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Implementing the teaching strategy: "Identifying Similarities and Differences"

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Implementing The Teaching Strategy "Identifying Similarities and Differences"

A Thesis

Presented to the

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In Partial Fulfillment

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by

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ABSTRACT

Recently, low test scores on standardized tests have provoked teachers and administrators to reflect on teaching strategies which improve academic achievement. One such strategy presented by Marzano, Pickering and Pollock (2001), "Identifying Similarities and Differences," promises great success in helping students learn effectively. There is literature that provides support and opposition for using such techniques when instructing students. In this quasi-experimental study, two dance classes were chosen to investigate the promise of the aforementioned strategy. The classes used to determine effectiveness of the teaching approach contained high school students in 9^{th}-12^{th} grades ranging in academic abilities. The same pre and post subjective and objective tests were given to both groups, which reveled no significant difference in achievement between the two classes. The subjective test had a p value of .313 and the objective test had a p value of .746. As indicated by research, the time limitation under which this experiment was conducted had a negative effect on the results. However, when examining the content in the essay tests, it was noted that students in the treatment group were able to draw more meaningful conclusions about the subject

matter than those in the control group, indicating the time-impeded instruction that did take place may have influenced the learning outcome positively. This study should inspire further research in the use of the teaching strategy "Identifying Similarities and Differences" as a way to enhance the learning process and ultimately lead to higher academic achievement.

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It is with much gratitude that I recognize the California State University San Bernardino Instructional Technology professors for their ability to guide and challenge me through the Master's program. I am grateful to Dr. Baek who inspired me to step out of my comfort zone and step into the world of research. Her passion is evident in the way she instructs and guides her students; she demanded excellence, which taught me volumes. Dr. Newberry's enthusiasm for sharing his knowledge by allowing his students to discover the answers for themselves demonstrates a bona fide constructivist at work. Developing what we thought were answers and being sent back to the drawing board was a terrific exercise in his instructional design.

Thanks to Dr. Brian Murray, Cathedral City High School Vice Principal, who wrote a letter of support to the IRB approving this study. A special thanks to my Dance II/III students in 2nd and 5th period; without your help and participation I could not have written this paper.

Thanks to my mom and dad who always believed in me and kept me from driving on the sidewalk on the long trips home from CSUSB. Thanks to my in-laws for feeding me so I

didn't have to cook; it's in the resolution, you know. To my dear friend Sue Vetti who I chatted hours with on my way home from school. Yes, I'm in my car! And finally, to my husband who still loves me after all this!

DEDICATION

I dedicate this piece of scholarly work to my husband, David. Without his patience, understanding, and encouragement, I would not have made it through this program. I love you, totally and completely.

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CHAPTER ONE

BACKGROUND

Introduction

Addressing low test scores and figuring out how to improve academic achievement in schools is perplexing districts, schools and teachers all over the nation. Cathedral City High School (CCHS) in Southern California is one of many schools struggling to improve academic achievement and raise state mandated test scores. A possible solution to this problem could be found in Classroom Instruction that Works: Research-Based Strategies for Increasing Student Achievement by Marzano et al. (2001). The authors include four suggested techniques (comparing, classifying, creating metaphors, and creating analogies) to help students identify similarities and differences and improve student learning. CCHS decided to adopt "Identifying Similarities and Differences," one of the nine strategies from the book, in an attempt to improve student achievement. It was expected that all teachers would participate in using such methods of instruction with the intention of having each student exposed to this strategy in every class. The expectation of this implementation was the students'

mastery in using this technique and as a result ultimately improving their academic achievement.

It is important to note that the district office suggested the use of the Marzano et al. book as a means to improve teaching strategies, and thus make a direct impact on the performance of students. The district also offered a workshop for interested administrators and teachers over the summer to support the use of the book in its schools in an effort to promote a positive instructional change in the classroom. Obviously the district, based on the recent test scores of students district-wide, felt it necessary to encourage the use of the instructional strategies provided by Classroom Instruction that Works.

The SDC (Staff Development Committee) began implementation of the strategy "Identifying Similarities and Differences" and met with department members to brief them on how to best apply this strategy in their classrooms. SDC members explained the techniques used in the book, as well as how they have applied these techniques in their discipline-specific classrooms, in order to encourage the entire faculty to use the strategy.

Statement of the Problem

The academic performance of students at CCHS is its staff's main concern, and implementing a teaching strategy to reverse the low performance on state mandated tests is its main objective. In order to do the aforementioned, it was decided by the SDC members to apply the teaching strategy "Identifying Similarities and Differences," as presented in Classroom Instruction that Works: Research-Based Strategies for Increasing Student Achievement by Marzano, Pickering, and Pollock, to boost achievement levels in the classroom and on standardized tests. Because schools are expected to reach a particular score on standardized tests mandated by the state, CCHS was actively pursuing implementation of a school-wide instructional strategy which would increase student performance. The Palm Spring Unified School District embraced the Marzano et al. book and directed individual campuses to use it as a guide for instruction. The CCHS SDC members discussed the nine teaching strategies and research findings presented in the Marzano et al. book, and it was decided upon by the entire staff to implement the teaching strategy "Identifying Similarities and Differences" into classroom instruction.

There are always many concerns when implementing a new method of instruction and this study was no different. For example, all teachers agreed there was a need for raising performance levels of students; however, not all teachers appreciated being told how to teach. Furthermore, there were concerns in the overall effectiveness in implementing this technique in all classroom settings. Take for example the non-academic classrooms such as dance: Did students in these settings take the writing assignments, classwork, and assessments involved in learning such a strategy seriously enough to actually improve their understanding of the material presented? Another issue addressed with the implementation of this strategy was the question of what learning theory or theories were most effective when instructing with this technique. Moreover, how did using this strategy improve student understanding of the content being delivered? The abovementioned concerns should not be ignored when looking at the effects of putting into practice the use of a teaching strategy such as "Identifying Similarities and Differences."

Using an instructional strategy which produces positive results in the academic realm is the ultimate goal of any educator. Unfortunately, the strategies used

by CCHS at the time of this study were not as effective in producing such results as desired. Therefore, it was important that an intervention, such as adopting the Marzano et al. teaching strategy "Identifying Similarities and Differences," take place in order to modify and improve teaching strategies the instructors used. Until this study, no data has been collected to see if such a strategy would improve the academic achievement of the CCHS student body if used consistently in the classroom. The problem identified was a sub-par performance on standardized tests, the solution was to implement a Marzano et al. teaching strategy (Identifying Similarities and Differences) to give students the tools to increase understanding of scholastic materials and positively influence academic performance.

Purpose of the Project

The purpose of the project was to examine the effects of implementing the teaching strategy Identifying Similarities and Differences while teaching specific dance steps and technique to students enrolled in Dance II/III classes at CCHS.

Null-Hypothesis

1. Applying the teaching strategy "Identifying Similarities and Differences" will not improve student understanding of subject material through the use of comparison, classification, metaphors, and analogies, and as a result no improvement in the quality of classwork and test scores of students exposed to this strategy will be noted.

Significance of the Project

The significance of the project follows.

1. In order to enhance academic achievement it is necessary to implement a teaching strategy which provides students with tools needed to increase classroom performance. This study will produce data showing whether the implementation of "Identifying Similarities and Difference" is an effective teaching strategy.

Limitations

During the development of the project, a number of limitations were noted. These limitations are presented in the next section.

1. Some students in the control group might have been exposed to this strategy in another class,

as he or she may have had another SDC member as a teacher, or another teacher who was also using this strategy. However, this instructional strategy was used during the control group's dance class meetings. However, it should be noted there could have been a transfer of skill on the students' behalf.

2. Students may not have taken the instructional process as serious as in an academic classroom setting. Lack of desks, textbooks, and other familiar academic materials in a dance class may have influenced the attitudes of students.
3. Time limitations pose a major concern. Dance students were involved in a dance production during the time the experiment took place. Most of the focus at this point in the class was on polishing routines for performance, not on teaching or reviewing skills; as a result, lack of time may have influenced students' ability to process and practice the information provided.
4. The strategy implemented was only used in five lessons, so practice time may not have been sufficient enough to see an improvement. Students may not have grasped the strategy

enough to fully understand and apply it and therefore influenced the test scores.

5. The end of the year was approaching and students' attitudes were far less serious.
6. Attendance was less regular at the point in the year the study was conducted. Students absent on the days the teaching strategy and classroom activities supporting this activity were used likely did not perform as well on the post tests as those students who received the instruction.
7. Students absent on the days the post-tests were given had to wait until after Spring Break to make up the exams.
8. Gain or loss of participants. Students who transferred into the class or out of the class during the experiment may or may not have been included in the results.
9. No multiple graders were available to correct the essay exams given to students.

Definition of Terms

The following terms are defined as they apply to the project.

1. comparing: to identify similarities and differences between two or more items.
2. classifying: "…the process of grouping things that are alike into categories on the basis of their characteristics" (Marzano, et al., p.17).
3. creating metaphors: "…the process of identifying a general or basic pattern in a specific topic and then finding another topic that appears to be quite different but that has the same general pattern" (Marzano, et al., p.17).
4. creating analogies: "the process of identifying relationships between pairs of concepts-in other words, identifying relationships between relationships" (Marzano, et al., p.17).
5. variant: refers to several ways to solve a problem.
6. invariant: refers to one way to solve a problem.
7. schema: representation

8. transfer: to shift or move knowledge from one problem and apply it to another.
9. superficial similarity or surface similarity: "…solution-irrelevant but salient details…plays and important role as a bridge between source and target problems" (Chen, 1996, p.411).
10. structural similarity: "…the causal relations among the key problem elements" (Chen, 1996, p.411).
11. procedural similarity: "…the specific operational features shared by source and target solutions…" (Chen, 1996, p.412).
12. base problem: a known problem
13. target problem: a new problem
14. structure tag: "…allows the subject to very approximately categorize and identify the type of problem posed" (Ripoll, 1998, p.7).
15. domain tag: like the structure tag but only relevant to surface features or similarities.
16. intra-domain: refers to problems that share the same domain tag or surface features.
17. structural alignment: encoded information about the structure (pairs or objects) which helps the

brain sort through and identify similarities and differences between the pairs or objects.

CHAPTER TWO

REVIEW OF THE LITERATURE

Introduction

Applying the teaching strategy "Identifying Similarities and Differences," as outlined by Marzano, Pickering, and Pollock (2001) to the three learning theories: behaviorism, cognitivism, and constructivism, will enhance student learning and performance. Although each learning theory has a different philosophy about how information should be communicated and disseminated to the learner, the goal of each theory is that learning is achieved. The teaching strategy "Identifying Similarities and Differences" can be used with all three theories to enhance the learning outcome. There are nine strategies total discussed by Marzano, Pickering, and Pollock; however, "Identifying Similarities and Differences" will be the only strategy examined with the three theories. There are four techniques in the teaching strategy "Identifying Similarities and Differences:" comparing, classifying, creating metaphors, and creating analogies. All techniques are inter-related and important tools used in this instructional strategy. Some of the literature reviewed in this section will support the use of all four

techniques in instruction, as well as examine how these techniques work to provide learners a better understanding of the material they are studying. Other literature reviewed in this chapter will question the techniques and their effectiveness in academic instruction. However, all of the studies discussed here are important to examine and take into consideration when implementing the teaching strategy "Identifying Similarities and Differences."

Summary of Learning Theories

Because not every learning theory is conducive to every learning situation, instructors must be aware of the best way to facilitate learning by understanding when it is appropriate to use a behaviorist, cognitivist, or constructivist approach in their instruction. The behaviorist theory focuses strictly on the stimuli and responses. The information a student receives and the feedback given by the instructor are very controlled in order to produce the learning outcome. Such an approach can be useful when introducing a new or unfamiliar concept, yet would not be as effective to use when the objective is to have a learner apply a concept learned in the past to a new concept. The "drill and kill" strategy associated with behaviorism lacks learner involvement and

may seem rather out-dated, yet it does prove useful in teaching new material.

Ertmer and Newby (1993) point out that behaviorism and cognitivism are both concerned with the learner and the environment; however, the cognitivist theory takes the learning process one step further and examines how the learner codes, organizes, and retrieves the information that already has been learned. Cognitivists give more credit to learners in terms of their ability to control what is learned in that they "monitor and exercise control over their own attempts to learn" (Wildman, 1981, p.348). Such control, possessed by the learner, allows the learning experience to resonate in the mind, making it more memorable and easier to retrieve.

As discussion of the three learning theories progresses, it is notable that the philosophies backing the theories begin to give more control to the learner during the learning process. This freedom and control is very evident in the constructivist theory. Constructivism promotes active involvement of the learner with his environment, which is similar to cognitivism; however, according to Ertmer and Newby (1993), the learner is said to construct his own meaning from the experience. Yet, when statements such as, "...the internal representation

of knowledge is constantly open to change; there is not an objective reality that learners strive to know" are made by the aforementioned researchers, one questions how instructors using this approach can accomplish the *objective* of learning (p.63).

Analysis of Learning Theories as They Apply to "Identifying Similarities and Differences"

When looking at Marzano, Pickering and Pollock's strategy "Identifying Similarities and Differences" and applying the behaviorist theory to this strategy, one would use the basic form of *comparing* to teach students the similarities and differences between two items. In such an instance, the instructor presents the two items to be compared to the class and may use tools such as the Venn diagram, a matrix, or other visual displays to direct correct student responses when comparing the items. Such an event is teacher-directed and structured so learners cannot stray from the intended objective. As Seels and Glasgow (1990) point out, "Behaviorists are concerned with discovering the relationship between stimuli and responses in order to predict and control behavior" (p. 34). The structure of this activity is consistent with the behaviorist theory of how learning occurs in that it

allows the teacher to manipulate the stimuli and give feedback to ensure correct responses. As the learning theories seem to progress and allow learners to become more active in their knowledge, so does the strategy of "Identifying Similarities and Differences."

Another form in this process is called *classifying* and requires students to group items prior to comparing them. The instructor can give these groupings to students, or the instructor can allow students to choose appropriate categories the items should be organized in prior to comparing them. The students can use a matrix or another graphic organizer to help them classify the items. With this activity, students have the opportunity to manage the information they already posses, retrieving knowledge from previous learning situations, to enhance the learning process. In designing a lesson which promotes the cognitive theory of learning, "...the instructor should be concerned with the activities which students must perform," as well as realize the learner should be made aware of his responsibility is his own learning process (Wildman, 1981, p. 14). In doing the aforementioned, an instructor can successfully implement an effective teaching strategy based on the cognitivist's viewpoint.

The constructivist's belief about learning goes beyond the stimulus and response beliefs of the behaviorists, as well as the monitoring and control beliefs of the cognitivists. In the same way, the application of creating analogies and metaphors uses abstract ideas which learners will recall from past and present experiences and use them to create new meanings for the items being compared. Just as Willis and Wright (2000) describe the new Reflective, Recursive, Design and Development (R2D2) model, as it pertains to instructional design, and how it features the use of all participants involved to create a solution, the constructivist learning theory requires students to actively participate and create meaning from their learning experience. Having learners create their own analogies and metaphors will promote the higher level thinking associated with the constructivist view.

The Value of Comparison

Gentner and Markman (1994) conducted research based on the importance of structural alignment in comparison. In other words, this research reinforced the theory that individuals are able to identify the differences in like or similar pairs easier than they are able to recognize

differences in dissimilar pairs. At first this might seem contrary to what one might think about identifying the differences within a given pair. Although it might be expected, it would be incorrect to assume it is easier to pick out differences between pairs which are different, not similar. However, after examining the research and theories presented by Gentner and Markman (1994), it is clear that "...the similarity of a pair increases with its commonalities and decreases with its differences" (p.152). Specifically mentioned to support Gentner and Marksman's hypothesis was the structural alignment view which "...assumes that mental representations consist of hierarchical systems that encode objects, attributes of objects, relations between objects, and relations between relations" (p.152). In other words, when comparing a pair, the brain looks for a stored match in order to process the similarities and differences. To make the retrieval easier, the pairs should be more similar than different if the goal is to identify the differences between the pair.

The experiments conducted by Gentner and Markman (1994) involved undergraduate students from Northwestern University who received course credit for their participation in the study. The subjects were given 40

pairs of words, 20 similar and 20 dissimilar, randomly mixed, and asked to list one difference for as many pairs of words in the given 5 minute time period. Subjects were cautioned to do the easiest pairs first and told they would not have time to list a difference for all 40 pairs.

The alignment of structures was a focal point of this research study and it was hypothesized the more structurally aligned the pairs, the more successful the subjects would be at identifying differences among the pairs. The results yielded the anticipated hypothesis and confirmed the view that "...comparison...is accomplished via an alignment process" (p.154). Because dissimilar pairs have "fewer points of overlap," and there is less of a common structure, subjects were not successful at making a comparison of the two words (p.155). Simply stated, the more alike the two words, the easier it is to find the differences between them. Placing two abstract words together and asking subjects to make a connection is to set them up for failure. Therefore, teachers will have more success in their instruction when having students compare high similarity pairs (objects, words, dance moves) because they can find a wider range of differences in such pairings.

The Importance of Classification

Grouping like items according to characteristics is another technique which helps students solve problems. If students can be taught to classify they can draw conclusions from classifications and thus come up with an answer more readily than students who do not use this technique to problem solve. Ripoll (1998) did a study with 120 psychology students at the University of Provence who volunteered to be his subjects. Ripoll developed six target questions for six experimental conditions where subjects were not asked to find solutions to the problems. There were two types of target problems: intra-domain (problem contained a similar structure to that of the base problem) and inter-domain (problem contained a different structure than that of the base problem). There were three levels to the questions: 1. Base and target questions contained surface cues strategically inserted in the same places in both questions. 2. Base and target questions contained surface cues, but they were not inserted in the same places. 3. There were no surface cues used in the questions. Subjects were presented the base problem, then a week later given the target problem. Ripoll found by exposing subjects to a base problem, then to a target problem with surface similarities and intra-domain tag

factors, it increased subjects' retrieval of the base problem and allowed them to relate the base problem information and solution to the target problem. Using such a method in instruction will allow teachers to expose students to the tool of identifying similarities and differences and enhance their ability to transfer previous knowledge to new problems. Such connections between old and new instruction is paramount in fostering learning, recalling previous knowledge, and being able to successfully apply what is already known to what is unknown.

The Value of Analogies

Students who are able to use analogies to solve problems are using a more complex way to solve problems than that involved in the previously mentioned techniques. The older the students, the more experience they can draw from when solving a problem. Teaching students to transfer the information they have gained from something they have experienced, or have prior knowledge of, into a formative solution is a powerful tool, and favored by the constructivists. Understanding what these similarities are and how to employ the transfer of knowledge are necessary to implementation of this strategy.

There are three types of similarities that were the subject of focus in a research experiment designed by Zhe Chen (1996) involving a "bead retrieval problem" using 5 and 8 year-olds. The ages of the subjects are years behind those of high school students; however, it is an important and applicable study in that students' abilities to use analogies in problem solving increases as they mature in age. Superficial similarity, structural similarity, and procedural similarity are used by students to transfer existing information to a novel problem in order to find a solution. Superficial similarity "...which refers to solution-irrelevant but salient details...plays an important role as a bridge between source and target problems" (Chen, 1996, p. 411). Providing students with important details of a dissimilar problematic situation, but not a relevant solution to the problem, will promote transfer of superficial similarity and thus help them solve the challenge at hand.

Structural similarity is the "causal relations" students can pick out from the "key elements" in a past problem and the current problem (Chen, 1996, p.411). For example, if a dance student is having trouble getting around two full revolutions when executing a double pique, and remembers when learning how to perform a pirouette her

arms began the revolution and her head was used to continue to pull the body around to complete the revolution, she is using "key elements" (arms and head) in two different styles of dance turns (pirouette and pique) to correctly execute the step. The two turns, the pique and the pirouette, are not identical in execution, body position, or in all aspects of technique; however, the student can draw on her experience of executing one turn to help her execute the other based on her knowledge of what causes her to turn (the arms and the head). This represents the power of analogical problem solving.

Lastly, procedural similarity refers to the "specific operational features" which are shared in the solution of a past problem to the current problem (Chen, 1996, p.412). Chen's research findings indicate students were able to use surface similarities from the stories told to them and apply them to the bead retrieval problem, leading them to extract the bead from the glass cylinder without turning the cylinder over (1996). Furthermore, structural similarities greatly increased students' abilities to solve the bead retrieval problem. As a final point, a combination of both similarities increased the rate of transfer significantly (Chen, 1996). Teaching students to draw on the use of analogies to help them solve problems

will not only increase the likelihood of successful problem solving, it will also make for more meaningful learning. Such meaningful learning will stay with students and become important in solving future academic problems.

The old cliché, "There is more than one way to skin a cat," is certainly applicable to solving many academic problems with which students are faced. Chen (1999) performed another research study based on analogies and their usefulness in helping students solve problems. This experiment involved children ranging in age from 8 to 11 years old and the use of problems "analogous to Luchin's classic water jar problems" (Chen, 1999). The study looked at providing students with variant and invariant ways to solve the problems and examined how students were able to transfer their knowledge when presented with a novel problem, depending if they were exposed only to invariant equations or only variant equations (Chen 1999).

The use of variant equations helped students to develop problem schemas, or representations, which increased their transfer of knowledge from one problem to another more so than the invariant problems (Chen, 1999). Interestingly, while both groups, whether they were exposed to the variant or invariant problems, were able to

improve their problem solving performance, the study found that age did influence the ability to transfer the knowledge gained from the variant problems with the older children (Chen, 1999). Such results confirm the importance of using analogies when instructing students. The results also indicate that the older the students, the more ability they have to understand, use and properly apply the use of analogies in their problem solving activities. Therefore, high school students are exceptional candidates for using analogies to solve problems.

Why Analogies May Not Work

Although there is plenty of reliable research supporting the use of this teaching strategy, especially with the use of analogies, there are many studies that suggest otherwise. In other research conducted on the effectiveness of analogies in instruction, some have found this strategy to be unhelpful, even causing a negative result in student learning and achievement. In their article "Instructional Analogies and the Learning of Concepts," Newby, Ertmer, and Stepich (1995) review several such studies before presenting their opposing research findings. The authors cite several studies which

support the view that analogies are not effective and do not cause an improvement in the learning process. Drugge and Kass (1978), Gabel and Sherwood (1980), Bean, Singer, and Cowen (1985) are all studies which conclude analogies fail to be useful in instruction. Newby et al. go on to discuss such research, while they oppose this viewpoint, maintaining "a number of factors limiting the effectiveness of analogies have been identified (e.g., Duit, 1991; Thagard, 1992) which may account for these inconsistent results" (p.6).

Perhaps the analogies were not helpful to students because in the Gabel and Sherwood study (1980) "...it was shown that as many as 48% of the subjects did not fully understand the analogies used to teach the content" (Newby et al., 1995, p.6). Clearly, the lack of understanding of the analogy itself can impede the learners so that grasping the concept being taught is virtually impossible.

The research article continues by suggesting:

> Such findings have prompted some investigators to suggest the need for teachers to devote time and effort to explain the relationship between the analog and the target and to explicitly delineate relevant similarities and differences (e.g., Clement, 1993)(p.7).

Time seems to be a critical factor in any teaching situation. If there cannot be enough time to cover the necessary information, how can students be expected to grasp the concept being taught?

Critics of analogies also claim that there "is a tendency to overgeneralize or create unwanted misconceptions" when students are learning a new concept with an analogy (p.7). The argument the authors use to defuse the research findings is that "analogies from near base-domains may have more readily generated misconceptions which led to unshared attributes being treated as valid" (p.7). This claim is not supported and is inconsistent with the aforementioned study conducted by Gentner and Markman (1994) concluding there needs to be structural alignment, or similarities within the two items being compared, in order for successful comparisons to be made. Both studies have found near (Gentner and Markman, 1994) and far (Newby et al. 1995) base-domains work; perhaps both near base-domains as well as different base-domains can be utilized when instructing with analogies. Maybe it is just a matter of finding out which base-domain will work with which concept. In either case, it is necessary to conduct further research in this area.

Furthermore, Newby et al. continue presenting the opposing viewpoint while defending the use of analogies by stating time is an important factor when instructing with analogies. If there is not enough time for students to spend reading about the analogy, as well as the content, then students will not fully understand the concept. Finally, the last defense for analogies presented in this study is that this instructional technique cannot work without proper cueing given by the instructor while the student is learning. "Cueing is particularly important because learners do not always see the relationship between the base and target domains" (p.7). The implication here is that perhaps during the instruction process students were not properly cued, that is, they were not given enough information to help them associate the analogy with the target domain, and as a result missed the concept being taught. The previously stated claims made by Newby et al. present a strong defense against those who do not believe analogies assist with the learning process. Not understanding the analogy; not having enough time to thoroughly explain the analogy to students, or not allowing students unlimited time to study the concept with the analogy; not selecting a proper base-domain, whether a near base-domain or a different base-

domain in relation to the target domain; and not properly cueing the students so they can see the relationship between the base and target domain all contribute to the ineffectiveness of analogies.

Summary

To promote learning, instructors must be responsibly mindful of the learning theories, how each can be used, and the type of teaching strategy that will best facilitate learning when using a particular theory. Although learning theories have evolved, each still has its place in the instruction process. One cannot focus on a particular learning theory exclusively without cheating students of a complete learning experience. When understood and used with effective teaching strategies such as "Identifying Similarities and Differences," learning will take place.

According to Marzano et al.(2001), employing the teaching strategy "Identifying Similarities and Differences" is immensely beneficial to students. The brain uses a natural system to approach solving problems, and the aforementioned strategy and techniques supports this system. A teaching technique which trains students to tap in to previous knowledge, through comparing,

classifying, and using metaphors and analogies to solve problems is not only effective, it is essential. However, there is an opposing viewpoint that maintains analogies are not helpful and do not facilitate learning. Such research, nevertheless, has appeared to be questionable in that the limitations found in these studies can be turned around or corrected in order to make analogies a useful teaching aid.

CHAPTER THREE

METHODOLOGY

Introduction

The design method for this project was that of quasi-experimental because the researcher could not control all variables in the experiment, such as class size and the issue of time. In addition, convenience samples were used in place of true randomized grouping. This research was designed to uncover the suggestion of a casual relationship, to see if the implementation of the teaching strategy "Identifying Similarities and Differences" would cause the treatment group to outperform the control group, thus a quasi-experimental design was selected. Students from the Dance II/III classes were used in the treatment and control groups to conduct the experiment. The techniques demonstrated by the teacher with the treatment group to help students with identifying similarities and differences was that of comparing, classifying, creating metaphors, and creating analogies. All techniques were utilized as recommended by Marzano et al.(2001). Students were introduced to and instructed how to use a Venn diagram to compare two dance skills and used a comparison matrix when looking at three dance skills. They also were

instructed on how to create meaningful metaphors and analogies that they can apply to the skills learned in dance class, helping them make learning more meaningful. The results of the data analysis provide information on the success or failure of the implementation of "Identifying Similarities and Differences" as a tool to improve academic achievement and explain if this strategy will help instructors teach more effectively, producing positive results in the area of academic achievement. As such, the null hypothesis for this is experiment is that applying the teaching strategy "Identifying Similarities and Differences" will not improve student understanding of subject material through the use of comparison, classification, metaphors, and analogies, and as a result no improvement in the quality of classwork and test scores of students exposed to this strategy will be noted.

Sample Examined

Implementation of the teaching strategy "Identifying Similarities and Differences," and without the strategy, began simultaneously with the Dance II/III classes in the Physical Education Department at CCHS. In the these dance classes, Period 2 was used as the treatment group and Period 5 was used as the control group in order to collect

diverse academic make-up of the dance classes it would be valid to generalize the results of this experiment to the rest of the high school; however, the sample size of this experiment is small, thus compromising external validity. Cathedral City High School is made up of mostly a minority population. The school itself had an enrollment of 2,577 students. The ethnic breakdown of the school population is as follows: 1,631 Hispanic, 714 Caucasian, 99 Black, 77 Filipino, 35 Asian, 16 American Indian/Alaska Native, and 5 Pacific Islander.

It is notable that all students but one in the two dance classes were girls. This was probably due to several reasons: dance is considered a feminine activity, there is a stereotype associated with boys who take dance, there are other electives which are more appealing to boys than the dance class elective.

Data Collection

Assessments

Subjects were given two pre- and post-tests, one objective and one subjective test. Both tests contained the same questions for each administration, and both the control and treatment groups were given each test. Because some students test better on subjective versus objective test,

and vice versa, it was decided that it would be interesting to look at both types of tests when comparing data. As a result, a multiple-choice test and an essay test were developed and administered to improve the reliability of the experiment's results.

The objective test was made up of 20 multiple choice questions with five questions focusing on the four categories used in the Marzano et al. book: comparison, classification, metaphors, and analogies. The questions covered skills and technique used in the dance classes since the beginning of the year. In order to ensure content validity, great care was taken in designing the test by consulting lesson plans and creating test questions which reflected the material covered in class. Skills and technique, which were not specifically discussed and worked on in class, were not included in the test questions. The questions were presented in a random order and were not categorized in groups, ie. metaphors or classifying. Students were given 30 minutes to complete the objective test. Answers to the test were either correct or incorrect; there is no subjectivity on a multiple-choice test. The test was administered with paper and a scantron and scored by machine, then checked again for scoring accuracy by the researcher.

The subjective test was in the form of an essay question asking students to identify as many similarities and differences between two types of turns commonly performed in dance, the chainé and the pirouette. Both turns were extensively covered in class and students were familiar with both skills. Because students had to organize their ideas they were given the full 55 minutes in class to complete their essays. The scoring of this essay test did not focus on the mechanics, organization and flow usually associated with writing assessment. The information being looked at here was the number of comparisons subjects were able to make in their essays. As such, the number of comparisons were counted and recorded appropriately for comparison between the two groups. Although this data was analyzed by a statistical program, the researcher also noted the quality of answers given by both groups to see if there was a more detailed and thoughtful answer given by one group or the other.

Assignments

In class assignments were developed to promote a better understanding of the material covered in class. All assignments were modeled after the ideas given in the Marzano et al. book. The control group had written work to do to reinforce their understanding of certain dance

skills and concepts, as did the treatment group. However, the treatment group's assignments were geared toward the use of graphic organizers such as the Venn diagram, comparison matrixes, and the creating of metaphors and analogies as suggested by the Marzano et al. book, while the control group was not exposed to these aids when given classwork (see Appendix F).

In the first assignment, the treatment group used the Venn diagram to compare the chainé to the pirouette, and the control group simply listed the elements involved in performing these turns, without noting comparison, on a blank sheet of paper. It was expected the treatment group would have more success on their post-test due to the help of the visual created by the Venn diagram.

The treatment group also used a comparison matrix to compare the characteristics of a chainé, pirouette, and piqué, and the control group was not given a graphic organizer to compare the three skills, but were asked to describe and define each turn to the best of their ability on a regular piece of paper. Given the use of the tool, it was again predicted the subjects in the treatment group would have an easier time coming up with more characteristics than the control group, and as a result would perform better on their post-tests.

In another assignment, subjects in the treatment group wrote a letter to a partner explaining the proper execution of a chainé, while their partner wrote a letter to them explaining the proper execution of a pirouette. The letters were exchanged, read and responded to, listing the elements their partner left out. Finally, the partners wrote each other once more pointing out the similarities and differences within the two skills. The control group was not exposed to the comparison of the turns in their letters; instead, they wrote to their partner describing the proper execution of either the pirouette or chainé, traded letters, and responded with anything their partner left out. Here again, it was predicted the reinforcement of the material provided by the teaching strategy the treatment group was exposed to would help students have a better understanding of the two skills being featured in the lesson, and as a result, outperform those in the control group on the post-test.

To expose the treatment group to the use of metaphors, subjects were asked to develop their own dance metaphors after some guided practice with the instructor. The students were put in small groups of three to four and supplied with a list of terms they could use to create their dance metaphors. Each group was responsible for

coming up with five metaphors. Each group chose their best metaphor, put it on the board for the entire class to see, and ask the class to explain their group's metaphor. This was designed to challenge the class to think of the relationships proposed by their peers. The control group was not exposed to the use of metaphors, but they received a handout reviewing the same key skills and techniques the treatment group created metaphors with.

The last assignment using the Marzano et al. strategy of "Identifying Similarities and Differences" involved the technique of analogies. Students in the treatment group were exposed to creating analogies with guidance from the instructor. After a few practices, students got into groups of three or four and created their own dance analogies. As with the metaphors, students shared their analogies with the rest of the class, placing their best analogy on the board and allowed the rest of the class an opportunity to solve it. Students explained their analogies, justifying their answers to the class. Again, this assignment was to expose the treatment group to the use of analogies; and because this study employed the use of the teaching strategy "Identifying Similarities and Differences" to improve classroom instruction, the control group was not exposed to this activity.

Data Analysis

The data was analyzed using ANOVA. No significant difference was found when comparing the control and treatment groups' pre-tests, indicating there was no threat of selection in terms of internal validity; therefore, ANOVA was used to statistically analyze the data. Although not recorded in a numerical fashion, the student responses on the essay portion of the experiment were looked at and compared between the groups. This was decided upon by the researcher to see if there was a difference in the content responses given by the treatment versus the control group.

Summary

When conducting this experiment it was decided the best way to proceed was with a quasi-experimental design. This design was chosen because of the use of convenience samples, small sample size, as well as the uncontrolled variable of time. However, the sample size from the Cathedral City High School Dance II/III classes was made up of various academic ability levels, which provided a nice base for examining how effective the teaching strategy "Identifying Similarities and Differences" would be with a range of subject ability levels. The

participants were all female, save one; however, the teaching strategy being implemented was not gender biased, so this did not affect the outcome of the study. The treatment group received instruction and practice in using the four methods associated with this strategy. The control group was given assignments that reinforced what they learned in class; however, they did not use any of the comparison or classification techniques, nor were they introduced to metaphors or analogies as a way to help them solve problems. Both groups were given pre and post-tests, subjective and objective, to compare the effects of the teaching strategy. To make sure the there were no statistical differences between the treatment and control groups, their pre-test scores were analyzed to see if a third variable should be accounted for when comparing the groups' pre and post-test scores. ANOVA was used in analyzing the pre-test data, which yielded no significant differences when comparing the pre-test scores of the treatment and control group; as a result, ANOVA was used to analyze the all test results.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

In order to improve student achievement, especially on standardized tests, it is necessary to examine the implementation of the teaching strategy in question, observe the effectiveness, or lack there of, of this strategy, then make a decision to keep using the strategy or find an alternative approach to achieve improvement. Upon finishing the instructional phase of the experiment, two types of assessment, objective and subjective, were used to carry out the research process and examine the effectiveness of applying the instructional strategy "Identifying Similarities and Differences." The objective evaluation consisted of 20 multiple-choice problems featuring questions using the four techniques (comparing, classifying, using metaphors, and using analogies) as outlined by Marzano et al. (2001). The subjective exam contained an essay question asking participants to compare the chainè turn to the pirouette. Both the pre and posttest objective and subjective results were evaluated using the SPSS program. Once it was determined that there was no significant difference between the control and

treatment groups in the pretest results, the posttests were evaluated using a one-way analysis of variance (ANOVA). Upon completion of the analyzing process, the null-hypothesis was retained; that is, applying the teaching strategy "Identifying Similarities and Differences" does not improve student understanding of subject material through the use of comparison, classification, metaphors, and analogies, and as a result no improvement in the quality of classwork and test scores of students exposed to this strategy will be noted.

Presentation of the Findings

The results of the multiple-choice assessment are presented in Table 1. A one-way ANOVA conducted on the posttest results, and a significance score of .313 shows there is not a significant difference between the control and treatment groups. Therefore, in this case study, it appears the teaching strategy "Identifying Similarities and Differences" did not help students who were exposed to this technique achieve higher scores on the posttest than students who did not receive this type of instruction.

Table 1. Multiple-Choice Post-test Results

Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Control	32	10.5938	3.25140	.57477	9.4215	11.7660	4.00	16.00
Treatment	25	9.8000	2.43242	.48648	8.7959	10.8041	5.00	13.00
Total	57	10.2456	2.92331	.38720	9.4700	11.0213	4.00	16.00

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.843	1	8.843	1.035	.313
Within Groups	469.719	55	8.540		
Total	478.561	56			

Table 2 represents the findings of the essay test that asked students to compare the chainè to the pirouette. Again, a one-way ANOVA was carried out on the posttest results; and once more no significant increase in achievement on the test was noted between the control and treatment groups.

Table 2. Essay Post-test Results

Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Control	24	15.7083	5.20434	1.06233	13.5107	17.9059	6.00	28.00
Treatment	23	15.2174	5.12531	1.06870	13.0010	17.4337	5.00	26.00
Total	47	15.4681	5.11541	.74616	13.9661	16.9700	5.00	28.00

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.831	1	2.831	.106	.746
Within Groups	1200.871	45	26.686		
Total	1203.702	46			

Discussion of the Findings

There are a number of factors that might explain the results of this study. It is this researcher's belief that not only the limitations presented in Chapter 1 influenced this experimental outcome, but as identified in Chapter 2 of this research presentation, there are also many research-backed reasons why this experiment failed to produce successful results in the treatment group's test scores.

Although the analyses of variance performed on both the multiple-choice and essay test results did not yield significant differences between the control and treatment groups, the researcher did note a difference in the quality of essay responses between the treatment and control groups. While the essay test is not objective, and the subjective nature involved in grading such a test needs to be considered, the higher quality responses found in the treatment group's essays should not be discounted.

The control groups' essays tended to be more list oriented, not offering specific examples of why there were similarities and differences between the chainè and pirouette. On the other hand, the treatment groups' responses contained more thoughtful explanations of how the turns were similar and different and what the importance of these similarities and differences were. What follows are examples of typical control group responses to the posttest essay question.

Example 1:

> Along with the difference between the two turns, there are also similarities. Both turns require a prep and both require one to spot. The dancer must pull up and stay centered for it to be done properly. Both turns begin with legs and arms in

4th position and in pliè. The turns then go from pliè to relevè. Both turns require time, energy, and confidence.

Example 2:

A chainè requires more than one turn, and /or until your [you're] dizzy, and a pirouette requires only a certain number of turns. A chainè has to do with traveling towards one direction and a pirouette is done in place.

Example 3:

Some similarities are that both the chainè and the pirouette are both French words. Also well [while] doing both a major thing is to spot. In both you are also going up on relive [relevè]. There is a prep for both turns. When starting turns arms are in 4th position. Head has to snap well [while] you are doing turns. Also arms have to be strong and head up.

While the above examples represent accurate comparisons of the chainè and pirouette, the students have basically listed the similarities or differences without offering any thought as to why theses characteristics are important elements when executing the turns. The treatment group, on the other hand, attempted to offer

explanations of why or how the turns are executed along with the specific comparisons being made.

Example 1:

> When doing a chainè both feet stay on the ground and travel. Pirouettes, however, do not travel and one foot is at posse [passé] turned in. With chainès you can keep on going and never loose [lose] momentum, chainès are like lines they technically can never end. Pirouettes can only have so many turns until your momentum give[s] out or you fall….

This student was able to compare the traveling and stationary aspects of a chainè and pirouette respectively, while using a simile to show she understands the concept of momentum in both turns.

Example 2:

> When doing a chainè we can do as many as we want in a dance because we can keep constant momentum. Unlike a chainè a pirouette doesn't have that continues [continuous] momentum and slowly dies out, causeing [causing] dancers to do less turns.

In this example, the student is able to identify the importance of momentum and compare the turns in this respect. She recognizes the momentum in a chainè is

continuous and can be regenerated by the dancer while the pirouette has limited momentum and thus the revolutions are limited.

Example 3:

> In a chainè the arms are in 4th position. One are is to the side and the other is in front, but rounded in. . . . While turning the arms open and close as if one was holding a beach ball. The arms help one turn as they open and close increasing velocity and momentum.

This student was able to draw an analogy with the way the arms are held in a "beach ball" position while executing the chainè. She was also able to explain one of the functions of the arms in the turn is to help the dancer increase the momentum of the turn.

Summary

The posttest results yielded no statistical differences between the control and treatment group and thus indicate the teaching strategy "Identifying Similarities and Differences" did not help the treatment group understand the material better than the control group. Although there was no statistical significance found in the objective or subjective posttest results, it

was noted that there were more meaningful essay responses given by the treatment group than by the control group. These more thoughtful responses could be directly related to the type of instruction the treatment group received. The use of analogies and metaphors seem to have had some influence over the students who were exposed to the instruction using these tools because these comparisons showed up in the students' writing.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This experiment was designed to examine the effectiveness of the teaching strategy "Identifying Similarities and Differences." Students exposed to this particular teaching strategy did not achieve a higher level of knowledge in the area of dance than did the students who were instructed without the use of the strategy. Although subjective and objective tests were given, there was no significant difference between the treatment and control groups' test results. These results are in contradiction to most of the research that inspired this study. It is the opinion of the researcher that controlling the variable of time in a stringent manner could change the outcome of the study results; as researchers (Newby et al. 1995, Simons 1982, 1984) have found, time is of monumental importance when instructing students with the use of analogies. Furthermore, while reviewing the data produced by this study, it is important to keep in mind the necessary changes which need to be evoked by further research to promote the possibilities of a true measurement of strategy's effect.

Conclusions

The conclusions extracted from the project follows. When comparing the objective test result scores, there was no significant difference between the treatment and control groups. These findings would indicate that there is no benefit in using this instructional teaching strategy. However, when considering the variable of time and the insufficient availability of this necessary element, one cannot overlook its influence on this study.

In this experiment, the limitation of time can be categorized into three groups: First, the time limit placed on the instructor and students due to the dance performance they were preparing for; second, the classtime devoted to the explanation of the treatment group activities and assignments; third, the participation and practice time students were given to master the four techniques used in the "Identifying Similarities and Differences" teaching strategy. Considering the different limitations of time will contribute to the understanding of why the conducted experiment did not reach its full potential.

During the time this experiment took place, the dance instructor and students were preparing for their annual dance show. This is the dance department's most prevalent

performance of the year and requires much in-class preparation. As a result, the instructor had to confine the instruction used with the teaching strategy "Identifying Similarities and Differences" to a condensed period of time. Consequently, much of the instruction seemed rushed in order to get through the tasks required of both the teacher and students. There were only seven days the instructor could use to teach the four techniques (comparing, classifying, using metaphors, and using analogies) involved with the teaching strategy in question. The threat of time, or lack there of, seemed to reduce the success of the strategy prior to any instruction taking place.

The classtime the instructor was able to devote to the explanations of the four techniques, as well as the practice time she was able to give students was also limited to only one class period per technique. Newby et al. (1995) point out that the failure of some research experiments involving the use of analogies were directly related to not enough practice time. "Another limiting factor appears to be the time required to make use of analogies. Analogies may be effective but not efficient as instructional aids" (p.7). The article goes on to say that an "unlimited study time" is necessary for analogies

to be comprehended. While this particular case was based on research done by Simons (1982, 1984) and focused on the fact that students should be given an unlimited amount of time to process the information when reading analogies with content, it can also apply to the issue of limited time placed on the treatment group.

When introducing four new techniques to a group of students, the instructor needs ample time for teaching the concept as well as allowing students to work with the new model. The luxury of time was not available to the instructor or students in this area. Perhaps part of the problem in this experiment was the students did not fully understand how to use the tools, more specifically the analogies; and had the students understood the analogies, they might have done better, as suggested by Newby et al. (1995). "...the subjects did not fully understand the analogies used to teach the content. Of those who did understand, scores on the semester achievement test were raised significantly" (p.6). The lack of familiarity in the use of analogies was also a problem regarding time. Students who did not grasp the concept of an analogy, which required students to use abstract ideas recalling past and present experiences and then use them to create new meanings for the items being compared, were at a loss

for transferring the base-domain to the target-domain. Had more time been allotted, student success in understanding analogies may have prevailed.

Unfortunately, the time in which the instructor explained how to use a Venn diagram, a classification matrix, a metaphor, and an analogy was also done the same day as the activity involved with the aforementioned techniques, allowing no time for extra explanations of the techniques or digestion of the new material. As a result, students were not able to comprehend, properly use and transfer the techniques to help them perform better.

Because the practice activities and assignments were completed the same day as the explanation of the technique, and each activity was only gone over one time, most students may not have benefited from the teaching strategy. The students seemed to handle using the Venn diagram for comparing and the matrix chart for classifying quite well. However, the more complex tasks of creating metaphors and analogies should have been given more time for explanation and practice. As cited by Newby et al. (1995), one of the reasons students were not successful in using analogies was the overgeneralization of the information. "This occurs when attributes of the analog are included or mapped to the target when the attributes,

in fact, are not relevant or do not exist" (p.7). The assignments that challenged students to create their own metaphors and analogies may have been too advanced for the students' own good. In other words, they may have overgeneralized or assumed something they should not have about the metaphor or analogy and as a result had a misunderstanding of the concept they were supposed to grasp.

Another issue that may have affected the post-test results was the absenteeism of the students. When a participant was not in class on a day the teaching strategy was used to cover specific dance steps or concepts, she did not have the benefit of the instruction, or the advantage of practicing the concept with other students, which was supposed to enhance the learning process. Students who were absent were required to make-up the assignment, but did not have the advantage of hearing the entire explanation or working with a small group of students to use the new tool in the learning process. Also, due to time pressures, the posttest was given right before Spring Break which meant that any students absent on that day would have to make-up the posttest upon returning from vacation. The time off may have influenced how students who were absent performed on

the make-up test, as the material may not have been as fresh in their minds as those who took the test before the vacation.

As with the objective test scores, the subjective test results possessed no significant differences in the control and treatment groups when looking at solely the scores. However, when examining the content of the written responses of the treatment group versus the control group, the researcher found the treatment group had more thoughtful responses containing pertinent examples or comparisons. This difference may be explained in a couple of ways. First, the treatment group was exposed to the use of the Venn diagram and comparison matrix. These were tools students were encouraged to use to help organize their thoughts before responding to the essay prompt. Second, the exercises the student participated in when creating metaphors and analogies was engaging and enlightening. Students related to the dance terminology in a new way, by comparing the unfamiliar to the familiar. They were very attentive and had fun developing metaphors in small groups. As a result, they were able to remember and recall the techniques they used to create a metaphor, and possibly an analogy, and apply it to their essay responses. Therefore, the researcher

cannot ignore the content of student responses, even though there was no significant difference between the two groups on the essay test results.

It does not appear the construction of the test questions were more advantageous to the treatment group. While one might argue the test questions which used metaphors and analogies would favor the treatment group who received direct instruction using such examples, the outcome of the tests prove otherwise. There was no significant difference, no advantage, seen between the two groups which would suggest the test questions favored one group over the other.

Recommendations

The recommendations resulting from the study follow.

1. Controlling the variable of time is necessary when conducting this research experiment. Research conducted by Newby et al. (1995) indicates the use of analogies is difficult when time is an issue. It is suggested that further research in this area is not conducted unless there is sufficient time available to properly instruct the participants, as well as allow for enough practice and participation with the new

material. In order not to limit the results of a future study, time should be given much consideration in the design of the research plan.

2. It is also recommended that the experiment be conducted over a school year's period of time. This will allow for researcher and/or teacher and students time to focus on the tasks involved in grasping the more cognitive aspects of analogies. It will also allow the teacher to build to the more difficult tasks of understanding metaphors and analogies by providing students ample time to master the comparing and classifying strategies.

3. It was decided almost as an afterthought to administer a subjective assessment along with the objective test. While the results of both assessments proved the null hypothesis, the researcher was encouraged to find the content of the essays written by the treatment group to be more introspective than those of the control group. It is for this reason that one cannot ignore the positive contributions that "Identifying Similarities and Differences" has

on the learning process of students who are exposed to the strategy and should not completely discount the effectiveness of this tool in the classroom.

4. It would be helpful when analyzing the data to compare the treatment and control groups' results based on the four techniques individually instead of as a whole. For example, investigating the treatment group's responses to the classification questions and weighing them against the control group's responses. This may provide further analysis for researchers interested in discovering which of the four techniques (comparing, classifying, using metaphors, or using analogies) are most effective, or why one technique may be less effective. Researchers would then be able to identify and resolve problems throughout the experiment, especially if the experiment is conducted over a long period of time.

5. Further research is necessary to determine the impact of the teaching strategy used in this experiment. While many studies presented by Marzano et al. (2001) overwhelmingly indicate

successful use of "Identifying Similarities and Differences," it is necessary to examine the influence of time on the four techniques included in this strategy. As teachers and administrators search for ways to improve the academic success of students, they should not discount the implementation of "Identifying Similarities and Differences."

Summary

This study indicates the implementation of "Identifying Similarities and Differences" in a dance class did not increase the overall academic achievement of students taking the class. However, there are many factors that can account for these results. The most important and essential factor that influenced this experiment was the factor of time. Research indicates if enough time is not provided for both instruction and practice, analogies are not going to be understood by the students. Lack of time may also cause students to confuse the information and misuse the analogies, causing more harm than good in the learning process. While this technique has been proven to work, the conditions of this study did not promote such success. Further research is necessary to

discover the most effective ways to implement this teaching strategy and improve student achievement.

APPENDIX A

INFORMED CONSENT

INFORMED CONSENT

The study in which your child is being asked to participate in is designed to investigate the teaching strategy "Identifying Similarities and Differences." This study is being conducted by Karilyn (Putignano) Dangleis under the supervision of Dr. Baek, Professor of Instructional Technology. This study has been approved by the Institutional Review Board, California State University, San Bernardino.

In this study your son or daughter will be asked to participate in a study that will help determine if the teaching strategy "Identifying similarities and differences" will help improve the way he or she learns. This teaching strategy concentrates on using comparisons, classification, metaphors, and analogies to help students grasp concepts being taught. The assignments and activities I will be teaching will use these techniques.

In this study students will be asked to complete five in class assignments, and a pre and post test, designed to test the strategy in question. The classroom activities and tests will be completed over two weeks in class and be incorporated into regular classroom activities. All responses will be held in the strictest of confidence by the researchers. No names will be reported with the responses given by students. All data will be reported in group form only. By contacting me, you may find out the group results of this study upon the completion of my thesis in June 2004.

Your child's participation in this study is totally voluntary. You are free not to give consent and withdraw at any time during this study without penalty. When your child has completed the survey, they will receive a debriefing statement describing the study in more detail. Please note that whether your child participates in the study, he or she is still required to participate in all class activities, assignments, and tests; however, his or her test scores will **NOT** be used in the study.

If you have any questions or concerns about this study, please feel free to contact Dr. Baek at (909) 880-5454. A copy of the tests and materials are available the principal's office of the school.

By placing a check mark in the box below, I acknowledge that I have been informed of, and that I understand, the nature and purpose of this study, and my child freely consents to participate.

Place a check mark here ☐

Parent Signature and Date: _____

Student's Name: _____

APPENDIX B

INFORMED ASSENT

STUDENT ASSENT

The study in which you are being asked to participate in is designed to investigate how decisions are made. This study is being conducted by Karilyn (Putignano) Dangleis under the supervision of Dr. Eun-Ok Baek, Professor of College of Education, Instructional Technology. This study has been approved by the Institutional Review Board, California State University, San Bernardino.

You are being asked to participate in a study that will help determine if a teaching method called "Identifying similarities and differences" will help improve the way students learn. This method uses comparison, classifying, metaphors and analogies to help you learn the concepts I will be teaching. In this study you will be asked to respond to five decision problems. The classroom activities and tests will be completed over a two-week period in class and be incorporated into regular classroom activities.

All of your responses will be held in the strictest of confidence by the myself and Dr. Baek. Your name will not be reported with your responses. I will be looking at how the class does as a whole and will not be singling anyone out. All data will be reported in group form only. In other words, anyone reading the study will not know how an individual did on the tests, but rather how the entire class did on the tests. When I complete my thesis (a very long essay I am required to write about this study) in June, I will share the results (what I find out by doing this study) with you in class. Please note that if you decline (choose not to participate) to be part of the study, I will not use your test results in my research. Declining to participate does not, however, exclude you from participating in the class activities, assignments and exams which will be part of my classroom instruction during this time.

Your participation in this study is totally voluntary. You are free not to answer any questions and withdraw at any time during this study without penalty. Again, if you choose not to participate in this study I will not use your test results in my research. However, you are still expected to participate, as you always do, in the regular classroom activities, assignments and tests. Also, your grade will not be negatively affected if you choose not to participate in this study. When you

have completed the post-test you will receive a debriefing statement describing the study in more detail. In order to make sure the study results are not negatively influenced, we ask that you not discuss this study with other students or participants.

If you have any questions or concerns about this study, please fell free to contact Dr. Baek at (909) 880-5454.

By signing below, I acknowledge that I have been informed of, and that I understand, the nature and purpose of this study, and I freely consent to participate.

Student Signature and Date:

_____

APPENDIX C

DEBRIEFINGS STATEMENT

Study of the Teaching Strategy

"Identifying Similarities and Differences"

DEBRIEFING STATEMENT

This study you have just completed was designed to investigate whether the teaching strategy "Identifying Similarities and Differences" helps increase academic achievement. In this study four techniques of this strategy were used: comparing, classifying, creating metaphors, and creating analogies. These techniques are proven to help students improve their test scores. The activities using the graphic organizers, such as the Venn diagram, and the process of creating metaphors and analogies, were used to reinforce the similarities and differences between the dance skills we are studying. We are particularly interested in the relationship between students who were exposed to this teaching strategy and those who were not.

Thank you for your participation and for not discussing the contents of the class activities involving comparing, classifying, and creating metaphor and analogies. If you have any questions about the study, please feel free to contact Karilyn (Putignano) Dangleis at 770-0147. If you would like to obtain a copy of the group results of this study, please contact Karilyn (Putignano) Dangleis in June 2004.

APPENDIX D

INSTITUTIONAL REVIEW BOARD

APPROVAL LETTER

APPENDIX E

CCHS APPROVAL LETTER

APPENDIX F

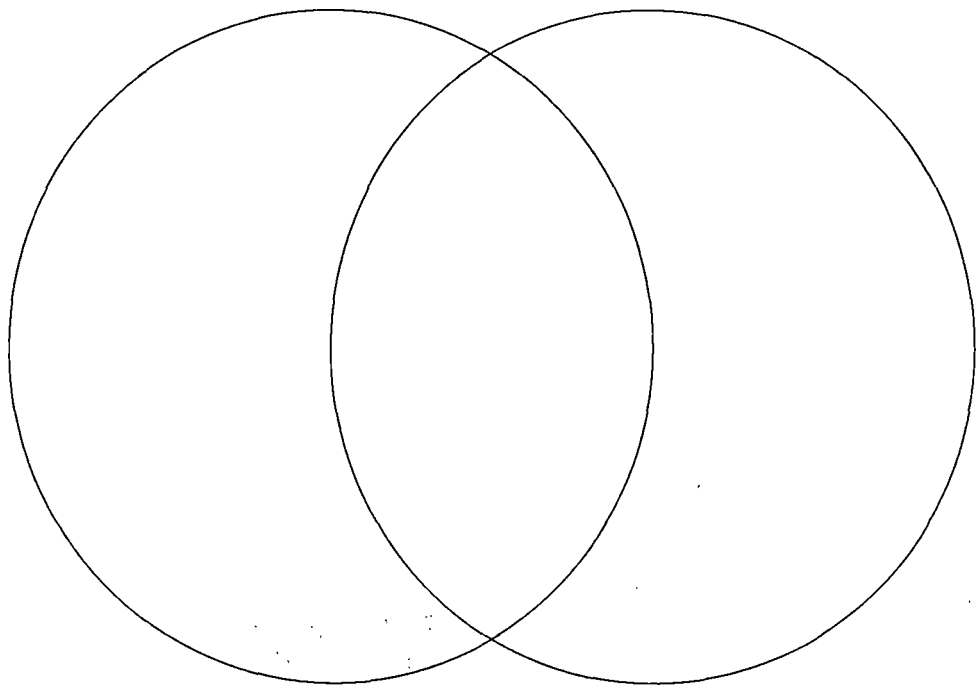
TREATMENT GROUP

ACTIVITIES AND ASSIGNMENTS

IDENTIFYING SIMILARITIES AND DIFFERENCES

Write the differences between the two skills in the appropriate outside circles and list the similarities between the skills where the circles overlap.

Battement ↓ Grand Jete ↓



Dance Matrix

Characteristics	Skills		
	Piquè	Pirouette	Chainè
Arm Positions	Similarities: Differences:		
Leg Positions	Similarities: Differences:		
Preparations	Similarities: Differences:		

With your group members, create 5 metaphors using 5 terms from the list below. Write your metaphors on this paper. Be prepared to share one metaphor and be able to explain the relationship of the unlike objects being compared.

Example taken from Marzano et al. 2001:
"Love is a rose" is a metaphor. On the surface, love and a rose have no obvious relationship. At an abstract level, however, they do. Here's how one can say love is a rose!

Literal: ***Rose:*** *The blossom is sweet to smell and pleasant to touch, but if you touch the thorns, they can stick you.*

Abstract: Something is wonderful and you want to go near it, but if you get to close, you might get hurt.

Literal: ***Love:*** *Makes you feel happy, but the person you love can end up hurting you.*

Dancing
Routine
Movement
Isolations
Stretching
Chaine
Pirouette
Battement
Pique
Fouette
Tombe pas de bourree
Pas de bourrree
Plie
4^{th} position
Jazz walks
Cross ball change
Preparation (prep)
Technique
Spot
Jazz
Hip hop
Jete
Tendu
Degage
Center
Parallel
Choreography
Choreographer

Analogies are another way we can compare elements of dance. You have probably used analogies in your English classes or on standardized tests. An analogy looks like this: A:B::C:D (It is read: A is to B as C is to D).

Examples:
Flex : Point :: Bend : Straight (A flexed foot is the opposite of a pointed foot, just as a bent leg is the opposite of a straight leg.)

_____ : Ballerina :: Balance beam : Gymnast (Hint: Identify the relationship between the gymnast and the balance beam.)

_____ : Flexibility :: Dieting : Losing Weight

Use the terms below and come up with 5 analogies. Put your best analogy on the board and see if the class can figure it out. (Don't put the answer on the board!)

Dancing	Choreographer	Technique
Routine	Choreography	Preparation (prep)
Movement	Parallel	Cross ball change
Isolations	Center	Jazz walks
Stretching	Degagè	4th position
Chainè	Tendu	Pliè
Pirouette	Jetè	Pas de bourree
Battement	Hip hop	
Piquè	Jazz	
Fouettè	Spot	

Tombe pas de bourree

APPENDIX G

PRE AND POST

OBJECTIVE TESTS

Answer the following questions to the best of your ability. Please answer the following based on what you have been taught in this dance class, not other dance classes you may have taken.

1. ingredients : cake :: choreography : _____
   A. dancing
   B. routine
   C. steps
   D. movement
   E. none of the above

2. Warm-ups are the appetizers of
   A. dinner
   B. dance
   C. isolations
   D. stretching

3. The following are turns EXCEPT:
   A. chainé
   B. pirouette
   C. battement
   D. piqué
   E. foutetté

4. The following are preparations EXCEPT:
   A. tombé pas de bourree
   B. plié in 4th position
   C. right foot crossed behind left foot for jazz walks
   D. cross ball change
   E. chainé on relevé

5. 4th position : pirouette :: plié : _____
   A. chainé
   B. jeté
   C. pas de bourree
   D. cross ball change
   E. all of the above

6. Technique is the dancer's _____.
   A. tool box
   B. answer sheet
   C. bag of tricks
   D. box of chocolate

7. Technique refers to all of the following except:
   A. arm position
   B. leg position
   C. timing
   D. relevé
   E. pliè

8. The arms in a pirouette are similar to that of the _____.
   A. piqué
   B. chainé
   C. fouetté
   D. all of the above
   E. none of the above

9. turnout : ballet :: parallel : _____
   A. modern
   B. jazz
   C. hip hop
   D. salsa

10. Performing _____ is the teacups ride at Disneyland.
   A. pirouettes
   B. jetés
   C. chainés
   D. pas de bourrees

11. The following should be executed with turnout EXCEPT:
   A. chainé
   B. piqué
   C. pirouette
   D. fouetté
   E. plié

12. The following skills require the leg to be "thrown," EXCEPT _____.
   A. jeté
   B. battement
   C. degage
   D. tendú
   E. B and C
   AB. C and D

13. weights : scales :: pulling up : _____
    A. center
    B. parallel
    C. preparation
    D. plié

14. _____ is keeping your eye on the ball.
    A. jumping
    B. turning
    C. spotting
    D. lifting
    E. pliéing

15. Plié to relevé exists when executing all of the following EXCEPT:
    A. jeté
    B. pirouette
    C. piqué
    D. jazz walks
    E. pas de bourree
    AB. all of the above
    AC. none of the above

16. low : hip hop :: pulled up : _____
    A. jazz
    B. ballet
    C. modern
    D. salsa
    E. none of the above
    AB. all of the above

17. The following are done in place, except _____.
    A. a single pirouette into a pas de bourree
    B. chainé
    C. pirouette
    D. fouetté

18. Choreography is a _____.
    A. dance
    B. road map
    C. story
    D. how to book
    E. recipe

19. The following are past through when doing a grand battement to the front, EXCEPT:
    A. first position
    B. second position
    C. tendu
    D. degagé
    D. petit battement

20. The following are used to travel, EXCEPT:
    A. jazz walks
    B. a cross ball change
    C. a pas de bourree
    D. a battement

APPENDIX H

PRE AND POST

SUBJECTIVE TESTS

Writing prompt:

In dance there are many different types of turns; for example, chainè, pirouette, pique, and fouette. There are many similarities and differences that can be noted when comparing two types of turns. You are probably most familiar with the chainè and pirouette turns, as we have concentrated more on these turns up to this point in class.

Please write and essay comparing the chainè turn to the pirouette turn. Your essay should discuss both the similarities and differences between the turns. You should focus your comparison on the most specific and detailed elements of these turns, including how to execute these turns, the proper technique used in these turns, etc.

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