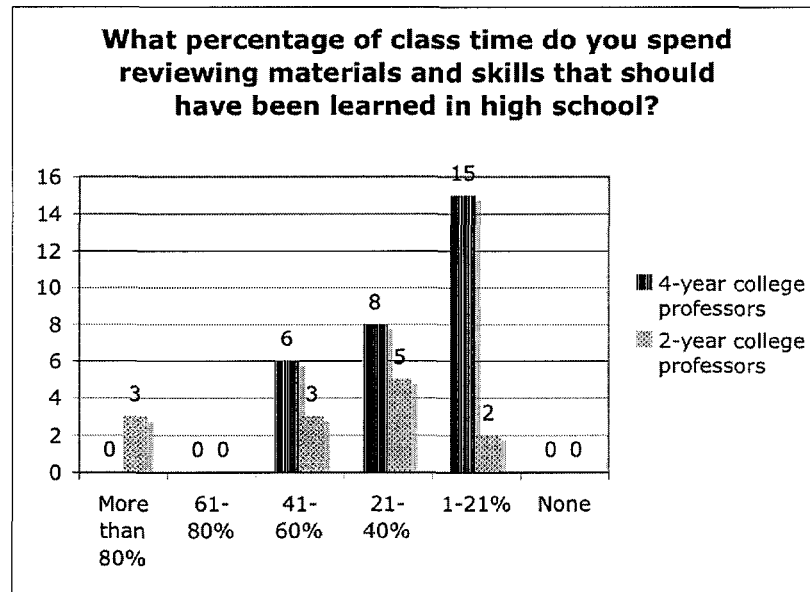
Figure 17: Survey Question 12 Filtered Data



The only other question that rejected the null hypothesis confirming a significant difference in the data between two-year and four-year college professors is fourteen. This question had professors indicate what percentage of time they spend reviewing materials and skills that students should have learned in high school. The majority of

four-year professors, 52%, said they spend an average of 1-21% of class time reviewing materials. Twenty-eight percent take 21-40% of class time go over material and 21% of the 4-year college instructors use 41-60% of the time. The largest percentage of two-year college professors, 39%, said they reviewed materials during 21-40% of instructional time. Twenty-three percent used 41-60% of class time going over concepts. The same percentage of professors responded that they review for more than 80% of the course. Fifteen percent of two-year college professors use 1-21% of their class time revisiting material and skills that should have been learned in high school. When this data was analyzed through a chi-squared test, a  $\chi^2$  value of 9.98 and a p-value of .019 were found. This p-value less than .05 indicates that there is a significant difference in the data gathered. Figure 18 shows a side-by-side view of the responses of the two groups of professors.

Figure 18: Survey Question 14 Filtered Data



Figures 19-31 are presented below. These are the comparison charts for the remaining thirteen survey questions.

Figure 19: Survey Question 1 Filtered Data

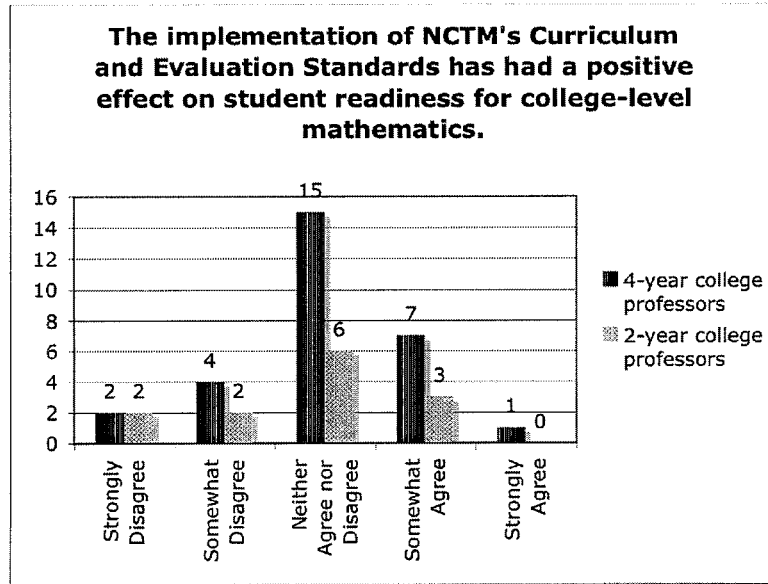


Figure 20: Survey Question 2 Filtered Data

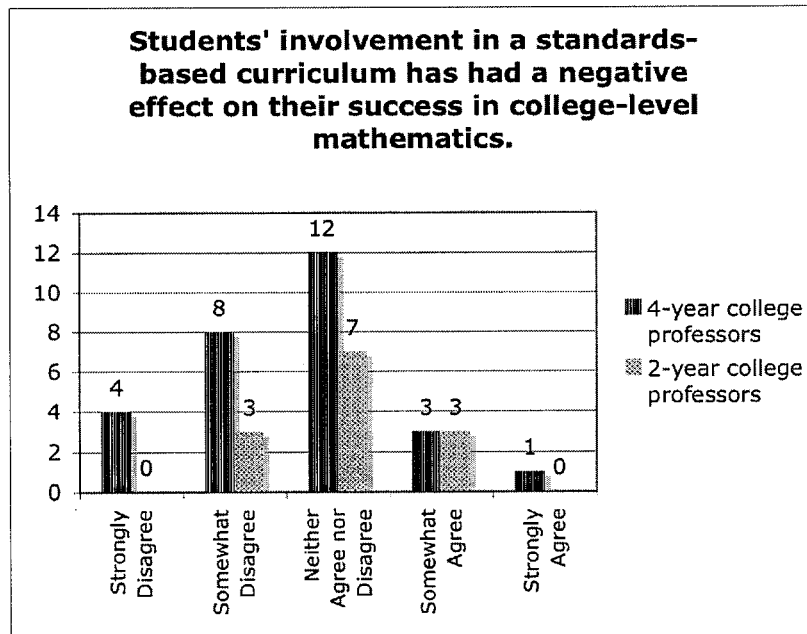


Figure 21: Survey Question 3 Filtered Data

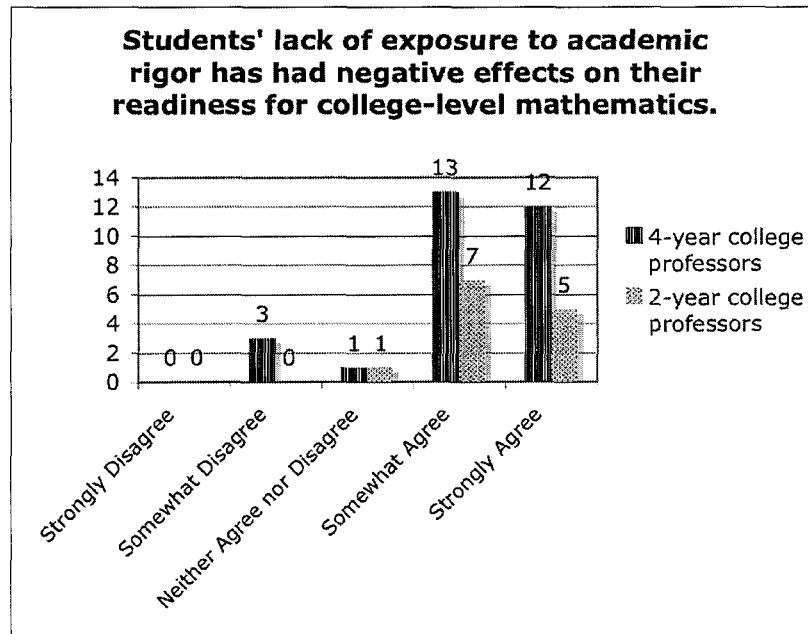


Figure 22: Survey Question 4 Filtered Data

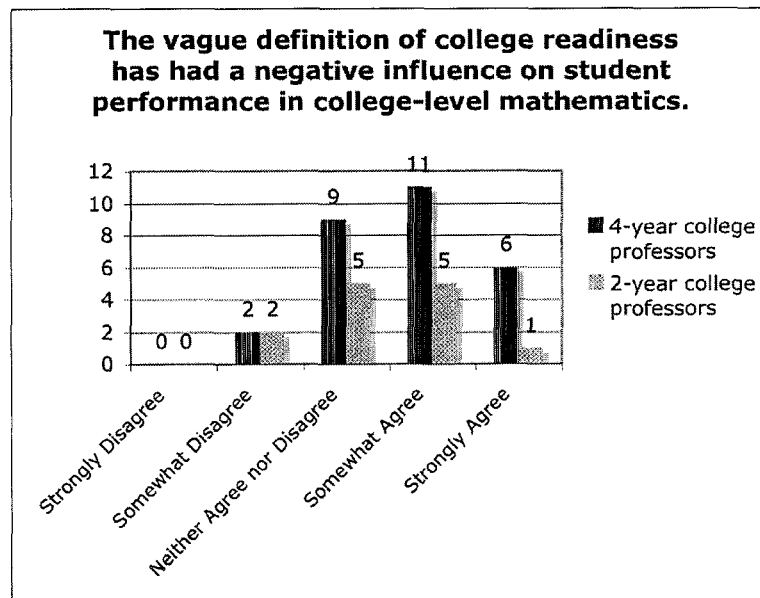




Figure 23: Survey Question 5 Filtered Data

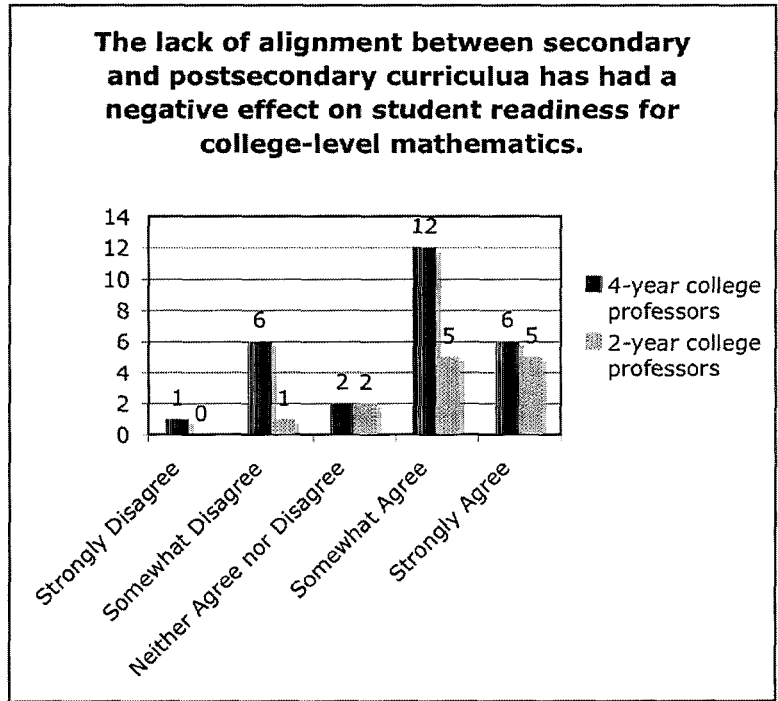


Figure 24: Survey Question 6 Filtered Data

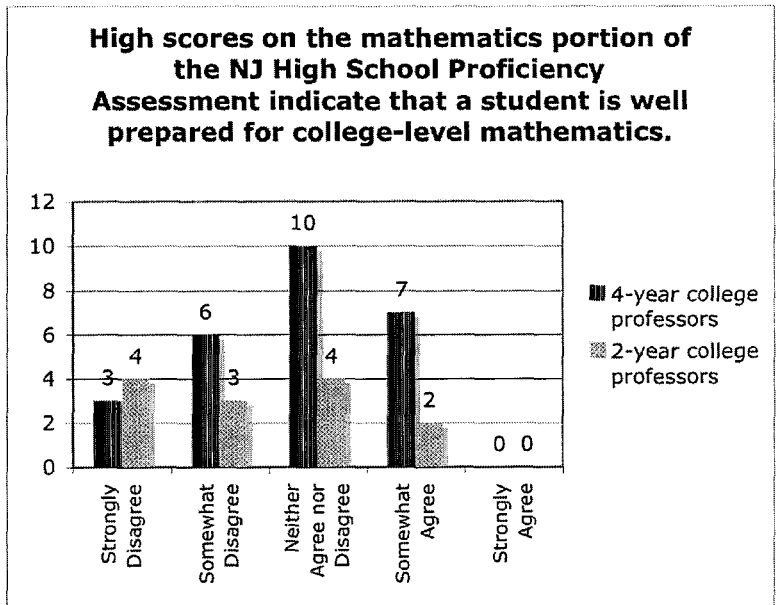


Figure 25: Survey Question 7 Filtered Data

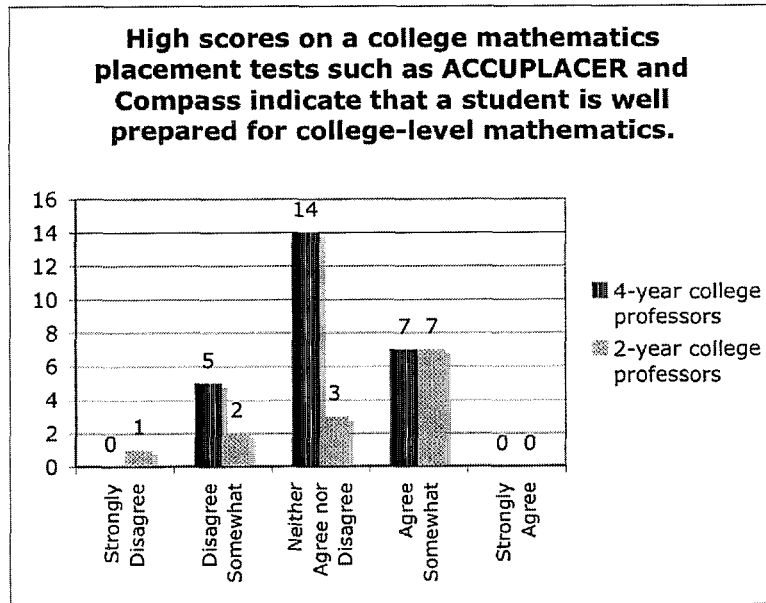


Figure 26: Survey Question 8 Filtered Data

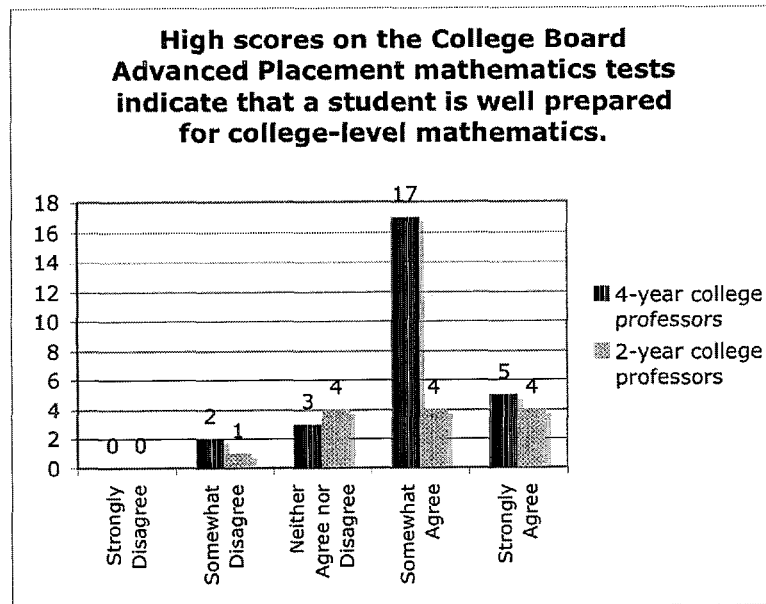


Figure 27: Survey Question 9 Filtered Data

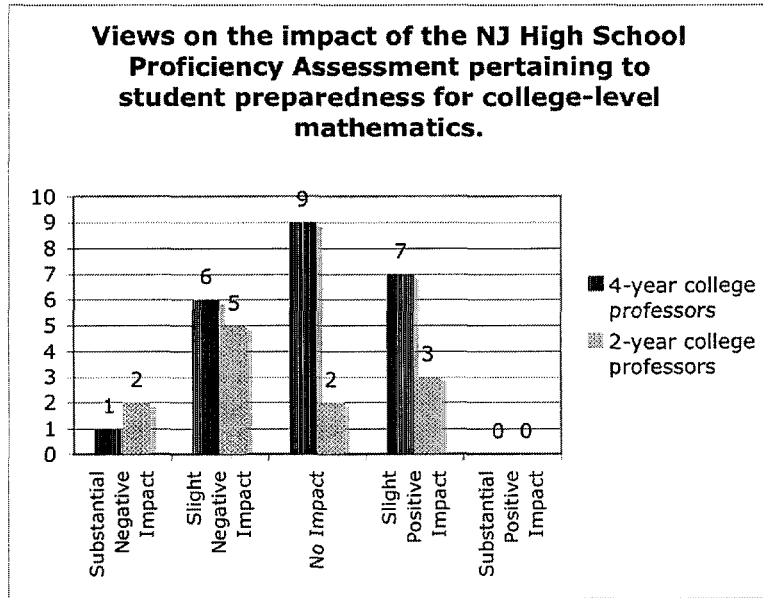


Figure 28: Survey Question 10 Filtered Data

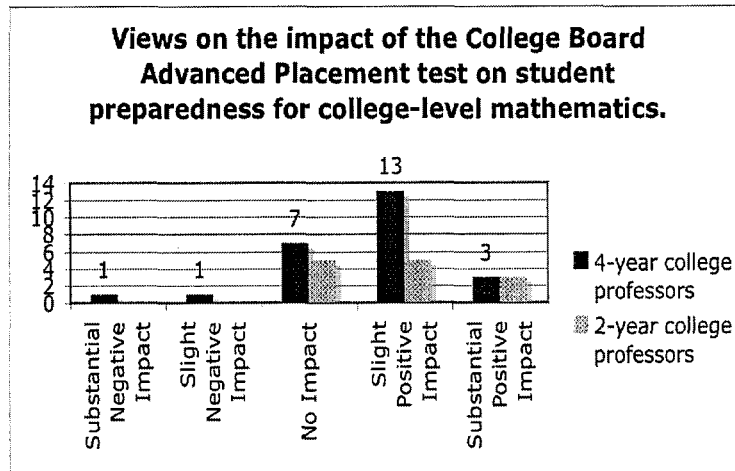


Figure 29: Survey Question 11 Filtered Data

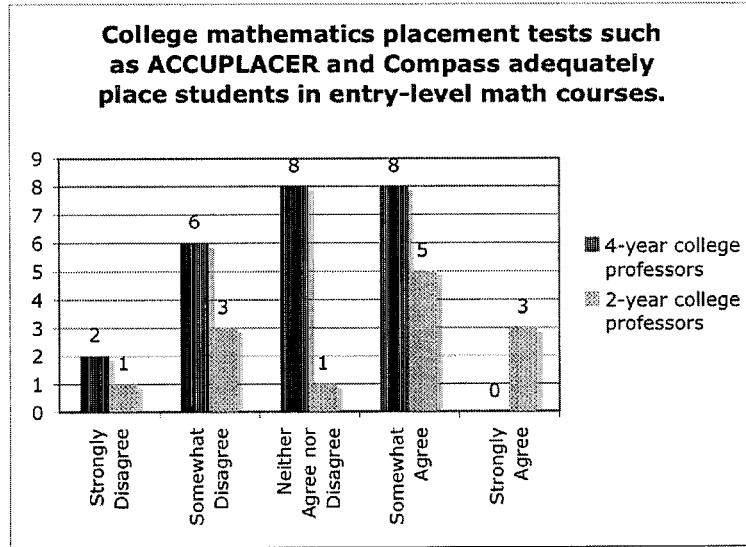


Figure 30: Survey Question 13 Filtered Data

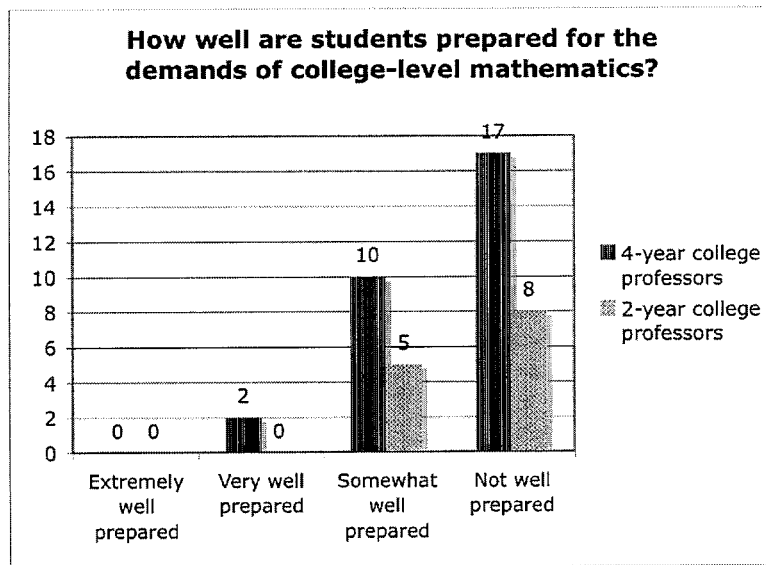
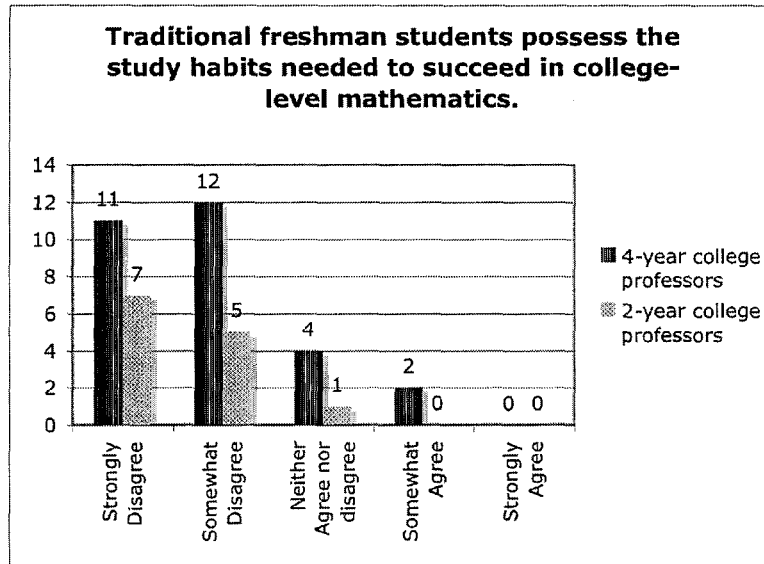


Figure 31 Survey Question 13 Filtered Data



## CHAPTER V

### Summary, Conclusion and Recommendations

#### Summary

Students are not performing well in their freshman year in college mathematics classes. More incoming college freshman are being required to take remedial mathematics coursework. This all may be because students are not well prepared for college level mathematics.

Some reasons students are not ready for postsecondary mathematics are mentioned below. The curriculum overhaul of mathematics education at the K-12 level has caused it to not be aligned with postsecondary curricula anymore. Students are not adequately prepared for the academic challenge associated with a college curriculum. They do not possess the appropriate study habits, and they are not exposed to academic rigor. Students are uncertain with the definition of college readiness since it is vague. The Epistemological messages of textbooks in high schools and colleges are not the same, thus confusing students. Common college placement tests are not aligned with secondary school curricula causing students to perform poorly on the tests and placing them in remedial mathematics courses. The use of graphing calculators in the K-12 curriculum has also been thought to contribute to students not being ready for college-level mathematics. The need for reform to fix the problem of students not being ready for postsecondary mathematics is apparent, and organizations have made recommendations to accomplish this

The purpose of this research was to determine whether college professors from two- and four-year college professors feel that students are ready for college-level mathematics, and to determine the factors that affect student preparation. The research was designed to answer the following questions:

1. What factors contribute to students' readiness for college-level mathematics, and do the factors have a positive or negative effect on students?
2. Do professors feel college placement test scores, HSPA scores and Advanced Placement scores adequately indicate students' readiness for postsecondary mathematics?
3. Do professors feel that the mathematics portion of the HSPA and mathematics Advanced Placement tests have a positive effect on student preparedness for college-level mathematics?
4. Do college mathematics placement tests accurately place students in entry-level college math courses?
5. Does the use of calculators in K-12 mathematics have a positive effect on students' achievement in postsecondary mathematics?
6. Are students prepared for the demands of college-level mathematics?
7. Do the thoughts of two-year and four-year college professors differ pertaining to the topic of student readiness for postsecondary mathematics?

These research questions were answered through a devised survey consisting of 16 questions sent to two-and four-year professors from selected New Jersey colleges. The data was compiled and analyzed. The entire surveyed population's answers were analyzed by comparing response percentages while a chi-squared test examined the

difference in responses of two- and four-year college professors, and the following conclusions were drawn.

### Conclusions

Analysis of the data obtained suggests that professors feel students are not prepared for college-level mathematics. The factors that affect student preparation include the lack of exposure to academic rigor, the vague definition of college readiness, and the lack of alignment between secondary and postsecondary curricula. Incoming freshman students are not ready for the demands of college-level mathematics, and they do not possess the study habits essential for being successful in college mathematics. The majority of two-year college professors feel that graphing calculators do not have a positive effect on student performance

When considering students' high scores on certain mathematics tests, it was found that scores on the College Board Advanced Placement mathematics tests imply that a student is ready for postsecondary mathematics. The Advanced Placement tests also have a positive effect on the preparation of students. On the contrary, high scores on college placement tests and HSPA do not lead to the same conclusion.

The use of calculators in the K-12 curriculum has had a negative effect on student performance in college-level mathematics. This view is felt more by two-year college professors as opposed to four-year instructors. This may be true because two-year colleges must accept all students that apply to their institutions. Many of these students are required to take college placement tests that generally do not allow calculator usage that they are use to in high school classes.



Most professors spend, on average, 1-21% of their class time reviewing materials and skills that they should have learned in high school. This seems like a small amount of time considering that many of the professors indicated that students are not well prepared for their classes. This small percentage of time may be due to the fact that professors do not have the time to review materials since they have their own curriculum to finish.

The New Jersey Core Content Standards for Mathematics have, in effect, become the mathematics curriculum for all New Jersey public schools. These standards align with the NCTM *Curriculum and Evaluation Standards*. Every eleventh grade student must take and pass the High School Proficiency Test in order to graduate high school. Colleges and Universities do not have these same standards to motivate their curricula. It seems obvious that the lack of alignment between secondary and postsecondary curricula has an effect on student performance in college-level mathematics. Standards that drive a curriculum like the New Jersey Core Content Standards, should affect a student's preparation level for postsecondary mathematics, but the majority of the professors indicated that they neither agree nor disagree with statements posed pertaining, in some way, to the standards. One can venture to say that college professors are not familiar with the standards used by high schools, or they do not feel that the standards are applicable to college-level mathematics.

#### Recommendations

The number of professors who participated limited this study. Only 26% of the professors invited to take the survey, actually did so. The population considered for this study included the entire math departments from the chosen colleges. Since many

instructors do not come in regular contact with traditional freshman students, they could not fill out a survey. A larger population would need to be considered to obtain more accurate results.

The researcher recommends that public schools and higher education institutions communicate and work closely together to improve students' college readiness for mathematics. High school students, educators and administrators need to be given a concrete definition of college-readiness so that students can be prepared for established placement standards. It should be required that high school and postsecondary education align their curricula. This will help smooth the transition for freshman students. Through communication, college professors and administrators could let the high schools know what is expected of an incoming freshman student, and high school teachers could discuss what the state requires of them. Again, helping to align the curricula. The problem of the supposed lack of academic rigor in high school courses could be addressed. Professional development could be offered for teachers to help them integrate rigorous coursework into their classes and promote good study habits.

## REFERENCES

- Betebenner, Damian (2001). Readiness for college level mathematics. Retrieved October 3, 2006, from AERA Grants Program Web site:  
[http://www.era.net/grantsprogram/abstract\\_list/Abstracts/Abs-RG-00032942.html](http://www.era.net/grantsprogram/abstract_list/Abstracts/Abs-RG-00032942.html)
- Callan, P.M., Finney, J.E., Kirst, M.W., Usdan, M.D., Venezia, A. (2006). Claiming common ground: state policymaking for improving college readiness and success. Retrieved October 5, 2006 from The National Center for Public Policy and Higher Education Web site:  
[http://www.highereducation.org/reports/common\\_ground/index.shtml](http://www.highereducation.org/reports/common_ground/index.shtml)
- Cebulla, K.J., Schoen, J.L., Winsor, M.S. (2001, April). Preparation of students in a standards-orientated mathematics curriculum for college entrance tests, placement tests, and beginning mathematics courses. Paper presented at for the Annual Meeting of the American Educational Research Association, Seattle, Washington. Retrieved October 8, 2006, from ERIC. (ERIC Document Reproduction Service No. ED453217)
- Charles A. Dana Center (n.d.). Mathematics in the fourth year of high school. Retrieved December 20, 2006, from Mathematics TEKS Toolkit website:  
<http://www.utdanacenter.org/mathtoolkit/support/mathrequirements.php>
- Clapp, M. & Demske, K.E. (1999, December 10). Students Less Prepared for College. *The Guardsman Online*. Retrieved October 4, 2006, from  
[http://www.ccsf.edu/Events\\_Pubs/Guardsman/f991208/uwire02.shtml](http://www.ccsf.edu/Events_Pubs/Guardsman/f991208/uwire02.shtml)
- Gordon, S.P. (2006). Placement tests: the shaky bridge connecting school and college mathematics. *Mathematics Teacher*. 100, 174-178.
- National Council of Teachers of Mathematics (1989). *Curriculum and Evaluation standards for school mathematics*. Reston, VA.
- Raman, M (1998, April 13-17). Epistemological Messages Conveyed by High School and College Mathematics Textbooks. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA. Retrieved October 8, 2006, from ERIC. (ERIC Document Reproduction Service No. ED420523)
- Risher, K. (2003). Why do so many students perform so poorly in higher-level mathematics?. *Mathematics Teacher*. 96[2], 102-104.
- Students Not Ready for College (2005, August 30). *A NewsHour with Jim Labrer Transcript*. Retrieved October 5, 2006, from  
[http://www.pbs.org/newshour/bb/education/july-dec05/sat\\_8-30.html](http://www.pbs.org/newshour/bb/education/july-dec05/sat_8-30.html)

Student Readiness: the Challenge for Colleges (2006, March 10). *The Chronicle of Higher Education*. Retrieved October 10, 2006, from <http://chronicle.com/free/v52/i27/27b03801.htm>

The High School Survey of Student Engagement (2005 Spring). Getting Students Ready for College: What Student Engagement Data Can Tell Us. Retrieved October 6, 2006, from <http://ceep.indiana.edu/hssse>

## APPENDIX

### Sample Survey

#### College Professors' Perceptions on Student Readiness for College-Level Mathematics

Please answer the following questions to the best of your ability. Thank you in advance for your cooperation.

1. The implementation of NCTM's Curriculum and Evaluation Standards has had a positive effect on student readiness for college-level mathematics.

Strongly Disagree  
Somewhat Disagree  
Neither Agree nor Disagree  
Somewhat Agree  
Strongly Agree

2. Students' involvement in a standards-based curriculum has had a negative effect on their success in college-level mathematics.

Strongly Disagree  
Somewhat Disagree  
Neither Agree nor Disagree  
Somewhat Agree  
Strongly Agree

3. Students' lack of exposure to academic rigor has had negative effects on their readiness for college-level mathematics.

Strongly Disagree  
Somewhat Disagree  
Neither Agree nor Disagree  
Somewhat Agree  
Strongly Agree

4. The vague definition of college readiness has had a negative influence on student performance in college-level mathematics.

Strongly Disagree  
Somewhat Disagree  
Neither Agree nor Disagree  
Somewhat Agree  
Strongly Agree

5. The lack of alignment between secondary and postsecondary curricula has had a negative effect on student readiness for college-level mathematics.

Strongly Disagree  
Somewhat Disagree  
Neither Agree nor Disagree  
Somewhat Agree  
Strongly Agree

6. High scores on the mathematics portion of the NJ High School Proficiency Assessment indicate that a student is will prepared for college-level mathematics.

Strongly Disagree  
Somewhat Disagree  
Neither Agree nor Disagree  
Somewhat Agree  
Strongly Agree

7. High scores on college mathematics placement tests such as ACCUPLACER and Compass indicate that a student is will prepared for college-level mathematics.

Strongly Disagree  
Somewhat Disagree  
Neither Agree nor Disagree  
Somewhat Agree  
Strongly Agree

8. High scores on the College Board Advanced Placement mathematics tests indicate that a student is will prepared for college-level mathematics.

Strongly Disagree  
Somewhat Disagree  
Neither Agree nor Disagree  
Somewhat Agree  
Strongly Agree

9. Views on the impact of the NJ High School Proficiency Assessment pertaining to student preparedness for college-level mathematics.

- Substantial Negative Impact
- Slight Negative Impact
- No Impact
- Slight Positive Impact
- Substantial Positive Impact

10. Views on the impact of the College Board Advanced Placement tests pertaining to student preparedness for college-level mathematics.

- Substantial Negative Impact
- Slight Negative Impact
- No Impact
- Slight Positive Impact
- Substantial Positive Impact

11. College mathematics placement tests such as ACCUPLACER and Compass adequately place students in entry-level math courses.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

12. The use of calculators in the K-12 curriculum has a positive effect on student performance in college-level mathematics.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

13. How well are students prepared for the demands of college-level mathematics?

- Extremely well prepared
- Very well prepared
- Somewhat well prepared
- Not well prepared

14. What percentage of class time do you spend reviewing materials and skills that should have been learned in high school?

- More than 80%
- 61-80%
- 41-60%
- 21-40%
- 1-21%
- None

15. Traditional freshman students possess the study habits needed to succeed in college-level mathematics.

- Strongly Disagree
- Somewhat Disagree
- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree

16. Indicate the type of college at which you are employed.

- 2-year college
- 4-year college



