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“Let’s Review.”
A Look at the Effects of Re-teaching Basic Mathematic Skills

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Math in the Middle Institute Partnership
Action Research Project Report

in partial fulfillment of MAT Degree
Department of Mathematics
University of Nebraska-Lincoln
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“Let’s Review.”
A Look at the Effects of Re-teaching Basic Mathematic Skills

Abstract

In this action research study of my classroom of 8th grade mathematics, I investigated the effect of reviewing basic fraction and decimal skills on student achievement and student readiness for freshman Algebra. I also investigated the effect on the quality of student work, with regards to legibility by having students grade each other’s work anonymously. I discovered that students need basic skill review with fractions and decimals, and by the end of the research their scores improved. However, their handwriting had not. At the end of the research, a majority of the students felt the review was important, and they were ready to take math next year in high school. As a result of this research, I plan to implement weekly fraction and decimal review assignments in all middle school grades: 6th, 7th, and 8th. In addition, fraction and decimals must be incorporated into daily assignments, where appropriate, in order to encourage students to retain these skills.

This action research investigated the benefits of reviewing and re-teaching in today's classroom, specifically mathematical operations with fractions and decimals for eighth grade students. These review units were designed to test students' prior knowledge and then provide opportunity for practice of these basic skills as students prepare for their freshman algebra courses. In addition, student handwriting was also examined as students were required to grade each other's review worksheets anonymously.

The idea for this project began as a discussion among the math curriculum team at my school. After talking with the high school math teachers, many of them expressed concerns about our students' understanding of fractions and decimals. It was apparent to them that by the time our eighth graders entered high school they have forgotten their basic skills when it comes to fractions and decimals. To account for the gaps in learning that were occurring, high school assessments were being rewritten to accommodate students who were not able to complete objectives that tested over the rational number system. The rational number system is one of the focuses of our algebra classes and without the fraction and decimal skills, our students could not succeed. In addition, since these students did not understand basic fractional concepts, algebraic fractional concepts had become more difficult to teach.

After confirming with the fifth and sixth grade teachers about when these skills were taught, it was decided that retention could be the cause of the problem. It was then that I decided to try a review and re-teaching activity with the eighth grade class as it was their last opportunity for review before entering high school the following year. With this research, in order to give students more opportunity to "master" these basic concepts, classroom time was given to review and re-teach concepts taught in earlier grade levels. Additionally, worksheets, quizzes, and tests were given to assess students' progress throughout the research. Simultaneously as an incentive

for students to complete their homework in a more readable fashion, student neatness on homework was also considered as students graded each other's review worksheets anonymously.

Problem Statement

In order to meet state standards at my school, students need to take three years of math classes including both the algebra and geometry courses before they graduate. Enrolling as many students as possible in the freshman algebra class helps the students and the school meet these state requirements. However, about fifty-percent of each freshman class do not take the one-year algebra course (55% in 05-06 and 48% in 06-07); instead they are enrolled in a more simplified two-year algebra course that does meet the standards but does not require students to take additional math courses after meeting graduation requirements. Ideally the more students that are enrolled in the one-year course, the more math courses students need to complete before graduation.

Any high school teacher who teaches freshman mathematics should know the skills that their students are bringing with them to their course. However, many times these skills are unpracticed and have been forgotten. Basic skills such as operations with fractions and decimals are essential to high school math courses. If an opportunity to review and re-teach skills like these could be done in the middle school grade levels, high school teachers could spend less time trying to re-teach the skills themselves and instead teach the material they need to in order to meet their curriculum. Eighth grade is an opportune time to implement this review since the students are still taking a general math course, and it allows for the opportunity to bring together all the skills taught in grades five through seven.

Literature Review

Several questions came to mind as I talked to the high school math teachers: Why are students failing? Did the lessons I taught in eighth grade not adequately prepare them for high school algebra? Are they missing skills? What skills are they missing? Was the student placed in the wrong class?

As I started to answer these questions, the first one I wanted to answer was: Was the student placed in the wrong class? White, Gamoran, Smithson, and Porter (1996) studied seven high schools in California and New York investigating the effects of enrolling lower level math students in more rigorous math courses. In general, they found that students who are initially assigned to college-preparatory courses such as algebra and geometry not only learn more, but they are more likely to pursue higher mathematical studies in subsequent years. They stated that “a key logistical difficulty of the course sequences is student placement” (p. 292). In order to help each student decide on the course he/she should enroll in as a freshman, we have each student take an algebra prognosis exam called the Hanna Orleans. This exam, final semester grades, the guidance counselor’s opinions, and my opinions guide students on their decisions. If each student is placed correctly according to our criteria, then the problem must be something else.

During another math curriculum team meeting, with grades six through twelve represented, we compared my eighth grade outcomes and objectives with the Algebra 1 curriculum. We decided that there was more than enough “pre-algebra” coursework in eighth grade to adequately prepare a student for high school algebra. Therefore, he/she was not missing any skills from coursework like I previously thought; instead, the students were not retaining the skills from one year to the next. The new question before me was “Why are students not

retaining skills from one year to the next, and what mathematical skills are in need of the most reviewing?”

Researching basic skills, I found some journals that discussed textbooks over the years and the problems that they are causing. I do not want to blame my textbook for my students' problems as I am in control of my own teaching, but my research has shown me that it is a place to start. Hamann and Ashcraft (1986) analyzed textbooks from grades kindergarten through third grade for frequency of basic addition facts. In general, they found that many textbooks use smaller and easier values when presenting new material. In fact Hamann and Ashcraft found that in most cases, textbooks present problems with larger and more complicated values with a substantially lower frequency than problems with smaller and less complicated values (p. 180). As I began to compare this data to my teaching and my textbook, I realized that many times when I began a new topic I started with easier values, usually whole numbers and integers, and sometimes “got around” to presenting problems with rational numbers. In Hamann and Ashcraft's research they stated that, “one might argue that more complex addition skills...and other factors are better taught with simpler imbedded problems. This hardly seems sufficient justification” (p. 189).

What does this mean for my research? As I teach the outcomes for my classes I need to be aware of the opportunities I give my students to review basic facts. For example: when teaching one-step equations I begin with small whole numbers so the students can learn the new concept. Slowly we make the problems more difficult by using negative numbers and eventually the occasional decimal or fraction. By accident, I am handicapping my students. I have “fallen prey to the small problem syndrome” (Hamann & Ashcraft, 1986, p. 189). By teaching in this fashion my students never truly get to work with a large amount of questions that have rational

numbers as part of the problem. Ashcraft and Christy (1995) analyzed elementary textbooks from grades first through six for the frequency of operands larger than five. In general, they found that since small operands are used when introducing new material, “large facts receive much less review, partly because once they have been presented, the text turns to a new topic” (Ashcraft & Christy, 1995, pp. 406-7).

After realizing what was going on in my textbook and my classroom instruction, I looked at my old assessments. Many of the assessments had questions that were whole number problems; in fact, very few questions contained rational numbers. “Not only did periodic review through the texts tend to over represent smaller facts, but even the year-end cumulative test reflected the small fact bias” (Ashcraft & Christy, pp. 408). When those assessments were written, their intent was to see if the student could do the algebraic operations; if the student missed the problem because he/she could not add fractions correctly, does that mean they did not complete the outcome? In other words, if the assessment was to test the algebraic operations and the student could do the operations but could not add fractions, did the student meet the outcome? Whether the answer is ‘yes’ or ‘no’, by removing fractions and decimals from the exam, I was removing opportunities for basic skill review.

Continuing with my research, I discovered that in other research; Henderson, Landesman, and Kachuck investigated the use of computer video instruction for review of mathematical concepts. In general, they found that students enjoyed learning from the computer and that students who used the program gained a statistical advantage (p. 220). In their research, “fractions were ultimately chosen as the major topic for the modules, because it was identified by the teachers as the single most common area of difficulty for students who were likely to drop out of the mathematic sequence” (Henderson, Landesman, & Kachuck, 1985, pp. 208-209). With

confidence I asked the high school teachers what basic skills freshman are lacking.

Overwhelmingly their responses were fractions and decimals, including percents. Denmark and Kepner (1980) distributed 3200 surveys to teachers on twenty-three different educational and mathematical categories. The results of the surveys were analyzed and the results agreed that computing with fractions, decimals, and percents; along with converting among all three was a basic skill all students need (pp. 108-9).

My action research project is different than the projects described here in that it gave students the opportunity to review their basic skills. As the regular curriculum was taught throughout the semester, time was taken to re-teach specific fraction and decimal operation skills. In my research students were given the opportunity to review skills they might have forgotten and then were assessed on them. Requiring homework that had more complicated questions made the students accountable for the skills they have learned over the years. As the research of Hamann & Ashcraft showed, there was a trend in writing simpler questions first and then never actually getting to the harder questions. My review sheets, quizzes, and tests continually increased in difficulty with each concept.

Purpose Statement

The purpose of my research is to see if review of basic skills such as computation with fractions and decimals will increase student achievement and in turn make them better prepared for freshman algebra and if grading homework anonymously will increase student neatness on homework. I want to know why students forget the skills they need for subsequent math courses. I want to better understand what it takes for students to master fraction and decimal arithmetic. I want to know if peer pressure, since other students have to read their work, is a good incentive

for students to write more legibly. In addition, I want to know if students really feel they are adequately prepared for high school math.

I examined the variables of student achievement with review assignments, quizzes, pre- and post-tests, a standardized test, student interviews, and student surveys in seeking to answer the following research questions. What is the effect on student achievement due to basic skill review? What is the effect on student work if other students are grading it anonymously? What is the effect on student preparedness for freshman algebra due to basic skill review?

Method

My action research began on February 19, 2007 with a pre-test given to all my 8th grade students in my first 8th grade class (see Appendix A). My action research did not begin until the nineteenth because shortly after leaving the training workshop at the University, my wife and I came down with the flu, and we each missed a week of school. The following week was state wrestling, and school was dismissed for the tournament.

After giving the pretest and going over the scores with the students one-on-one, I began my reviewing and reteaching units. Each unit was referred to with a given week as the initial intention of the project was to last eight weeks. The action research actually entailed thirteen weeks as there were many obstacles to overcome once I began the research. Each unit had its own worksheet (see Appendix B), and after every two units there was a cumulative quiz given as well (see Appendix C).

The worksheet for week one was given the week of February 26th, and week two was given the following week of March 5th. Week three's worksheet was handed out the middle of the week of March 12th because the quiz for weeks one and two was given in the beginning of the week. The following week was our middle school's Terra Nova standardized testing, and no

worksheet was handed out. Worksheet number four was handed out the week of March 26th with the quiz for weeks one through four given on April 3rd. Easter break was that Friday and the following Monday so no worksheet was given that week. The worksheet for week five was handed out the week of April 10th, and the following week of April 16th week six's worksheet was assigned.

The week of April 23rd I was able to attend a technology workshop on Thursday and Friday, so no worksheet was assigned. However, the quiz over weeks one through six was given in my absence. Unfortunately the guidelines for the quiz were not followed, and some students used calculators, notes, and even each other to complete the quiz. Since this quiz was not given in the same fashion as the others this quiz was thrown out, and a retake quiz was created and given the following week (see Appendix D). In addition to Quiz 1-6, week seven's worksheet was also handed out the week of April 30th. The final worksheet was assigned the week of May 7th, and the post test, which was the same as the pretest, was given on May 16th.

At the beginning of the action research, each student was given a random number between 1 and 100. This number was to be their student ID for any item that needed to remain anonymous. In this way every week's worksheet could be handed in on the last day of the week it was assigned, and then redistributed on the following Monday for the students to grade without knowing whose paper they were actually grading. After grading the papers I would collect them, look them over for mistakes, and then add their names to the papers so they could be passed back to their original owners. In addition, I would take this time to look over papers for students who were not showing work or not writing in a neat and legible fashion. Quizzes and tests were graded by me personally, and no student ID was used.

I initially waited to give the students the survey until I had all of the IRB paperwork returned because I did not want to survey students without parents being aware. The surveys (see Appendix E), were passed out to the 8th grade class on March 12th and collected by another teacher. Students were instructed to write their names on the survey and were told that I would not look at them until the school year was out in May. The teacher who collected them kept the surveys until the end of the school year and then at that time removed the students whose parents had given them permission to be in the research. Then this teacher separated them into two piles, and the names were removed with scissors. I then received the pile with the sixteen students who had permission to be in the research. The student survey was again given after the action research project was over on the last day of school, May 18th, and the same procedures were followed as before to ensure that every student's opinions remained anonymous.

Student interviews were conducted after school over a period of three weeks, May 1st through the 18th. The same teacher who collected my IRB paperwork and the surveys was the only person who knew which students had permission to be part of the research. I asked her to randomly pick ten students who had permission and give me the list of names to interview. Each interview was done with the same series of sixteen questions (see Appendix F). Each interview was recorded, and then a transcript was typed so that their answers could be analyzed.

The first piece of information I wanted to look at was the students' pre- and post-test scores. Each student's score on the pre-test was paired with their score on the post-test (see Appendix G). Here I was able to compare their scores and look for growth. The class average and standard deviation was also computed for each test. In addition I created a bar graph to visually show the changes for each student on their pretest and post test along with the class average (see Appendix H).

The second piece of data that I wanted to analyze was the students' quiz scores over the thirteen weeks. Each quiz contained information from each of the previous weeks and continuously increased in difficulty until the final quiz that contained six fraction or decimal algebraic problems. Each student's score on the first quiz was paired with their scores on each of the following quizzes. The class average and standard deviation was also computed for each quiz. Since the first and the second quiz each had ten questions and the third quiz only had six, I converted their scores to a ten-point scale before creating the bar graph (see Appendix I). The bar graph shows each student's individual score on each of the three quizzes along with the class average (see Appendix J).

The third piece of data I looked at was the students' scores on their weekly unit assignments. Every assignment was out of 10 points, and all of the students scores are listed for each of the eight week's assignments (see Appendix K). Unfortunately four grades are unaccounted for since two students failed to turn in assignments. The bar graph was created only from the class averages since I wanted to look at the class as a whole and compare the assignments from week to week(see Appendix L).

The student survey results were the next piece of data for me to analyze. The information provided for the survey was anonymous, and I have no way of knowing who completed which survey. Therefore each student received a letter to differentiate from one student to the next. Each survey (see Appendix E), from the beginning of the research to the end of the research was recorded according to how they answered each question (see Appendix M).

The last piece of quantitative data that I looked at was the sixteen students' Terra Nova standardized test scores for the last two years. I did not have last year's scores for one student because he/she was not enrolled in my school at that time. Additionally, one student's scores

were unavailable. The Terra Nova assessment has three math scores for each student. The score is given in grade level equivalents. For example, a student with a score of 6.5 would be a student with the skills of a student in the middle of the sixth grade. The first score is a general math score that represents math applications such as algebra and geometry. The second score represents math computational skills similar to the basic skills I am covering in my research with fractions and decimals. The final score represents a composite score based on the first two. I used each student's three different math scores and paired their scores from last year in seventh grade to this year in eighth grade, along with the class average for each math score by grade; the standard deviation is provided. This information is not included.

The last two pieces of data information come from my own personal journal and the students' interviews. Of the sixteen open-ended questions, I focused on four specific questions: number one, three, four and six. Analyzing these questions I looked for commonalities among their answers and noted any answers that were individually unique. Within my own journal I also noted observations about the quality of students' papers and any comments students had made throughout the research.

Findings

After analyzing the data, I believe that basic skill review did have a positive effect on student achievement. Comparing students' pre-test scores to their post-test scores, twelve of the sixteen students improved their scores while the scores of the remaining four students remained the same (see Appendix G). Amazingly, ten of the students with increasing scores increased by a factor of two or more. This growth can be seen in the bar graph in Appendix H. The class average for the pre-test was 2.75 questions correct with a standard deviation of 2.05, and the class average for the post-test was 5.88 questions correct with a standard deviation of 4.11. The

class average increase of 3.13 points has a P-value of 0.003, and this significant increase of scores is just one of the many ways my class improved over the semester.

Each review worksheet introduced new material that was more difficult than the next; therefore, when looking at them I was mainly interested in seeing if the students' scores were maintained throughout the research. Surprisingly, there actually was a slight increase in students' scores. When I compared the class averages on the bar graph this increase can be seen over the period of the eight assignments (see Appendix L).

Unfortunately student scores for the three quizzes did not show any significant changes over the thirteen weeks. Four students' scores got worse as the quizzes covered more material and increased in difficulty, and only one student showed an increase in their scores over all three quizzes (see Appendices I, J, and N).

The final piece of evidence that student performance was positively affected by my research is in the Terra Nova standardized tests. The math computation section is a test of students' basic skills that includes questions involving fractions and decimals. Looking at the class's average grade level last year at the end of seventh grade compared to the end of eighth grade this class increased 2.1 grade levels in one academic year with a P-value of 0.01. In fact, six students who had scores available increased by four or more grade levels. One student, number 31, commented when the tests were over that he wished we had gone over division of mixed numbers before taking the tests. He had not remembered how to do them, and we had not yet reached that re-teaching unit.

A side effect of this research is that I wanted to improve the quality of homework that students were completing. Many of their assignments showed very little work, were disorganized, and difficult to read. I felt that if each student had to complete his or her

assignment knowing that another classmate would have to read and grade it, he or she would be more motivated to write legibly. From week to week I noticed very little improvement in the quality of many students' work. As an added incentive it was stated in class as we were grading the assignments anonymously that any problem they could not read would be counted wrong. I made a note in my journal about one specific student; even I could not read his or her work. I have decided that having students grade each other's papers was not the right type of motivation for students to write more neatly. However, analyzing the first survey, five students felt that their handwriting was difficult to read, and three of them felt strongly about it, and nine said their handwriting was easy to read. On the final survey only two felt that their handwriting was still difficult to read, and eleven now felt their handwriting was easy to read (see Appendix M – question number three).

The final question I wanted to answer was if students felt they were prepared for algebra next year and would the review and reteaching of basic skills help the students feel more prepared. Based on the survey that was given at the end of the school year, I believe that this eighth grade class feels they are ready for high school math next year. The student survey had questions that asked students their feelings about math and the skills they have learned so far and question eight specifically asked "I am ready to take algebra next year" (see Appendix E). The scoring for the survey used a score of one for "Strongly Disagree" and up to a five for "Strongly agree." A score of three was a neutral score.

On the first survey only three of the students who answered question one said that they were good at math; in fact, another three said they were not good at math. The remaining ten students circled a neutral score (see Appendix M). However, on the second survey, six now said they were good at math, and no one said that they were not. Again there were still ten students

who were neutral. The seventh question asked about skills learned this year, and on the first survey three were neutral, and the remaining thirteen agreed that the items learned this year will help them next year, with three of them strongly agreeing. However, on the second survey all sixteen students felt that the skills learned this year will help them next year, and nine of them felt strongly about it.

The final question in the survey was number eight, “I am ready to take algebra next year;” five students said they were not, four said they were, and the remaining seven gave a neutral score on the first survey. After all of the review worksheets and the post test, four students were still neutral about taking algebra next year but the remaining twelve students agreed that they were ready to take algebra next year. In fact, four students felt strongly about it where only one felt strongly on the first survey (see Appendix M).

The student interviews confirm my thoughts about this class. Ten of the sixteen students were interviewed and question one of the interviews was, “What math class do you think you will take next year?” I double checked their answers with the Hanna Orleans exam, and six of the ten interviewed said they would take the more challenging Algebra 1 course next year. In fact, out of the sixteen students, nine are enrolled in Algebra 1 next year.

When students were asked about what they wanted to know about next year, student number twelve’s answer of “How hard is it going to be?” was representative of more than half of the students interviewed. In addition when asked if they thought math next year would be hard for them, half answered yes because math is not their subject. However, when they were asked if the math they learned in middle school helped them get ready for high school, student number twenty-one’s answer of “yes, because I have learned a lot” was representative of every student interviewed.

Conclusions

With the state standards and the requirements that every classroom must meet, every minute of every class is important. I now feel that I was justified in spending class time reviewing basic skills. Using time out of every week to reteach basic skills not only helps students who may be lacking these skills, but it also allows for students to review topics they may have forgotten due to a lack of use. In addition, by incorporating questions involving fractions and decimals a teacher can increase the level of difficulty on homework assignments and assessments. As Hamann and Ashcraft (1986) discovered, textbooks do not have the sufficient amount of difficult questions to require retention of basic skills. By providing students with this type of supplemental material a teacher provides an opportunity for students to review their basic facts within the current curriculum.

Another added bonus to a reteaching and reviewing of this type, students gain confidence in their own math skills, and therefore are better students. As a result standardized test scores increase, and students are less intimidated about taking more advanced math classes in high school.

Implications

The next step after completing my action research is to continue this type of review with next year's eighth grade as well. In addition I want to incorporate a similar review into my seventh grade math classes. Fraction and decimal review is still needed in seventh grade as sixth grade is the year they "master" these skills. Next year's review needs to encompass the entire school year but does not necessarily have to be every week. I want to include other topics into the review sheets such as percents and geometry, not just the algebra that this year's eighth grade had.

Teachers who may not want to spare classroom time to do a skill review of this type should know that the time is worth it. The few minutes that are spent each day that a review is done is time spared later on when trying to teach more advanced concepts. In the past, I have had to stop teaching a lesson to review and re-teach students fraction and decimal skills. With this type of weekly review, the time lost is gained in lessons later on.

Finally, there needs to be new discussion in our math curriculum team. Many of the high school assessments do not have questions containing fractions or decimals. It has been said that our high school assessments have been adjusted to account for the basic skills many students lack, but each new freshman class will have had some type of basic skill review to help remedy this problem. Sharing my research and the progress the eighth grade students have made this year with them would justify the need to increase the difficulty of the assessments. In addition, if we do not have assessments that contain fractions and decimals, then how can we make the students accountable for remembering them?

References

- Ashcraft, M. H. & Christy, K. S. (1995). The frequency of arithmetic facts in elementary texts: Addition and multiplication in grades 1-6. *Journal for Research in Mathematics Education*, 26(5), 396-421.
- Denmark, T & Kepner, H. S. (1980). Basic skills in mathematics: A survey. *Journal for Research in Mathematics Education*, 11(2), 104-123.
- Gamoran, A. & Hannigan, E. C. (2000) Algebra for everyone? Benefits of college-preparatory mathematics for students with diverse abilities in early secondary school. *Educational Evaluation and Policy Analysis*, 22(3), 241-254.
- Gamoran, A., Porter, A. C., Smithson, J., & White, P. A. (1997). Upgrading high school mathematics instruction: Improving learning opportunities for low-achieving, low-income youth. *Educational Evaluation and Policy Analysis*, 19(4), 325-338.
- Hamann, M. S. & Ashcraft, M. H. (1986). Textbook presentations of the basic addition facts. *Cognition and Instruction*, 3(3), 173-192.
- Henderson, R. W., Landesman, E. M., & Kachuck, I. (1985). Computer-video instruction in mathematics: Field test of an interactive approach. *Journal for Research in Mathematics Education*, 16(3), 207-224.
- Nicol, C. (2002). Where's the math? Prospective teachers visit the workplace. *Educational Studies in Mathematics*, 50(3), 289-309.
- White, P. A., Gamoran, A., Smithson, J., & Porter, A. C. (1996). Upgrading the high school math curriculum: Math course-taking patterns in seven high schools in California and New York. *Education Evaluation and Policy Analysis*, 18(4), 285-307.

Appendix A

Pre-Algebra Post Test

SHOW ALL WORK

NAME:

1. $\frac{4}{5} + \frac{1}{4}$

2. $\frac{6}{15} - \frac{2}{3}$

3. $\frac{9}{10} \times \frac{5}{6}$

4. $\frac{7}{12} \div 1\frac{2}{3}$

5. $2.25 + 1.6$

6. $14.29 - 9.034$

7. 92.8×4.1

8. $4.134 \div 0.78$

9. $\frac{a}{5} + \frac{2a}{9}$

10. $\frac{3b}{c} \times \frac{4c}{7n}$

Solve for the variable.

11. $\frac{2}{3}n + \frac{2}{5} = \frac{6}{10}$

12. $0.3k + 5.1 = 5.88$

Appendix B

Week 1 Adding and Subtracting Fractions

CODE:

** Please Show All Work **

1) $\frac{5}{9} + \frac{1}{3}$

2) $\frac{3}{5} + \frac{1}{10}$

3) $\frac{7}{8} - \frac{1}{2}$

4) $\frac{4}{7} - \frac{3}{14}$

5) $\frac{2}{11} - \frac{2}{5}$

6) $-\frac{12}{13} + \frac{1}{2}$

7) $\frac{1a}{10} + \frac{5a}{6}$

8) $\frac{5x}{6} + \frac{3x}{8}$

For Questions 9 and 10, Solve for the variable.

9) $n - \frac{5}{9} = \frac{1}{3}$

10) $w + \frac{8}{15} = \frac{4}{5}$

Week 2 Multiplying Fractions

CODE:

** Please Show All Work **

1) $\frac{1}{3} \times \frac{4}{11}$

2) $\frac{2}{9} \times \frac{5}{6}$

3) $\frac{12a}{5} \times \frac{1a}{4}$

4) $\frac{a}{b} \times \frac{c}{b}$

SOLVE

5) $\frac{7a}{10} = 14$

6) $\frac{3x}{5} = (-9)$

REVIEW

7) $\frac{-6}{8} - \frac{-2}{8}$

8) $\frac{75}{100} - \frac{1}{25}$

9) $\frac{1a}{10} + \frac{5a}{6}$

10) $\frac{2x}{3} - \frac{1x}{2}$

Week 3 Dividing Fractions

CODE:

** Please Show All Work **

1) $\frac{1}{2} \div \frac{3}{4}$

2) $\frac{2}{5} \div \frac{6}{7}$

3) $\frac{8}{3} \div \frac{4}{9}$

4) $\frac{12}{5} \div \frac{3}{10}$

5) $\frac{a}{b} \div \frac{a}{b}$

6) $\frac{2}{n} \div \frac{4}{p}$

REVIEW

7) $\frac{3}{7} - \frac{9}{14}$

8) $\frac{1}{5} \times \frac{1}{3} + \frac{1}{2}$

9) $\frac{a}{b} \times \frac{c}{a}$

SOLVE

10) $\frac{3x}{4} + \frac{1}{3} = \frac{7}{9}$

Week 4 Mixed Numbers

CODE:

** Please Show All Work **

Write as a mixed number.

1) $17/6$

2) $25/7$

Write as an improper fraction.

3) $6 \frac{2}{3}$

4) $8 \frac{4}{9}$

REVIEW

5) $4/5 - 12/15$

6) $\frac{x}{y} + \frac{x}{y}$

7) $\frac{3a}{10} \div \frac{5b}{2}$

8) $7 \times 2/9$

SOLVE

9) $3n = 4/5$

10) $\frac{2w}{7} + \frac{19}{35} = \frac{5}{7}$

Week 5 Mixed Numbers

CODE:

** Please Show All Work **

1) $6 \frac{1}{3} + 9 \frac{2}{3}$

2) $10 - 3 \frac{4}{9}$

3) $3 \frac{1}{9} \times 2 \frac{7}{10}$

4) $14 \times 4 \frac{2}{7}$

5) $2 \frac{1}{2} \div 8$

6) $10 \frac{1}{3} \div 3$

SOLVE

7) $x - 2\frac{1}{2} = 8\frac{3}{4}$

8) $x + 1\frac{1}{4} = 4\frac{5}{4}$

9. $(5 \frac{1}{2})a = 2 \frac{1}{5}$

10. $\frac{3y}{4} + 7 = 6 \frac{3}{4}$

Week 6 Decimals + -

CODE:

** Please Show All Work **

1) $2.3 + 0.7$

2) $4.9 + 1.245$

3) $34.26 - 22.81$

4) $1,346.5 - 4.092$

SOLVE

5) $x - 127.92 = 4.1$

6) $x + 4.78 = 100.01$

REVIEW

7) $-\frac{3}{4} - \frac{3}{8}$

8) $\frac{9}{2} + 4\frac{1}{2}$

9) $3\frac{7}{6} \times 2\frac{4}{5}$

10) $\frac{8}{3} \div 5\frac{2}{3}$

Week 7 Decimals X

CODE:

** Please Show All Work **

1) 3.2×8.6

2) 14.1×0.03

3) 22.22×5.601

4) 1.9×0.91

REVIEW

5) $\frac{a}{3} + \frac{a}{4}$

6) $2 \frac{1}{2} + 3 \frac{3}{4} - 5 \frac{1}{4}$

7) $20 - 7 \frac{1}{8} - 4 \frac{5}{6}$

8) $\frac{ab}{cd} \times \frac{g}{h}$

Solve for the variable

9) $n + 3 \frac{2}{5} = 7$

10) $(10 \frac{7}{8})w = 1$

Week 8 Decimals \div **CODE:****** Please Show All Work ****

1) $0.0925 \div .05$

2) $6.765 \div 5.5$

3) $62.05 \div 7.3$

SOLVE 4) $0.12a = 0.396$

REVIEW

5) 14×0.001

6) $47.6 - 1.62$

7) $\frac{9}{6} \div 2\frac{3}{4}$

8) $\frac{12}{15} + \frac{2}{3}$

Solve for the variable

9) $n - 42.75 = 1.9$

10) $\frac{3}{5}w = 4\frac{1}{5}$

Appendix C

Quiz Week 1 and 2

NAME:

** Please Show All Work **

1) $\frac{2}{3} + \frac{1}{6}$

2) $-\frac{2}{10} + \frac{6}{10}$

3) $\frac{1a}{2} - \frac{3a}{8}$

4) $\frac{7}{10} - \frac{19}{20}$

5) $\frac{8}{12} \times \frac{3}{6}$

6) $\frac{2}{3} \times \frac{3}{4}$

7) $\frac{1}{9} \times \frac{-4}{7}$

8) $\frac{2b}{7} \times \frac{3b}{5}$

SOLVE

9) $w + \frac{1}{3} = \frac{5}{6}$

10) $\frac{3x}{4} = 12$

Quiz Week 1-4

NAME:

** Please Show All Work **

1) $-\frac{7}{11} + -\frac{2}{3}$

2) $\frac{6}{15} - \frac{3}{5}$

3) $\frac{4}{7} \times \frac{5}{8}$

4) $\frac{a}{b} \times \frac{a}{b}$

5) $\frac{10}{12} \div \frac{3}{6}$

6) $\frac{m}{2} \div \frac{m}{2}$

Write as a mixed number.

7) $\frac{18}{5}$

8) $\frac{21}{2}$

SOLVE

9) $w - \frac{3}{10} = \frac{2}{5}$

10) $\frac{9x}{10} = \frac{3}{4}$

Quiz Week 1-6

NAME:

** Please Show All Work **

Solve for the Variable

1) $x + \frac{2}{3} = \frac{4}{5}$

2) $b - 3\frac{2}{3} = \frac{7}{9}$

3) $\frac{4y}{3} = 5$

4) $w + 9.247 = 10$

Simplify

5) $\frac{abc}{xyz} \times \frac{ay}{xz}$

6) $\frac{4p}{3r} \div \frac{7}{5p}$

Appendix D

Quiz Week 1-6 *Retake***NAME:**

** Please Show All Work **

Solve for the Variable

1) $x - 7/8 = 1/4$

2) $b + \frac{9}{10} = 1 \frac{2}{5}$

3) $\frac{2y}{6} = 8$

4) $w + 13.92 = 100$

Simplify

5) $\frac{a^2b}{c} \times \frac{bc^2}{a}$

6) $\frac{m}{4} \div \frac{s}{3}$

Appendix E

Student Survey

Please give your honest response to each statement.

1-Strongly Disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly Agree

1.	I am good at math.	1	2	3	4	5
2.	I always show my work when doing math homework.	1	2	3	4	5
3.	My handwriting is easy for others to read.	1	2	3	4	5
4.	I always give my best effort when doing math homework.	1	2	3	4	5
5.	I need to review sometimes.	1	2	3	4	5
6.	The math skills I learned in 6 th and 7 th grade helped me this year.	1	2	3	4	5
7.	The math skills I learned this year will help me next year.	1	2	3	4	5
8.	I am ready to take algebra next year.	1	2	3	4	5

COMPLETE THE FOLLOWING STATEMENTS.

One good thing about grading another student's homework is:

One not so good thing about grading another student's homework is:

To help me succeed in freshman algebra next year I need help with:

Appendix F

Student Interview Questions

Student interviews will be focused on a subset of these questions.

1. What math class do you think you will take next year as a freshman?
2. How many math classes do you think you will take in high school? How do you know?
3. What, if anything, do you wish you knew about high school math classes?
4. Do you think the math class you take next year will be difficult for you? Why or why not?
5. Is the math class you are supposed to take next year the one you wanted to take? If it is, how do you know it is right for you? If not, which one do you want to take and how do you know it is the right one for you?
6. Do you think your middle school math classes have done a good job getting you ready for high school? Why or why not?
7. Do you think it was important to review math skills every week in class? Why or why not?
8. Did you think it was fair that some students got to take algebra this year, and you have to wait till next year? Why or why not?
9. What makes math easy or difficult for you?
10. Have you ever had a really bad experience with math? If so, what happened?
11. What could teachers do to help students who are having trouble with math?
12. Do you think you had enough time in class to learn every new math topic? Why or why not?
13. Why do you think students sometimes forget how to add and subtract fractions?
14. What can teachers do to help students remember skills from the beginning of the school year to the end of the school year?
15. Do you think it is important to remember everything you learn in math class? Why or why not? If not, what kinds of things is it ok to forget?
16. What do you think is the purpose of math homework?

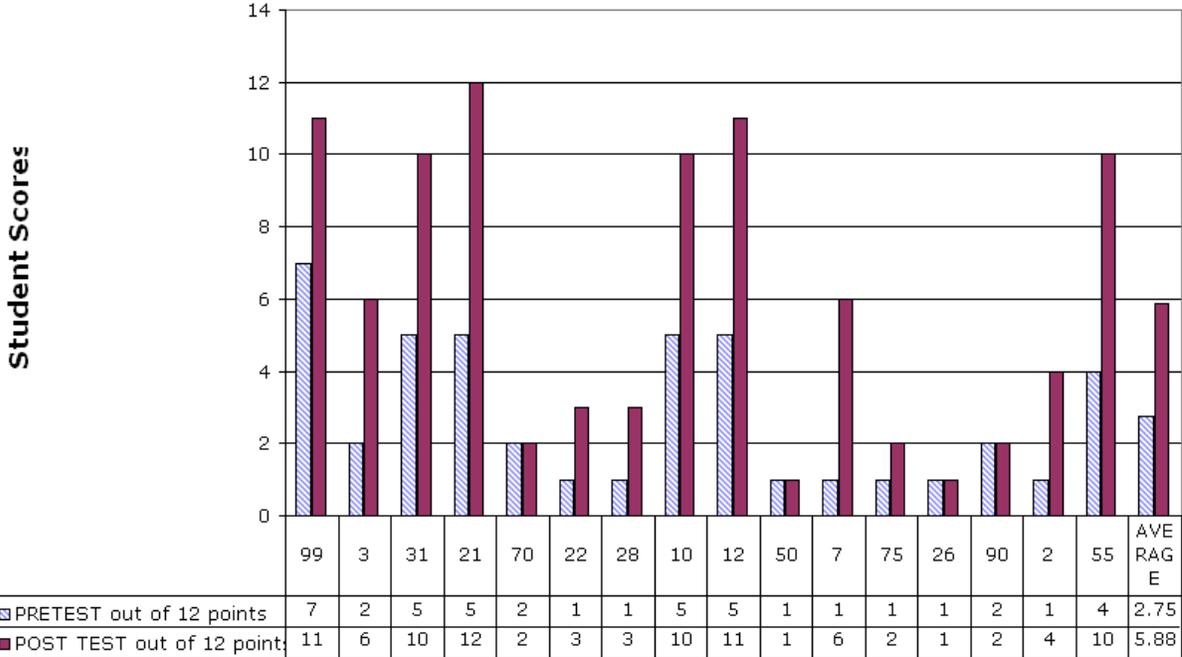
Appendix G

PRE/POST TEST STUDENT SCORES AVERAGES AND STANDARD DEVIATION

STUDENT ID	PRETEST out of 12 points	POST TEST out of 12 points				
99	7	11				
3	2	6				
31	5	10				
21	5	12				
70	2	2				
22	1	3				
28	1	3				
10	5	10				
12	5	11				
50	1	1				
7	1	6				
75	1	2				
26	1	1				
90	2	2				
2	1	4				
55	4	10				
AVERAGE	2.75	5.88				
STANDARD DEVIATION	2.05	4.11				

Appendix H

PRE-TEST VS POST TEST



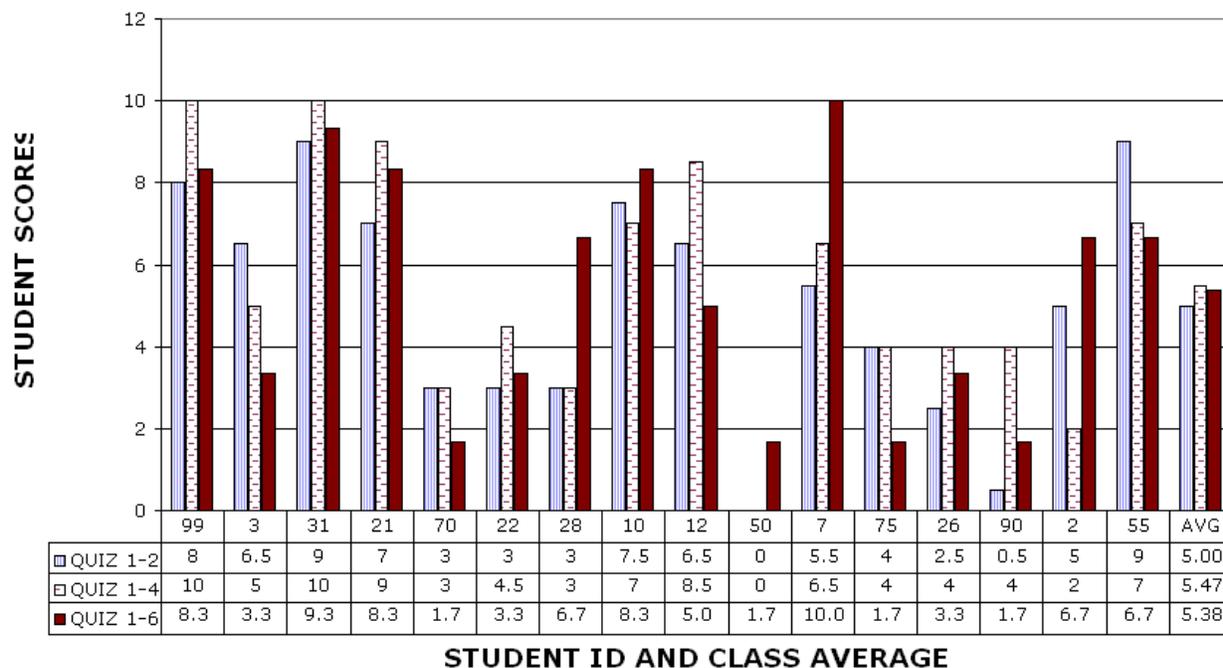
Appendix I

QUIZZES STUDENT SCORES AVERAGES AND STANDARD DEVIATION

STUDENT ID	QUIZ 1-2 out of 10 points	QUIZ 1-4 out of 10 points	QUIZ 1-6 out of 6 points	QUIZ 1-6 adjusted to 10 points
99	8	10	5	8.3
3	6.5	5	2	3.3
31	9	10	5.6	9.3
21	7	9	5	8.3
70	3	3	1	1.7
22	3	4.5	2	3.3
28	3	3	4	6.7
10	7.5	7	5	8.3
12	6.5	8.5	3	5.0
50	0	0	1	1.7
7	5.5	6.5	6	10.0
75	4	4	1	1.7
26	2.5	4	2	3.3
90	0.5	4	1	1.7
2	5	2	4	6.7
55	9	7	4	6.7
AVERAGE	5.00	5.47	3.23	5.38
STANDARD DEVIATION	2.83	2.95	1.81	3.01

Appendix J

STUDENT QUIZZES

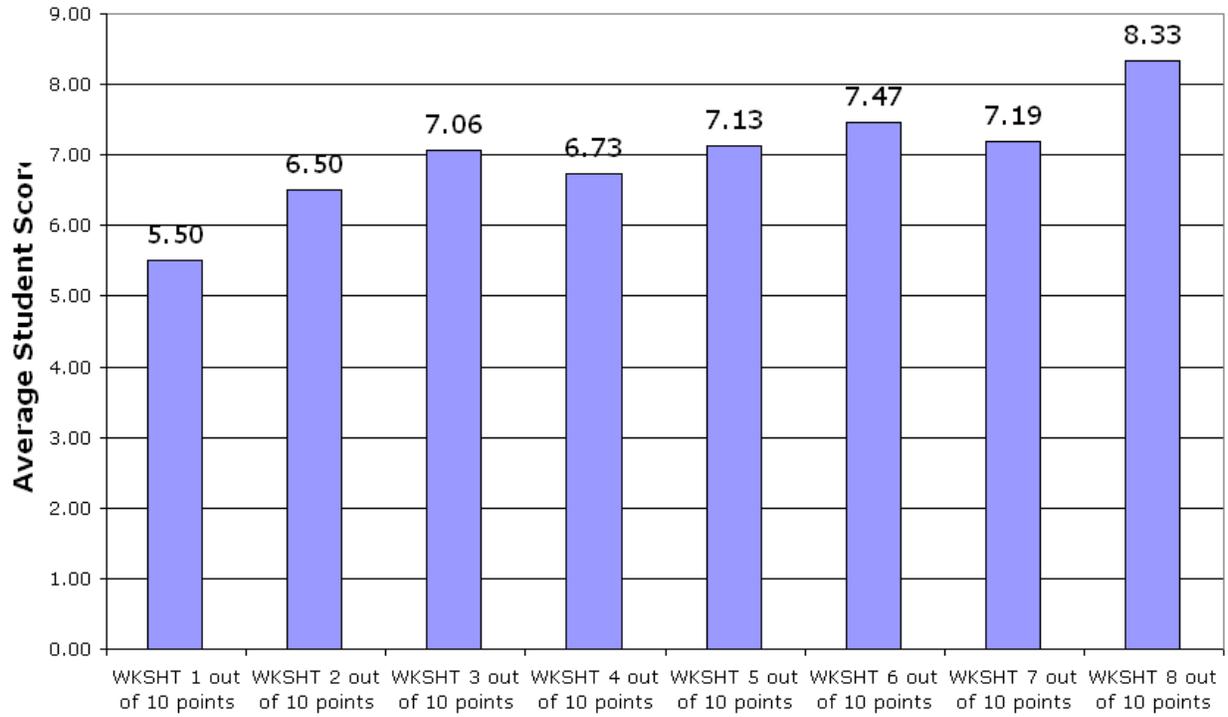


Appendix K

REVIEW SHEET: STUDENT SCORES								
AVERAGES AND STANDARD DEVIATION								
STUDENT ID	WKSHT 1 out of 10 points	WKSHT 2 out of 10 points	WKSHT 3 out of 10 points	WKSHT 4 out of 10 points	WKSHT 5 out of 10 points	WKSHT 6 out of 10 points	WKSHT 7 out of 10 points	WKSHT 8 out of 10 points
99	10	9	9	7	8	10	8	10
3	4	5	9	6	7	7	9	10
31	9	8	7	8	8	9	9	9
21	9	5	6	8	5	10	6	9
70	2	8	8	8	3	6	6	9
22	8	5	8	8	3	5	5	8
28	4	8	9	4	7	6	10	8
10	4	9	5	6	10	8	6	7
12	6	9	8	9	8	10	7	10
50	2	4	8	6	9	7	6	8
7	7	8	4	8	10	8	7	1
75	4	1	7	7	NHI	NHI	6	NHI
26	0	7	7	6	4	5	7	7
90	5	4	7	NHI	9	5	8	10
2	5	5	2	3	8	9	5	10
55	9	9	9	7	8	7	10	9
AVERAGE	5.50	6.50	7.06	6.73	7.13	7.47	7.19	8.33
STANDARD DEVIATION	2.94	2.39	1.98	1.62	2.33	1.85	1.64	2.29
NHI = STUDENT DID NOT HAND IN WORKSHEET								

Appendix L

Review Worksheets



Appendix M

Student Survey: Beginning of research

??	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q
1	3	3	2	3	3	3	5	2	2	4	5	3	3	3	3	3
2	4	3	3	4	3	3	3	2	2	3	4	4	4	3	4	3
3	5	4	1	5	4	4	2	1	1	5	5	3	3	5	5	2
4	4	4	2	4	3	4	3.5	2	2	4	5	4	4	4	4	3
5	3	4	2	3	4	5	3	5	2	3	3	3	4	4	4	5
6	3	4	3	4	5	3	3	3	3	5	4	3	3	4	3	3
7	4	4	3	5	4	4	4	3	3	4	5	4	4	5	4	4
8	2	3	2	4	3	3	4.5	3	3	3	5	2	2	4	3	2

Student Survey: End of research

??	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q
1	4	4	3	3	4	3	3	4	3	3	4	4	3	3	3	3
2	4	4	4	3	3	4	3	3	2	5	4	4	3	3	3	3
3	5	4	4	4	3	5	4	2.5	2	5	5	4	3	3	4	5
4	4	4	4	4	3	4	5	4	3	4	5	4	3	4	4	4
5	4	5	4	4	4	5	4	4	4	5	5	4	4	4	4	4
6	5	5	4	4	4	4	4	2.5	4	4	5	4	2	4	4	4
7	5	5	4	4	4	5	5	5	4	5	5	4	5	4	4	5
8	5	4	4	3	4	4	3	4	3	4	5	5	4	3	4	5

Appendix N

STUDENT ID	QUIZ 1-2	QUIZ 1-4	QUIZ 1-6
99	8	10	8.3
3	6.5	5	3.3
31	9	10	9.3
21	7	9	8.3
70	3	3	1.7
22	3	4.5	3.3
28	3	3	6.7
10	7.5	7	8.3
12	6.5	8.5	5.0
50	0	0	1.7
7	5.5	6.5	10.0
75	4	4	1.7
26	2.5	4	3.3
90	0.5	4	1.7
2	5	2	6.7
55	9	7	6.7
AVG	5.00	5.47	5.38