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The effect of a student assessment instrument in the performance of basic skills mathematics students at the community college level

Matthew Flacche
Rowan University

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THE EFFECT OF A STUDENT ASSESSMENT INSTRUMENT IN THE PERFORMANCE OF BASIC SKILLS MATHEMATICS STUDENTS AT THE COMMUNITY COLLEGE LEVEL

by
Matthew Flacche

A Thesis

Submitted in partial fulfillment of the requirements of the
Master of Arts Degree
of
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Approved by _____
Dr. Eric Milou

Date Approved _____5/1/00_____

ABSTRACT

Matthew Flacche, The Effect of a Student Assessment Instrument in the Performance of

Basic Skills Mathematics Students at the Community College Level, 2000,

Dr. Eric Milou, Higher Education with Math Specialization.

This study was conducted to see if implementation of a self-assessing instrument
improved students test scores when compared to no mid-unit assessment at all. The
experiment involved basic skills mathematics students from Camden County College in
Blackwood, New Jersey. Two Math Skills III (Elementary Algebra) classes, containing a
total of 39 students, were included in the study. Both sections of students completed
pretests. The students in both classes received similar instruction, however one class (the
treatment group) received three weeks of instruction, completed and graded Student
Assessment Instruments (SAI's) approximately every other class (during the instruction),
and took a unit exam (posttest), while the other class (the control group) received three
weeks of instruction and the posttest only. The pretest and posttest were used to
perform an analysis of covariance (ANCOVA). The statistical analysis revealed a
significant positive difference in the test performance of the treatment group ($F=6.184$,
$p<0.05$). The author concluded that teachers should incorporate daily assessment into
their classes, and conduct similar experiments to verify and support the significant
findings of this study.

MINI-ABSTRACT

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This study was conducted to see if implementation of a self-assessing instrument improved students test scores when compared to no mid-unit assessment at all. An analysis of covariance (ANCOVA) revealed a significant positive difference in the test performance of the treatment group ($F=6.184$, $p<0.05$). It was concluded that teachers should incorporate daily assessment into their classes, and conduct similar experiments to verify the findings of this study.

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Chapter One – Introduction

Background

Camden County College (CCC) is the second largest institution of higher learning in NJ next to Rutgers University. The school caters to a diverse population of students with respect to age, race, maturity, and college preparation. The *open enrollment* policy, standard with most community colleges, tends to draw a large number of students in need of basic skills remediation in reading, writing, and especially mathematics. It is estimated that more than 50% of the students attending CCC take at least one basic skills class during their time at the college.

As an instructor in CCC's basic math program, one should always be active in the pursuit of teaching techniques and strategies which benefit the broad array of student *learning styles* encountered. This includes, but is not limited to, constantly acquiring new problems and puzzles to use as anticipatory sets during teaching. With respect to assessment, new methods to monitor students' progress, are extremely desirable. A major concern has been the *daily* assessment of students. It is often too late to wait for results from major tests. It is crucial to take advantage of class time, far before a test, to determine if the students are progressing at an acceptable rate.

A former graduate student at Rowan University, Michael Burke (1987), successfully completed a thesis pertaining to *The Effect of Practice Testing to Learning on the Achievement and Attitude of Geometry Students.* In this study, Burke determined there was no significant difference in student performance when practice testing was utilized before an actual test (as opposed to the conventional test review so commonly practiced by math teachers). In another study, Bohuslov (1980) recommended providing sample

tests for practice before administering formal testing. Unfortunately, practice testing takes place after most of the instruction is completed. The practice testing may give students a model to imitate during last minute studying, but offers no additional measuring device for teachers. The difference between the cited research and this study was that the special quizzing technique, used on the treatment group, was implemented almost daily. This gave the student many chances to evaluate their own knowledge and preparation long before formal testing occurred. Both the students and teacher were able to benefit from the stress-free, Student Assessment Instrument (SAI) or modified quiz; students were able to focus on which concepts they were weak in without suffering grade-wise, and the teacher was able to constantly adjust the class lessons based on the student's quiz performance.

More attention should be focused on assessment in non-stress related situations. Conventional quizzes given in between tests are perhaps less stressful than full-fledged tests, but still invoke student concern, stress, and anxiety. Research identified the stress and anxiety associated with testing (Heath, 1994). Research also showed a significant change in student response to different types of assessment (Heath, 1994). For example, students allowed to use their text book, for reference purposes only, encountered less stress than students forced to memorize large amounts of information. Additionally, students given the opportunity to show their knowledge, verbally or visually, more likely avoided the math anxiety that so many students today experience (Bohuslov, 1980). The National Council of Teachers of Mathematics (NCTM) suggested that assessment should occur in class everyday (Webb & Welsch, 1993). Teachers should assess students learning through activity, questioning, quizzing, and testing (McLeod and Ortega, 1993). The NCTM also acknowledged the importance of classroom assessment because it determines the direction of future instruction (Webb & Welsch, 1993).

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This study focused directly on the SAI, and how it related to student assessment and more importantly, achievement. Testing intermittently is not the only way students should be assessed (Rosenstein, Caldwell, & Crown, 1996). Quizzing in-class is widely accepted as a strict, test-like event (on a smaller scale). Perhaps quizzes are universally disliked, or even feared, by students. Instead of aiding in the preparation for upcoming exams, quizzes tend to be lumped in the same category with tests, because they are administered and graded in a similar way. Quizzes can be restructured to be more productive and more favorable for students. Rosenstein, Caldwell, & Crown (1996) suggested that the assessment process should be open to scrutiny and modification. It is important to remember, the goal of assessment is not to raise tension and anxiety, but to see where students strengths and weaknesses are. In *Standard 18*, Rosenstein, Caldwell, & Crown (1996) stated that "all students will be evaluated using a diversity of assessment tools and strategies to provide multiple indicators of the quality of every student's mathematical learning and of overall program effectiveness" (p. 595). In other words, one big test a month is not enough to evaluate the development of students.

A quiz does not have to be treated solely as a grade or a competition. Webb & Welsch (1993) emphasized, "needed are ways for using evaluation and other means to encourage students to value learning for its own sake rather than competing for grades or teacher recognition" (p. 303). Since the SAI didn't entail a grade (which could have hindered student's class average), students had the opportunity to discover not all classroom activities must result in a grade. They engaged in this self-assessment for the sake of improvement purposes only. Elderveld (1983) pointed out that self-assessment is an important part of student learning. In a study of math anxiety, Heath (1994) reported her student greatly benefited from taking tests that would not hurt her grade.

Statement of the Problem

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Students and teachers need to assess the progress of learning more than the conventional tests and quizzes which are popularly used today. Since mathematics is known as a continually building and developing course of study, students need to have more opportunities to measure their level of mastery of concepts along the process of learning. This frequent assessment needs to be implemented without increasing the level of stress or concern of the students. Students need to learn the importance of assessment as part of the learning process, and not solely as a grading instrument.

Research Question

Do significant differences exist between the treatment group (students who are frequently assessed by the Student Assessment Instrument) and the control group (students who receive the same instruction, but no SAI) on a unit exam in basic algebra classes at Camden County College?

Need for the Study

Math anxiety is obviously present in developmental college math courses. The conceptions of math anxiety sometimes overlaps with test anxiety (McLeod and Ortega, 1993). Vuko (1997) explained, "whether it's a needle-toting nurse poking the soft flesh inside your elbow, or a math quiz at school, testing rattles your nerves no matter your age" (p. 5). Perhaps the topic came to the surface from repeated testimonials of struggling students. *When I get to the tests, I just freeze,* or *I was never good at taking math tests* are classic reports from remedial math students whom apparently cracked under the pressure of conventional assessment in the classroom.

This study showed that implementation of a self-assessment instrument improved student test scores. Rosenstein, Caldwell, & Crown (1996) suggested that diverse and alternate methods of assessments should be used. The SAI also enhances teacher's instructional decision making skills, an important part of the learning process. Perhaps

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one of the most important uses of the SAI is the student's increased awareness of mastered and unmastered mathematical concepts. Rosenstein, Caldwell, & Crown (1996) noted that students need to "learn ways to identify the places they need help" (p. 595).

Limitations and Definition of terms

1)   This study involved two math classes, instructed by the same teacher.

2)   The number of students involved in the samples is a limitation. A total of 39 students participated in the study.

3)   The time allotted for the study was limited. The student's progress differences was assessed over a short period of 3 to 4 weeks.

4)   It was difficult to show a *dramatic* difference between the class who completed modified quizzes and the class who completed no quizzes. Students in this course generally pass 80 to 90% of the time, a high success rate. Students scored well on the posttests in both classes. The high pass rate was related to the effective instruction, and the nature of the material covered (considered review material for most students enrolled).

It is important to define the quiz as interpreted by conventional pedagogy, and how it was alternatively perceived in this study. Traditionally, a *quiz* is a short, graded, recorded, and counted examination. It is shorter and less intimidating than a test, but still manages to instill fear into students. The *quiz* to be used with the treatment group was much different than the quiz as universally defined. The Student Assessment Instrument (SAI) was extremely short, collected, graded, recorded, and returned to students generally the same day, or at the beginning of the next class. Although the grades were recorded (for teacher reference), the SAI grades did not decrease the students final grades. Students were also advised that bad SAI scores would not hurt their final grade, however good SAI scores *enhanced* their final grade (see Appendix A-Student/Instructor Agreement).

Chapter Two - Review of Literature

Introduction

Two important aspects of classroom environment which dramatically affect the performance level of student testing are the student's anxiety level, and the way in which the teacher conducts the assessment. This study investigated these aspects of classroom environment, and how they could be modified to enhance student performance.

Math Anxiety

Testing in math class causes extreme stress and tension in students. According to Burke (1987), testing can be traumatic for the test taker. Bohuslov (1980) and Vuko (1997) both conveyed the idea that anxiety affects more math students than not. Perhaps the inflicted anxiety is such a *normal* part of math class, teachers often ignore the possibility of reducing the level of its existence. Vuko (1997) cleverly added "whether it's a needle-toting nurse poking the soft flesh inside your elbow, or a math quiz at school, testing rattles your nerves no matter your age" (p. 5).

What is math anxiety, and how common is it? Math anxiety, more formally known as mathphobia - a term coined by Mitchell Lazarus - is defined as an irrational and impeditive dread of mathematics (Bohuslov, 1980). Bohuslov (1980) furthermore explained, it is likely that mathophobics outnumber by far those who are comfortable with mathematics. Jackson & Leffingwell (1999) blamed math anxiety, in part, in students having poor experiences in math. Jackson & Leffingwell (1999) offered the convincing statistic, 11 students, or 7 percent of 157, had only positive experiences in their mathematics classes from kindergarten through college.

Does stress inhibit student's ability to learn math? Unfortunately, math anxiety

affects student performance in testing. Schwarzer (1987) noted that poor test performance has been linked to cognitive (worry) component of anxiety more than emotional component. When students worry too much about the outcome or grade of their math test, their result is lower test grades. In more dramatic terms, Bisse (1993) explained high levels of anxiety can devastate a student's ability to perform. Students report their difficulties with testing in mathematics. In one study, Jackson & Leffingwell (1999) communicated that students found that taking timed tests in competition with peers was difficult. Likewise, Smith, Michael, & Hocevar (1990) conducted a study where *only* in the instance of a mathematics fluency test did the experiment group, exposed to anxiety-inducing test-taking instructions, achieve a significant lower mean score on the posttest than did the control group.

How does a teacher help reduce the stress and anxiety which develops in math class? Smith (1994) noted that "daily preparation is a key element in avoiding mental blocks or math anxiety" (p. 102). This suggestion is not completely satisfying considering that *most* students attend class regularly, and *most* students suffer from at least some level of stress or anxiety in math class (Bohuslov, 1980). Direct treatment is potential solution for students suffering from math anxiety. Results showed that both stress inoculation and systematic desensitization resulted in significant reductions in math anxiety in testing situations (Schneider & Nevid, 1993).

Alternative Assessment

Although students can reduce their level of stress during math testing by increasing their preparation (Smith, 1994), it is the responsibility of teachers to search, experiment, and formulate alternative methods of assessment for students (Rosenstein, Caldwell, & Crown, 1996). Rosenstein, Caldwell, & Crown (1996) suggested diverse and

alternate methods of assessments should be used in the classroom. Parkay and Stanford (1992) point out the four styles, as described by McCarthy, in which students learn. If students learn in multiple ways, they should be given the opportunity to demonstrate their knowledge in different ways too. This is where the use of the SAI was considered.

There are three reasons to support the notion of the SAI as an alternative means of assessment. First is the reduction of stress or math anxiety. When students have the opportunity to assess their own learning, without concern of *passing* or *failing*, positive effects are the result. Pennington (1995) observed when students were given the opportunity to quiz each other informally, there was a positive effect on the post-test scores of this group. King, Cyr, Gross, & Armstrong (1996) expressed the need for teachers to create a stress-free math assessment, ultimately reducing math anxiety. The SAI actually created a more relaxed classroom environment. Bisse (1993) suggested math teachers need to create an informal, relaxed classroom atmosphere; a recommended measure to reduce math test anxiety is to replace long periodic tests with short, daily quizzes. Steele & Arth (1998) also suggested that assessment should be informal at times. In a study by Heath (1994) her student "knew the material very well, but that she could not pass the written tests because she suffered from extreme math anxiety" (p. 4). When learning was assessed in an alternative, informal fashion, Heath (1994) discovered that "the student's anxiety was reduced when she learned her tests were required, but would not hurt her final grade" (p. 5).

Secondly, alternative assessment can serve as a better educational guide for student involved in the learning process. Charles (1995) reported that self-assessment activities have allowed students more control in the evaluations. Charles (1995) additionally noted that students take their evaluations more seriously. Marshal (1990) expressed the need for teachers to replace conventional multiple-choice testing with

alternative means of assessment. Alternative assessments must replace multiple choice tests where students work with novel problems (Marshal, 1990). It is important for students to measure their level of mastery of math concepts on a daily basis. Lumsden (1996) asserted that students who regularly engage in self-assessment generate information about their working knowledge of mathematical concepts. In this study, assessment without the potential of failure motivated students to actively participate, and develop a better attitude towards math. Positive instruction and assessment in the classroom can convince students that they can do math (Steele & Arth, 1998).

Lastly, the SAI offered immediate feedback to students, allowing them more opportunity to adjust their studying to more effectively learn math. Pennington (1995) pointed out that "immediate feedback is a highly regarded technique evaluated by several researchers, including Hicks, Houston, Cheney, and Marquard who acknowledged that it is a well-known contributor to the learning process" (p. 6). Additionally, Bohuslov (1980) conveyed that students are able to better assess their learning when provided with immediate feedback.

Chapter Three – Methodology

Introduction

This study was conducted to determine if significant differences existed between students who frequently assessed their learning in class by means of the SAI, and students who did not use this assessment tool.

The Sample Population

The study was conducted at Camden County College, a large community college in southern NJ. The students varied in age from 18 to 43 years of age. It is important to note that maturity plays a part in the basic skills study. For example, the teen-aged population of basic skills math students sometimes lack the maturity or wisdom to face their deficiency. They sometimes deny their need for basic math review even though they have unsuccessfully tested into higher levels of math. Although students are placed into the basic skills math classes by testing scores from the New Jersey College Basic Skills Placement Test (NJCBSPT), their scholastic ability greatly varies in other areas of study. For example, a student may place into basic math, yet be in college-level reading and writing courses. This type of student is allowed to progress in college courses as long as they are not directly math related (such as Biology or Physics). Conversely, a student in basic skills reading, writing, and math, may only select courses from a brief list of possible classes.

The students who participated in this study were enrolled in two Math Skills III classes (elementary algebra), a total of 39 students, during the Spring 2000 semester. Both classes were taught in the morning, one at 8:00 am, and one at 9:30 am. Both classes contained a mixture of students with respect to age, gender, race, and attitude.

The Treatment and Control Groups

Both sections of students were pretested and posttested on their knowledge of mathematical concepts and skills. The pretest (see Appendix B) contained 12 questions; students were allowed 15 minutes to complete the test. The pretest instrument was a teacher-modified screening test used in the preceding course Math Skills II. The 12 questions tested for mastery of the units to be taught at the beginning of Math Skills III. The Math Skills III was not used as a pretest instrument because, typically, too many students score "0" correct. This would have been a poor measure of the students' beginning knowledge; just because a student scores "0" correct, doesn't meant they know *nothing*. All students who participated in the study received approximately 3 weeks of instruction after the pretest. The students then completed a posttest to conclude the time-constrained study. The posttest (see Appendix F) was a teacher-created unit test for the three chapters covered; it contained 30 questions, and students were allowed 50 minutes to complete the test. Scores from both the pretest and post-test were recorded.

The only difference in classroom instruction was the use of the SAI with the treatment group. The treatment group completed 3 short in-class *quizzes* (SAIs). The SAI's were 4 exercises in length, and took 5 to 10 minutes to complete (see Appendix C-E). The SAI's were collected, graded, and recorded, but not counted against the student's final grades. Students received their graded SAI's later in the same class period, or at the beginning of the next class. The control group received the same instruction, but did not utilize the SAI.

The Experimental Design and Methods

The data gathered during this study was evaluated using an analysis of covariance (ANCOVA). The independent variable in the study was the SAI (Student Assessment Instrument) or modified quiz. The dependent variable in the study was the posttest

performance measured as the number correct. The covariate was the beginning math ability as measured by the number correct in the pretest.

Approximate Time Schedule

1–18–00	Classes began, pretests administered, graded, and recorded.
1–18–00 to 2–3–00	Students in both classes received instruction.
1–25–00	First SAI administered during class to the treatment group
2–1–00	Second SAI administered during class to the treatment group
2–3–00	Third SAI administered during class to the treatment group
2–8–00	Posttests administered, graded, and recorded.

Chapter Four – Analysis of Data

Introduction

This experiment was conducted to determine if there existed a significant difference in the pretest and posttest scores of basic algebra students using the Student Assessment Instrument (SAI) compared to algebra students not using the self-assessment device. Furthermore, the pretest and posttest scores, for both groups were compiled and compared by means of an analysis of covariance (ANCOVA).

In Table 4.1, the pretest and posttest scores are tabulated for both the control group and the treatment group respectively. In the table, "Student ID" represents the student identification number. In the remaining columns, "Pre" stands for pretest, "Post" stands for posttest, "(C)" stands for the control group, and "(T)" stands for the treatment group.

The means were calculated for the pretest and posttest scores of both the control group and treatment group. Table 4.2 is a bar graph illustrating this information. The pretest consisted of 12 free-response questions; each response was graded correct or incorrect with no chance for partial credit. The posttest consisted of 30 multiple-choice questions; students recorded their responses on a scan-tron sheet. The standard deviations were calculated for the pretest and posttest scores of both the control group and treatment group. Table 4.3 is a bar graph illustrating this information.

TABLE 4.1: Pretest and Posttest Scores for Both Groups

Student ID	Pre (C)	Pre (T)	Post (C)	Post (T)
1	11	8	28	29
2	8	7	28	25
3	6	3	27	27
4	5	6	27	26
5	7	5	29	28
6	8	1	29	26
7	9	7	25	29
8	1	9	19	24
9	11	7	29	30
10	7	9	28	30
11	6	3	28	26
12	9	4	26	29
13	7	3	26	26
14	5	10	26	30
15	6	7	23	28
16	6	9	23	30
17	3	7	22	26
18	2	6	23	22
19	8		26	
20	3		23	
21	8		26	

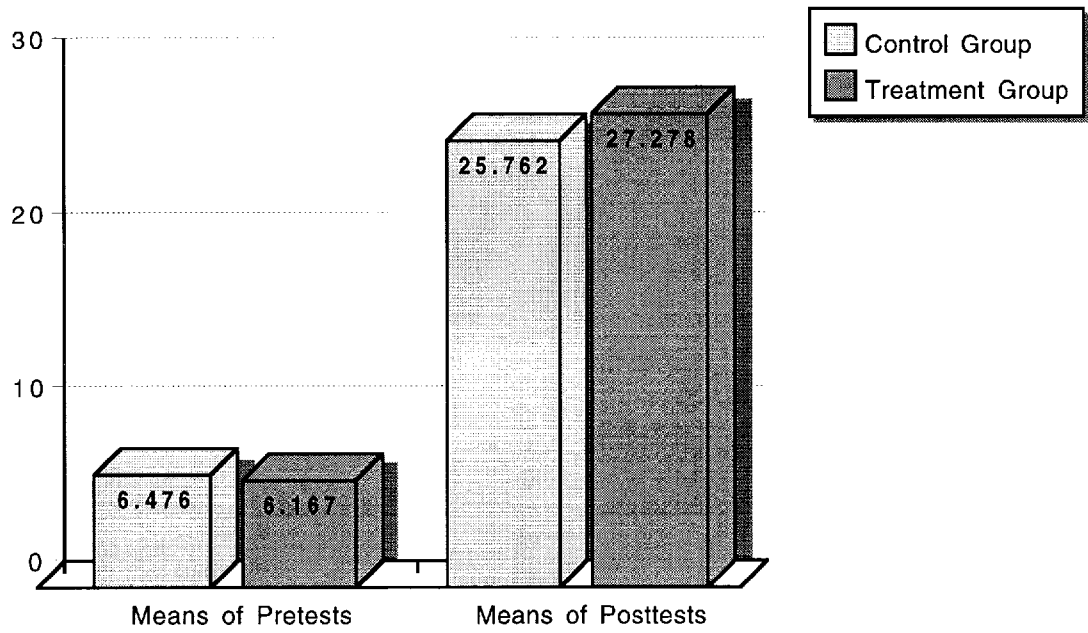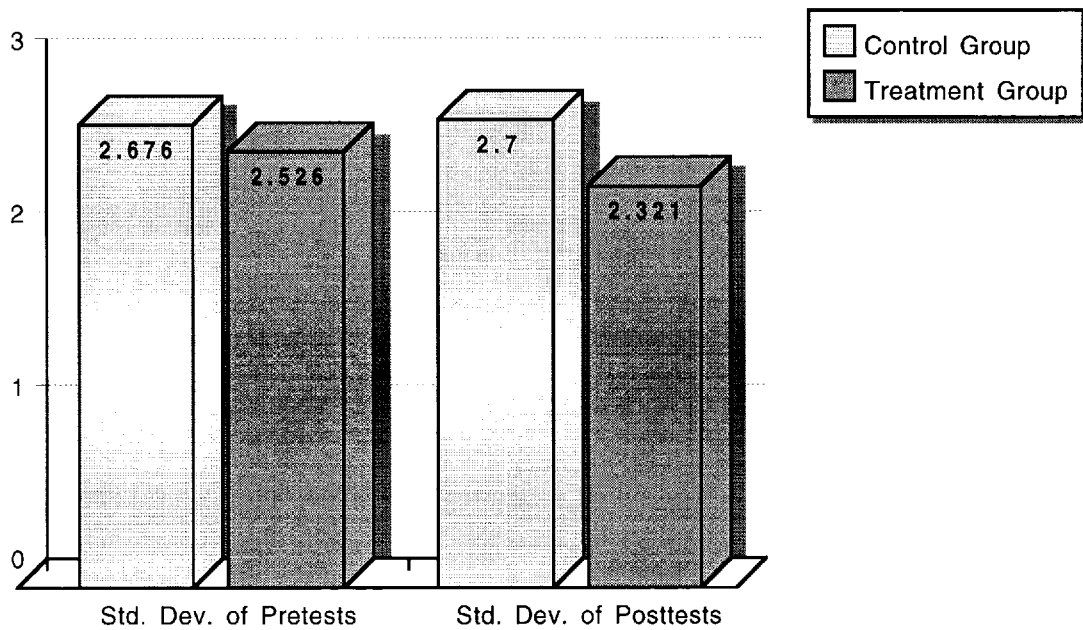**TABLE 4.2: Means of Pretest and Posttest Scores**

TABLE 4.3: Standard Deviations of Pretest and Posttest Scores

An examination of Table 4.5 indicated the treatment group scored 2.58% lower

than the control group on the pretest, but 5.05% higher than the control group on the

post test. An examination of Table 4.6 indicated a decrease of 5.61% in the standard deviation of the pretest scores for the treatment group. The standard deviation for the treatment group's posttest scores was 14.04% less than the control group's standard deviation.

An analysis of covariance was conducted using the pretest and posttest scores. The analysis indicated a corrected model F value of 11.204 with $p < 0.01$, an intercept F value of 645.629 with $p < 0.01$, a covariate F value of 17.398 with $p < 0.01$, and a control F value of 6.184 with $p < 0.05$.

The analysis revealed a significant difference between the treatment group and the control group with respect to student scores on the posttest. The treatment group started the experiment with lower pretest scores, yet scored higher on the posttest. Starting the experiment with less knowledge, and ending the experiment with more knowledge, suggests the treatment group was able to learn more efficiently and effectively, with the SAI as the only difference in instructional technique.

Chapter Five – Summary, Conclusions and Recommendations

Summary of Findings

The purpose of this study was to determine if significant differences existed between students who were frequently assessed by the Student Assessment Instrument (treatment group) and students who received the same instruction, but no quizzes (control group) on a unit exam in basic algebra classes at Camden County College. An experiment was conducted to statistically analyze students pretest and posttest scores, to determine if there were significant differences between the treatment and control groups.

An analysis of covariance (ANCOVA) was conducted using the pretest and posttest scores of both groups of students. The analysis indicated a corrected model F value of 11.204 with $p < 0.01$, an intercept F value of 645.629 with $p < 0.01$, a covariate F value of 17.398 with $p < 0.01$, and a control F value of 6.184 with $p < 0.05$. The analysis revealed a significant difference between the treatment group and the control group with respect to student scores on the posttest.

Conclusions

The method of frequent student assessment, described as the student assessment instrument (or "SAI"), had a significant effect on test performance of the treatment group. Students who used the short quizzes to assess their progress on a more frequent basis experienced increased test scores. Since there was a positive, significant difference in the performance of the treatment group, it can be concluded that the use of the SAI was a beneficial addition to conventional assessment, as compared to no mid-unit assessment at all.

Bohuslov (1980) and Vuko (1997) both conveyed the idea that anxiety the majority of math students and that inflicted anxiety is such a *normal* part of math class, teachers often ignore the possibility of reducing the level of its existence. Schwarzer (1987) reported that math anxiety affects student performance in testing. Bisse (1993) explained that high levels of anxiety can hinder a student's ability to perform. Since the SAI is a stress reducing, non-threatening way for students to frequently check their understanding of mathematical content and level of preparation for class, students were able to worry less, and learn more. This study concurs with the research, pertaining to stress and anxiety, provided by Bohuslov (1980), Vuko (1997), Schwarzer (1987), and Bisse (1993).

Smith (1994) concluded that students can reduce their level of stress during math testing by increasing their preparation. Additionally, it is the responsibility of teachers to search, experiment, and formulate alternative methods of assessment for students (Rosenstein, Caldwell, & Crown, 1996). Parkay and Stanford (1992) pointed out that students learn in different ways. This suggests that students should be given the opportunity to demonstrate their knowledge in different ways too. The SAI is an alternative means of assessment which helps students raise their level of preparation. This experiment concluded that reduced stress, along with increased preparation between unit testing, helps students achieve higher test performance.

Bisse (1993) recommended math teachers to replace long periodic tests with short, daily quizzes in order to create an informal, relaxed classroom atmosphere. Steele and Arth (1998) suggested that assessment should be informal at times. The SAI is short and informal.

Charles (1995) reported that self-assessment activities help students take testing more seriously, and perceive it as a true self-assessment and personal goal setting tool.

Lumsden (1996) asserted that students who regularly engage in self-assessment generate information about their working knowledge of mathematical concepts. Steele and Arth (1998) added that assessment without the potential of failure can also motivate students to actively participate in math class. The SAI is primarily a student self-assessment tool which invoked no additional potential of failure for the students.

Finally, Pennington (1995) pointed out that researchers acknowledged that immediate feedback is a highly regarded technique, and a well-known contributor to the learning process. Additionally, Bohuslov (1980) concisely stated "students are able to better assess their learning when provided with immediate feedback". The SAI is promptly returned to students during the same class period, or the beginning of the next class at the very latest.

Recommendations

The analysis of pretest and posttest scores through an analysis of covariance (ANCOVA) revealed a significant positive difference, with $p < 0.05$, in student test performance when they participated in frequent self-evaluation in before a unit exam. It is suggested that math teachers, informally but accurately, assess their student's progress on a daily basis. Mathematics students, particularly developmental mathematics students, need to be guided towards daily preparation for class, as opposed to waiting until the night before unit exams, when it is most likely too late to learn course material.

Since this experiment was conducted with a small sample, it is suggested the study be repeated with a larger sample, and for a longer duration of time. If teachers wish to test the effectiveness of a particular assessment tool, they should repeat the study over several semesters to observe the consistency or inconsistency of the results. An increase in the body of data will strengthen the validity of any findings in the experiments.

Teachers should experiment with different types of assessment to find the type

most suitable for their students. Teachers should also choose the type of informal assessment which caters to multiple learning styles such as written, verbal, audible and visual. This would allow more students to benefit from the daily assessment. After teachers find a type of assessment they wish to utilize, it is suggested they conduct similar experiments, comparing the pretests and posttests, to construct statistical support for their assessment technique.

The results of this study imply that use of the Student Assessment Instrument (SAI) enabled students to:

1) Measure their level of preparation for class with almost immediate feedback,

2) Determine if they understood the concepts taught the class before,

3) Determine what concepts and skills needed more work and attention.

The results of this study imply that use of the Student Assessment Instrument (SAI) enabled the teacher to:

1) Measure the student's level of understanding with respect to recently taught concepts and skills,

2) Determine if additional attention was required for individual concepts and skills,

3) Make quick decisions with respect to changes in instructional content according to student's performance on the informal quizzes.

Appendix A – Student/Instructor Agreement

CAMDEN COUNTY COLLEGE
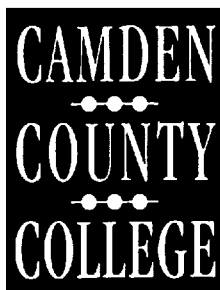
Student/Instructor Agreement
Math Skills I, II, III

Section One: Additional Information not provided in the general syllabus
 Instructor: Mr. Flacche
 Contact Number: 227-7200 ext. 4410 (leave message for me)
 Internet Communication (e-mail): FLACCHE@aol.com
 School Closing Number: 559

Section Two: Grading Policy
 Standard breakdown of your final grade:
  Tests and other assignments.......   75%
  Final Exam Grade...................   25%
 Alternate breakdown of your final grade (if it benefits the student)
  Tests and other assignments.......   50%
  Final Exam Grade...................   50%

Section Three: Appropriate Behavior in College
 Some students have trouble distinguishing between appropriate and inappropriate behavior in college classes. The best way to approach this topic is to be **considerate** to your fellow students and your instructor. For example, use of the lavatory and pencil sharpener does not require interruption or permission during class. Additionally, it is important to **respect** your fellow students and instructor while they are speaking in class. If you would like to participate and/or interject during classroom activities, please raise your hand.

Section Four: Required Materials
 <u>TEXT BOOKS</u>: The books described in the Math Skills Department Syllabus should be brought to all classes unless otherwise instructed.
 <u>CALCULATORS</u>: Calculators are permitted in class (Math Skills 1 students may use calculators after Chapter 3 is completed). I recommend the TI-30xa (Texas Instruments), although it is not mandatory to buy it. Other comparable models are the TI-35 and the TI-36x. Calculators are permitted on all Math Skills final exams.

Section Five: Making up missed work
 <u>QUIZ MAKE-UP</u>: Quizzes are not officially a part of your final grade in this

math class. They are used for daily assessment of student progress and preparation. Therefore, there are no make-ups offered for missed quizzes. You should consult one of your study partners (Section Nine) to copy and try the problems from a missed quiz.

> **NOTE:** Poor quiz grades <u>will not decrease</u> your final grade. However, good quiz grades can <u>enhance</u> your final grade!
>> Example) If a student earns a final grade of 79.1 and has good quiz grades, a "B" will be assigned for a final letter grade. If a student earns a final grade of 79.1 and has poor quiz grades, a "C" would be assigned for a final letter grade.

<u>TEST MAKE-UP</u>: When a student misses a scheduled test, I automatically assign a "0" for a grade in my records. Test make-ups will be granted when the student returns to class with **WRITTEN VERIFICATION** of the unforeseen absence. Since you are an adult, notes from friends or family **WILL NOT** be accepted as "written verification". Generally, students have one week to make up a missed test. Make-up tests **ALWAYS** entail more work than the standard in class test!

Section Six: Test Improvement

Students may improve their test grades in the following manner: For every problem you answer incorrectly on a test, you correct it AND do two more similar problems from the text or review book. If this work is completed accurately and neatly, you will earn half the difference between 100 and your original grade.

> Example) If you correctly answer 21 problems out of 30 (70%) on a test, improving your grade to an 85% would entail submitting 27 problems (9 corrected problems + 2 problems for each incorrectly answered problem).

Section Seven: Lateness

Getting to class on time is extremely important. Severe and/or frequent lateness will not be tolerated. Classes where you arrive more than 20 minutes late will count as an absent day unless there is documentation provided that reasonably explains the tardiness. Also remember, if you are late to class, remember to be considerate and respectful to fellow classmates and your instructor by sitting and getting set up for class as quickly and quietly as possible.

Section Eight: Class Attendance

As stated in your College Handbook, and the Math Skills General Syllabus, students are expected to attend **all** scheduled classes. In the event of an emergency, students will be permitted a <u>total</u> of:

> a). four personal days (if class meets twice a week)
> b). six personal days (if class meets three times a week)
> c). two personal days (if you are enrolled in a summer class which meets three times a week)

d). three personal days (if you are enrolled in a summer class which meets four times a week)

These are days in which you may choose to not attend class. The personal days are the **only** absences that will be permitted during this course; so use them for **true emergencies only**! If a student fails to meet the attendance requirement for the course, I may choose to assign a grade of NA (Not Attending) for the course. If a student has an unusual situation develop during the semester where attending class if difficult, BUT manages to keep up with class and achieve passing grades (this is unusual), I may choose to assign the grade (A,B, or C) earned by the student. Generally, a student must meet the attendance requirements to be eligible for 4-day review courses (offered shortly after the conclusion of the course for students that do not pass the final exam).

Section Nine: Study Partners

Perhaps the most useful resources in the classroom (other than your instructors) are your fellow class mates. I require each student to make acquaintance with <u>at least</u> two other students in class (including exchanging full names and phone numbers). You may keep in touch with your study partners for simple reasons such as obtaining assignments from a missed class, or **STUDYING TOGETHER** (recommended by your instructor).

STUDY PARTNER #1:   Name_____   Phone_____

STUDY PARTNER #2:   Name_____   Phone_____

- -

Section Ten: Written Agreement

I have read **and** understand all of the rules and policies, which will be followed, in this Math Skills course. I [print name] _____ (ID # or Soc. Sec. # _____) will abide by the rules and policies explained in this agreement. I will follow attendance policy ____ (choose letter in "Section 8" which applies to your class situation).

Student Signature_____
Date_____

STUDY PARTNER #1:   Name_____   Phone_____

STUDY PARTNER #2:   Name_____   Phone_____

Appendix B – Pretest

Math Skills III
Unit 1–3 Pretest

NAME_____   DATE_____

MTH–030–_____   CLASS TIME_____

Use the available space or the reverse side of this paper to do the work and place the answers in the blanks provided. ***REDUCE ALL FRACTIONS.***

1)   Evaluate: $-8 - (-5)$ 1) _____

2)   Write the following phrase using symbols: 2) _____
three times the sum of x and twice y.

3)   Simplify: $\left(-4a^5 b\right)\left(-7ab^5\right)$ 3) _____

4)   Simplify: $12x^2 y + 5xy^2$ 4) _____

5)   Simplify: $\dfrac{15x^4 yz^3}{-5xyz}$ 5) _____

6)   Simplify: $2x^2 + 7x^3 + 3x^2 - 5x^3$ 6) _____

7)   If a = -3, b = -2, and c = -1,   7) _____
then $3a - b^2 + 4ac = $?

8)   Evaluate: $\dfrac{-3 - 2^2}{3(-6) - 2(-2)}$ 8) _____

9)   Solve for x: $6x - 2 = 9x + 1$ 9) _____

10)   Solve for x: $3 (x - 5) = 3 + 5x$ 10) _____

11)   Solve for x: $5 - 3x \leq 17$ 11) _____

12)   Five less than twice an integer is three.   12) _____
Find the integer.

Appendix C – Student Assessment Instrument 1

Student Assessment Instrument 1

Name _____
Mr. Flacche
Math Skills III

1) Write "seven less than three times a number" using algebra symbols.

2) Perform the order of operations:
$$3(6-4)^3 - 4^2$$

3) Simplify: $4(6x + 3) + 3x - 2$

4) Combine like terms:
$$4x^2y + 3xy^2 - 3x^2y + xy^2$$

Appendix D – Student Assessment Instrument 2

Student Assessment Instrument 2

Name _____
Mr. Flacche
Math Skills III

1) Evaluate: $|-5|-|-2|$

2) Perform the indicated operations: $8 + (-2) - (-5) - 3$

3) Perform the indicated operations: $-2^2 - (6)(-3)$

4) If x=-2 and y=-3, then evaluate:

$$\frac{y^2 + x^2}{xy}$$

Appendix E – Student Assessment Instrument 3

Student Assessment Instrument 3

Name _____
Mr. Flacche
Math Skills III

1) Solve: $3(2x - 1) - 2 = 3x + 4$

2) Solve: $-\dfrac{3}{4}x + 5 \leq -7$

3) In number 2, the graph would start at _____ (location) , have a(n) _____ dot (open or closed), and travel to the _____ (direction).

4) Solve this literal equation for m:
$$y = mx + b$$

Appendix F – Posttest

General Test Directions: Choose the letter of the correct answers, then fill the
corresponding circles in on your scan-tron sheet.

1) Write in exponential form: $12 \cdot q \cdot q \cdot q \cdot r \cdot r \cdot s \cdot s \cdot s \cdot s$
   a. $12q^2r^3s^4$ b. $12qr^2s^5$ c. $12q^3r^2s^4$ d. $24q^3r^2s^4$

2) Perform the distributive property: $14 (2x - y)$
   a. $28x - y$ b. $7x - 14y$ c. $14x - 7y$ d. $28x - 14y$

3) Simplify: $15x - 5y - 5x + 5y$
   a. $10x$ b. $10x - 10y$ c. $-10y$ d. $10xy$

4) Simplify: $-1 - (-4) + (-2) - 5$
   a. -6 b. -12 c. -4 d. -8

5) Perform the distributive property and simplify: $-3 (5x - 1) + 20x$
   a. $35x + 1$ b. $5x + 3$ c. $-35x - 3$ d. $5x - 3$

6) Evaluate: $-| 5 - 19|$
   a. 14 b. -14 c. 24 d. -24

7) Evaluate: -8^2
   a. 64 b. -64 c. 16 d. -16

8) Evaluate if... $a = 2, b = -3, c = -1$: $7c^2 - ab$
   a. -13 b. 13 c. 1 d. -1

9) Evaluate if... $a = 2, b = -3, c = -1$: $3c^2 + a^2 - b^2$
   a. 2 b. -2 c. 16 d. -16

10) The fractions $\frac{4}{9}$ and $\frac{9}{4}$ are known as _____.

    a. Coterminants   b. Opposites   c. Reciprocals   d. Integrals

11) Evaluate: -10 + 9

    a. 19   b. -19   c. 1   d. -1

12) Evaluate: 25 - (-14)

    a. 11   b. -11   c. 39   d. -39

13) Evaluate: (-9)(-8)

    a. -72   b. -17   c. 72   d. -1

14) Evaluate: 12 - (6-10) + 4

    a. 16   b. 20   c. -16   d. -20

15) Evaluate: $6\left(4 - 2^2\right)^2$

    a. Undefined   b. 0   c. 384   d. -384

16) Solve: 15x - 9 = 14x

    a. 9   b. -9   c. $\frac{-9}{29}$ d. $\frac{9}{29}$

17) Solve: 5y - 4 = 3y + 2

    a. 1   b. -1   c. 3   d. -3

18) Solve: $\frac{x}{17} = 3$

    a. 59   b. -51   c. 51   d. -59

19) Solve: $-\frac{5}{6}x = 35$

    a. 40   b. -42   c. -40   d. 42

20) Solve: 9(3x + 2) - 10x = 12x - 7

    a. -5   b. 8   c. 5   d. -8

21) Solve for t: I = Prt

a. $t = \dfrac{P}{rI}$ b. t = IPr   c. t = I + P + r   d. $t = \dfrac{I}{Pr}$

22) Solve for y: x + y - z = 180

a. y = 180 - x - z   b. y = 180 - x + z   c. y = 180 + z   d. y = -x - z - 180

23) Solve: -4x - 6 < 2

a. x > -2   b. x < -2   c. x < -1   d. x ≥ -1

24) In number 23, the graph should have a(n) _____ circle, traveling to the _____.

a. closed, right   b. open, right   c. closed, left   d. open, left

25) Solve: 3(x + 4) ≥ 6

a. x ≥ -2   b. x ≤ -2   c. x ≤ -1   d. x > -1

26) In number 25, the graph should have a(n) _____ circle, traveling to the _____.

a. closed, right   b. open, right   c. closed, left   d. open, left

27) The sum of two consecutive odd integers is 56. Find the larger of the two integers.

a. 28   b. 33   c. 37   d. 29

28) Josie is 3 years less than 3 times as old as Tina. If the sum of their ages is 45, how old is Josie?

a. 30   b. 31   c. 12   d. 33

29) 3 times a number decreased by 5 is 43. Find that number.

a. 27   b. 12   c. 16   d. 19

30) The length of a rectangle is 3 less than four times as much as the width. If the perimeter of the rectangle is 64cm, what is the length of the rectangle?

a. 7cm   b. 9cm   c. 28cm   d. 25cm

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