

**ABE Master Teacher Academy**

**Grouping Students to Improve Their Math  
Application Skills**

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## **Grouping Students To Improve Their Math Application Skills**

### **Teaching Context**

My name is Ricardo Quintana and I teach Pre-GED and GED mathematics at San Jacinto Adult Learning Center with the El Paso Independent School District. I have been teaching here since August 1993. I taught GED for the first ten years, ESL for the next two years, and this year I am teaching mathematics. I teach ABE and GED mathematics. At this moment I have about five students in the morning session and eleven students in the afternoon session. On the average they stay with me for about a semester or two. Most of my students are Beginning ABE and Intermediate ABE, but I do have some that are in Advance ESL and Spanish GED. Their ages vary quite a bit. Some are in their twenties like Jesse, and some are in their sixties like Esperanza. They also have different goals in their life. Like Jesse, he needs to get his GED to be able to join the Marines, and Esperanza, she is a displaced worker. She needs to get her GED to be able to find a better job.

As you can see, I have a diverse group of students, students in basic mathematics to students in algebra and geometry. They also come and go, since we have open enrollment at the school. Some students learn real fast and they go test, while others have been with me for about a year. Students that have gone to high school and are drop-outs are the ones that finish faster, while students like Esperanza that only went to the sixth grade in her native country take some time to learn all the concepts. These are the students that stay with me the longest.

## **Problem**

I decided to do this project because I saw that students had a difficult time solving percent application problems when they worked alone. I decided to find out if by working in groups they would do better in solving percent application problems. I wasn't doing much group work with my students before I decided to do this. I didn't think group work would improve their ability to do application problems.

## **Research Question**

My research question was "Do students do better in working percent application problems if they work in a group, individually or both?" I did the study with the eleven students that are in my afternoon class.

## **Action Learning Plan**

The first thing I did was to interview the students to find out their preferences, do they like to work alone, in groups, or both. I also gave them a survey to fill out for me. I asked them questions like "What has been your experience in working with individualized instruction versus group instruction?", "Which one do you like best and why?", "Do you think you learn more with individualized instruction or group instruction?", "Is there any particular type of instruction you prefer and if so, what kind?"

After the interview and the survey I let them study individually. I used the Steck-Vaughn, Mathematics Skill Books, "Decimals and Percents" and "Solving Word Problems". Some students had to start from scratch. They didn't know how to do

percents and I had to show them. They studied for about three weeks in the month of January 2007. On January 29, 2007, I gave them their first assessment. It was an instructor made exam with ten application questions on percents. Some examples of the questions were, “A television that normally sells for \$339 is on sale for 25% off. How much will you save during the sale?”, “What is 30% of 200?” I scored the exam by taking ten points off for each incorrect problem. This was their raw score. Then I used the Arizona Mathematics Rubric to get a scale score. I got this rubric from the Arizona Department of Education. It uses a holistic scale to measure a student’s knowledge about the subject. The length of the scale is from zero to four. A four response represents an effective solution, a three response contains minor flaws, a two response shows gaps in understanding and/or execution, a one response shows some effort beyond restating the problem or copying given data, and a zero response shows no mathematical understanding of the problem.

I then discussed the scores with the students and asked them how they felt about the assessment.

I then interviewed the students a second time. This time I asked them how they felt about working in groups. Some were reluctant to work in a group because they felt that they could work and learn better if they worked by themselves. I finally convinced them to work in groups. I grouped them in groups of three students. I put an advanced student in each group. Since I only had eleven students, one group consisted of two students. They worked in groups the month of February 2007. I used the same books, Steck-Vaughn, Mathematics Skill Book.

I gave them a second exam on percent application problems. This exam was

similar to the first exam. All I did was change some numbers and words on the second exam. Again I scored the exam, taking ten points off for each incorrect problem. This was their raw score. I then used the Arizona Mathematics Rubric to get their scale scores.

### **Findings and Conclusions**

Again I discussed the results with my students. I was surprised, and they were surprised with the results. The students that did poorly the first time did a lot better this time. They told me that working in groups improved their understanding of the subject tremendously. Like Ignacia said, “Sometimes I don’t understand and in a group they can help me.” Bernardo also had a comment, he said, “When I cannot do the problem I can ask my partner to see how I can do the problem.” I think this happens because by doing group work, students are not put on hold if they don’t understand the problem, they can find out almost immediately from their partners the process needed to do the problem.

Finally, I did a small statistical analysis on the data I acquired from the assessment and the interview and put it together in a power point presentation. Here are some of the results:

#### **First interview and survey by preferred mode of instruction.**

<b>Individual</b>	<b>63.64%</b>
<b>Group</b>	<b>18.18%</b>
<b>Both</b>	<b>18.18%</b>

**Raw scores from the first assessment.**

<b>Raw Score of 20</b>	<b>9.09%</b>
<b>Raw Score of 40</b>	<b>9.09%</b>
<b>Raw Score of 50</b>	<b>18.18%</b>
<b>Raw Score of 60</b>	<b>18.18%</b>
<b>Raw Score of 70</b>	<b>9.09%</b>
<b>Raw Score of 90</b>	<b>9.09%</b>
<b>Raw Score of 100</b>	<b>27.28%</b>

**Scale scores from the first assessment.**

<b>Scale Score of 4</b>	<b>36.36%</b>
<b>Scale Score of 3</b>	<b>9.09%</b>
<b>Scale Score of 2</b>	<b>18.18%</b>
<b>Scale Score of 1</b>	<b>27.28%</b>
<b>Scale Score of 0</b>	<b>9.09%</b>

**Second interview and survey by preferred mode of instruction.**

<b>Individual</b>	<b>45.45%</b>
<b>Group</b>	<b>9.09%</b>
<b>Both</b>	<b>45.45%</b>

**Raw scores from the second assessment.**

<b>Raw Score of 60</b>	<b>9.09%</b>
<b>Raw Score of 70</b>	<b>18.18%</b>
<b>Raw Score of 80</b>	<b>36.36%</b>
<b>Raw Score of 90</b>	<b>9.09%</b>
<b>Raw Score of 100</b>	<b>27.28%</b>

**Scale scores from the second assessment.**

<b>Scale Score of 4</b>	<b>36.36%</b>
<b>Scale Score of 3</b>	<b>54.55%</b>
<b>Scale Score of 2</b>	<b>9.09%</b>

**Scale score comparison.**

	<b>First Test</b>	<b>Second Test</b>
<b>Mean</b>	<b>2.36</b>	<b>3.27</b>
<b>Median</b>	<b>2.00</b>	<b>3.00</b>
<b>Mode</b>	<b>4.00</b>	<b>3.00</b>
<b>Q1</b>	<b>1.00</b>	<b>3.00</b>
<b>Q3</b>	<b>4.00</b>	<b>4.00</b>
<b>SD</b>	<b>1.50</b>	<b>0.26</b>

Let me interpret some of the graphs for you. First let's look at the differences from the first interview and survey to the second interview and survey. The number of students who preferred the individual mode of instruction went down from 63.64% to 45.45%. The group mode of instruction went down from 18.18% to 9.09%, while the both mode of instruction went up from 18.18% to 45.45%. This tells us that the both mode of instruction was the preferred mode of instruction the second time around.

Now let's look at the raw and scale scores. As you can see by the graphs the scores went up. I didn't have any raw scores below 60%. In the scale scores, the lowest was a two.

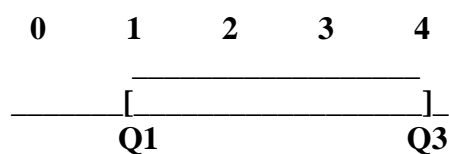
I did a scale score comparison using the mean, median, mode, Q1 (the median of the first half of the data), Q3 (the median of the second half of the data), and the standard deviation of the data. The mean went up, and there was not that much deviation from the mean in the second test, .26, which shows an improvement in the scale scores.

I also did a box and whiskers plot of the data using Q1 and Q3. You can see an improvement here by looking at Q1 and Q3. The scale scores went up and there is not much deviation in the scale scores of the second test. In this plot you can see that the scale scores did increase from (1, 2, 3, 4) to (3, 4). You can see by the data, the students that had problems with the first assessment did much better on the second assessment. Working with groups did increase their knowledge of percent application problems.

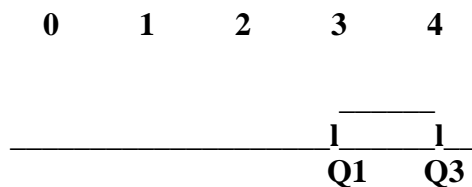
In the future, I will have my students work more in groups when doing percent or any other application problems.

# BOX AND WHISKERS PLOT

## First Test Scale Scores



## Second Test Scale Scores



Sources:

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