

Connecting Math and Critical Thinking through Group Interaction

The ANN Practitioner Research Project - Final Report

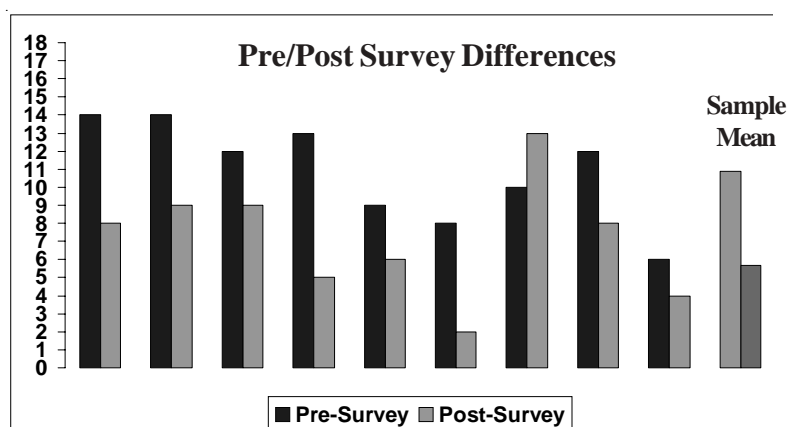
Tom Brewer

Tom Brewer is an ABE/GED instructor in the San Juan Unified School District in Sacramento, California. (tbrewer@sanjuan.edu). Tom presented a progress report at the ANN Pre-conference in Philadelphia last year at the COABE Conference. Here is the final summary of his project.

A primary question guided my research: In what ways will ABE and Pre-GED level students benefit from direct instruction and cooperative work to solve math problems that require critical thinking?

I collected evidence of student progress in a number of ways. Quantitative analysis of student work and tests checked students' basic understanding of the materials. Math CASAS pre- and post- tests documented student progress. CASAS tests determined areas of need. I developed a questionnaire to assess students' attitudes and perceptions of their own math skills, and then a follow-up questionnaire illustrated how these perceptions changed. [See pages 9 - 10 for pre- and post-surveys.] Below are the results of a student sampling. In almost all cases students felt better about math and were more confident about their abilities to solve math problems.

On the graph at the right a decrease in score indicates a more positive attitude. [See page 11 for directions on using the surveys.]



In addition to the math attitude survey, students described their feelings in a math journal.

The journal has been a valuable tool to assess students' understanding of math concepts as well as their feelings about math. After a lesson on finding the circumference of a circle, a student wrote, "We took paper plates; any circle will do, and a piece of string. If you cut the string the size of the plate straight across (diameter) the piece of string will go around the edge of the plate about three times. When we did this together, it clicked. I will never forget the circumference of a circle." By thinking through the lesson and going through the process of expressing his ideas on paper, this student really demonstrated a deeper understanding of key concepts.

I used the data collected to evaluate the chosen teaching strategies. It is clear to me that the time needed to prepare for this type of group work is well worth the effort. When students interact with each other and are encouraged to share results of their work, they can achieve a higher level of understanding. I plan to continue these practices and employ other current evidence-based research to improve student learning.

Name _____ Date _____

ABE Mathematics Survey - PRE

Circle yes or no to best describe your position on the following statements. When you finish the survey, total the number of circles in each column.

- | | | | |
|---|-----|-----|----|
| 1. I like to study math. | Yes | No | |
| 2. Math is difficult for me. | | Yes | No |
| 3. I am good at memorizing. | Yes | No | |
| 4. I did not like math in school. | | Yes | No |
| 5. I can see and analyze patterns. | Yes | No | |
| 6. I find word problems difficult. | | Yes | No |
| 7. I understand prices while shopping. | Yes | No | |
| 8. I think I have math anxiety. | | Yes | No |
| 9. I can read graphs and diagrams. | Yes | No | |
| 10. I am not good with money. | | Yes | No |
| 11. I feel I have number sense. | Yes | No | |
| 12. I have never been good at math. | | Yes | No |
| 13. I usually understand shapes and geometry. | Yes | No | |
| 14. Math was always my worst subject. | | Yes | No |
| 15. I enjoy solving difficult problems. | Yes | No | |
| 16. It is hard for me to measure things accurately. | | Yes | No |
| 17. I want to study algebra. | Yes | No | |
| 18. Data and statistics trouble me. | | Yes | No |

Total

brewer/2007

Name _____ Date _____

ABE Mathematics Survey - POST

Circle yes or no to best describe your position on the following statements. When you finish the survey, total the number of circles in each column.

1. I can see and analyze patterns.	Yes	No	
2. Data and statistics trouble me.		Yes	No
3. I usually understand shapes and geometry.	Yes	No	
4. It is hard for me to measure things accurately.		Yes	No
5. I feel I have number sense.	Yes	No	
6. Math was always my worst subject.		Yes	No
7. I want to study algebra.	Yes	No	
8. I have never been good at math.		Yes	No
9. I like to study math.	Yes	No	
10. I am not good with money.		Yes	No
11. I am good at memorizing.	Yes	No	
12. Math is difficult for me.		Yes	No
13. I can read graphs and diagrams.	Yes	No	
14. I did not like math in school.		Yes	No
15. I understand prices while shopping.	Yes	No	
16. I find word problems difficult.		Yes	No
17. I enjoy solving difficult problems.	Yes	No	
18. I think I have math anxiety.		Yes	No
Total	_____	_____	_____

How to Use the ABE Mathematics Survey

Give students the ABE mathematics attitude survey.

Have each student total each column.

Provide math instruction for a given period of time.

Give students the post math attitude survey.

Have each student total each column. Measure the change in the middle column. A decrease in score means math attitudes have improved.