

**Report on Action Research Projects
Moreland Ridge Middle School
Blue Springs School District
January, 2008**

Introduction

During the 2006 – 2007 school year 47 volunteer teachers at Moreland Ridge Middle School (Moreland Ridge) conducted a series of action research projects for the purpose of examining the extent to which selected instructional strategies enhanced the learning of students. The directions provided to teachers are presented in the attachment to this report. Each participating teacher selected two groups of students both of which were being taught the same unit or set of lessons. In one group (the “experimental” group) a specific instructional strategy was used, whereas in the other group (the “control” group) the strategy was not used. The same pre-test and post-test was administered to students in both groups. The pre-test scores were used to “adjust” the post-test scores using a statistical technique referred to as analysis of covariance (for a discussion of analysis of covariance see Winer, Brown, & Michels, 1991). In simple (and metaphorical) terms, the adjustment translates the post-test scores into those that would be expected if students in the experimental and control classes started with the same scores on the pre-test. In effect, it is a way of controlling for students’ differences in what they know about a topic prior to the beginning of instruction on the topic. Analysis of covariance is typically used when students cannot be randomly assigned to experimental and control groups, as was the case with the action research projects reported here. Figure 1 presents the findings for each teacher at Moreland Ridge.

Figure 1: Findings for Individual Teachers

Teach #	Strategy	Adjusted Experimental Mean	Adjusted Control Mean	Prob	Effect Size	Pgain
1	Nonlinguistic Representations	33.45 (n = 18)	28.78 (n = 9)	.002	1.46	43
2	Nonlinguistic Representations	11.47 (n = 64)	10.62 (n = 26)	.268	.24	9
3	Nonlinguistic Note Taking	16.42 (n = 71)	14.45 (n = 16)	.000	.82	29
4	Graphic Organizers	11.62 (n = 81)	11.42 (n = 24)	.826	.00	0
5	Nonlinguistic Representations	60.11 (n = 40)	58.26 (n = 21)	.713	.09	4
6	Graphic Organizers	18.12 (n = 42)	18.17 (n = 46)	.937	.00	0
7	Nonlinguistic Representations	14.07 (n = 40)	11.47 (n = 20)	.029	.59	22
8	Nonlinguistic Representations	56.34 (n = 23)	60.89 (n = 26)	.025	-.68	-25
9	Double column notes with visual and summary statement	13.82 (n = 63)	13.02 (n = 23)	.115	.35	14
10	Nonlinguistic Representation	12.98 (n = 18)	13.35 (n = 24)	.598	-.17	-7
11	Note taking	13.90 (n = 66)	15.31 (n = 22)	.022	-.51	-20
12	"I" Chart Note Taking	14.15 (n = 63)	14.44 (n = 15)	.765	-.06	-2
13	Note Taking	29.39 (n = 103)	25.15 (n = 24)	.001	.64	24

Teach #	Strategy	Adjusted Experimental Mean	Adjusted Control Mean	Prob	Effect Size	Pgain
14	Graphic Organizer	16.88 (n = 41)	15.60 (n = 40)	.106	.37	14
15	Graphic Organizer	9.98 (n = 65)	10.91 (n = 20)	.195	-.29	-11
16	Notes w/drawings	6.14 (n = 69)	5.50 (n = 21)	.091	.36	14
17	Note Taking	6.65 (n = 83)	6.07 (n = 20)	.427	.16	6
18	Nonlinguistic Representations	17.41 (n = 24)	17.84 (n = 24)	.484	-.21	-8
19	Notetaking Nonlinguistic/Linguistic	15.32 (n = 23)	11.71 (n = 22)	.001	1.11	37
20	Graphic Organizer	11.08 (n = 60)	12.23 (n = 22)	.239	-.27	-11
21	Illustrated Terms	30.28 (n = 66)	30.68 (n = 23)	.693	-.09	-4
22	Identifying Similarities/Differences	13.55 (n = 20)	9.46 (n = 24)	.000	1.75	46
23	Effort & Recognition	37.88 (n = 15)	35.11 (n = 16)	.125	.60	23
24	Nonlinguistic Representations	13.27 (n = 29)	14.21 (n = 20)	.279	-.32	-13
25	Graphic Organizer	19.95 (n = 38)	20.58 (n = 41)	.350	-.21	-8
26	Nonlinguistic Representation	17.48 (n = 70)	17.09 (n = 24)	.453	.16	6
27	Graphic Organizer	8.11 (n = 44)	8.32 (n = 20)	.557	-.16	-6
28	Nonlinguistic	13.93 (n = 20)	15.21 (n = 21)	.156	-.47	-18
29	Graphic Organizer	9.95 (n = 59)	9.79 (n = 23)	.788	.06	2
30	Graphic Organizer	7.78 (n = 59)	7.74 (n = 19)	.933	.00	0
31	Effort	51.54 (n = 23)	36.58 (n = 25)	.000	2.28	49
32	Effort & Achievement	21.16 (n = 60)	21.21 (n = 60)	.959	.00	0
33	Note Taking	12.23 (n = 66)	11.04 (n = 22)	.024	.50	19
34	Note Taking	12.19 (n = 72)	11.40 (n = 25)	.113	.33	13
35	Notetaking Nonlinguistic/Linguistic	7.40 (n = 24)	6.50 (n = 25)	.251	.35	14
36	Note Taking Strategies	13.91 (n = 64)	13.25 (n = 24)	.215	.27	11
37	Kinesthetic Activities with notes (Foldable)	6.96 (n = 42)	6.30 (n = 25)	.204	.32	13
38	Graphic Organizer	10.62 (n = 60)	9.94 (n = 24)	.473	.16	6
39	Double column notes (in pictures/in words)	14.30 (n = 46)	12.90 (n = 16)	.000	1.14	37

Teach #	Strategy	Adjusted Experimental Mean	Adjusted Control Mean	Prob	Effect Size	Pgain
40	Note Taking	9.03 (n = 66)	7.22 (n = 18)	.000	.97	33
41	Nonlinguistic Representations	14.34 (n = 43)	14.05 (n = 22)	.748	.09	4
42	Setting objectives and providing feedback	15.94 (n = 45)	16.46 (n = 21)	.519	-.17	-7
43	Note Taking	12.88 (n = 22)	12.10 (n = 86)	.103	.32	13
44	Note Taking	6.09 (n = 63)	5.41 (n = 22)	.212	.28	11
45	Highlighting with a yellow highlighter important information of article for test	16.84 (n = 70)	15.61 (n = 23)	.030	.46	18
46	Nonlinguistic Representations	17.51 (n = 71)	17.33 (n = 20)	.719	.06	2
47	Non-linguistic representation	8.85 (n = 63)	7.62 (n = 22)	.002	.69	26

a) Adjusted Experimental Mean: the post-test mean of the experimental groups adjusted for differences in the pre-test scores (number of students reported in parentheses).

b) Adjusted Control Mean: the post-test mean of the control group adjusted for differences in the pre-test scores (number of students reported in parentheses).

c) Prob: the probability of observed differences between adjusted means under the assumption of no true differences between means (i.e. the null hypothesis).

d) Effect Size: the standardized mean difference between experimental and control groups—the difference in the average score of the experimental group and the control group stated in standard deviation units. Thus an effect size of 1.00 would indicate that the average score in the experimental group is one standard deviation higher than the average score in the control group.

e) Pgain: the percentile gain or loss indicated by the effect size.

Figure 1 presents the findings for all 47 studies (column headings are explained in the footer). Of particular interest is the column entitled “Pgain.” This stands for the percentile gain (or loss) in achievement associated with use of the instructional strategies. To illustrate, consider the results reported in the first row. The adjusted mean for the experimental group was 33.45; the adjusted mean for the control group was 28.78. The percentile gain for this study was 43. This means that the average score in the experimental group was 43 percentile points greater than the average score in the control group. (Percentile gain is computed from the effect size which is the difference between the experimental group and control group mean expressed in standard deviation units. For a discussion of effect size, see Lipsey & Wilson, 2001).

It should be noted that in some cases the reported percentile gain is negative. This occurs when the adjusted mean for the experimental group is **less than** the adjusted mean for the control group. For example, the percentile “gain” reported in the eighth row is negative 25 (-25). This means that the average score in the control group was 25 percentile points greater than the average score in the experimental group.

Also of interest in interpreting Figure 1 is the fact that most of the studies, when considered in isolation, did not exhibit statistical significance ($p < .05$). This can be observed in the column entitled “Prob.” For an individual study to be considered statistically significant, the value in the column

should be .05 or lower. According to this criterion, 14 of the studies would be considered statistically significant.

However, when the results of a set of studies are combined using meta-analytic techniques, the findings considered as a group might be statistically significant even though a number of the individual studies are not significant. Such is the case with the present set of studies. Specifically, when the results of the 47 action research projects are combined the overall percentile gain is 10 (weighted average effect size = .25). This means that on the average, the strategies used in the study represent a gain of 10 percentile points over what would be expected if teachers did not use the instructional strategies (for a discussion of how effect sizes are combined and an overall significance level is computed see Lipsey and Wilson, 2001). Additionally, this overall effect size is significant at the .0001 level. This level of significance is generally interpreted as an indication that the observed differences could have occurred less than one time in ten thousand if there is no true difference between group means (for a detailed discussion of the meaning of statistical significance see Harlow, Mulaik, & Steiger, 1997). That is, a reasonable inference is that the overall effect of a 10 percentile point gain is probably not a function of random factors that are specific to the action research studies; rather, the 10 percentile point increase represents a real change in student learning.

Another way to examine the general effect of the instructional strategies is to consider the distribution of effect sizes and percentile gain associated with the effect sizes. Figures 2a and 2b present the distribution of effect sizes and associated percentile gain.

Figure 2a: Distribution of Effect Sizes

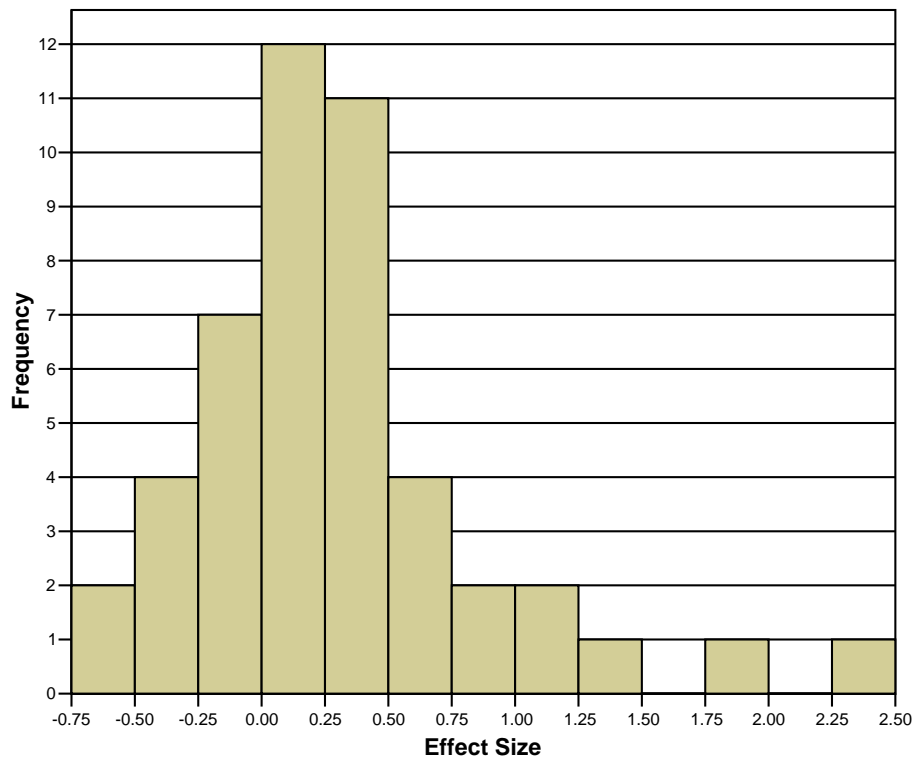


Figure 2a reports the distribution of “groups” of effect sizes across the 47 studies. For example, two studies exhibited an effect size between -0.75 and -0.50 (see first column), twelve studies exhibited an

effect size between 0.00 and 0.25 (see fourth column), four studies exhibited an effect size between 0.50 and 0.75 (see sixth column) and so on.

Figure 2b: Distribution of Percentile Gains

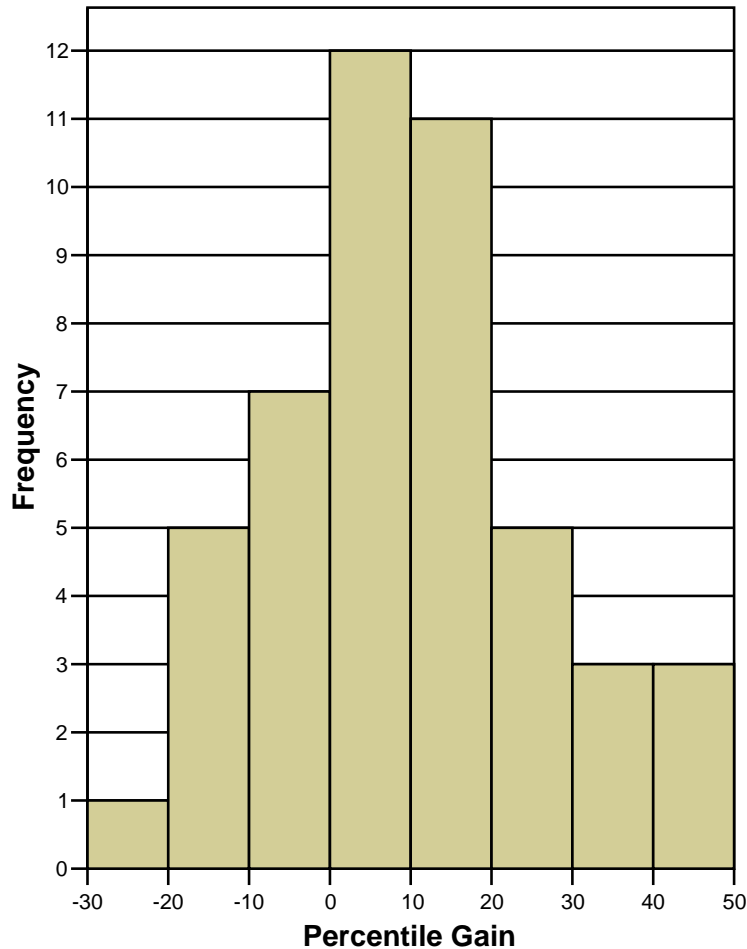


Figure 2b reports the distribution of “groups” of percentile gain associated with effect sizes across the 47 studies. For example, three studies exhibited a gain between 40 and 50 (see eighth column), three studies exhibited a gain between 30 and 40 (see seventh column), five studies exhibited a gain between 20 and 30 (see sixth column) and so on.

The distribution of effect sizes and associated percentile gain indicates that for the majority of teachers the action research project demonstrated a positive effect for the instructional strategy that was employed. Specifically, the vast majority of studies (34 of 47 or 72%) demonstrated positive effect sizes.

Another useful way to aggregate the findings from the 47 action research studies is by type of strategy employed. As indicated in Figure 1 (column 2, “strategy”), teachers used different strategies in their action research projects. Figure 3 presents the results for seven types of strategies.

Figure 3: Findings for Specific Strategies

Strategy	N	Average ES	PGAIN	Sig
Identifying Similarities/Differences	1	1.75	46	.0001
Kinesthetic Activities*	1	.32	13	NS
Nonlinguistic Representations*	30	.16	6	.0002
Note Taking*	18	.41	16	.0001
Providing Feedback	1	-.17	-7	NS
Reinforcing Effort	3	.64	24	.0008
Summarizing*	1	.35	14	NS

N: the number of studies focusing on a particular strategy

Average ES: the weighted average effect size for the studies focusing on a particular strategy

PGAIN: the percentile gain (or loss) associated with the average effect size

Sig: the significance level of the average effect size. Note that NS means not significant

*Some studies utilized more than one strategy

Figure 3 presents weighted average effect sizes and their associated percentile gains for the strategies of identifying similarities and differences, kinesthetic activities, nonlinguistic representations, note taking, providing feedback, reinforcing effort, and summarizing. It should be noted that providing feedback had a negative effect on student learning. In other words, the group in which a providing feedback strategy was systematically used had **lower** scores than the group in which a providing feedback strategy was not used. This was not the case for the strategies of identifying similarities and differences, kinesthetic activities, nonlinguistic representations, note taking, reinforcing effort, and summarizing, which all exhibited positive effects on student learning.

Next Steps

From the information presented above, one might conclude that Moreland Ridge has evidence that in general the instructional strategies addressed in the action research projects have the potential of enhancing student learning. There are many things that might be done with this information. The least preferable alternative is to ignore the findings. Among the most preferable alternatives would be to identify those instructional strategies that are to be common strategies used by groups of teachers or all teachers at Moreland Ridge. These common strategies could form the basis of teachers observing each other with the intent of discussing different uses of the strategies. Prior to identifying these common strategies, Moreland Ridge might wish to expose all teachers to selected instructional strategies. Additionally, this process could be extended throughout all middle schools in Blue Springs School District.

References

Harlow, L.L., Mulaik, A.A., & Steiger, J.H. (Eds.), (1997). *What if there were no significance tests?* Mahwah, NJ: Erlbaum.

Lipsey, M. W. & Wilson, D.B. (2001). *Practical Meta-analysis*. Thousand Oaks, CA: SAGE Publications.

Winer, B.J., Brown, D.R., & Michels, K.M. (1991). *Statistical principals in experimental design*. Boston: McGraw-Hill.

Attachment

Instructions for Action Research Project

Thank you for considering engaging in an action research study regarding the effectiveness and utility of specific instructional strategies in your classroom. To be involved in a study you must be willing to do a few things. First you should select a specific instructional strategy and use this strategy in a unit that you teach. For example, you might decide to use nonlinguistic representations during the unit, or you might decide to have students engage in comparison or classification tasks as forms of identifying similarities and differences. Next, you must administer and score a pre-test and post-test for the unit. For example, if you teach mathematics, you might select a four week unit on linear equations to employ nonlinguistic representations. At the beginning of the unit, you would administer a pre-test on linear equations. At the end of the unit you would administer a post-test which might be identical to the pre-test, or it might be different. The important point is that you have a pre-test and a post-test score for each student on the topic of linear equations. Ideally the pre-test and post-test are comprehensive in nature. Additionally, you must deliver the same unit to another group of students. This, of course, means that you are teaching the same unit to two different groups of students. You would administer the same pre-test and post-test to this other group of students; however, you would not use the selected instructional strategy. In this case, you would not use nonlinguistic representations with this second class. Finally, you would score the pre-test and post-test for both groups of students and record their scores on the attached forms. You don't have to identify students by name (in fact, it is preferable that you don't). The unit can be as short or long as you wish, but it must be completed and the data submitted by _____.

When you have completed the study please fill out the forms below and submit them to the action research team leader for your school. That individual is _____.

Note that the first form asks you to provide general information about your school, the instructional strategy you used and so on. It also asks you to provide a personal ID number as opposed to your name. This is because the results of the action research projects will be reported in an anonymous fashion. Only you will know which results apply to your students.

Thank you for considering involvement in an action research project.

School _____

Personal ID number _____

Subject and grade level taught _____

Topic addressed during the unit _____

Instructional strategy you used _____

General comments about the project: