DOCUMENT RESUME

ED 329 935 CS 010 487

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TITLE The Effectiveness of Interactive Instructional Practices on Content Area Reading Comprehension.
SPONS AGENCY Office of Special Education and Rehabilitative Services (ED), Washington, DC.
PUB DATE Mar 89
CONTRACT G008630125
NOTE 19p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, CA, March 27-31, 1989).
PUB TYPE Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Analysis of Variance; Content Area Reading; *Instructional Effectiveness; Instructional Innovation; Intermediate Grades; Junior High Schools; Middle Schools; *Reading Comprehension; Recall (Psychology); *Teacher Effectiveness; Teaching Methods; Vocabulary Development
IDENTIFIERS *Interactive Teaching

ABSTRACT

Four studies conducted over a 2-year period systematically evaluated the effectiveness of interactive instructional practices in the vocabulary learning and reading comprehension of learning disabled students. The design of the four studies was similar in that comparisons were made among three different interactive teaching strategies (semantic mapping, semantic feature analysis, and semantic/syntactic feature analysis) and a teaching strategy relying on direct, definitional instruction. During the first year, subjects consisted of 42 bilingual, learning disabled students in upper elementary grades studying social studies and 61 learning disabled junior high and middle school students studying science. During the second year, subjects consisted of 47 upper elementary and 53 junior high school students. All subjects were selected randomly from a metropolitan southwestern school district. Although specific instructional materials and students varied across the 2 years of the study, the major distinguishing characteristic between the two studies was that researchers instructed the students the first year while teachers resumed responsibility for instruction the second year. Upon completion of instructional intervention (and again 4 weeks later), students completed a multiple choice test and a written recall activity. Results indicated: (1) evidence to support the short and long term effectiveness of the interactive strategies; (2) transfer of this understanding to a written recall task was less encouraging; and (3) teachers were as effective as researchers in providing instruction. (Four tables of data are included; 24 references are attached.) (RS)

The Effectiveness of Interactive Instructional Practices On Content Area Reading Comprehension[1]

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[1]This research is supported in part by a research grant (G008630125) from the Office of Special Education and Rehabilitative Services, U.S. Department of Education.

Running Head: Interactive Instructional Practices

Research report presented at the 1989 annual conference of the American Education Research Association, San Francisco, March 1989.

The Effectiveness of Interactive Instructional Practices On Content Area Reading Comprehension[1]

Critical to the application of systematic intervention research is the capacity to generalize instructional principles from research to practice. It is naive of both researchers and practitioners to assume that those interventions investigated under controlled classroom conditions will perform in a similar manner when utilized by classroom teachers. By the nature of the job role and responsibilities, researchers and teachers uphold differing agenda and beliefs concerning the implementation of innovative practices.

When innovative practices are tested for effectiveness by researchers serving as teachers, researchers enter the classroom with the major agenda of upholding the integrity of the research design. To that end they manipulate the participatory structure, the management system, and the content of the classroom to facilitate the implementation of the practices under study. When they assume the role of teacher or instructional leader, the context of the classroom changes to better match the requirements of the research and the researcher. While the researcher may have worked to retain the integrity of the classroom by observing and working in the classroom prior to implementing the practices being studied, by default the classroom has become a somewhat artificial environment. Findings from studies which employ the researcher as teacher hold important information and implications for practice. They allow the study of instructional practices in an environment where controls are more easily instituted and described. When the instructional practices are implemented across various classrooms, it allows for a greater degree of similarity across settings (even though in these controlled settings variance will be substantial).

In contrast, the agenda for teachers who assume the role of implementing innovative practices during instructional research is different. Whereas the researcher's major investment may be in the integrity of the research and instructional design, the teacher has more competing responsibilities that focus on the integrity of the classroom, the school, and the political pressures within. A number of researchers have suggested that organizational structure and school-level factors play an important role in classroom practice and change (Cuban, 1984; Little, 1987; Rosenholtz, Bassler, & Hoover-Dempsey, 1986). Within the organizational framework, the teacher is more likely than the researcher to embed the instructional practices within the context and structure of the classroom, thereby adapting the practice rather than the classroom to provide a good fit. By default, more variability should be evident among the various participating teachers than the researchers who served in the teaching role.

In the same light, whereas the researchers in a study may have relatively similar belief systems

about the instructional practices under study due to the common knowledge base both from theoretical and practical perspectives, teachers will represent a wider array of beliefs. These beliefs influence the degree to which instructional practices are adopted wholesale or molded, adapted, and adjusted to fit teachers' perceived reality (Richardson-Koehler & Fenstermacher, 1988). Doyle and Ponder (1977) have suggested that teachers are more or less receptive to innovative practices on the basis of practicality (does it fit current classroom management contingencies), situational context (does it fit my classroom situation in terms of participatory structure, curriculum, and content), and cost.

This contrast between researchers and teachers in terms of their implementation of innovative classroom practices holds particular interest for those researchers who conduct classroom intervention research. It charges us not to restrict intervention research to one-shot studies in which researchers serve as the instructional agent (Wong, 1987), but to systematically study practices as they are introduced by classroom teachers participating as researchers.

The research being conducted as part of the Interactive Teaching Project affords such an opportunity. During the first year of the project researchers served as teachers, implementing interactive teaching strategies or direct instructional practices. During the second year, teachers served as the instructors during the studies. Using the effect sizes generated from the studies conducted across the two years of the project should provide some insight into the effectiveness of researchers and teachers as they implement innovative practices and to the general effectiveness of the innovative practices.

Method

This paper synthesizes the findings from four studies collected over a two-year period which have systematically evaluated the effectiveness of interactive instructional practices on the vocabulary learning and reading comprehension of two populations of learning disabled students. The design for the four studies is similar in that comparisons were made among three different interactive teaching strategies and a teaching strategy relying on direct, definitional instruction. The interactive teaching strategies are theoretically couched in assumptions related to schema theory, e.g. the importance of activating prior knowledge (Rumelhart, 1980), concept attainment theory, e.g., instruction that explicates the organization of the knowledge and the distinctive features of the vocabulary (Klausmeier, 1984), a psycholinguistic model of reading, e.g., instruction that facilitates predicting, justifying, and confirming/disconfirming ideas when constructing meaning (Goodman, 1984), and a socio-cultural theory of cognitive development, e.g. content that is discussed within the context of meaningful, socially embedded activities (Diaz, Moll, & Mehan, 1986; Vygotsky, 1978). Three different interactive strategies were used in the studies: (a) semantic mapping (SM) (Pearson & Johnson, 1978), semantic feature analysis (SFA) (Anders & Bos, 1986; Johnson & Pearson, 1984), and semantic/syntactic feature analysis (SSFA)

(Allen, 1985). In contrast, definitional instruction (DI) focused on learning concise, content-related definitions using high student engagement through oral recitation, teacher monitoring, and corrective feedback (Carnine & Silbert, 1979; Duffy & Roehler, 1982).

During the first year, two studies were conducted with two different populations learning two different contents. One population consisted of students identified as bilingual, learning disabled in upper elementary grades in a metropolitan, Southwestern school district. The second population consisted of students identified as learning disabled in junior high and middle school settings in the same school district. From these two populations samples of students were randomly selected. While students who participated in the elementary study focused on social studies content and texts, students who participated in the junior high study focused on science content and texts.

During the second year, two studies were also conducted with students from the same two populations. As in the previous year, the upper elementary, bilingual students focused on social studies, while the junior high students concentrated on science. Although specific instructional materials and students varied across the two years of the study, the major distinguishing characteristic between the studies conducted during the first and second years was the person implementing the teaching strategies. In the first year, researchers were trained in the different instructional interventions and instructed the students. In the second year, responsibility for the instruction was transferred from the researcher to the teacher. In these studies the teachers were the special education teachers for the participating students. A systematic program of staff development was provided for the participating teachers.

Subjects

Subject characteristics for the four studies are presented in Table 1. In the four studies students were identified as learning disabled according to school district criteria. This included a discrepancy between intellectual functioning and academic achievement with low achievement in reading. In the case of the bilingual students, performance IQ (WISC-R) was used as the measure of intellectual functioning. In all four studies the student characteristic patterns reflect a discrepancy between intellectual functioning and reading achievement. A further control was used for intellectual functioning with a criterion of at least an 85 standard score. In the case of the bilingual students, criteria also included the student's first language as Spanish and some Spanish currently spoken in the home.

Insert Table 1 about here

For each study, analyses of variance were conducted to determine if differences were evident among the four instructional conditions for the student characteristics of intellectual functioning, reading

achievement, prior knowledge in the topic being studied, and interest in the topic. No significant differences were evident for any of the analyses.

Materials

Instructional materials. For each study chapters were selected from either social studies or science texts. Each chapter was analyzed using a content analysis (Frayer, Frederick, & Klausmeier, 1969) to identify key concepts and the hierarchical level of importance. Concepts were identified as superordinate, coordinate, or subordinate. Concepts were both implicit and explicit in the text. In all cases expository texts were selected.

The concept (content-related vocabulary) generated from the content analysis and their context-grounded definitions served as the focus of instruction in the four instructional conditions. In the DI condition, the instructional materials consisted of a written list of the vocabulary and their definitions presented in groups of five concepts. In the SM condition, instructional materials consisted of a written list of the vocabulary which the teacher and students used to generate a semantic map (Pearson & Johnson, 1978). This map consisted of a visual representation of the vocabulary and the relationships among the different vocabulary. In the SFA condition, a hierarchically structured matrix (relationship chart) was constructed to use during instruction. In the chart, the superordinate concept served as the title, the coordinate concepts as columns and subordinate concepts as rows. In the SSFA condition, the chart was provided along with cloze-type sentences based on the relationships among the coordinate and subordinate concepts. In the bilingual studies the instructional materials were prepared in both Spanish and English.

To guide the researchers (Year 1) and teachers (Year 2), teaching guidelines and scripts were developed for each instructional condition. For the staff development provided during the second year, an instructional notebook was developed containing teaching guidelines and the instructional materials. In addition, videotapes were developed for each instructional condition and used during the staff development. These videotapes and accompanying handouts highlighted the critical teaching behavior associated with the instructional condition and demonstrated "good" examples of each of the teaching behaviors. These instructional videotapes were developed from the videotapes taken of the teachers during their practice sessions.

Assessment materials. Student learning was assessed by asking each student to complete a written recall of what he/she knew about the topic of the experimental passage. Directions indicated that students could include information discussed and read during the instructional sessions and other information they knew about the topic. Students were also informed that spelling, grammar, and punctuation would not be evaluated, however, assistance would be provided if requested.

Student learning was also measured by an objective measure. For each experimental and practice

passage, 30-item multiple choice test were constructed. Test construction was based on the content analysis of each passage and each test consisted of vocabulary and comprehension items. The vocabulary items measured students' knowledge of the context-related meanings of the vocabulary derived from the content analysis; the comprehension items measured students' understanding of the ideas presented in the passage and their ability to apply the concept in novel situations.

Students' prior knowledge for the experimental passage for each study was measured using the items from the experimental passage test and 10 items from the practice passage test. Students' interest in the topic was measured using a 7-item interest inventory. Each item represented a superordinate or coordinate concept presented in the experimental passage and students rated each statement on a 5-point Likert scale measuring the interest in "learning about" it.

In the bilingual studies, all assessment materials and directions were prepared in both Spanish and English.

Procedures

Researcher/teacher training. In the Year 1 studies, researchers served as teachers. Each researcher was a member of the project team and read the literature with regard to interactive instructional strategies and definitional and direct instruction. They had also participated in the development and fielde testing of the teaching guidelines and scripts. They were trained in the different instructional intervention and randomly assigned to instructional groups with each researcher teaching at least two different instructional conditions.

In the Year 2 studies, the students' special education teachers served as the teachers and were randomly assigned to instructional conditions. To prepare the teachers to use the different instructional interventions, systematic staff development was provided. At the first day of staff development teachers were introduced to each of the intervention through a combination of lecture/discussion and role-playing. At the conclusion of this first session, teachers were randomly assigned to teach one or two of the interventions. They were given the materials needed to teach both a staff development session and a practice session. Over the following five weeks each teacher practiced their interventions with his/her students using the provided materials. Sessions were videotaped and evaluated by the researchers.

The teachers then returned for a second day of staff development. At this second staff development session teachers viewed and discussed the instructional videotapes and the critical teaching behaviors demonstrated on the tapes. Using the experimental passage and instructional materials, they participated in a combination of lecture/discussion and role playing. At the conclusion of the second workshop teachers were provided with instructional materials to use when leading the experimental sessions. Experimental designs were also videotaped by the researchers, and reviewed to determine if

the intervention followed instructional guidelines.

Intervention procedures. During intervention students were first given the prior knowledge test and topic interest inventory. Two to three weeks later, students and the researcher/teacher participated a in three 50-minute practice sessions and approximately two weeks later, they participated in three 50-minute experimental sessions.

During the first practice and experimental session, students were introduced to the study and informed they would be engaging in a prereading activity designed to enhance reading comprehension. All groups were introduced to the concepts and their instructional materials.

In the DI condition, the activity consisted of direct, definitional instruction (Carnine & Silbert, 1979; Duffy & Roehler, 1982) emphasizing oral recitation, the correct and automatic pronunciation of each vocabulary word and phrase, and the memorization of the concise context-related definitions. The vocabulary was learned and reviewed in groups of five with initial intensive practice followed by spaced practice.

For the three interactive conditions, the intervention utilized interactive, discussion-oriented strategies (Bos & Anders, in press) designed to assist students in activating prior knowledge, instantiating new knowledge, and predicting and drawing relationship among the concepts. Using these strategies, students were invited to predict definitions for each of the concepts and offer any background knowledge and experiences they may have had relative to the concepts. In the SM condition, the students were provided with the vocabulary list. The discussion focused on predicting meanings and constructing a semantic map. In developing the map, students predicted the superordinate, coordinate, and subordinate concepts and their relationships. In the SFA condition, students were provided with the relationship chart. The discussion focused on predicting the meanings and the relationships between each coordinate and subordinate concept on the relationship chart. Relationships were judged as being related (+), not being related (-), or uncertain (?). In the SSFA condition, the students not only completed the relationship chart through discussion, but also completed five cloze-type sentences using information derived from the relationship chart to fill in the blanks.

On the second day of intervention, the researcher/teacher and students in all conditions reviewed their respective instructional materials and read to confirm their predictions or learning. Students were then instructed to read the assigned text using their prereading materials as a guide. Following reading, students again reviewed their instructional materials and were asked to offer any changes that needed to be made in their respective study materials.

On the third day of intervention, students again reviewed their materials. Materials were then collected and students were instructed to write "all you know about the topic." Students wrote for 20 minutes. Following writing, the multiple choice test was administered. To measure long term learning,

four weeks later the students again completed the written recall and the objective test.

For the bilingual studies, the researchers/teachers used the students' preferred language for instruction using the other language as support during instruction. Students read the passage and took the multiple-choice test in the language in which their reading was more proficient. They were free to write their recalls in either language and no instructions were given specifying in which language to write their recalls.

Data Scoring

For the objective test, each item was computer scored as correct or incorrect and a vocabulary score and comprehension score were computed for each student.

For the written recall a variety of scoring procedures were utilized. Only the holistic score for each recall is reported in this paper. To obtain a holistic score each written recall was scored using a traditional holistic rating with a 6-point scale (Irwin & Mitchell, 1983). The recalls were judged on overall quality including cohesion, elaboration, clarity of ideas, format and grammar. The criteria of spelling, handwriting and punctuation were disregarded in this analysis.

Data Analyses

Data from the two Year 1 studies were analyzed to determine the short and long term learning effects of the four instructional conditions using a 4 x (2) mixed design (Lindquist, 1953). In this design, the four instructional conditions served as the between factor, while time (posttest and follow-up test) served as the within factor. The score for the experimental items on the prior knowledge test, the score for the topic interest inventory, and the IQ standard score (see Table 1) served as covariates in the analyses. These three factors were selected due to their theoretical linking to the dependent measures (Anderson, Reynolds, Schallert, & Goetz, 1977; Osako & Anders, 1983; Torgesen, 1987).

Data from the junior high Year 2 study were analyzed using the same design, except that data from the holistic ratings on the written recalls at follow-up were not available. Data from the elementary Year 2 study were analyzed using a 4 (instructional condition) analysis of covariate design for the posttest. Follow-up data were not available.

When possible, an effect size (Glass & Hopkins, 1984; Glass, McGaw, & Smith, 1981) was generated for each dependent measure (vocabulary score, comprehension score, and holistic rating) at short term learning (posttest) and long term learning (follow-up test) by comparing the interactive instructional conditions (SM + SFA + SSFA) to the definitional instruction.

Results

Based on the questions posited, the results section will focus primarily on the effect sizes and their comparisons across time of measurement (posttest and follow-up) and person serving as instructor (researcher or teacher).

Covariates. The role that the covariates played in the analyses were generally consistent across the four studies. On the multiple choice test, prior knowledge served as a significant covariate for both the vocabulary and comprehension scores, whereas prior interest in the topic and IQ were not significant. The exception was the vocabulary score for the Year 2, bilingual elementary study in which Performance IQ rather than prior knowledge served as a significant covariate. For the holistic score which was derived from the written recall, none of the covariates (prior knowledge, topic interest, or IQ) were significant in any of the four studies. The different role prior knowledge plays as a covariate on the multiple choice test compared to the written recall was replicated across the four studies.

Vocabulary scores. For the vocabulary scores, a comparison was made between the adjusted mean for the definitional instruction and the averaged adjusted means for the interactive instructional conditions in terms of student performance both at short term (posttest) and long term (follow-up) learning and for Year 1 and Year 2 studies. Table 2 presents the adjusted means and standard deviations for the four studies on the vocabulary scores at post test and follow-up as well as the effect size computed by comparing the definitional condition to the interactive conditions (Glass & Hopkins, 1984; Glass, McGaw, & Smith, 1981). The mean effect size for short term learning on the four studies is .88 with the sizes ranging from .50 to 1.28. This mean effect size of .88 indicates that, on the average, students at the 50th percentile of the interactive conditions scored as well as students at the 81 percentile of the definitional instruction condition assuming that both groups were normally distributed. For long term learning the mean effect size was .98 indicating that students at the 50th percentile of the interactive conditions scored as well as students at the 84 percentile of the definitional instruction condition.

When effect sizes are compared across the person implementing the instruction (researcher, Year 1 or teacher, Year 2), the mean effect size is higher when the teachers served as the instructors 1.07 (86%ile) than when the researchers instructed the students .82 (80%ile).

Insert Table 2 about here

Comprehension scores. Differences are also evident between definitional instruction and interactive instruction in the case of the comprehension scores on the multiple choice test. Table 3 presents the adjusted means and standard deviations for the four studies on the comprehension scores at post test and follow-up as well as the effect size. The mean effect size for short term learning across the four studies is 1.25 with the effect sizes ranging from .81 to 1.51. This mean effect size of 1.25 indicates that, on the average, students at the 50th percentile of the interactive conditions scored as well as students at the 89 percentile of the definitional instruction condition assuming that both groups were normally distributed. For long term learning the mean effect size was 1.05 indicating that students at the 50th percentile of

the interactive conditions scored as well as student at the 85 percentile of the definitional instruction condition.

When effect sizes are compared across researcher and teacher, the mean effect sizes are similar for both, 1.17 (88%ile) when the researchers instructed the students and 1.15 (87%ile) when the teachers instructed the students.

Insert Table 3 about here

Holistic ratings. Holistic ratings were obtained through analysis of the written recalls. In comparison to the multiple choice test, results for the holistic ratings indicate a lower effect for the interactive instructional strategies. The mean effect size for short term learning across the four studies is .59 with the sizes ranging from .13 to .97. This mean effect size of .59 indicates that, on the average, students at the 50 percentile of the interactive conditions scored as well as students at the 72 percentile of the definitional instruction condition. For long term learning the mean effect size (based on Year 1 only) is .37 (range -.17 to .90) indicating that students at the 50 percentile of the interactive conditions scored as well as student at the 64 percentile of the definitional instruction condition.

The comparison between the researcher as teacher and the classroom teacher at posttest indicate a higher effect size for the teacher (.91, 82%ile) in contrast to the researcher (.26, 60%ile). Analysis at follow-up is not possible.

Insert Table 4 about here

Discussion

One question addressed in this paper is the effectiveness of the interactive teaching strategies in comparison to the direct, definitional instruction. Based on the direction and magnitude of the effect sizes for the vocabulary scores and the comprehension scores on the multiple choice tests, there is evidence to support the effectiveness of the interactive strategies. Furthermore, this learning is evident not only for short term vocabulary acquisition and comprehension, but continues to be evident long term.

The transfer of this understanding to a written recall task is less encouraging. While most effect sizes continue to fall in a positive direction, the magnitude is generally less and the stability is much less consistent, ranging from -.17 to .97. Given the population this contrast between recognition tasks (multiple choice tests) and recall tasks (written recalls) is not surprising. Studies

with learning disabled students have consistently indicated that these students as a group different from normally and low-achieving students in their sens.tivity to the organization of ideas in producing expository text and in their ability to product expository texts (Englert & Thomas, 1987; Nodine, Barenbaum, & Newcomer, 1985; Thomas, Englert, & Gregg, 1987). This results from these studies clearly indicate that if these elementary, bilingual and junior high students with learning disabilities are to demonstrate learning on open-ended written recall measures, they will need instruction in transfer of knowledge to such tasks.

The major question addressed in this paper focuses on the instructional strategy effectiveness in terms of the person providing the instruction: researcher or teacher. It was suggested that researchers might be more effective in implementing intervention research due to their theoretical and practical understanding of the interventions under study, belief systems that better match that of the instructional strategies being investigated, and the degree to which researchers' agenda allow them to uphold the integrity of the intervention. In contrast, teachers should have a lesser understanding of the theoretical underpinnings associated with an innovative practice, display more variability across teachers in terms of the belief systems. and find a greater need to respond to competing agenda within the school and classroom.

When comparing effect sizes across the two types of instructors, the results do not support this original hypothesis. Teachers were at least as effective as the researchers. In terms of the vocabulary scores, the mean effect sizes were 1.07 (86%ile) for teachers and .82 (80%ile) for researchers. For the holistic ratings the same trend was evident, .91 (82%ile) for teachers and .26 (60%ile) for researchers. For the comprehension scores, the results for both groups were comparable, 1.17 (88%ile) for teachers and 1.15 (87%ile) for researchers.

Several explanations might account for this finding. One might be that the belief systems for these teachers were consistent with practices they were implementing. As discussed in the Scanlon, Gallego, and Reyes paper (this session), survey assessment of the teachers' knowledge and belief about vocabulary instruction as collected prior to staff development indicate that the teachers as a group tended to rate interactive vocabulary strategies (knowledge hypothesis) as both effective and usable. This is in contrast to a large sample of teachers collected by Miller (1987) who judged interactive strategies as less effective and usable than strategies related to other explanations of the vocabulary-comprehension connection.

Other explanation might be related to the nature of the staff development. The staff development process was based on an interactive philosophy in that teachers were given opportunities to interact with their prior knowledge regarding their students and teaching and were encouraged to become actively engaged in the adopting and adapting both definitional and interactive instruction to deal with the

constraints of their classroom and school contexts. Teachers were also encouraged to reflect on their teaching and their use of the various instructional practices. Such reflection has been deemed particularly important to changing teacher practice (Anders & Richardson-Koehler, 1986; Doyle, 1987, Richardson, in press).

The importance of translating research to practice has received much attention and discussion in the research, practice, and popular literature, e.g. Becoming a Nation of Readers (Anderson et al., 1985), The Reading Report Card (1985), Handbook of Research on Teaching (Wittrock, 1986). In contrast, we are only at the initial stages of systematic study. The research discussed in this paper including the use of effect sizes across studies provides one methodology for investigating the robustness of innovative instructional practices.

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Table 1

Means and Standard Deviations for Student Characteristics

Characteristics	Year 1		Year 2	
	Bilingual Elementary (n=42)	Junior High (n=61)	Bilingual Elementary (n=47)	Junior High (n=53)
Age	11.36	13.80	11.47	12.73
	(1.25)	(.93)	(.97)	(.81)
IQ[1]	96.93	91.97	94.00	92.38
	(9.36)	(8.95)	(12.22)	(8.15)
Reading Achievement	75.98	81.30	75.42	81.07
	(7.53)	(11.20)	(7.63)	(4.88)
Prior Knowledge	11.31	13.31	9.74	10.18
(items=30)	(3.40)	(2.84)	(2.42)	(3.09)
Prior Interest	25.19	22.90	24.65	21.23
(total score=35)	(6.56)	(7.69)	(7.04)	(5.58)

[1]Performance IQ used for bilingual elementary studies, Full Scale IQ used for junior high studies

Table 2

Adjusted Means, Standard Deviations and Effect Sizes

for the Vocabulary Scores

Year/Study/Time	Definitional Instruction	Semantic Mapping	Semantic Feature Analysis	Semantic/ Syntactic Feature Analysis	Effect Size
Year I (Researcher)					
Elementary					
Posttest	6.41 (2.2)	6.59 (2.5)	8.09 (2.7)	7.76 (1.9)	.50
Follow-up	5.74 (2.2)	7.89 (2.4)	7.65 (1.6)	8.67 (2.7)	1.15
Junior High					
Posttest	8.02 (2.6)	10.58 (1.6)	10.66 (2.4)	9.46 (1.8)	.92
Follow-up	5.93 (2.8)	8.11 (1.9)	7.72 (2.5)	9.25 (1.9)	1.01
Year 2 (Teacher)					
Elementary					
Posttest	6.48 (2.1)	8.77 (2.4)	9.44 (2.5)	8.94 (1.5)	1.28
Follow-up	Not available				
Junior High					
Posttest	6.95 (2.2)	8.87 (2.3)	9.26 (3.1)	10.04 (1.8)	.83
Follow-up	6.23 (2.4)	8.64 (2.9)	8.46 (2.9)	8.50 (2.9)	.79

Table 3

Adjusted Means, Standard Deviations and Effect Sizes

for the Comprehension Scores

Year/Study/Time	Definitional Instruction	Semantic Mapping	Semantic Feature Analysis	Semantic/ Syntactic Feature Analysis	Effect Size
Year 1 (Researcher)					
Elementary					
Posttest	6.19 (2.7)	8.50 (2.6)	8.55 (1.9)	7.88 (2.2)	.81
Follow-up	6.03 (1.9)	8.30 (2.6)	8.33 (2.4)	8.24 (2.3)	.86
Junior High					
Posttest	7.46 (2.2)	9.98 (1.6)	10.60 (2.0)	10.14 (2.2)	1.22
Follow-up	6.92 (2.1)	8.09 (2.6)	8.19 (3.2)	9.79 (2.0)	.78
Year 2 (Teacher)					
Elementary					
Posttest	7.25 (2.4)	10.23 (2.8)	10.24 (1.5)	10.12 (2.0)	1.46
Follow-up	Not available				
Junior High					
Posttest	6.17 (2.4)	8.89 (2.1)	8.96 (1.7)	9.53 (2.0)	1.51
Follow-up	5.09 (1.5)	8.42 (2.1)	7.82 (2.1)	7.89 (1.2)	1.51

Table 4

Adjusted Means, Standard Deviations and Effect Sizes

for the Holistic Ratings

Year/Study/Time	Definitional Instruction	Semantic Mapping	Semantic Feature Analysis	Semantic/ Syntactic Feature Analysis	Effect Size
Year I (Researcher)					
Elementary					
Posttest	4.05 (2.0)	4.22 (2.3)	4.99 (1.6)	5.14 (1.6)	.39
Follow-up	3.72 (1.4)	3.44 (2.3)	3.10 (1.1)	3.68 (1.6)	-.17
Junior High					
Posttest	5.27 (2.9)	6.20 (1.9)	5.17 (2.1)	5.44 (1.9)	.13
Follow-up	1.73 (1.5)	3.62 (1.9)	4.11 (2.2)	4.09 (1.5)	.90
Year 2 (Teacher)					
Elementary					
Posttest	3.44 (1.4)	3.80 (2.0)	6.75 (2.0)	5.20 (1.9)	.97
Follow-up	Not available				
Junior High	2.70 (1.3)	5.02 (1.7)	3.18 (1.5)	4.50 (1.8)	.85