

Carefully read the description of the experiment below. Be prepared to answer the questions that follow the design description as a class quiz.

A graduate student in education believes that “both adults and children learn better under constructivist practices using more hands-on interactive approaches, not traditional methods such as lecturing.” He recognizes that lectures can cover more material more quickly, but suggests that “passive learners get tired of such an approach.” He plans a study to determine if there is a statistically significant difference between an experimental group and a control group when comparing the difference in pretest and posttest scores in math. Subjects used in the study were sixth-grade students in Covington, Kentucky.

Table 1

One-Way Analysis of Variance for Differences Between Pretests and Posttests in Measurement Unit

| Source | df | SS | MS | F |
|----------------|----|---------|-------|-----|
| Between groups | 1 | 18.12 | 18.12 | .76 |
| Within groups | 49 | 1174.04 | 23.96 | |
| Total | 50 | 1192.16 | | |

Note: F was not significant at $\alpha=.05$.

The experiment was done for two math units; a “measurement” unit and a “Ratio and Proportion” unit. The experimental group was taught using a constructivist approach, (using a word processor, a spreadsheet, rulers, meter sticks, scales, and other hands-on materials). The control group was taught with a more traditional approach including

Table 2

One-Way Analysis of Variance for Differences Between Pretests and Posttests in Ratio and Proportion Unit

| Source | df | SS | MS | F |
|----------------|----|--------|-------|-------|
| Between groups | 1 | 35.08 | 35.08 | *4.29 |
| Within groups | 45 | 368.24 | 8.18 | |
| Total | 46 | 403.32 | | |

Note: F was significant at $\alpha=.05$.

lectures, reading assignments and textbook problems to be worked. Initially there were 25 students in the experimental group, and 26 students in the control group. However for the post-test of the ratio unit there were only 23 from the experimental group and 24 from the control.

The two math instructions units done in this study were treated as separate statistical analyses. The variable of interest was the difference between a pretest score done before each unit and a posttest score after each unit. How would differences in these scores be statistically compared to determine if there was a “significant” effect of teaching approach?

| | | | |
|-----------------|---------------------|--|--------------------------------|
| Answer choices: | (A) subjects | (B) units | (C) teaching approach |
| | (D) groups | (E) pretest/posttest difference | (F) Covington, Kentucky |

Name _____ **Quiz Number** _____ **Date** _____ / _____ / **2012**

Circle the appropriate letter for each question.

- 1) What is the experimental unit for this experiment? A B C D E F
- 2) What is the sampling unit for this experiment? A B C D E F
- 3) What is the dependent variable for this experiment? A B C D E F
- 4) What is the treatment variable for this experiment? A B C D E F
- 5) If the design is RBD, what are the blocks? A B C D E F NA
- 6) Does it seem more likely that the treatments are fixed or random? (A) fixed (B) random
- 7) What is the treatment arrangement for this experiment? (A) single factor (B) factorial (C) nested
- 8) What is the experimental design? (A) CRD (B) RBD (C) LSD (D) Split-plot (E) Repeated Measures
- 9) The treatment degrees of freedom are _____.
- 10) The degrees of freedom for the error used for testing treatments are _____.