ACQUISITION AND TRANSFER OF A WRITING REVISION STRATEGY: A SELF-REGULATORY ANALYSIS

by

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ABSTRACT

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Social cognitive theorists propose an alternative idea of transfer that relies on the concept of adaptation (Martinez-Pons, 2000; Zimmerman, 1989). The present study examined whether acquisition and transfer of a writing revision strategy would be enhanced by teaching college students key self-regulatory processes.

Seventy college students were randomly assigned to either three experimental groups or to a control group. The learning and transfer tasks used involved writing exercises that required combining short sentences into longer sentences or paragraphs. Some students learned a writing revision strategy and two additional self-regulatory skills —self-monitoring of each of the steps involved in the strategy, and self-evaluation of the effectiveness of the writing strategy. It was hypothesized that students who learned the three self-regulatory processes (strategy use, monitoring, and evaluation) would surpass students who learned with fewer self-regulatory processes on the posttest as well as on the transfer task. To overcome limitations in previous studies, two transfer tasks were given and perceived similarity between learning and transfer was assessed in each transfer trial.

The data suggests that all groups of students tried to adapt their performance to the novel tasks. Although, the scores on the transfer tasks were modest in an absolute sense, the results indicate the importance of employing multiple transfer tasks to reveal fully the dynamic nature of transfer. Even when the transfer outcomes did not reach the level of high expertise, it can be concluded that teaching students self-monitoring and self-evaluation processes did enhance their acquisition and transfer of the writing revision strategy.

A very interesting finding was the relationship between similarity and adaptation scores with self-efficacy and self-evaluation scores. The correlations among self-efficacy beliefs, self-evaluation judgments, perceived similarity and adaptation were on the high end. Students with higher perceived similarity scores had also higher self-efficacy beliefs, rated their performance higher and saw the one sentence problems as very useful in helping them solve the transfer tasks. This study provides empirical evidence of how teachers can modify their instructional practices to train students in self-regulation.

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CHAPTER 1
INTRODUCTION

The study of transfer of learning has fascinated researchers since educational psychology became an independent discipline —more than 100 years ago. The continuing interest in transfer has been fueled by its educational implications —changes in the curriculum and teaching practices— as well as by its practical implications —the need to teach students skills that are transferable to the real world. However, answers to questions regarding these implications have proven elusive, and despite of more than a century of research, transfer continues to be a vexing issue to contemporary educators.

Historical Definitions of Transfer

Transfer refers generally to how people use prior knowledge, information, and experience to solve or learn a novel task (Mayer & Wittrock, 1996). This general definition fits with the theoretical postulates of the four major historical views of transfer: formal discipline, identical elements, cognitive and metacognitive (see Table 1.1).

Among the first to scientifically study the pedagogical implications of transfer was E. L. Thorndike. Thorndike's early experiments on transfer marked the beginning of a heated controversy that remains alive in the present literature —the issue of specificity vs. generality. Thorndike and his colleagues challenged the main assumptions of the doctrine of formal discipline —the prevailing view at the time— by showing that mental "faculties' did not transfer across contexts. According to the doctrine of formal discipline, the mind can be educated by training basic mental faculties such as memory, attention and judgment. The underlying assumption is that these basic mental faculties can be generalized to diverse situations that involve the same cognitive skill. For example,

learning list of nonsense words enables students to develop good memory skills in biology or geography. Greek, Latin and Geometry constituted the core of the curriculum because it was believed that the formal properties of these disciplines would teach students how to think.

Thorndike and Woodworth (1901) conducted the first experimental study to show evidence against the notion of generality proposed by the doctrine of the formal discipline. In their study, they found that people that were trained in estimating the area of rectangles —by looking at the figure and guessing its extension— only were able to transfer this skill to other rectangles with different sizes but not to different geometrical figures. This allowed Thorndike and Woodworth to conclude that transfer is specific and not a general skill.

Thorndike's view of transfer became known as the identical elements theory. Its main assumption is that for transfer to take place there must be a series of common elements between the learning task and the transfer task (Thorndike & Woodworth, 1901). This conclusion generated an educational debate between Thorndike and his colleagues and the proponents of the doctrine. Eventually, the formal discipline became discredited due to lack of empirical evidence (Haskell, 2001)

An important contribution of Thorndike was to bring attention to the issue of similarity. However, he was highly criticized for not being specific in his theory about the nature of what constitutes two identical elements between tasks. Years later, Charles Osgood (1949) expanded Thorndike's early ideas by defining similarity as shared elements between stimuli and responses. For Thorndike and Osgood similarity was conceived as an objective reality; it referred to the properties of the task and the nature of

the responses. Today, perceived similarity on the part of the learner rather than actual similarity between tasks is considered more important for successful transfer (Gick & Holyoak, 1987).

Judd's pioneering research represents the beginning of the cognitive view. In his classic experimental study, Judd (1908) showed that the key element for transfer was the human ability to abstract concepts. This view is radically different from Thorndike's theory in which particular behaviors, and not a broad idea or concept, are the source of transfer —again a conflict between specificity and generality. Judd's theory of transfer went beyond Thorndike's theory of identical elements by acknowledging the role of cognitive processes.

The contemporary debate within the cognitive view is focused on the extent to which cognitive processes are influenced by the context. For some theoreticians, cognition is independent from the situation in which it occurs —abstraction movement—, and for others, it is dependent and influenced by the circumstances —situated learning movement. This dispute goes back to the notion of generality and specificity.

Researchers in the cognitive field have studied transfer extensively. Evidence indicates that transfer is enhanced by activating cognitive processes, such as selection, organization, and integration of information during learning, as well as by the creation of classroom environments that allow students to participate more actively in their own learning process.

During the 1960's, researchers integrated the study of how people think with what people know about their own thinking (Flavell, 1979). This research belongs to the metacognitive view. The advantage of blending together metacognitive with cognitive

processes into one comprehensive framework is that it can potentially explain both specific and general transfer. Schraw (2001) explains cognitive skills as domain-specific —they are learned and applied within particular content areas (math, writing, reading), and metacognitive skill as domain-general —they can be used across contexts. However, more research is needed to clarify this relationship.

After more than a century of research, modern researchers still keep asking the same questions: is the content of what transfers specific or general? What is the role of similarity? What constitutes near and far transfer? What is the role of perceived similarity? The difference of opinion among researchers about these issues has been intensified by a discouraging body of research that indicates how difficult is for people to transfer skills —lack of transfer is more frequent than expected (Mayer & Wittrock, 1996; Detterman, 1993; Haskell, 2001).

In terms of the issue of specificity and generality, a main cause of the diverse theoretical positions and inconsistent outcomes in the literature has been the mistake of equating domain-specific and domain-general skills with their near or far application. In terms of the topic of similarity, a central problem has been that many studies have overlooked the issue of perceived similarity. This omission combined with the loose use of the terms near and far transfer by researchers has generated mixed outcomes.

Present research efforts are shifting toward the creation of more extensive taxonomies and dynamic explanations of transfer. Barnett and Ceci (2002) have proposed a new classification of transfer that separates the content of what transfers —specific vs. general skills— from the context in which transfer skills are applied —similar (near transfer) vs. dissimilar (far transfer). Accordingly, a general math strategy can have

limited applications whereas a specific monitoring skill can have extensive applicability and be used in extremely different situations (see Table 2.2)

The two overall dimensions —context and content— are, in turn, divided into a series of subdimensions. The advantage of this subdivision is that each transfer task can be quantified as similar to the learning task in some features, and as far transfer in other dimensions. Barnett's and Ceci's taxonomy provides a strong analytic framework to guide future studies and to understand past research. However, it is important to take into account that in terms of similarity, the taxonomy aims at classifying the external properties of the transfer tasks, but it does not address how learners perceive correspondence among tasks. Further research needs to include the notion of perceived similarity into the study of transfer. The combination of both qualities —objective and perceived— will provide a more complete picture of the issue of similarity, and might avoid confusing results in the future.

In addition to better classifications, researchers have indicated the need to reconceptualize transfer as a dynamic construct (Hatano & Greeno, 1999). Bransford and Schwartz (1999) noticed that traditional transfer studies have used an approach in which participants are "sequestered" during the transfer tasks without opportunities to seek help, receive feedback, and revise their work. The assumption underlying this kind of methodology is that transfer is a static behavior that is either present or absent. Dynamic approaches require methodological changes in the study of transfer, such as not accepting single answers as the only correct response, giving more than one-shot tasks, and focusing on trial and error behaviors.

This dissertation proposal is based on the idea that a social cognitive model of academic self-regulation (Zimmerman, 1990; 2000) can offer a different theoretical perspective to understand transfer —namely, as an adaptive self-regulatory process.

A Social Cognitive Definition of Transfer

Social cognitive theorists propose an alternative idea of transfer that relies on the concept of adaptation (Martinez-Pons, 2000; Zimmerman, 1989). From this perspective, transfer is the process by which the individual tries to adjust to a new task. Unlike previous views, transfer is explained in terms of adaptive self-regulatory processes rather than as a task outcome (Martinez-Pons, 2000). Successful adaptation to the transfer task is primarily dependent on the proactive self-regulatory processes that the person employs, and not only on the properties of the transfer task or the way the material was presented during instruction (Martinez-Pons, 2000).Unsuccessful transfer is hypothesized to be related to deficient self-regulatory skills.

Self-regulated learners can derive feedback from their transfer performance and can adjust their behavior accordingly. When individuals have developed self-regulatory skills, they personally adapt their learning strategies to changing personal and contextual conditions, initiate use of strategies, incorporate adjustments based on contextual features of the situation and maintain motivation (Martinez-Pons, 2000).

Initial failure on the transfer task is not definitive because what really matters is the strategic adjustment that follows initial imperfect attempts to transfer. Because transfer tasks involve new elements (especially in the case of far transfer tasks), transfer must be discovered rather than merely inferred a priori.

The Present Study

Although there has been a lot of research that explores how self-regulatory skills affect performance, very few studies have focused specifically on the issue of self-regulation and transfer (e.g. Martinez-Pons, 2000, and Fuchs et al., 2003). The present study examined whether acquisition and transfer of a writing revision strategy would be enhanced by teaching college students key self-regulatory processes. To the best of my knowledge there are no studies in the literature that focus on transfer of writing revision skills with college populations as a result of self-regulatory training.

Table 1.1 Historical Views of Transfer and the Social Cognitive View of Transfer

	Formal discipline view	Identical elements view	The cognitive view	The metacognitive view	The social cognitive view
Year (aprox.)	Before 1900	1901	1908	1960	1970
Author(s)	Plato, Aristotle, John Locke	Thorndike / Osgood	Judd, Katona, Wertheimer	Flavell	Bandura, Zimmerman,
Main ideas	Training in formal disciplines –Latin, math -enables the mind to transfer what is learned to other disciplines. Training of basic mental functions affects transfer to new situations. General view of transfer.	For transfer to occur there most be a set of identical elements between two learning tasks. Totally against a general theory of transfer. Similarity is the key word. Produces "near transfer" Specific view of transfer.	Reaction to the identical elements model. Transfer is the result of abstracting the general principle underlying a particular task. A general abstract principle is transferred to particular concrete tasks. Produces "far transfer"	Transfer is the result of generalizing metacognitive and regulatory skills within and across domains.	Transfer is the process by which the individual tries to adapt to a new task. Transfer is explained in terms of adaptive self-regulatory behavior. Successful adaptation to the transfer task is primarily dependent on the self-regulatory skills that the person has. Transfer as a dynamic construct and feedback as a mechanism to improve transfer performance
Learner	Not concerned with the learner's cognitive processes.	Not concerned with the learner's cognitive processes.	Concerned with the learner's cognitive processes.	Concerned with the learner's cognitive and metacognitive processes.	Concerned with the learner's cognitive, metacognitive social, and motivational processes.
Evidence / educational implications	Very little research. However, recent few studies suggest that it may still be a valid model. Inclusion of classic subjects in the curriculum. General thinking skills interventions. Teaching computer programming languages.	A lot of research. Strong influence over curriculum design and textbooks.	A lot of research. Instructional methods that engage the learner into activating cognitive processes. Social participation in the classroom.	A lot of research. Educational programs that have complemented instruction with metacognitive and self-regulatory practice.	A lot of research. Instructional methods that include self-efficacy beliefs, modeling and metacognitive and self-regulatory processes.
Current models	General thinking skills theories.	Singley and Anderson' ACT * theory.	Abstraction theories. Situated cognition theories.		Self-regulated models of academic learning.

CHAPTER 2
LITERATURE REVIEW

The purpose of the present chapter is to provide a full description and understanding of the concept of transfer, as well as its theoretical evolution and derived educational implications. The first section describes accepted definitions and taxonomies. The next sections explain the main historical models followed by three recurrent theoretical and practical issues – similarity, specificity and generality. The last sections address the need for new models. An alternative view of transfer based on social cognitive theory is presented (see Table 1.1 which summarizes all the models). The chapter concludes with a brief discussion of research on self-regulation and writing skills.

Definition and Taxonomy

Transfer is the understanding of how people use prior knowledge, information and experience to solve or learn a novel task. Mayer and Wittrock (1996) define transfer in the following way:

> Transfer occurs when a person's prior experience and knowledge affect learning or problem solving in a new situation. Thus, transfer refers to the effect of knowledge that was learned in a previous situation (task A) on learning and or performance in a new situation (task B). (p. 48).

An important but not always apparent distinction is the difference between learning and transfer (Mayer & Wittrock, 1996). When previous learning affects performance on a same task it is called learning, and when prior learning influences performance on a new task it is refer as

transfer. For example, if a student has learned the formula for estimating rectangles and then is given a test on this topic, a high grade will be considered a measure of successful learning. On the other hand, an indication of transfer is the same student going home and using his knowledge on areas to accurately estimate the extension of his room.

Transfer can be understood as a continuum of situations that gradually differ from the original learning task (Detterman, 1993). Haskell (2001) describes six progressive levels of transfer based on how dissimilar the transfer tasks are from the learning experience:

1. *Nonspecific transfer* refers to the application of previous knowledge in everyday life, and it is considered the lowest level of generality. For example, shifting from subway tokens to subway cards.
2. *Application of transfer* refers to the application of what someone has learned to a very specific situation. For example, learning the formula of the area of a rectangle, and then applying this knowledge to actually estimating the area of a rectangle.
3. *Context transfer* refers to the application of what someone has learned in a vaguely different situation. A small child might be able to decode a brief text in front of his classmates but feel inhibited in front of his relatives.
4. *Near transfer* refers to transfer of knowledge to new situations that are quite similar but not identical to the learning situations. A person might use knowledge about playing the guitar to learn how to play the lute.
5. *Far transfer* refers to transfer of knowledge to new situations that are quite different from the original learning situation. Analogical reasoning is an example of this kind of transfer.
6. *Displacement or creative transfer* is when the interaction of old and new knowledge produces a new concept. Scientific discoveries will be good examples of this level.

According to Haskell, levels 1 and 2 are considered simple learning. Level 3 refers to the application of learning across contexts. None of the first three levels involves the use of information in novel situations. Levels 4, 5 and 6 require the application of prior knowledge into new tasks; level 4 is considered near transfer whereas levels 5 and 6 are both considered far transfer.

Other classifications of transfer take into account different types of transfer. Two commonly categories are positive transfer versus negative transfer (Schunk, 1996). Positive transfer refers to cases in which prior knowledge facilitates or increases performance on a new situation. For example, speaking Spanish could support learning French because both languages share roots and have similar grammatical structures. Negative transfer is when knowledge about something interferes with learning something new. English drivers have a hard time driving in other countries because they are used to sitting on the right side of the car.

Salomon and Perkins (1989) classification of high-road transfer versus low-road transfer takes into account the spontaneous or conscious nature of transfer. Low-road transfer refers to the spontaneous and sometimes automatic transfer of well-established skills. This kind of transfer is somehow equivalent to the first three levels of Haskell's categorization. High-road transfer refers to the conscious abstraction of something and its application in new situations – equivalent to the other three levels of Haskell's model.

Gagné's (1974) well known classification of vertical and lateral transfer also overlaps with some of the previous taxonomies. Vertical transfer refers to mastering a certain level of skills before learning higher-level skills —mastering how to multiply numbers before learning how to divide numbers whereas lateral transfer involves transferring skills to new problems at the same level —one digit and two digit sums.

All these classifications substantiate the multidimensional nature of transfer and indicate the complexity of this construct.

Historical Views of Transfer

This section describes four historical views of transfer: formal discipline, identical elements, cognitive and metacognitive. Overall assumptions, classic research-studies, educational implications, limitations, and contemporary ramifications are discussed for each view. Table 1.1 summarizes the main points of the historical evolution of the concept of transfer.

The Formal Discipline View

The first theory of transfer is known as the doctrine of formal discipline; the prevailing view at the beginning of the 20th century. Although the doctrine of formal discipline is usually attributed to the English philosopher John Locke (Higginson, 1931), its roots go back to the idealist philosophy of Plato and to the faculty psychology of Aristotle (Higginson, 1931).

From the perspective of this doctrine, the mind is composed of a set of general "faculties' or mental powers, such as memory, attention, judgment, reason, and observation. Mental faculties are strengthened with proper practice and exercise, as if they were a muscle. The way to develop mental power, according to the theory, was to expose learners to formal disciplines like Latin, Greek and geometry (Stratton, 1922). It was believed that the exact and precise nature of these classic disciplines would teach students how to think. Since medieval times, Latin and Greek were considered disciplines to educate and exercise the mind (Higginson, 1931).

In terms of transfer, the underling assumption is that basic mental faculties can be generalized. Enhancement in one aspect of a faculty, for example, attention, improves that faculty as a whole. Once a faculty is trained, its powers are not limited by specific constraints.

Learning how to be attentive in one context makes people attentive in any circumstance. This is a very general notion of transfer that assumes that knowledge transfers across different domains as long as the same mental faculty is required. Learning geometry facilitates learning music because both share similar reasoning skills. Having mathematical skills helps to understand political arguments because both have comparable logical properties.

From a pedagogical point of view, marginal attention was given in the school curriculum to the teaching of more specific skills or applied subjects. About how skills were supposed to transfer outside school Stratton (1922) explains, "the particular kinds of knowledge needed for one's life-work (…) cannot be foreseen, depending so largely on later circumstances and choice. But by a mind discipline this knowledge will readily be gained when the need itself is clear" (p. 2).

Little empirical evidence was found for this view, and after research conducted during the first quarter of the Twentieth century —including Thorndike's classic studies on transfer, the doctrine of formal disciplines was for the most part discredited. Yet, its influence still prevails in some educational quarters. Contemporary educational interventions that focus on teaching general thinking skills are current manifestations of the doctrine. A commonly cited example is the teaching of computer programming languages, such as LOGO (Mayer & Wittrock, 1996; Singley & Anderson, 1989). Current results from this research remain controversial (Haskell, 2001). Some studies have found empirical evidence of transfer of general skills while others have found little support (Klahr & Carver, 1988). After reviewing the literature, Mayer and Wittrock (1996) concluded that "modern attempts to find mind-improving subject matter, such as (…) the teaching of LOGO in elementary and secondary schools, have been no more successful than were historical attempts to use Latin as a vehicle for improving students' minds" (p. 52).

The center of this debate is related to the specificity or generality of transfer, an important issue that is discussed in the following sections.

The Identical Elements View

With the consolidation of educational psychology as a new discipline during the late 1800's and early 1900's, psychologists started to study and understand learning processes using experimental methods (Boring, 1950).

While working at the prestigious psychology laboratory of Columbia University, Edward Thorndike and Robert Woodworth published one of the earliest and most important articles of training of transfer (Thorndike & Woodworth, 1901). This article is often cited as the first systematic empirical attempt to understand transfer. The design follows a pre-test, training, posttest model that became popular and widely used by other researchers. Experimenters presented to participants a series of pieces of different sizes of paper cut in various geometric shapes (triangles, circles, rectangles, and irregular figures), and asked them to write down the area of each figure (pretest). Following the pretest, subjects were given a series of paper rectangles and were asked to guess the area of every rectangle (training). After each guess, participants looked at the real area and recorded the error. Once a certain amount of improvement was achieved on the rectangle tasks, subjects were again exposed to the original series of geometrical figures (posttest). On the posttest, participants improved when the areas were similar in shape to those of the training series —rectangles— but not in the case of figures with different shapes.

This conclusion challenged the main assumption of the doctrine of formal discipline by showing that transfer is specific and not a general skill. A series of later experiments confirmed

this finding. See Thorndike (1906) for a description of some of the studies conducted at that time showing evidence of the specificity of transfer.

These new studies generated an educational debate that the proponents of the doctrine of formal discipline subsequently lost due to lack of empirical evidence (Haskell, 2001). The following quote from Stratton (1922) captures the strong feelings of that time about the idea of general transfer:

> Experiments by James, Thorndike, Woodworth, and others have shown how idle is the attempt to train these general powers; have shown, indeed, that there are no general powers to train. The belief in such powers goes with the antiquated idea of mental faculties, now of merely historic interest and swept aside with phrenology and its absurd map of the skull and brain. No study gives general training; it gives only particular training (p. 3).

Thorndike's view of transfer became known as the identical elements theory. Its main assumption is that for transfer to take place there must be a series of common elements between the learning task and the transfer task (Thorndike, 1906). This concept contradicts the notion of generality inherent in the formal discipline view. Thorndike and Woodworth moved from the idea of general mental faculties to the notion of specific mental functions. Stratton (1922) describes the concept of mental function sustained by Thorndike and his colleagues as follows:

> Instead of a single power of memory, there is a power to recall colors, another power to recall sounds; and so on, (…). The mind (…) is our convenient name for countless special operations or

> functions. We may train one of these functions or a number of them, but not a faculty in general (…) these countless particular functions are independent; they act almost as though they were insulated from one another; when you have trained one of them, you have trained that limited function and none else (p. 4-5).

In terms of transfer, training of one mental function improves other mental function only if there are common elements between the two of them (Thorndike, 1906). In the geometrical figures study described above, Thorndike and Woodworth concluded that it was not possible to teach a general function for estimating geometrical areas, but it was possible to train a specific function for learning how to estimate rectangles' areas.

In a series of later studies, Thorndike and his colleagues tested specifically the impact of learning Latin on reading English (Thorndike, 1923) and general intelligence (Thorndike, 1924; Broyler, Thorndike, & Woodyard, 1927). These results seemed to indicate that the teaching of Latin did not have a strong effect on overall reading English performance or general intelligence improvement. Eventually, Latin was removed from the curriculum.

A main problem with the identical elements theory is that Thorndike was vague in his explanation of what constitutes two identical elements. His theory tends to suggest that mental functions are the key elements, but these functions are not clearly defined. Implicit in the idea of identical elements is the notion of similarity. Years later, Charles Osgood (1949) developed a theory of transfer in which he expanded Thorndikes's theory by identifying the identical stimulus and response elements that facilitate transfer and by formalizing the concept of similarity.

The Concept of Similarity

At the time Osgood developed his theory, two different experimental designs were used to study transfer (Travers, 1967): a proactive design and a retroaction design. Both designs involve a control and experimental groups, but they vary on the nature of the learning tasks (see Table 2.1).

Table 2.1
Proactive and Retroactive Experimental Designs

	Proactive design	**Retroaction design**
Experimental group	Learns task A ↓ Tested on task B (transfer)	Learns task A ↓ Learns task B ↓ Tested on task A
Control group	Learns unrelated task ↓ Tested on task B (transfer)	Learns task A ↓ Learns unrelated task ↓ Tested on task A

For the proactive design, the experimental group learns task A whereas the control group learns an unrelated task and then both groups are tested on task B (transfer task). It is assumed that the transfer task will be affected by learning task A. The retroactive design requires that both groups learn task A, then the experimental group learns task B and the control group learns an unrelated task, and then both group are tested on task A. The idea behind the retroactive design is that learning of task B will affect performance on task A by enhancing it (positive transfer) or decreasing it (negative transfer). Most of this research comes from a behaviorist laboratory tradition in which commonly used tasks, such as visual stimuli, auditory stimuli, and nonsense words.

Osgood developed his theory of similarity based on the body of research on transfer generated by studies that used these two experimental designs. Osgood distinguishes two kinds of identical elements; one has to do with the nature of the stimuli (situation) and the other with the nature of the responses (Osgood, 1949). Three specific laws of transfer operate when the stimulus varies from one task to another and when different responses are necessary. Each law is based on a different paradigm of transfer and retroaction. The first law states that "where stimuli are varied and responses are functionally identical, positive transfer and retroactive facilitation are obtained, the magnitude of both increasing as the similarity among the stimulus members increases" (p. 134). The paradigm for this law is stated as follows: S1 →R1, S2 →R1, S1→R1. This paradigm is known as stimulus generalization. Studies of this type include classic conditioning research. For example, a physiological response such as a galvanic skin response is first conditioned to a specific tone. Then, a test tone is presented and the degree of similarity between the first and second responses is measured; the greater the similarity between the original stimulus and the test stimulus the greater the amount of generalization or positive transfer.

The second law maintains that "where stimuli are functionally identical and responses are varied, negative transfer and retroactive interference are obtained, the magnitude of both decreasing as similarity between the responses increases" (p.135). The paradigm underlying this law can be represented by S1→R1, S1→R2, S1→R1. Osgood (1946) had subjects learn a list of words that included sets of two letters paired with adjectives (c.m.-elated) followed by intercalated items, such as c.m. – high, c.m.-left, and c.m.- low. Later, participants had to relearn the original list. Interference was found in all conditions but it was lower for cases in which responses were similar.

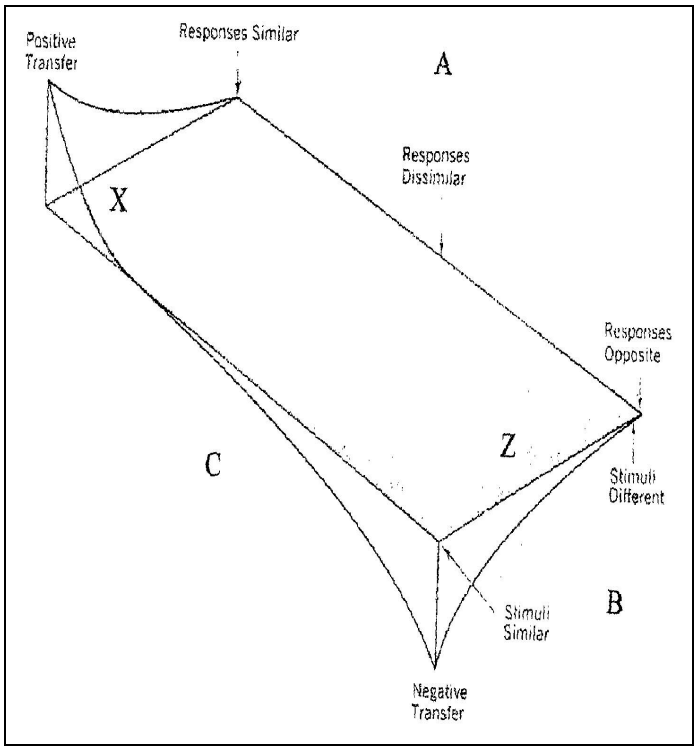
The third and last law holds that "when both stimulus and response members are simultaneously varied, negative transfer and retroactive interference are obtained, the magnitude of both increasing as the stimulus similarity increases" (p.135). The paradigm for this law is represented as S1→R1, S2→R2, S1→R1. In this case, it is predicted that presenting similar stimuli that requires diverse responses will increase negative transfer and retroactive interference.

Osgood's model of transfer is supported by these empirical laws. The model can be represented in a three-dimensional graph (see Figure 2.1). Response similarity between two tasks is represented along dimension A. Stimulus similarity is represented along dimension B. Both dimensions form a plane. Transfer is represented by dimension C. At one end of the continuum is positive transfer and at the other end negative transfer. The model predicts either positive or negative transfer based on the similarity of the stimuli and the responses. In Figure 2.1, point X represents the case in which the learning task and the transfer task have similar stimuli and the response to each task is also the same. In such a situation, Osgood predicts positive transfer. Point Z represents two opposite responses and two somewhat different stimuli. The predicted response is negative transfer. The model also predicts negative transfer when different responses are required from similar stimuli. Empirical evidence showed that Osgood's model was accurate about predicting positive transfer but less precise about predicting negative transfer (Travers, 1967).

Modern researchers continue to study the conditions in which positive or negative transfer occurs. Sweller (1980) found that teaching participants a set of training tasks that varied in difficulty levels produced either positive or negative transfer if the sequence of presentation was manipulated. When easy problems followed difficult ones, learners showed positive transfer.

On the other hand, when hard problems followed an easy one, learners tended to show negative transfer.

Figure 2.1
Osgood's Model of Transfer



Limitations

A major limitation of Thorndike's identical elements theory is his ambiguity in explaining the nature of the identical elements that facilitate transfer. Osgood's contribution addresses this issue. However, these two models do not take into account a learner's cognitive processes when learning and transferring skills.

The issue of similarity continues to be an essential part of the current discussion about transfer. For Thorndike and Osgood, similarity referred to the properties of the task and the nature of the responses, but neither theorist gave attention to how the learner perceived the tasks.

Similarity was conceived as an objective reality. Modern theoreticians like Gick and Holyoak (1987) maintain that the key determinant of transfer is not actual similarity as Thorndike and Osgood suggested but rather perceived similarity on the part of the learner. The important concept of similarity in the present understanding of transfer is expanded upon later in this chapter.

Another limitation of the identical elements theory is that it explains the nature of near transfer, but it doesn't explain the mechanisms of far transfer. The idea of far transfer is a critical topic of discussion in later theories.

Educational Implications

Thorndike's theory had a great influence over curriculum design and pedagogy. No other theory of transfer has had such an impact on educational practices (Haskell, 2001). Even now its effects continue to guide and influence teaching.

The educational goal underlying the formal discipline model had to do with making students better thinkers. At the heart of the theory was training the mind. The means to achieve this was the teaching of classical subjects. The educational goal behind the identical elements theory was to prepare students to apply knowledge gradually in explicit situations with the purpose of mastering specific skills and their application. Educators, therefore, divided the curriculum into specific behaviors that were taught in a sequence starting with lower level skills and followed by higher levels skills. Drill and practice became the way to accomplishing mastering (Mayer & Wittrock, 1996). Gagné's leaning hierarchies (1968) are a classic example of how this model has been implemented in the classroom.

Contemporary Views

The ACT* (pronounced act star) theory, developed by Singley and Anderson (1989), is a modern version of Thorndike's theory. The main difference between the two approaches is the important role that cognitive processes play in the present model. The ACT* theory uses the idea of identical elements to explain cognitive representations. The theory evolved from a research tradition that used production systems to model human cognition. Productions systems are a set of condition-action rules that use the form "IF" and "THEN". In the words of Singley and Anderson,

> When the ACT* theory is applied to the study of transfer, single productions are the units of cognitive skills, the elements that Thorndike was searching for. A first approximation to and understanding of transfer involves comparing two sets of productions for different tasks. To the extent that the production sets overlap, transfer would be positive from one task to the other. (…) This simple formulation is in fact a modern version of Thorndike's theory of identical elements. Where it differs from that formulation is primarily the fact that, unlike Thorndike's superficial elements, productions are versatile and powerful computational formalisms. (p. 31-32)

The ACT* theory defines the identical elements that mediate transfer as cognitive productions in the form of conditions, a very different approach from Osgood's model in which stimuli and responses were identified as the identical elements.

One of the more interesting educational application of the ACT* theory has been the development of intelligent computer based-tutors that teach students how to solve problems in diverse areas such as mathematics and computer programming (Singley & Anderson, 1989). When students are working on a problem and make an error, the computer based-tutor interrupts the solution and provides assistance in the specific areas in which the students are having difficulties. The instruction given by the computer based-tutor is tailored to the students' needs by comparing their performance against an ideal solution. This kind of research belongs to a tradition that recognizes the importance of identicality but also emphasizes the role that abstract knowledge plays in transfer. Views that describe transfer as a cognitive phenomenon are described in the next sections.

The Cognitive View

Today's prevalent theories of transfer recognize, unlike earlier explanations, a cognitive dimension as a key mechanism for transfer to occur. The origins of this theoretical shift were based on the research of Charles Judd and advocates of the Gestalt psychology. In the first part of this section, Judd's classic study of transfer is described as well as the popular work done by Gestalt psychologists George Katona and Max Wertheimer. As these studies played a fundamental role in the development of the concept of transfer, they are described in detail. The next part of the section addresses contemporary views, particularly two opposing models —the abstraction model and the situated learning model. Because of the incredible productivity of cognitive researchers, this section is the longest of all the historical views.

The General Principle View

Judd's pioneering research, conducted during the first decade of the 1900s, was a reaction to Thorndike's already popular and well accepted identical elements theory. Judd (1908) clearly disapproved the idea of only training specific mental functions. He wrote, "those who have advocated this doctrine of specific functions have had very limited views of the facts involved, and have consequently reached a formula of mental organization which is wholly inadequate" (p. 28). In his classic study, Judd (1908) showed that the key element for transfer was the human ability to abstract concepts. Two groups of students were asked to hit a target that was placed under water with a dart. The experimental group received a full explanation of refraction whereas the control group did not. Both groups began practice with the target under twelve inches of water. During these first series of trials no differences were found between the two groups. For the second series of trials, the target was moved from twelve to four inches of water. In this case, the performance of the experimental group was better than the performance of the control group. Judd concluded that children abstracted a general principle and transferred it to a new learning situation. In other words, students who learned the laws of refraction were able to apply them and adapt their behavior when a new target was presented.

This view is radically different from Thorndike's theory in which particular behaviors, and not a broad idea or concept, are the source of transfer. It is important to notice that Judd was not opposed to the idea of identical elements. His argument was that abstracting the underlying principle of a specific phenomenon would facilitate transfer even in situations in which no obvious identical elements are identified (Haskell, 2001).

Judd's theory of transfer went beyond Thorndike's theory of identical elements by acknowledging the role of cognitive processes. The recognition of a general principle implies the

use of higher mental processes and transfer at this level cannot be explained in the mechanical way proposed by Thorndike (Higginson, 1931). Emphasizing the role of the learner was a major step in creating the foundation for the development of later theories and contemporary views.

Judd's experiment is often cited as one of the first empirical studies to contradict the accepted notion of identical elements. Unfortunately, when the article was published, Judd only described the design of the study and never reported the actual data he obtained. More than 30 years later, Hendrickson and Schroeder (1941) duplicated Judd's study. In the replicated study, students were asked to shoot an air gun instead of darts. Two experimental groups and one control group were used. As in the original study, the control group did not receive any instruction on refraction, but the instructions given to the two experimental groups were different. The first experimental group received general written instruction on the laws of refraction. The second experimental group received the same instructions plus a sentence that explicitly called attention to the fact that changing the depth of water changes the amount of the refraction. During the first series of trials both experimental groups learned faster than the control group. The experimental group with the more specific information (group 2) learned faster than the experimental group with the more general information (group 1). This was different from Judd's study in which no differences between the control and experimental groups were found during the practice phase. For the second series of trials, experimental group 1 surpassed experimental group 2, and both experimental groups outperformed the control group. This was in accordance with Judd's original findings. Hendrickson and Schroeder concluded that how the principle was taught made a difference in performance. The knowledge of the refraction principles was useful not only on the transfer task —learning to hit the target at a depth of two inches— but also during the learning task —hitting the target at a depth of six inches.

It is important to mention that the differences among the three groups in terms of their performance, although significant, were unexpectedly very small. Because there is no information group means in the original study, Hendrickson's and Schroeder's data could not be compared to Judd's data. Further studies coming mainly from the Gestalt tradition found more and stronger empirical evidence that supported Judd's claims.

The Gestalt View

From a Gestalt point of view, transfer is the result of making mental configurations. The following quote by Higginson (1931) explains how configuration works as a mechanism for transferring:

> …transfer of learning from one thing to another results from the intrinsic nature of configurations. A configuration, for instance, may retain its identity of structure and pattern even though the filling and the detailed content may change. That is, a configuration may actually be carried from one situation to another, or from one sense department to another" (p. 374).

Another equivalent term commonly used by Gestalt's researchers when referring to configurations is the notion of whole-principles. These two concepts are an elaborated continuation of Judd's early idea of a general principle.

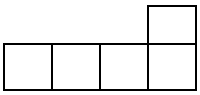
Katona (1940) was interested in understanding which methods of teaching and learning resulted in the greatest effect of transfer. The results of Katona's studies parallel Judd's findings. Participants received instruction on how to solve problems with unusual geometrical figures. The purpose of the assigned tasks was to rearrange geometrical figures made with squares by

changing the position of certain sides; for example, making four squares out of five squares by moving three lines (see Figure 2.2).

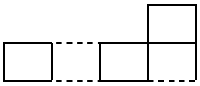
Figure 2.2
Example of a Geometrical Problem (Katona, 1940)

Directions: Make four squares out of the five squares by changing the position of three sides.

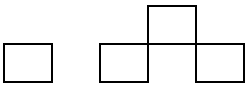
Problem:



Lines that can be removed:



Solution:



One of the experiments tested three different learning methods (Katona 1940). Group 1 learned how to solve the geometrical tasks by having the experimenter show each solution step at a time (i.e. “first we remove this line, then this other line…”). Students were repeatedly exposed to the right answer of some problems, but no explicit relationship between the steps was given. It was expected that the solutions would be memorized as a result of the repetitions.

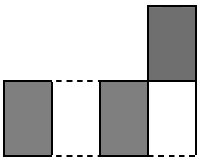
Group 2 was taught an arithmetic principle by indicating the total number of lines and their relation to the geometrical figures (i.e. “there are 16 lines, the goal is to make four squares so each square must have four independent side lines”). Then, participants were also shown the steps to solve the problems (i.e. “first we remove this line, then this other line…”).

The third group was exposed to a meaningful solution. The experimenter explained the function of each step and its role in solving the task. In this case, the laws of Gestalt guided instruction. The purpose was to help students come up with a whole-principle that would allow them to organize the information perceptually. Instead of dealing with lines, the experimenter emphasized gaps by shading some of the squares (see Figure 2.3). For this group, there was no mention of the underlying principle to solve the task (i.e. "there are 16 lines, the goal…") or repetitions of the steps (i.e. "first we remove this line, then…"). The experimenter only showed how to solve the problems by shading some of the squares. It was expected that students would form an abstract configuration of the solution to the problem and to transfer it to other geometrical tasks.

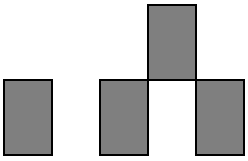
Four weeks later, the experimenter gave a posttest that included some of the tasks used during the training phase and new tasks. The group that was taught the meaningful solution (group 3) outperformed the other two groups in the familiar tasks as well as the new tasks. The group that learned the arithmetic principle (group 2) performed equally in familiar and new tasks, but in both cases the performance was lower than that of group 3. The memory group (group 1) performed better on the practice tasks, but the scores on the new task were no better that the ones of the control group. In other words, this last group was not able to transfer knowledge to the new geometrical problems.

Figure 2.3
Meaningful Solution - Instruction Given

Problem**:**



Solution:

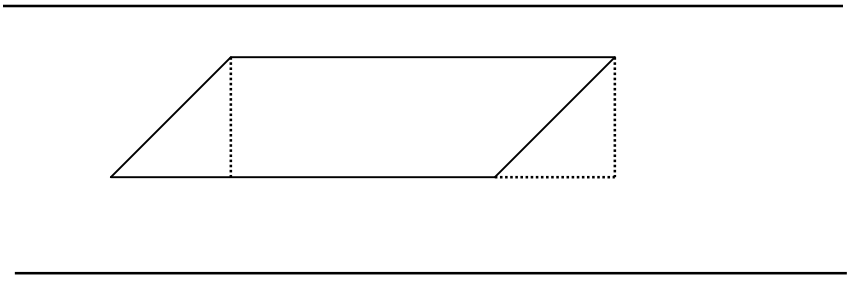


Katona noticed that by showing examples that allow the learner to organize the information in a coherent way (group 3) a principle was abstracted, and then it was applied to other situations. In his own words, "In meaningful learning the practiced tasks served as examples, not as the object of learning; an integrated knowledge (a whole-principle) was acquired and was later applied to all tasks involving the same principle —the so-called "practice tasks" as well as to new tasks" (p. 127).

This experiment along with others led Katona to two conclusions: 1) learning by understanding helps students to infer a principle, or in Gestalt terms to come up with a specific configuration, and then apply it to different problems, and 2) learning by memorizing limits students' learning to specific responses that can only be applied to problems requiring those behaviors. In the best case scenario, memorization produces only near transfer and in the worst case no transfer at all.

Wertheimer, one of the founders of the Gestalt movement, found more empirical evidence that showed that memorization and understanding affect transfer in different ways. Some of these findings are reported in his classic book "Productive thinking" (Werthheimer, 1959). His most famous study also involved learning with geometrical figures. Wertheimer taught young children how to find the area of rectangles by figuring out how many little squares fit into a rectangle. After students had learned how to find the area using this method, he asked the children to find the area of a parallelogram. Some of these children were able to find the area by transforming the parallelogram into a rectangle by either drawing lines or using scissors (see Figure 2.4). On the contrary, students who had learned the arithmetic formula for estimating the area of a rectangle were clueless when trying to figure out the area of the parallelogram.

Figure 2.4
How to Transform a Parallelogram into a Rectangle (Wertheimer, 1959)



In a modern version of Wertheimer's studies on parallelograms, Sayeki, Ueno and Nagasaka (1991) took the additional step of teaching Japanese fifth graders how to estimate parallelogram areas by using decks of cards. The advantage of the deck of cards is that it allows students to actually see how the area of certain geometrical figures remains invariant through particular transformations (e.g. a rectangle into a parallelogram). In this study, the control group

was taught the paper and scissors method. The students who were exposed to the deck of cards outperformed those who had been exposed to the "paper-cut" instruction.

Judd's study differs from Katona's and Wertheimer's studies in several aspects. Judd explicitly taught his students the principle of refraction. This method of instruction was similar to Katona's second group in which students were given an arithmetic principle to solve the geometrical problems. Katona and Wertheimer went beyond direct instruction and found that discovering the principle underlying a solution led to higher degrees of transfer. It should be noted that Hendrickson and Schroeder did not find large differences in the performance of the experimental groups when they replicated Judd's study. One possible explanation might be that students exposed to the principle of refraction did not learn it very well whereas Katona's and Wertheimer's participants developed a deeper understanding of the task, and therefore were more successful at transferring. The study conducted by Sayeki and his colleagues also indicated that using the deck of cards allowed students to better comprehend how to figure out the area of a parallelogram, and that this method was more powerful than the paper and scissor strategy used by many of Wertheimer's participants.

The main conclusion that can be drawn from the previous series of studies is that transfer is affected by the degree to which people learn the underlying principles. Deeper understanding, either by discovery or direct instruction, produces better transfer. For the last 20 years, research that has focused on the differences between experts and novices in diverse content areas has corroborated the important role that knowledge base plays in highly competent performance. These studies also have shown that the quantity of one's knowledge is less important than the qualitative characteristics of one's knowledge. The knowledge of experts tends to be highly procedural, goal oriented, and organized in meaningful patterns (Glaser, 1992). See Pressley and

McCormick (1995) for a review of the literature on studies that have compared the behavior of experts and novices in writing, math and sciences.

Contemporary Views

The contemporary debates about transfer have focused on the issue of the extent to which cognitive processes are influenced by the context. For some theoreticians, cognition is independent from the situation in which it occurs, for others, it is dependent and influenced by the circumstances. The abstraction movement[1] represents one extreme of the dependent-independent context continuum whereas the situated learning movement represents the other extreme. See Anderson, Reder and Simon (1997), Anderson, Greeno, Reder and Simon (2000), and Greeno (1997) for a current discussion of the dispute between these two positions.

Each of these theoretical frameworks has a different understanding of learning and transfer, and as a consequence, each has offered differing educational policy recommendations. The abstraction model views learning as a process in which the learner has to understand and reorganize knowledge, principles, and concepts. The goal is for the learner to express general cognitive abilities, such as reasoning and problem solving skills. From this perspective, transfer depends on acquiring an abstract mental representation in the form of a schema. This schema indicates relations that produce an invariant structure across situations (Greeno, Collins, & Resnick, 1996). This definition of transfer is congruent with Judds's ideas and with the Gestalt notion of configuration, but the term schema is more modern and comes from the information processing research. Because the purpose of the abstraction paradigm is to understand how

[1] The abstraction view is also known as the cognitive view. For the purpose of this paper, the term abstraction will be used to differentiate this perspective from the two early views discussed previously.

people construct knowledge, more emphasis is placed on how the individual learns. The theoretical focus is the person and not how the environment affects learning.

There is a large body of research that supports the claims of the abstraction view. These studies have covered a wide range of ages as well as diverse content areas. For example, in an study commonly cited as strong evidence for the power of abstraction teaching, Biederman and Schiffrar (1987) quickly taught a group of college students and professors to identify successfully the sex of recently born chicks, a skill that takes experts in the field years to master. Participants were exposed to an instructional sheet that visually depicted the differences between female and male chicken genitals. After one instructional session, the performance of the students and professor in comparison to that of the "professional sexers" went from a correlation of .21 on the pretest to a correlation of .82 on the posttest.

Studies in sciences, writing, and computer programming have also been conducted from an abstraction theory perspective (see Mayer & Wittrock, 1996; Haskell, 2001; Bransford, Brown, & Cocking, 2000 for the latest reviews of transfer). Klahr and Carver (1988) conducted a study in which elementary school children transferred a computer programming high level skill called debugging into a writing context. Children learned how to use a computer language called LOGO that allowed them to generate graphic effects. "Bugs" are commands that affect the programming outcomes, therefore, "debugging" means finding the commands that interfere with the desire result. Participants with high debugging skills did very well in correcting a variety of written instructions. Brown and her colleagues (1989) found that children as young 3 years old were able to transfer successfully between isomorphs problems —stories that had similar goals and obstacles for their solution— when instruction involved the use of analogies.

Situated cognition researchers claim is that learning and cognition are fundamentally situated and social (Brown, Collins, & Duguid, 1989). Learning is influenced by the socio-cultural context in which it is embedded —a child could play perfectly the piano in front of his teacher but make a lot of mistakes in front of a group of strangers. Unlike previous approaches, situated cognition theoreticians emphasize the social and contextual nature of learning. Acknowledging that the environment contributes to learning was a revolutionary step because traditionally context had been considered a negative factor for understanding cognition. About this point, Ceci and Rosi (1994) explain the conventional idea of context as follows, "context is a form of noise to be controlled, deleted or covaried. In nearly all developmental accounts of cognitive growth, context is viewed as an adjunct to cognition, rather than as a constituent of it" (p. 75).

Ceci and his colleagues conducted a pioneering series of studies that showed the importance of context in learning. In one study, children learned an algorithm faster when it was presented in the context of a video game than when it was presented in a laboratory task context (Ceci, 1990). In another study, two adults were able to solve a problem when presented in the familiar context of a horse racetrack bet than when it was presented in the unfamiliar context of a stock market decision (Ceci & Ruiz, 1991). A third study found that children had better time management strategies when the experimental tasks were given in their homes than when they were given in the lab (Ceci & Bronfenbrenner, 1985). These and other studies led Ceci and Roazzi (1994) to conclude that "the context in which learning occurs has an enormous influence on cognition, by serving to instantiate specific knowledge structures, by activating context-specific strategies, and by influencing the subject's interpretation of the task itself. Neither context nor cognition can be understood in isolation; they form an integrated system in which the

cognitive skill in question becomes part of the context" (p. 98). Ceci and his group distinguished three types of context: social, mental, and physical. The emphasis placed on these dimensions varies among different social approaches.

Situated cognition theoreticians recognize the importance of the mental and physical context, but they have placed a stronger emphasis on the social context. From this more radical point of view, learning is defined as understanding and participating in the social practices of the community (Greeno et al., 1996), and apprenticeships are valuable methods of teaching these social practices (Lave & Wenger, 1991). Unlike the abstraction view, the theoretical focus of the situated perspective is on the social context in which learning occurs and not on the individual.

The idea of cognition being contextually specific has led, incorrectly, to the assumption that the situate cognitive paradigm denies the idea of transfer (Anderson, Reder, & Simon, 1996; Greeno, 1997). Transfer, like learning, is seen as social, and it involves applying previous knowledge to new practices within the community or to practices outside the community. Greeno and his colleagues (1993) published an article that addresses how transfer specifically is conceptualized within the situated paradigm. They explain that for transfer to occur there must be some "constraints" and "affordances" that are invariant between the learning context and the transfer context. Transfer is the result of becoming "attuned to constraints and affordances through participation" (Greeno et al., 1996 p. 23). The term affordances was coined originally by perception psychologist James Gibson (1977) and refers to the selection of objects in the environment that can assist or "afford" an action.

Learning activities that lead to transfer from one situation to another are assumed to have a social base. The challenge for the learner is to know what to do in the new situation based on what was "afforded" by in the previous situation. So, transfer can be understood as adjustments

to restrictions and regularities between the person and the environment. This paradigm recognizes that one method for becoming "attuned to constrains and affordances" is by developing abstract representations, but it is not considered the only method. The notion of learning activities is much broader than that of the abstraction view and gives room for social interactions.

Research in this area has focused on how to construct teaching environments that allow students to participate more actively in the learning process. These classroom settings include modeling, guided practice supervised by experts, group activities, and class participation in the development of hypothesis, questions, problems, and conclusions. This kind of teaching follows the traditional practices that are used in working apprenticeships. For example, Collins and his colleagues (1991; 1989) have developed a model of cognitive apprenticeships to teach students academic subjects such as writing and reading. A lot of situated research has been done in the field of mathematics, and the work of Paul Cobb and his group has played a key role in the existing reform of mathematics (Cobb, Stephan, McClain, & Gravemeijer, 2001)

Consideration of the individual and social dimensions of transfer in educational research required the modification of well-established paradigms. In the preface of an influential compilation of the work of situated cognition theorists, the editors expressed that "the shift within cognitive science to situated cognition (…) is at least as profound, philosophically and methodologically, as was the shift to cognitivism from behaviorism…" (Kirshner & Whitson, 1997 p. vii)

The debate between the abstraction and situated views goes back to the notion of generality and specificity, a recurrent topic in the literature and research of transfer. This dichotomy will be addressed in greater detail later.

Educational Implications

According to the cognitive view, learning and transfer is enhanced by: 1) the development of instructional methods that engage students into activating cognitive processes that require selecting, organizing and integrating information during learning, and 2) the creation of classroom environments that allow students to participate more actively in their own learning process by emphasizing modeling, guided practice, group activities, and social development of knowledge (generating hypothesis, questions, problems and conclusions).

Limitations

The major limitation of both abstraction and situated cognitive views is that they do not focus on metacognitive processes. Although some researchers in each tradition have made reference to the value of metacognition, they have not dealt systematically with the issue of how metacognitive skills contribute to transfer. Other theories have included not only the role of metacognition but also motivation processes in learning and transfer (Mayer, 1998). This research is described in the next section.

The Metacognitive View

Metacognitive researchers have begun to study the issue of transfer only recently. Cognition and metacognition, although interrelated, are two separate domains. Cognition deals with how one perceives, organizes, processes, and remembers information whereas metacognition has to do with the deliberate conscious efforts to monitor and control these processes (Brown, 1980).

Research conducted within the abstraction view focused mainly on how cognition influences generalization of learning. Little attention was given to awareness and control of

cognition. Metacognitive researchers went one step further by integrating information about how people think with information regarding how learners understand their own thinking. The study of metacognition as a distinctive construct started during the 1960's (Tulving, 1996), and has yielded extensive findings. Flavell's (1979) pioneering work has been a major influence in the field.

Schraw and Moshman (1995) describe two components of metacognition: knowledge of cognition and regulation of cognition. Knowledge of cognition – what people know about cognition, including their own cognitive processes – can be divided into three different types of awareness: declarative, procedural and conditional. Declarative metacognition involves knowledge that the learner has about the factors that affect his or her performance. Procedural awareness refers to knowledge about how to do things. This kind of knowledge includes strategies, heuristics and rules. Conditional metacognition refers to knowledge about when and why to use declarative and procedural knowledge.

Regulation of cognition includes activities and behaviors that allow individuals to control their own learning. There are three major self-regulatory processes: planning, monitoring, and evaluating. Planning involves activities that are done before a task, such as goal setting and selecting appropriate strategies. Monitoring refers to keeping track of one's performance by self-recording or by self-testing one's knowledge. Evaluation is related to assessment of one's performance.

These two metacognitive dimensions —knowledge of cognition and knowledge of regulation— are related to one another, and a proper integration of both of them is crucial for successful learning and transfer to occur. Accordingly, transfer is the result of generalizing metacognitive and regulatory skills within and across domains.

An extensive area of research within the metacognitive field has been the study of cognitive learning strategies [2] (procedural awareness) and how to facilitate their use and implementation (conditional awareness). Although there is plenty of evidence that shows that effective and efficient learning strategies result in greater learning (Kulik, Kulik, & Shwalb, 1983; McKeachie, 1988), the literature also indicates that students do not always apply the learned strategies to new situations or tasks (Schneider & Pressley, 1997). Teaching a student to use a learning strategy does not guarantee generalization. Many studies have shown that when strategy instruction is combined with information about *why*, *when* and *where* to apply learning strategies, transfer is more likely to occur (e.g. Carnine, Kameenui, & Maggs, 1982; Kurtz & Borkowsky, 1984; Pressley, Borkowsky, & O'Sullivan, 1984; Ghatala, 1986; Pressley & McCormick, 1995). There is also a body of research that demonstrates that strategy instruction becomes more effective when it is combined with self-regulatory processes, such as goal setting, self-monitoring and self-evaluation (Bielaczyc, Pirolli, & Brown, 1995; Ford, Smith, Weissbein, Gully, & Salas, 1998).

The advantage of blending together metacognitive with cognitive processes into one comprehensive view is that it can potentially explain both specific and general transfer. According to Schraw (2001), cognitive skills are domain-specific because they are learned and applied within particular content areas (math, writing, reading) whereas metacognitive skill are domain-general because they can be used within several contexts. Schraw and his colleagues (1995) found preliminary empirical support for the hypothesis of a general monitoring skill across domains. In their study, performance and monitoring skills were correlated across several domains. The authors concluded that monitoring within domains is controlled —in addition to

[2] The terms learning, study and cognitive strategies are used interchangeably in the literature.

domain-specific knowledge— by general metacognitive processes.

Still further research is needed to clarify the connection between specific and general cognitive and metacognitive processes and how they affect transfer. Mayer and Wittrock put it this way, "In the metacognitive view of transfer, problem solvers are managers of their general and specific knowledge; they need to possess relevant specific and general knowledge, but they need to know also how to use that knowledge in the context of problem solving" (Mayer & Wittrock, 1996, p.51).

Educational implications

Metacognitive theory and research indicate that metacognitive knowledge and regulation can be improved by instruction. There are several successful educational programs that have incorporated metacognitive and self-regulatory practices (e.g. Brown, 1980; Palincsar & Brown, 1984; Pressley, El-Dinary, Wharton-McDonald, & Brown, 1998; Hofer, Yu, & Pintrich, 1998). Still, more research is needed to understand how cognitive, metacognitive and motivational factors interact among each other.

Final Comments

The history of theory and research on the issue of transfer has revealed the multidimensional nature of this construct. Initial efforts to explain transfer in terms of single dimensions, such as mental faculties, identical elements, rules, or principles, proved to be inadequate. However, by breaking down the concept of transfer into specific components, each historical view contributed to more inclusive views of the circumstances and specific underlying mechanisms.

Developing alternative ways of classifying and understanding transfer

After more than 100 year of research, transfer or learning continues to be a central topic in the educational research agenda —just in 2004 more than 20 articles about transfer were published in main academic journals. The prolific empirical evidence accumulated during these past years has provided profound insights in the understanding of generality. However, some of the same controversies that emerged during the beginning of last century still pervade today. In particular, two issues continue to generate disagreement in the research community: the specific versus the general nature of transfer (i.e. is the content of what transfers specific or general?), and the similar versus dissimilar contexts in which transfer is applied (i.e. what constitutes near and far transfer?).

The difference of opinion among researchers about these two issues has been exacerbated by the contradictory nature of some outcomes. There is plenty of evidence about successful transfer, but there is also a discouraging body of research that shows that in many cases people fail to apply previous knowledge to new situations (Mayer & Wittrock, 1996; Detterman, 1993; Haskell 2001).

There is a new trend emerging in the literature indicating that the lack of transfer found in many studies maybe related to the way transfer has been classified and conceptualized (e.g.Bransford & Schwartz, 1999; Hatano & Greeno, 1999; Martinez-Pons, 2000). Two main factors seem to be responsible for the conflicting results: 1) the lack of an appropriate and flexible taxonomy of transfer and, 2) limited theoretical understandings of how transfer is achieved in the early phases before learners achieve full expertise.

The first part of the present section describes a current multidimensional taxonomy of transfer created by Barnett and Ceci (2002). Table 2.2 depicts the two overall dimensions and

subdimensions of the taxonomy. The first dimension – content of transfer – has to do with the issue of specificity and generality. The second dimension – context of transfer – has to do with the issue of similarity. At the end of the section, a brief description of alternative ways of understanding transfer is given.

Table 2.2
Barnett's and Ceci's Taxonomy of Transfer (2002)

Part A **Content: What transfers?**			
Learned skill	Procedure	Representation	Principle or heuristic
Performance change	Speed	Accuracy	Approach
Memory demands	Execute only	Recognize and execute	Recall, recognize and execute

Part B **When and where transferred from and to**					
	Near	⟷			Far
Knowledge domain	Mouse vs. rat	Biology vs. botany	Biology vs. economics	Science vs. history	Science vs. art
Physical context	Same room at school	Different room at school	School vs. research lab	School vs. home	School vs. the beach
Temporal context	Same session	Next day	Weeks later	Months later	Years later
Functional context	Both clearly academic	Both academic but one non-evaluative	Academic vs. filing in tax forms	Academic vs. informal questionnaire	Academic vs. at play
Social context	Both individual	Individual vs. pair	Individual vs. small group	Individual vs. large group	Individual vs. society
Modality	Both written, same format	Both written, multiple choice vs. essay	Book learning vs. oral exam	Lecture vs. wine tasting	Lecture vs. wood carving

The Specificity-Generality Controversy

There are two levels of discussion related to the specificity-generality topic. The first has to do with the individual versus social nature of transfer –the abstraction and situated views represent this controversy. The second has to do with the specific versus general characteristics of the skills and knowledge that are transferred – the formal discipline and the identical elements theory represent the two extremes of the continuum.

With respect to the issues of individual and social explanations of transfer there has been a midpoint resolution. Theoreticians from both sides (Anderson, Greeno, Reder, & Simon, 2000) concluded that: 1) "individual and social perspectives on activity are both fundamentally important in education" (p. 11) , 2) learning can be general, and abstraction can be efficacious, but sometimes they are not (p. 12) , and 3) "situative and cognitive approaches can cast light on different aspects of the educational process, and both should be pursued vigorously" (p.12).

The issue of specificity and generality of skills and strategies continues to be controversial. Singley and Anderson (1989) explain the significance of this matter in the following way, "a fundamental transfer question is whether transfer is necessarily limited in scope or whether it is broad and ranges across diverse disciplines" (p. 24). A main cause of the diverse theoretical positions and inconsistent outcomes in the literature has been the mistake of equating domain-specific and domain-general skills with their near or far application. Barnett's and Ceci's taxonomy (2002) differentiates between the nature of skills and the context in which they can be applied. In their own words:

> The issue of whether the skill to be transferred is specific or general should not be confounded with discussions of whether the task constitutes near or far transfer. They are logically separable factors

> that may both affect transfer. Thus, it highlights a need to consider separately the transfer of specific facts and procedures and of general principles. (p.621)

The advantage of the present taxonomy over previous classifications is that it separates content from context giving room for many possible permutations (see Table 2.2). Thus, a student can learn a monitoring strategy —domain-general— and just be able to transfer it into a very similar context —near transfer. On the other hand, a student can learn a particular content strategy —domain-specific— and be able to transfer it to problems that differ significantly from the original learning task —far transfer.

The taxonomy divides the content dimension into three subdimensions (see Table 2.2, Part A). The specificity-generality of the learned skill —first row— takes into account three gradation levels. The first level, learned skill, includes learning of specific facts or standardized procedures such as algorithms, formulas, or equations. The second level, representation, involves generating representations in the form of matrixes or tree diagrams. The last level, principles or heuristics, is characterized by developing structural and causal understandings such as inference rules, hierarchical classifications and metacognitive skills.

The performance change measured —second row— is related to measures against which improvement is expected. Three levels are suggested: speed, accuracy and quality of execution. That is, was the skill successfully transferred and implemented? How long did it take to transfer? For example, a student could learn an outlining strategy for an argumentative essay and implement it effectively when writing a narrative essay but incorrectly when writing a social science paper. Eventually, the same student could learn to transfer the outlining strategy when writing different kinds of papers, and in each occasion it would take him less time to do it

successfully. Depending on the purpose of a study or the nature of the transfer task, one of these three measures might be more relevant.

The last row —memory demands— takes into account the memory demands required by the transfer task. The gradient covers from participants just executing a learned activity to participants selecting appropriate approaches to solve the transfer task. Situations that hint the transfer solutions would be at the beginning of the continuum whereas situations in which students have to discern proper procedures would be towards the end of the scale. In other words, if an instructor prompts a possible answer, a student only needs to execute the task correctly, but if no suggestion is given, the student also needs to recall and recognize proper information before solving the transfer task.

Barnett's and Ceci's taxonomy overlaps with Gagné's vertical versus lateral classification and Salomon's and Perkins's low-road versus high-road transfer categorization (see first section of the chapter). However, Gagné, Salomon and Perkins reduce transfer to a bi-dimensional construct whereas Barnett and Ceci conceptualize transfer as a more complex phenomenon with multiple dimensions. The implications of their taxonomy are fundamental for transfer research. Barnett and Ceci (2002) explain the purpose of their effort as follows:

> (…) we had one goal in mind (…) the development of a framework that made sense of the conflicting claims about transfer. To our best of knowledge the corpus of scientific studies from the prior century can be fitted into this framework. (p. 634).

Having a multidimensional classification of transfer that takes into account content and context and their subdimensions provides a theoretical structure to guide future studies and

understand past research. In an attempt to clarify previous studies, the authors were able to classify classic transfer experiments under their taxonomy. None of the studies evaluated were classified as far transfer along the six dimensions or even the majority of them.

The Similarity Issue

The issue of similarity is such a crucial one because transfer by itself can be explained as a continuum of situations that gradually differ from the original learning task (Detterman, 1993). Early efforts by Thorndike and Osgood explained similarity based on the objective properties of the learning and transfer tasks. Contemporary theorists such as Gick and Holyoak (1987) have realized that how the learner perceives the differences between tasks is even more important than the external similarities. Haskell draws attention to this issue by explaining that similarity is

> after all, the very problem of transfer: what do we mean when we say something is similar to something, or like something else? There is no simple way to say if something is a case of near of far transfer. The essential problem of similarity of equivalency has yet to be solved (…) what is near transfer to an expert may be far transfer to a novice (…) much of the perception of similarity (…) is in the mind of the perceiver, not in the concrete features of an object or event. (p.30).

A main problem is that many scientific studies as well as some instructional applications have overlooked the issue of perceived similarity. This omission combined with the loose use of the terms near and far transfer by researchers has generated many mixed outcomes in the literature.

Barnett's and Ceci's taxonomy breaks down the notion of similarity of context between the learning and transfer tasks into six dimensions (see Table 2.2, part B): 1) Knowledge domain across context, 2) physical context (where), 3) temporal context (time elapsed), 4) functional context (function of learned and transferred skills), 5) social context (skills learned or performed alone or in collaboration), and 6) modality across contexts (modality in which the tasks are assessed). At the same time, each dimension is quantified against a near-far transfer scale. Examples in each cell are presented in Table 2.2, part B.

The advantage of this multiple classification is that a task can be categorized as far transfer in some dimensions and not in others, avoiding confounding bi-dimensional labels (near vs. far). Still further research is needed to keep refining this classification. In the words of Barnett and Ceci (2002), "as more research effort is directed at these issues, we hope that many of our dimensions are broken down again into subdimensions, adding even more structure and further reducing the subjectivity that ineluctably is part of our discussion of similarity" (p. 623).

In addition to developing a better understanding of the external properties that a learning and transfer task can potentially share, it is necessary to include the notion of perceived similarity into the study of transfer. The combination of both qualities (objective vs. perceived) will provide a more complete picture of the issue of similarity, and might avoid confusing results in the future.

New Theories of Transfer

When one reads the current literature on transfer, one of the few things that most researchers agree on is the imperative need of developing new ways of understanding this construct. The following two quotes capture the general feeling in the research community:

> The failure in transfer of learning and the lack of development in the field are in large measure due to lack of an adequate theoretical base (...) researchers need theoretical development based squarely in empirical and experimental data (Haskell, 2001 p. xvii).

> One conclusion that derives from this continuing diversified and controversial nature of the concept of transfer is that there is an obvious need for further inquiry aimed at a better and deeper understanding of the processes underling transfer and at finding effective research-based and practically ways of facilitating transfer (Corte, 1999 p. 557).

Present research efforts are shifting toward the creation of more dynamic explanations of transfer that take into account small learning adjustments over time. According to Bransford and Schwartz (1999) traditional transfer studies have used "sequestered problem solving" approaches in which participants are "sequestered" during the transfer tasks without opportunities to seek help, receive feedback and revise their work. The underlying assumption is that people tend to "directly" apply prior knowledge to new tasks. Bransford and Schwartz believe that notions of direct application of knowledge combined with "sequestered" methodological approaches are in part responsible for the vast literature on failure of transfer.

Bransford and Schwartz (1999) propose a model that focuses on the learner's "preparation for future learning". The main goal of this perspective is to assess "people's ability to learn in knowledge-rich environments" (p. 68). They explain that when a company hires workers it is not expected that new employees would know everything, but instead would be able

to use current resources in order to learn. The authors make clear that in their model, "rather than an evaluation of whether people can generate a finish product, the focus shifts to whether they are prepared to learn to solve new problems" (p. 69). From this perspective, it is assumed that people interact with their environments and use it as a resource to obtain feedback, ask for help, and make performance changes. A methodological consequence of the model is the development of multiple and dynamic assessments of transfer. Bransford and Schwartz suggest that assessment can be improved by moving from static, one-shot measures to dynamic assessments that focus on "disposition to learn". In their own words,

> Our thesis is that evidence of transfer is often difficult to find because we tend to think about it from a perspective that blinds us to its presence. Prevailing theories and methods of measuring transfer work well for studying full-blown expertise, but they represent too blunt an instrument for studying the smaller changes in learning that lead to the development of expertise (Bransford & Schwartz, p.66).

Hatano and Greeno (1999) also agree with the need of generating models that recognize transfer of learning as a dynamic construct. They propose a new term for generalization of knowledge that is based on the notion of productivity instead of transfer. "In this regard, the term productivity, rather than transfer, should be used to refer to the generality of learning. Productivity refers to the extent to which learning in some activity has effects in subsequent activities of different kinds" (p.647). Like Bransford and Schwartz, Hatano and Greeno believe that the problem with transfer research has been the focused on "narrow criterion of successful transfer and by arranging experiments so that productive learning was not encouraged" (p.651).

That is, accepting a single answer and method as the only correct response, giving one-shot tasks, and not studying trial and error behaviors.

In a recently article by Lobato (2003) the same criticism appear again. She proposes a model called actor-oriented that also involves a dynamic understanding of transfer:

> Traditional models rely too heavily on the determination of transfer from an expert's point of view and, as a result, can lead to design decisions that are not informed by the specific generalizations that students have formed. In contrast, the actor-oriented transfer approach focuses on the processes by which learners form personal relations of similarity across situations, whether or not those connections are correct or normative (p. 20).

The present trend in the transfer literature fits very well with the assumptions of social cognitive theory. This dissertation proposal is based on the idea that a social cognitive model of academic self-regulation (Zimmerman, 1990; 2000) can offer a sound and solid theoretical framework to understand how transfer of learning evolves before full expertise is achieved.

A Social Cognitive View of Transfer

In the first part of this section, a general overview of social cognitive theory is presented. The second part of the section focuses on how self-regulation develops and the role that social interactions and models play in this process. The last part describes how the notion of transfer fits into this paradigm.

Self-Regulation Theory

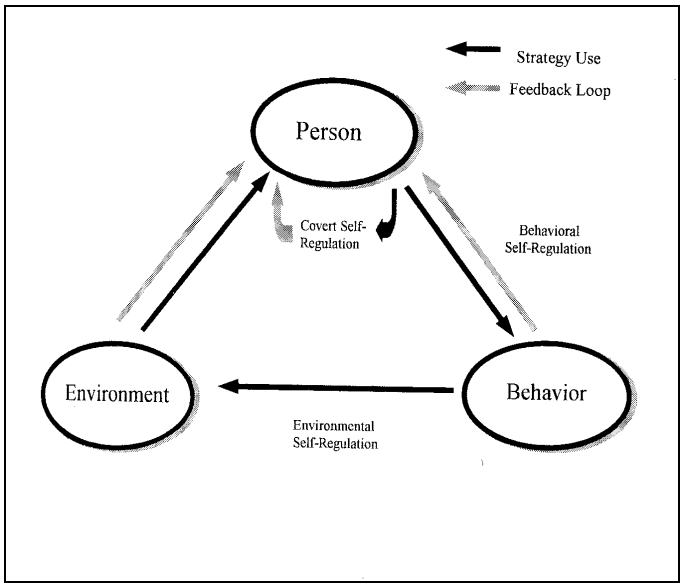
Although there are several well accepted models of academic self-regulation (Puustinen & Pulkkinen, 2001), a social cognitive model describes human learning in terms of "triadic reciprocity" in which behaviors, personal covert factors (including cognitive processes), and environmental events affect each other (Bandura, 1986). In turn, these three variables are influenced by motivational factors (Zimmerman, 1989). Figure 2.5 graphically depicts this model. Social cognitive theory gives the same weight to mental, behavioral and social aspects, thus integrating the main assumptions of the abstraction and situated views of transfer. Social contexts as well as cognitive processes affect each other equally.

Social cognitive theory assigns a primary role to humans' capacity to regulate their own functioning. When a student is in control of his/her behavior, motivation, and cognition, he or she can be described as a self-regulated learner. Hence, academic self-regulation has been defined formally as the extent to which students are metacognitively, motivationally and behaviorally in charge of their own learning process (Zimmerman, 1986). Social cognitive theory acknowledges the role of metacognitive processes, but it goes beyond the assumptions of traditional metacognitive models by emphasizing motivational and social aspects as well. Zimmerman (1995b) clarifies this issue in the following way:

> SRL involves more than metacognitive knowledge and skill, it involves a sense of personal agency to regulate other sources of personal influence, such as emotional processes, as well as behavioral and social-environmental sources of influence (p 218).

Although all students self-regulate to a certain degree, proactive self-regulated learners are aware of the relationship between the use of metacognitive, motivational and behavioral strategies and their academic outcomes. Consequently, these students are the ones who use a strategic approach for achieving academic goals (Zimmerman, 1990). The literature shows a high correlation between use of self-regulatory processes and academic performance (Zimmerman & Martinez-Pons, 1986; 1988; 1990).

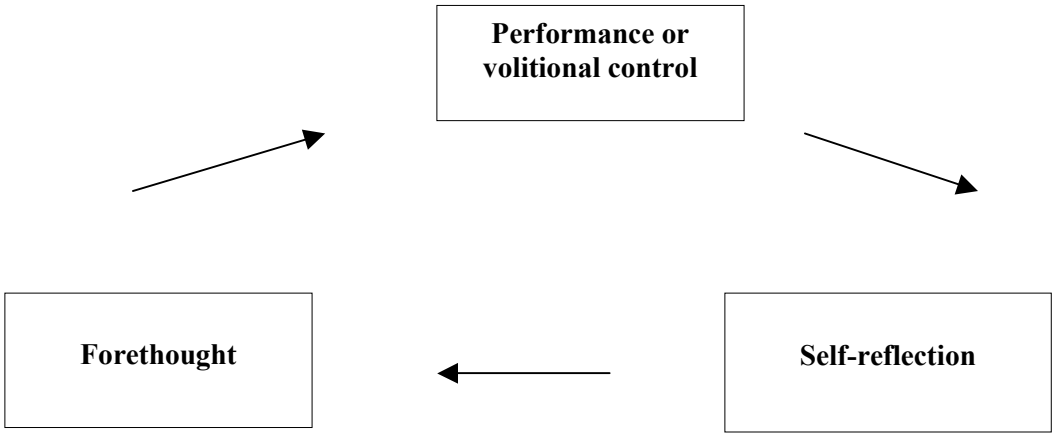
Figure 2.5
Social Cognitive Model of Triadic Reciprocity



In addition to learning strategies and motivational beliefs, social cognitive researchers emphasize the role of feedback in self-regulated learning (Zimmerman, 1990). A feedback loop involves a cyclic process in which students monitor the effectiveness of the learning strategies they are using and respond to this feedback in a variety of ways, such as modifying or adapting the learning strategy. Zimmerman (2000) divides self-regulatory subprocesses and related

motivational beliefs into three cyclical phases: forethought, performance or volitional control and self-reflection [3] (see Figure 2.6). *Forethought* involves processes that precede efforts to act whereas *performance* or *volitional* control encompasses processes that occur during action. Finally, *self-reflection* involves processes that occur after performance. Self-reflections have an influence on both, future responses on that experience and subsequent forethoughts. These influences complete a self-regulatory cycle.

Figure 2.6
Cyclical Phases of Self-Regulation



Self-Regulatory Subprocesses

Table 2.3 shows each of the processes and subprocesses that are involved in each self-regulatory cyclical phase. For this proposal, only evidence related to the subprocess that will be manipulated in the experimental study is described. These are self-efficacy beliefs, goal setting, self-recording/self-monitoring, and self-reflection.

[3] These phases correspond to the generic labels used by other self-regulatory theories: planning, monitoring and evaluating.

Table 2.3
Cyclical Phases and Subprocesses of Self-Regulation

Forethought	**Performance/Volitional control**	**Self-reflection**
Task analysis	Self-control	Self-judgment
▪ **Goal setting**	▪ Self-instruction	▪ **Self-evaluation**
▪ Strategic planning	▪ Imagery	▪ Causal attribution
	▪ Attention focusing	
	▪ Task-strategies	
Self-motivational beliefs	Self-observation	Self-reaction
▪ **Self-efficacy**	▪ **Self-recording**	▪ Self-satisfaction/affect
▪ Outcome expectations	▪ Self-experimentation	▪ Adaptive-defensive
▪ Intrinsic interest/value		
▪ Goal orientation		

Forethought Phase

Self-efficacy. A key motivational dimension of self-regulation is self-efficacy, which is defined as personal beliefs of one's capabilities to "organize" and "execute courses of actions" in order to attain "designated types of performance" (Bandura, 1977). Self-efficacy beliefs have five distinctive characteristics (Zimmerman, 1995a): 1) they involve judgments of capabilities to perform particular academic activities, 2) they are multidimensional and linked to different academic domains, 3) they are measured in a content dependent manner, 4) they depend on a mastery criterion of performance rather than normative, and 5) they are measured before students perform the activity.

According to social cognitive theory, effective self-regulation depends heavily on self-efficacy beliefs. Self-efficacy beliefs have been related to several outcomes, including strategy use and academic performance (Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons, 1990).

Goal setting. In general, a goal reflects one's purpose and refers to quantity, quality or rate of performance (Lock & Latham, 1990). In particular, goal setting involves establishing a standard or objective to serve as the aim of one's actions (Lock & Latham, 1990). It seems that goal setting is an effective mechanism because goals enhance motivation, that is, goals encourage people to meet task demands and to persist at the task over time (Lock & Latham, 1990). Goals, however, do not automatically enhance learning and motivation by themselves. Rather certain goal properties such as specificity, proximity and difficulty influence self-perceptions, motivation and learning (Schunk, 1990). Goals that express specific activities that are close in time and are viewed as difficult but reachable enhance performance better than general, long term, easy (or very difficult) goals.

There is a body of research that shows that goal setting has been an effective mechanism for improving performance on academic tasks (e.g. Lock & Latham, 1990; Schunk, 1990; Zimmerman, Bandura, & Martinez-Pons, 1992).

Performance Phase

Self-recording. Self-monitoring is a main self-regulatory subprocess that involves selective attention to specific actions or cognitive processes. Self-monitoring focus students' attention to a limited number of activities so that they can identify the source of success or failure of a particular academic outcome (Zimmerman & Paulsen, 1995). Self-recording is a formal method of self-monitoring, some examples of self-records are written logs, audio or videotape recordings, among others. There is evidence that self-monitoring enhances self-efficacy (Zimmerman & Kitsantas, 1996; Lan, 1998) and that it influences academic achievement, in particular, when combined with goal setting (Morgan, 1985; Zimmerman & Kitsantas, 1999)

Self-Reflection Phase

During self-reflection, learners make adjustments to improve future performance. These self-reflective processes, in turn, affect forethought processes completing the self-regulatory cycle. There is evidence that expert athletes tend to make more outcome attributions to strategy use (Cleary & Zimmerman, 2001; Kitsantas & Zimmerman, 1998). This kind of attributions facilitates the future selection of more adaptive strategies, in particular when learners fail in a performance task. This feedback loop (self-regulatory cycle) in which learners can modify upcoming performance is a critical piece for the understanding of transfer

Development of Self-Regulation

A major assumption of the social cognitive view is that humans have the ability to learn by observing others perform (Bandura, 1986). This vicarious capability plays a determinant role in becoming a self-regulated learner. Schunk and Zimmerman (1997), and Zimmerman (2000) proposed a four phase developmental model of self-regulation (see Table 2.4). The model predicts that academic competence develops initially from social sources and subsequently shifts to self-sources in a series of levels.

Observational Level

This level of functioning occurs when learners induce the major features of the skill or strategy from watching a model learn or perform. At this point, the source of learning is social and the source of motivation is vicarious (reinforcement). Successful models and their methods are imitated; unsuccessful ones are avoided.

Emulative Level

This level of functioning occurs when learners' performance approximates the general form of the model. The observer is not copying the exact action of the model. Rather the learner imitates the model's general pattern of style of functioning. Social influence is still the source of learning (social guidance and feedback) and direct reinforcement works as the source of motivation.

Self-Controlled Level

This level of functioning occurs when learners can use the strategies independently when performing on structured (e.g., near) transfer tasks. Students' use of self-regulatory strategies becomes internalized during this phase, but it remains dependent on representational standards of a model's performance and on the self-reinforcement that steams form behaviorally matching these representations. At this level, the source of learning is a cognitive process and the source of motivation is self-derived (self-reinforcement).

Self-Regulated Level

Finally, at this level learners systematically adapt their learning strategies to changing personal and contextual conditions. They can initiate use of strategies and incorporate adjustments based on contextual features of the situation. There is little or no residual dependence on the model during this phase. Self-efficacy beliefs are the source of motivation.

This multilevel model assumes that a self-regulatory level of skill emerges from an optimal sequence of social learning interactions. Zimmerman and Kitsantas (1996, 1997, 1999) have tested experimentally this developmental model and have found empirical data to support it.

Modeling and Academic Self-Regulation

The advantage of this multi-level model of the development of self-regulation is that it acknowledges the role of social support (e.g. modeling) on the acquisition of any academic task. Social models are important sources for teaching self-regulatory skills and for increasing students' self-efficacy beliefs. There is also plenty of evidence that supports the important role that models play in the academic performance of several skills (Schunk, 1998).

There are different types of models (e.g. adult models, peer models, coping models) but one that is particularly powerful is cognitive modeling. Cognitive modeling is a technique that involves teacher (or expert) modeling. The teacher (or the expert) illustrates the use of a particular strategy while "thinking aloud" to demonstrate the thoughts and procedures that are involved in the strategy. During cognitive modeling, the teacher (or expert) not only explains the strategy but also performs it. Schunk (1981) tested experimentally the effect of cognitive modeling. He found not only an effect on mathematical achievement but also on the self-efficacy beliefs of elementary students.

Table 2.4
Development of Self-Regulation

	Phases			
	Observational level	**Emulative level**	**Self-controlled level**	**Self-regulated level**
Description	Learners induce the major features of the skill or strategy from watching a model learn or perform.	An imitative level is achieved when the learner's performance approximates the general form of the model. The observer is not coping the exact action of the model, rather the learner imitates the model's general patter of style of functioning (e.g. imitate a question but not duplicating the exact wording).	Students' use of self-regulatory strategy becomes internalized during this phase but it remains dependent on representational standards of a model's performance and the self-reinforcement that steams form behaviorally matching these representations.	Learners systematically adapt their learning strategies to changing personal and contextual conditions. Learners can initiate use of strategies, incorporate adjustments based on contextual features of the situation. Little or no residual dependence on the model during this phase
Source of Learning	Social influence (*models and verbal description*)	Social influence (*social guidance and feedback*)	Self level	Self-level
Source of motivation	Vicarious reinforcement.	Direct reinforcement	Self-reinforcement	Self-efficacy beliefs

* Schunk, D.H., & Zimmerman, B.J. (1997). Social origins of self-regulatory competence. Educational Psychologist 32(4). 195-208.

This notion of cognitive modeling is very similar to the model of learning by social apprenticeships proposed by the situated perspective (Lave & Wenger, 1991) and to the idea of cognitive apprenticeships developed by Collins (1989, 1991). A difference between these views is the emphasis that social cognitive researcher placed on the sequential development of skill, derived first from social sources and then from self-sources. Palincsar's and Brown's (1984) reciprocal teaching model is also based on the idea of cognitive modeling because students learn initially from watching the teacher demonstrate and verbally model a reading or writing strategy before they, in turn, model it for their classmates. Palincsar's and Brown's research has shown that reciprocal teaching is an effective way to teach writing skills to junior high school students, and that this method has a positive influence on transfer. Other research on writing composition has also shown how effective modeling is when teaching self-questioning techniques and writing strategies to elementary school students (Scardamalia, Bereiter, & Steinbach, 1984).

Self-Regulation and Transfer

Social cognitive theorists propose an alternative idea of transfer that relies on the concept of adaptation (Martinez-Pons, 2000; Zimmerman, 1989). From this perspective, transfer is the process by which the individual tries to adjust to a new task (see Table 1.1). More specifically, transfer is explained as an adaptive self-regulatory process rather than as a task outcome (Martinez-Pons, 2000). Accordingly, successful adaptation to the transfer task is primarily dependent on the proactive self-regulatory skills that the person employs, and not only on the properties of the transfer task or the way the material has been presented during the instructional phase (Martinez-Pons, 2000). On the other hand, unsuccessful transfer is related to deficient self-regulatory skills. Performance adjustments are a consequence of the cyclical process that characterizes self-regulation.

This view of transfer has two major implications: transfer as a dynamic and adaptive construct and feedback as a mechanism to improve transfer performance. Historical views have assumed that transfer is a static behavior that is either present or absent. Traditionally, transfer has been measured using one single test; the first and only attempt of the learner to solve the new task.

From a social cognitive perspective, transfer depends on the process by which the individual tries to adapt to unfamiliar situations. Initial failure on the transfer task is not definitive because what really matters is the strategic adjustment that follows initial imperfect attempts to transfer. Because transfer tasks involve new elements (especially in the case of far transfer tasks), transfer must be discovered rather than merely inferred a priori. For example, an expert water skier may even experience negative transfer when initially attempting snow skiing because leaning against a tow rope requires a different balance point than when responding to downhill gravity. However, once the task difference is understood, other strategies for turning and edging the skies can be capitalized upon and adaptation will be enhanced. The point is that the initial attempt to transfer the skill did not provide an accurate picture of subsequent transfer. A self-regulated learner's ability to self-monitor his or her performance efforts and to test alternative adaptive strategies can be inferred only after repeated efforts to perform.

Conventional views of transfer do not take into account that self-regulated learners can derive feedback from their transfer performance and can adjust their behavior accordingly (cyclical phases of self-regulation). When individuals have developed self-regulatory skills, they personally adapt their learning strategies to changing personal and contextual conditions, initiate use of strategies, incorporate adjustments based on contextual features of the situation and maintain motivation (Martinez-Pons, 2000).

This shift in understanding transfer as a dynamic construct is compatible with the new trend emerging in the study of transfer discussed earlier in the chapter. What is unique about a triadic social cognitive view of transfer is the emphasis placed on social-environmental influences, behavioral outcomes, and covert self-regulatory strategies.

In terms of the generality and specificity of transfer, social cognitive theory considers these as emergent task properties that must be discovered and strategically self-regulated. When general metacognitive skills —goal setting, self-monitoring, and self-evaluation— are adapted to particular situations or are combined with specific knowledge, transfer is more likely to happen.

Thus, social cognitive theory blends together into one theoretical framework the postulates of the traditional abstraction view, the more radical situated view, and the more recent metacognitive view. Successful transfer is the result of social interactions as well as proper implementation of cognitive and metacognitive strategies.

Although there has been a lot of research that explores how self-regulatory skills affect performance, very few studies have focused specifically on the issue of self-regulation and transfer. Martinez-Pons (Martinez-Pons, 2000) conducted a correlational study with a diverse sample of students —middle school, undergraduate and graduate— that belonged to two different achievement tracks —honors and regular. Two scales were used, one to assess general academic self-regulation and other to measure self-regulated transfer behavior. His model of transfer included six dimensions: 1) Perceiving the task that requires an “adaptive action”; 2) analyzing the situation in order to determine which cognitive, affective and behavioral skills are need, and assessing how much of the novel task requires new learning; 3) selecting and combining previous and new acquired sets of skills useful for the novel task; 4) carrying out the task; 5) self-monitoring the skills selected in the previous step; and 6) modifying efforts as

needed to attain the adaptive goal. Path analyses showed that 1) self-regulated transfer behavior is different from general academic self-regulation, and 2) that self-regulated transfer mediates between general self-regulation and academic standing (i.e. honors and regular students).

Fuchs and his colleagues (Fuchs et al., 2003) studied how the teaching of self-regulatory skills combined with transfer instruction affected math performance. The study was conducted with a sample of 3rd graders. Three groups were used —regular instruction, regular and transfer instruction, and regular, transfer and self-regulation instruction. Self-regulation instruction included goal setting and self-evaluation strategies. Transfer instruction involved problem-solving methods and explanations about the meaning of transfer. The group that received instruction on transfer and self-regulation outperformed the other two groups in far-transfer math problems.

To the best of my knowledge there are no studies in the literature that focus on transfer of writing revision skills with college populations as a result of self-regulatory training.

Self-Regulation Research and Writing Skills

Given that the present dissertation focuses on the transfer of a writing revision strategy, research related to main self-regulatory subprocesses and the acquisition of writing skills is presented in this section. Emphasis is placed on the role of motivation beliefs and social influences —self-efficacy beliefs and modeling— and three self-regulatory skills —goal-setting, self-monitoring and self-evaluation.

Contemporary writing models such as the Self-Regulated Strategy Development Model (Graham, Harris, & Troia, 1998) and the Transactional Strategy Instruction Model (Pressley et

al., 1998) have conceptualized writing as a holistic activity. Special attention is given to three fundamental writing processes: Planning, drafting and revising.

During the *planning* process, ideas are generated and organized into a writing plan. While *drafting*, ideas are transformed into sentences and paragraphs, and when *revising* the text is reviewed and rewritten. These three processes are applied recursively; the writer goes back and forth from one to another. New writing models assume a process-oriented instruction. Students are taught what to do when writing. The emphasis is placed on the writing process itself rather than on the written product. In general, the evidence indicates that expert and novice writers differ in their planning, drafting and revising knowledge (El-Dinary, Brown, & Meter, 1995).

Current writing models fit very well with social cognitive models of self-regulation in which similar phases are emphasized – forethought (planning), performance (drafting), and self-reflection (revising). The cyclical nature of these three self-regulatory phases facilitates self-reflective evaluations and the implementation of adaptive writing revisions.

There has been plenty of research that has focused on the impact that self-regulatory processes have on writing skills. Processes that have been studied frequently include self-efficacy beliefs, goal setting, strategy use, self-monitoring and modeling. Evidence in each area is presented below.

Self-Efficacy Beliefs and the Role of Modeling in Writing

Self-Efficacy Beliefs

Self-efficacy beliefs and their relation to writing have been analyzed extensively. Recognizing and understanding the role that motivational factors play in writing has been an important contribution of this research. Klassen (2002) reviewed 16 studies on writing self-efficacy beliefs that focused on junior high school students. He found that in the majority of

these studies self-efficacy was correlated with writing. Zimmerman and Bandura (1994) conducted a study with college freshmen that were taking a writing course. Self-efficacy beliefs had a direct effect on final grades whereas, contrary to what is generally expected, SAT verbal aptitude scores and previous writing experience did not have a direct influence on performance. Shell and his colleagues (1989) found that self-efficacy beliefs were more strongly related to writing achievement than to beliefs related to the outcomes of actions —outcome expectancy— for both reading and writing. In conclusion, the evidence indicates that self-efficacy is a powerful predictor of writing performance.

Modeling

Modeling has also been associated with writing performance. Zimmerman and Kitsantas (2002) studied the influence of modeling and social feedback. Two kinds of models were manipulated, a copying model —one that gradually improves performance— and a mastery model —one that performs as an expert. A 2 x 3 design was used (social feedback -- present vs. absent, modeling -- none, copying and mastery). Significant effects were found for social feedback and modeling. Those students who were exposed to the coping model and received social feedback outperformed the other five groups in writing performance

Couzijn's (1999) investigated the effect of two different modeling situations in a sample of 9th graders. One group watched videotapes that had students model their thinking while writing an essay. The other group saw life confrontations in the classroom between pairs of students – a writer who shared his or her written text and reader who evaluated the quality of it. Both modeling conditions had significant effects on the learning task. However, students in the group that watched other learners discussed their writing in the classroom showed larger effects on a writing transfer task.

Other researchers have studied the use of modeling in the classroom with diverse age populations. For example, Palincsar's and Brown's (1984) research on reciprocal teaching has shown that modeling is a powerful teaching tool and that it can be implemented successfully in junior high school classrooms. Scardamalia and her colleagues (Scardamalia et al., 1984) found that modeling is an effective way to teach self-questioning techniques and other writing strategies to elementary school students.

In sum, these studies indicate that modeling affects writing performance and that it is a valuable teaching technique.

Self-Regulatory Skills and Writing

Goal Setting and Self-Monitoring

Schunk and Swartz (1993) investigated the effects of process and product goals on children's achievement outcomes during writing instruction. Process goals involve techniques and strategies that students use to learn (Weinstein & Mayer, 1986) whereas outcome goals involve rate or quantity of work (Schunk & Swartz, 1993). A sample of fifth graders was randomly assigned to one of four experimental conditions: product goal, process goal, process goal plus feedback and a control group. Results showed that the students in the process goal and process goal plus feedback conditions demonstrated higher writing skills than students in the product goal and control conditions. Also, students in the process goal conditions had higher self-efficacy beliefs. In a second experiment (Schunk & Swartz, 1993) the researchers assessed maintenance and generalization of strategy use, self-efficacy and writing skill. As predicted, combining process goals with progress feedback enhanced transfer of writing strategy use, skill and self-efficacy.

Zimmerman and Kitsantas (1999) also found evidence supporting the effectiveness of process and outcome goals during writing. In their study, the group that had a higher writing performance was the one that was instructed to shift from process to outcome goals, followed by the group that focused only on process goals, and by the group that learned outcome goals. Students who shifted goals started with a process goal an after the writing strategy had been mastered they changed their attention to outcome goals. In addition to goals setting, Zimmerman and Kitsantas studied the effect of self-monitoring strategy use. As expected, self-monitoring had a positive influence on writing performance and self-efficacy beliefs.

Zimmerman and Kitsantas results parallel those obtained by Schunk and Swartz. In these studies all experimental groups received identical strategy training, however, students who focused on process goals always surpassed individuals who set outcome goals. Goal setting and self-recording complement each other because goal setting provides the basis for selective observation. In other words, goal setting strengthens the effectiveness of self-monitoring. In summary, these studies show that goal setting has an effect on writing and that process goals are more effective than outcome goals.

Self-Evaluation

Good writing, revision and self-reflection processes are highly related. Empirical evidence has shown qualitative revising differences between more and less experienced writers. Several studies indicate that experts tend to revise at a whole-text level whereas novices revise at a sentence-level (Berkenkotter & Murray, 1983; Hayes, Flower, Schriver, Stratman, & Carey, 1987). Novice writers pay more attention to surface changes (mechanics, grammar and spelling) while experts, in addition to this surface changes, also review for structure, meaning, and readers' needs. Experts have stronger detection and diagnosis skills, and have developed a larger strategic

repertoire, including rewriting, and revising strategies. Novices have less strategies and weaker detection and diagnostic skills (Hayes & Flower, 1986).

Including self-reflection opportunities as part of writing instruction influences the quality of written texts as well as the likelihood of transferring writing strategies among contexts (Graham et al., 1998).

Concluding Comments

Throughout the history of research on transfer, several paradigms have dominated the field with clear research agendas and educational implications. According to Haskell (2001), there has been an implicit shift in understanding of transfer as an applied construct. The prevailing model, today, is an instructional view. Some of the questions that researchers are trying to answer are: How do we teach to develop transfer? What do we teach to enhance transfer? One can see an increasing number of instructional models in the recent literature that are addressing the issue of transferability with a sound scientific and empirical base (e.g. Marini & Genereux, 1995; Bereiter, 1995; Campione, Shapiro, & Brown, 1995; Singley, 1995; Dansereau, 1995; Griffin, Case, & Capodilupo, 1995; McKeough, 1995; Pressley et al., 1995; Lupart, 1995). However, more research is still needed. In the words of Mayer and Wittrock (1996), "although progress has been made, the search for teachable aspects of problem solving is not complete" (p. 59)

The overwhelming evidence that shows lack of transfer indicates the need to improve experimental designs that document how people transfer knowledge in the beginning phases, and, in turn, develop appropriate instructional methods. This study will add important information to the already existing literature by providing a strong theoretical base to guide the design of better instructional interventions.

If the study of transfer was important 100 years ago, now is even more necessary to develop better ways of fostering generality; the ability to transfer skills has become a fundamental need in our society. As Haskell (2001) has expressed it:

> "…in slow changing traditional societies, there's much less need for transfer of learning. The demands of our modern civilization, however, make transfer increasingly important. In our highly complex, rapidly changing, Information Age, the ability to transfer or generalize from the familiar to the less familiar, from the old to the new, not only renders our word predictable and understandable, but is a necessity for our adaptation to the technological and global demands of the 21st century." (p. 37).

CHAPTER 3
METHODOLOGY AND PROCEDURES

Sample

All participants were recruited from a public technical college in New York City. The final sample totaled 70 students, 28 females and 42 males. The average age was 21.4 years with a standard deviation of 5.40 years —the youngest participant had just turned 18 whereas the oldest was 57. The median age was 20 years.

The college is divided in three schools: technology and design, arts and sciences, and professional studies. Half of the students were in the technology and design field. Computer engineering and electrical engineering were the most common programs. Twenty-six percent were doing majors in professional studies, in such areas as hospitality management, nursing and dental hygiene. The rest of the students were part of the arts and sciences school and almost all sought a liberal arts and sciences degree.

The population enrolled at the college mirrors the complex demographics of cities that receive large groups of recent immigrants. For example, 53% of the students in the sample were born outside of the United States —the number of years living in the country ranged from 1 to 21 with a mean of 8.29. About 37% did not learn English as their first language; 16% spoke Spanish and the remaining 21% reported other languages such as Korean, Chinese, French/Creole, Bengali, Punjabi, Urdu, Yoruba and Arabic. Around 75% of these students said that they were able to read and write in their native languages.

The ethnic composition of the sample was distributed as follows: 49% Black, 23% Hispanic, 13% Asian, and 6% White. Nine percent of the students did not belong to any of these categories. In terms of socioeconomic status the college is predominately low income. Recent

statistics indicate that 60% of the total population has an income of less than $30,000 and 48% works 20 hours or more per week. However, no specific information about finances was gathered directly from participating students.

Students who were enrolled in English composition classes were invited to be part of the study and to attend two sessions. The author visited more than 40 classes (developmental and non-developmental courses) to ask for students' participation. Classroom teachers encouraged students' participation and some even gave extra credit to those students who completed both sessions —most instructors ignored one absence. Approximately, 150 students signed up for the study. Of those, 96 came to the first session (64% of all students who signed up) and 79% completed the study (53% of all students who signed up, and 82% of all students who attended the first session). Nine students were excluded from the final sample for the following reasons: 1) three had lived in the United States for less than two years and had clear and severe ESL deficits, 2) four had some sort of a learning disability, and 3) two had a perfect score on the pretest.

Task Materials

The learning task for this study was a writing task that required the combination of short sentences into longer sentences or paragraphs. This sentence-combining method has been widely used as an instructional tool in beginning writing classes (Strong, 1996; 1994; 1981) and some research studies (Zimmerman & Kitsantas, 1999; 1997).

This revision task was chosen for use for three reasons. First, variations in this task can be controlled experimentally —thus permitting rigorous assessment of transfer. Second, sentence combining problems are a demanding test of writing revision because they require structural changes in text, and many students have trouble transferring these literary skills to new

tasks. Third, there is evidence that many college students do not review or self-evaluate their written papers substantially (Bridwell, 1980), which are key self-regulatory processes. However, there is evidence (Beach & Eaton,(1984) that college students benefited from a self-assessment form, which improved their corrections in their written work. There is also evidence that writing revision can be taught as a metacognitive strategy (Zimmerman & Kitsantas, 1999, 2002).

Design and Procedures

Participants were randomly assigned to either three experimental groups or to a control group. Some students who were enrolled in developmental courses participated in the study because the data was collected at the end of the semester and according to their instructors they were already writing at the level that is required for placement in a non-developmental course. Because some students were not included in the final sample for various reasons, the groups did not end with equal totals. Table 3.1 displays the number of students in each experimental group according to their level of instruction (developmental vs. non-developmental).

Table 3.1
Number of Students in each Group

Control group		**Group 1**		**Group 2**		**Group 3**	
Developmental	Non Developmental	Developmental	Non Developmental	Developmental	Non Developmental	Developmental	Non Developmental
0	16	10	8	6	13	2	15
Total 16		Total 18		Total 19		Total 17	

All groups participated in the following phases: 1) a pretest phase 2) an instruction phase, 3) a practice phase, 4) a posttest phase, and 5) a transfer phase. These phases occurred during two sessions. During the first session, students signed a consent form and completed a

demographic questionnaire (see Appendix 1). Then, the experimenter guided students through the pretest, instruction, practice and posttest. The focus of the second session was on the transfer tasks. The scripts used in the sessions are attached in Appendix 2.

Both sessions lasted approximately one hour and were separated by one day (i.e. Monday and Wednesday or Tuesday and Thursday). Most students were tested individually, but there were some cases in which more than one student came at the same time (up to three students). In those sessions, the researcher followed the script with the small group and then gave individual attention to each student. All students received feedback on each learning problem. The author tested all students. Sessions were scheduled in a quiet room at the college. All students who completed the second session received five dollars in compensation for their time. Table 3.2 summarizes the intervention for each group.

Table 3.2
Intervention for the Control Group and Each Experimental Group

Sessions	Phases	Control group	Group 1	Group 2	Group 3
First session (One hour)	**Pretest phase (5 minutes)**	One sentence problem	One sentence problem	One sentence problem	One sentence problem
	Instruction phase (15 minutes)	---------	Revision writing strategy	Revision writing strategy	Revision writing strategy
	Practice phase (20 minutes)	---------	---------	Self-monitoring	Self-monitoring + self-evaluating
	Posttest phase (20 minutes)	Three sentence problems	Three sentence problems	Three sentence problems	Three sentence problems
Second session (One hour)	**Transfer phase**	Two newspaper articles	Two newspaper articles	Two newspaper articles	Two newspaper articles

Pretest Phase

During this phase, participants were asked to solve a problem that consisted of combining a series of short sentences into a single non-repetitive sentence. The researcher started the pretest session by introducing the concept of sentence combining while students followed using a handout (see Appendix 3). In order to combine the sentences, four standards were given: 1) to use the minimum number of words possible, 2) to add words to link ideas 3) to keep the main ideas of all short sentences, and 4) to write a grammatically correct final sentence. Students attempted to solve the first problem before receiving any kind of instruction.

Instruction Phase

During this phase, the experimenter explained how to solve the pretest problem, and then asked students to solve a second problem. After the students answered the second problem, the experimenter gave an explanation on how to solve it too. The experimenter's explanations varied according to the student's experimental conditions. Students in the experimental conditions had a writing revision modeled and described to them. This revision strategy consists of four steps: 1) circling all the words standing for new ideas in each sentence 2) grouping similar ideas together 3) organizing/ numbering ideas in a proper sequence, and 4) choosing connecting words (e.g. and, but, because, etc.) and/or changing word endings (e.g. -ing) to link ideas. Students in the control group received directions on the purpose of the task, but they were not taught the four-step revision strategy. The first group (experimental 1) was told only to use the revision strategy to solve the writing problem. The second group (experimental 2) was told to use the revision strategy and to monitor the implementation of each step of the writing strategy. The third group (experimental 3) was told to use the revision strategy, to monitor strategy implementation, and to evaluate the effectiveness of the final sentence. The control group was not shown the revision

strategy or given any additional specific instruction. This instruction phase lasted approximately 20 minutes. Two different handouts were developed; one for the three experimental groups and one for the control group (see Appendix 3).

Practice Phase

After the instruction phase students had 20 minutes to practice on six sentence combining problems, and each group was given a different handout while practicing (see Appendix 4). A timer was set so everyone had exactly the same amount of time.

Posttest Phase

Acquisition was assessed by giving a posttest involving three new multiple sentence problems that increased gradually in difficulty (see Appendix 5). On average, it took students 15 minutes to solve the posttest problems. All the writing problems were selected from Strong's *Sentence combining: A composition book* (1994) and *Writer's toolbox: A sentence-combining workshop* (1996).

Transfer Phase

The second session was devoted exclusively to solving the transfer problems. The experimenter explained the purpose of the exercises, which consisted of writing a newspaper article using some facts. These facts were written in the form of sequential sentences (see Appendix 6).

The transfer task is similar to the writing problems in the sense that it requires the ability to combine several sentences, but unlike the writing problems in which the outcome is to write one sentence, for the transfer task participants had to combine different sentences into one paragraph. Table 3.3 depicts the main differences between the posttest and transfer tasks. To

overcome limitations in previous studies, two transfer tasks were given and perceived similarity between learning and transfer was assessed in each transfer trial.

Table 3.3
Differences between the Instruction Task and the Transfer Task

	Instruction task	**Transfer task**
Problem setting	6-8 sentences about one single idea	23 sentences about different ideas
Constraints	Use minimum number of words	Use minimum number of sentences
Solution	Intra-idea solution Use four-step strategy to link phrases about a single idea into a one non-redundant sentence.	Intra-idea and inter-idea solution Use four-step strategy to link phrases about a single idea into a one non-redundant sentence. Learners will have to come up with an extra step to link different ideas into a non-redundant paragraph (adaptation part)
Final outcome	1 sentence	1 paragraph

Barnett's and Ceci's taxonomy (2002) was used to classify the transfer tasks. Table 3.4 illustrates how the tasks were categorized. In terms of content, the transfer tasks require the application of general skills. In terms of context, three dimensions —knowledge domain, functional context, and modality— are categorized in the direction of far transfer.

At the end of the second session, students were given examples of the sentence combining exercises and transfer tasks (see Appendix 7). They had to compare their original answers with the examples. Then, the experimenter had a discussion with each participant.

Table 3.4
Application of Barnett's and Ceci's Taxonomy of Transfer to the Present Proposal

Part A **Content: What transfers?**	
Learned skill	Principle or heuristic
Performance change	Approach
Memory demands	Recall, recognize and execute

Part B **When and where transferred from and to**				
	Near	◄——————————————————►		Far
Knowledge domain		School writing vs. current events writing		
Physical context	Same room at school			
Temporal context		Next day		
Functional context			Academic vs. journalistic	
Social context	Both individual			
Modality		Sentence vs. paragraph		

Measures

Writing Skill

Writing performance was assessed by using the outcomes on the pretest, posttest, and transfer tasks. The first problem that students answered during the instruction phase, before any instruction was given, was used as a pretest. Those students who had a perfect score on the pretest were excluded from the study.[4] For the posttest, students solved three writing revision problems that increased in their difficulty level gradually (see Appendix 5).

Specific rubrics were designed to score these sentences by taking into account the following categories: inclusion of key words, correct grammar, sensible and understandable sentences, and elimination of duplicate information. The answers on the pretest and posttest tasks were scored on a 100-point system. The three problems on the posttest were averaged to obtain a total score. The scoring sheets are shown in Appendix 8.

For the transfer tasks, participants solved two problems that required combining short sentences into a paragraph. Participants were told that they were assigned to cover a story and to write a newspaper article. Facts about the specific stories were given in short sentences. These writing problems were selected from real newspaper articles and then were transformed into multiple short sentences; each task had 23 sentences. All students were exposed to the same two transfer tasks. One of the stories was about a robbery and the other one about a student who was attacked by a snake; both had the same level of difficulty. Half of the students in each group answered the "robbery" task first and the "snake" task second. The other half answered the

[4] Although the first problem (pretest phase) was quite simple, none of the students during the pilot phase were able to get a perfect score. However, when collecting the data for this study some of the students did get perfect scores. The second problem (instruction phase) was more difficult than the first one because students had already received directions on how to use the four-step strategy to solve these kind of exercises, and it was expected that they could solve a more challenging task. However, very few students got high scores. Therefore, it was decided to exclude from the study students who had an average of 100 points on both problems.

"snake" problem first followed by the "robbery" one (see Appendix 6). The answers were scored on a 100-point scale. The same rubrics developed for the pretest and posttest were used to score the transfer tasks (see Appendix 8).

The author developed the scoring procedures using Zimmerman and Kitsantas' (1999, 2002) scoring system as a model. Zimmerman and Kitsantas' studies used a learning task that also consisted on combining short sentences into a single non-repetitive sentence.

To establish reliability of the scoring systems of the pretest, posttest and transfer tasks, a second rater scored 20% of the answers, and correlations were computed. On the pretest $r = .94$, on the posttest $r = .90$, and on the transfer tasks $r = .97$. All correlations were significant at the .001 level.

Number of Problems Solved During Practice

During the practice session students were given six problems. Since it was not expected that they would be able to answer all of them in 20 minutes, the number of problems solved was calculated for each participant.

Strategy Use

The first three steps of the writing strategy involved specific behaviors. The first step required "circling" new ideas in each sentence. The second step entailed "grouping" similar ideas together by drawing lines, and the third step "numbering" the ideas in a proper sequence. If students overtly used these steps on the posttest; they received a point for each step. Therefore, the maximum score was three. The number of strategies used on the three posttest problems was averaged. The fourth step of the writing strategy was not scored as an indicator of strategy use, because this step (i.e. the inclusion of connecting words and changing word endings) was

implicit in writing grammatically correct sentences and became part of students' writing performance. Although the control group did not receive instruction on the writing strategy, some students did use overtly some sort of similar strategy steps. For example, if they circle the clauses, or numbered the sequence of the sentences, or group similar clauses together they were given credit for it.

For the transfer tasks, students who overtly circled, grouped or numbered the clauses were given one point for each behavior, including control students. Some students used very interesting grouping strategies that involved organizing information within a sentence and between sentences. In those cases they were given two points, one for each grouping behavior. In addition, they were given additional points if they used another form of explicit strategy. The most common ones were checking marks or striking through the clauses that had already being included in the final paragraph.

Self-Efficacy

A measure of self-efficacy was used to assess students' perceived capability to solve each of the posttest and transfer problems. This measure was developed using procedures outlined by Bandura and Shunk (1981)

For each posttest problem, participants were asked the following question: *How sure are you that you can solve this writing problem in one sentence?* For each transfer problem they were asked the next question: *How sure are you that you can write this newspaper article using the minimum number of sentences?* Self-efficacy questions were asked before participants solve any writing problem.

In order to answer the self-efficacy questions, a 100-point scale with 10-point intervals was given. Written descriptions were provided next to the following points: 10 (not sure), 40

(somewhat sure), 70 (pretty sure), and 100 (very sure). For the posttest, the three self-efficacy measures were averaged to obtain a total score.

Self-Evaluation

After each posttest and transfer problem, participants were asked to rate how well they combined all the sentences into a single sentence (posttest) or into a paragraph (transfer). For the posttest, they were asked, *how well did you combine all sentences into a single sentence?*, and for the transfer tasks they were asked, *how well did you combine the sentences into a newspaper article?* Again, a 100-point scale with 10-point intervals was given. Written descriptions were provided next to the following points: 10 (not well), 40 (somewhat well), 70 (pretty well), and 100 (very well).

Similarity

A similarity measure was used to assess students' perceived similarity between the one sentence problems and the transfer problems. Participants were asked to rate how similar the newspaper article task was to the sentence problem tasks by using a 100-point scale (*how similar is the newspaper article to the one sentence problem task?*). Written descriptions were provided next to the following points: 10 (not similar), 40 (somewhat similar), 70 (pretty similar), and 100 (very similar).

Adaptation

An adaptation measure was used to assess how much the one sentence problems helped students to write the newspaper article (*How much did the one-sentence problems from last session help you to create the newspaper article task?*). Participants were also given a 100-point scale. Written descriptions were provided next to the following points: 10 (none) and 100 (a lot).

Hypotheses

Based on a social cognitive view of learning and transfer it is hypothesized that:

1. Group three will outperform all the groups in the writing performance on the posttest and transfer tasks —and that group two will surpass group one and the control group, and that group one will outperformed the control group.
2. Group three will use more writing strategies on the posttest and transfer tasks than all the groups —and that group two will use more than group one and the control group, and that group one will use more than the control group.
3. Those students who use more writing strategies will have higher scores on the posttest and transfer tasks.
4. Those students who have higher self-efficacy beliefs will have higher scores on the posttest and transfer tasks.
5. Group three will have higher self-efficacy beliefs on the posttest and transfer tasks than all the groups —and that group two will surpass group one and the control group, and that group one will outperformed the control group.
6. Group three will have higher self-evaluation scores on the posttest and transfer tasks than all the groups —and that group two will surpass group one and the control group, and that group one will outperformed the control group.
7. Those students who have higher self-evaluation scores will have higher scores on the posttest and transfer tasks.

8. Group three will have higher similarity scores than all the groups —and that group two will surpass group one and the control group, and that group one will outperformed the control group.
9. Group three will have higher adaptability scores than all the groups —and that group two will surpass group one and the control group, and that group one will outperformed the control group.
10. Those students who have higher similarity scores will have higher scores on the transfer tasks.
11. Those students who have higher adaptability scores will have higher scores on the transfer tasks.

CHAPTER 4
RESULTS

This chapter is divided in five major sections based on the outcomes of the dependent variables. The first section describes the writing performance on the pretest, posttest, and transfer tasks. In the second and third section, the results related to number of problems solved during the practice phase and strategy use on the posttest and transfer tasks are explained. The fourth section focuses on self-efficacy beliefs and self-evaluation judgments. Finally, the findings on the similarity and adaptability measures are presented. Table 4.1 depicts the correlations among all the dependent variables.

Writing Performance

In the first part of this section, the correlations among the writing scores are presented. In the second part, the analyses and outcomes of the pretest, posttest and transfer tasks are described in detail. Table 4.2 displays the means and standard deviations for each of the writing performance measures.

The writing scores on the pretest were positively correlated with the writing scores on the posttest, $r = .37$, $p < .01$, but they were not correlated with the transfer writing scores (see Table 4.1). On the other hand, there was a positive relationship between posttest writing performance and the two transfer tasks, $r = .47$, $p < .01$ and $r = .32$, $p < .01$, respectively. As expected, students' performance on both transfer writing tasks was correlated, $r = .55$, $p < 01$. "Instructional level" (developmental vs. non developmental) turned out to be only slightly correlated with pretests, $r = .26$, and posttest scores, $r = .30$ (both significant at the .05 level).

Table 4.1
Correlations among all the Dependent Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Instructional level	--																	
2. Writing pretest	.264*	--																
3. Writing posttest	.302*	.366**	--		.													
4. Writing transfer 1	.206	.063	.472**	--														
5. Writing transfer 2	.107	.164	.321**	.547**	--													
6. N. problems solved (practice)	.188	.070	-.205	-.109	-.145	--												
7. Strategy use posttest	-.006	.047	.245*	.020	.250*	-.306*	--											
8. Strategy use transfer 1	.167	.020	.432**	.181	.099	-.256*	.366**	--										
9. Strategy use transfer 2	.009	.074	.311**	.265*	.352**	-.330**	.517**	.401**	--									
10. Self-efficacy posttest	-.036	.107	.126	.201	.155	.032	.103	.024	.042	--								
11. Self-efficacy transfer 1	.017	.313**	.042	.161	.170	.047	.122	.022	.086	.714**	--							
12. Self efficacy transfer 2	-.006	.257*	.033	.212	.143	.019	.100	.043	.102	.599**	.795**	--						
13. Self-evaluation posttest	.163	.086	.150	.072	.031	.170	.189	.000	.160	.688**	.414**	.381**	--					
14. Self-evaluation transfer 1	.126	.408**	.199	.236*	.313**	.045	.145	.063	.182	.513**	.554**	.539*	.595**	--				
15. Self-evaluation transfer 2	-.001	.095	-.124	.013	-.080	.116	.099	-.086	.011	.570**	.618**	.607**	.542**	.534**	--			
16. Similarity 1	-.001	.082	-.078	.051	.055	.016	.085	.082	.116	.488**	.422**	.358**	.330**	.283*	.428**	--		
17. Similarity 2	.042	.064	.061	.199	.242*	-.070	.164	.070	.202	.467**	.463**	.478**	.305*	.333**	.519**	.764**	--	
18. Adaptation 1	-.026	.241*	.045	.204	.313**	.011	.288*	.090	.126	.330**	.251*	.377**	.230	.334**	.301*	.447**	.540**	--
19. Adaptation 2	-.107	.142	.002	.113	.125	-.020	.188	.117	.004	.373**	.274*	.392**	.141	.217	.355**	.446**	.508**	.773**

**. Correlation is significant at the .01 level (2-tailed) *. Correlation is significant at the .05 level (2-tailed)

Table 4.2
Writing Performance Scores: Means and Standard Deviations for the Control and Experimental Groups on the Pretest, Posttest, and Transfer Tasks

	Control		Group 1		Group 2		Group 3	
Writing performance	M	SD	M	SD	M	SD	M	SD
Pretest	82.75	21.72	74.17	22.80	80.32	19.39	83.14	7.98
Posttest	79.52	14.24	81.78	13.32	87.21	10.83	92.12	4.53
Transfer 1	57.63	25.56	57.83	24.54	46.53	21.80	76.23	12.81
Transfer 2	55.25	20.28	61.44	24.55	62.84	13.94	77.18	12.32

Pretest Writing Scores

Analysis of variance (ANOVA) techniques were used to analyze the outcomes on the pretest, and no significant differences among the groups were found (see Table 4.3).

Table 4.3
One-way Analyses of Variance for Effects of the Intervention on Five Dependent Variables

Variable	Source	SS	MS	*F* (3,66)	*p*	Post hoc *
Pretest writing scores	Between	933.15	311.05	.87	ns	0 = 1 = 2 = 3
	Within	23701.72	359.12			
Problems solved during practice	Between	18.95	6.32	6.13	.001	3 > 0
	Within	68.00	1.03			
Posttest- strategy use	Between	20.27	6.76	10.70	.001	3 > 0 2 > 0 1 > 0
	Within	41.67	.631			
Posttest-self-efficacy	Between	660.79	220.26	.62	ns	0 = 1 = 2 = 3
	Within	234116.55	354.80			
Posttest-self evaluation	Between	320.50	106.83	.35	ns	0 = 1 = 2 = 3
	Within	20062.20	303.97			

* Tukey HSD post hoc multiple comparison were performed. Control group = 1. Group 1 = 1. Group 2 = 2. Group 3 = 3.

Posttest Writing Scores

To control for initial writing differences and previous performance, an analysis of covariance (ANCOVA) was conducted using "instructional level" (developmental vs. non developmental) and pretest scores as covariates (see Table 4.4).

Table 4.4
Analysis of Covariance for Writing Performance on the Posttest

Source	df	SS	MS	*F*	*p*
Covariate 1 (instructional level)	1	639.105	639.105	6.11	.01
Covariate 2 (pretest writing scores)	1	796.506	796.506	7.62	.001
Posttest writing performance	3	1607.491	535.830	5.13	.001
Error	64	6691.965	104.562		

The analysis confirmed group differences. In addition, both covariates were significant predictors of outcomes in the model, $F(1,64) = 6.11$, $p < .01$, and $F(1,64) = 7.62$, $p < .001$, respectively. The adjusted means were 76.95, 85.28, 87.63 and 90.37 for the control and experimental groups 1-3, respectively. To test for differences among the groups on the adjusted means, simple GLM univariate contrasts were conducted using the control group as the reference category ―SPSS simple contrasts compare the mean of each level to the mean of a specified level. This analysis showed that as predicted, all treatment groups significantly outperformed the control group (group 1 by 8.33 points, $p < .01$; group 2 by 10.69 points, $p < .001$; and group 3 by 13.42 points, $p < .01$). A subsequent test with the same simple contrasts was performed with the third experimental group as the reference category, and no significant differences among the three experimental groups were found. However, polynomial contrasts indicated a significant linear trend, $p < .001$, confirming the expected progression (group 3 > group 2 > group 1 > 0).

Transfer Writing Scores

A repeated-measures ANOVA was performed to assess the writing performance on the transfer tasks (see Table 4.5). The experimental groups were defined as a between factor, and the two transfer tasks as a within factor (first and second trials).

Table 4.5
Repeated measures ANOVAS for Writing Performance on the Transfer Tasks

Test of within-subjects effects

Source	df	SS	MS	*F*	*P*
Within factor	1	745.05	745.05	3.66	.060
Within factor * group	3	1808.90	602.97	2.96	.039
Error (within factor)	66	13448.54	203.766		

Test of between-subjects effects

Source	df	SS	MS	*F*	*P*
Group	3	10565.54	3521.85	5.80	.001
Error (within factor)	66	40103.95	607.64		

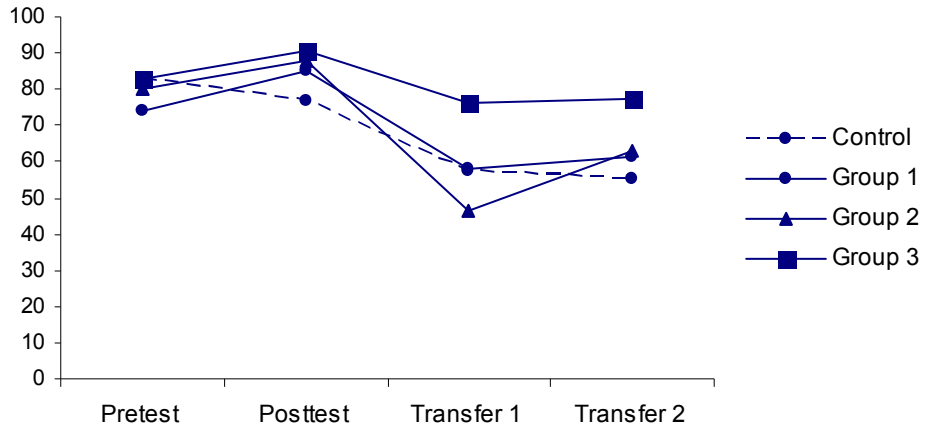
According to univariate within-subjects analyses, students' scores on the first and second transfer tasks did not differ significantly. The interaction between the experimental groups and the within factor reached significance $F(1,3) = 2.96$ $p < .01$. The writing performance of the second group on the first transfer exercise was quite low —resulting in a significant interaction.

Between-subject analysis indicated significant differences among the groups, $F(3,66) = 5.80 < .001$. Figure 4.1 displays the observed means on the pretest and transfer tasks and the adjusted means on the posttest.

To test for differences among the groups on the transfer means regular ANOVAS were carried. Table 4.2 displays the means and standard deviations. Post hoc Tukey HSD analysis indicated that on the first transfer task there were no significant differences between the control group and groups 1, 2 and 3. The third group significantly outperformed group 2 ($p <$ .001) but not group 1.

Post-hoc Tukey HSD analysis showed that on the second transfer task the third group significantly outperformed the control group, $p < .01$. There were no differences between the control group and groups 1 and 2.

Figure 4.1
Writing Performance Scores: Observed Means on the Pretest and Transfer Tasks, and Adjusted Means on the Posttest.



Although the four groups were statistically comparable on the pretest, all groups except the control group improved on the posttest. Across groups, writing performance dropped on the first transfer task, in particular for the second group. However, the second group increased its performance on the second transfer task .

Number of Problems Solved during Practice

Although all the groups had the same amount of time during the practice session, analysis of variance indicated significant differences among the groups in the amount of problems solved during this time, $F(3,66) = 6.13$, $p < .001$ (see Table 4.3). Students in the control group answered

more problems than students in the other groups. Table 4.6 displays the means and standard deviations. Students in the control group solved approximately five problems (M=4.66) whereas participants in the third group answered three problems (M=3.15). Post hoc Tukey tests showed only significant differences between these two groups, and no differences among the experimental groups. However, polynomial contrasts indicated a significant linear trend, $p < .001$ —smaller means in group 3 followed by larger means in group 2, group 1, and the control group.

Table 4.6
Number of problems solved during practice: Means and Standard Deviations for the Control and Experimental Groups on the Posttest and Transfer Tasks

	Control		Group 1		Group 2		Group 3	
Practice Phase	M	SD	M	SD	M	SD	M	SD
Number of problems solved	4.66	1.08	3.81	.93	3.76	1.16	3.15	.86

Strategy Use

As expected, a positive correlation was found between writing performance on the posttest and number of strategies used to answer the posttest problems, $r = .25$, $p < 05$ (see Table 4.1). In contrast, there was no relation between number of strategies that students applied on the first transfer task and writing performance on this task, perhaps, because the writing scores on this transfer task were quite low. On the other hand, writing performance on the second transfer task was higher, and it proved to be correlated with strategy use, $r = .35$, $p < 01$.

Strategy use on the posttest was correlated with number of strategies used on the first and second transfer tasks, $r = .37$ and $r = .51$, respectively. There was also a correlation of $r =. 40$ between the number of strategies that students employed on both transfer tasks (all these

correlations were significant at the .001 level). It seems that students who actually used some sort of writing strategy applied them on the posttest and the transfer tasks.

A negative relationship between number of problems solved during the practice session and number of strategies used during the posttest and transfer tasks was found (r = - 31, -.26 and -.33, respectively). The fewer problems students´ solved during the practice session, the more strategies they used on the writing tasks.

Posttest Strategy Use Scores

As predicted, very few participants in the control group used any components of a writing strategy on the posttest (M = .25). By contrast, students in the first (M=1.24,), second (M=1.28) and third groups (M=1.78) performed significantly higher according to ANOVA, F (3,66) = 10.70, $p < .001$ (see Table 4.3). Table 4.7 displays the means and standard deviations. Post hoc Tukey tests showed that the control group differed significantly from the other groups. Although the differences among the three experimental groups did not reach statistical significance, they correspond to the hypothesized trend (group 3 > group 2 > group 1) as indicated by polynomial contrast that showed a significant linear trend, $p < .001$.

Table 4.7
Strategy Use Scores: Means and Standard Deviations for the Control and Experimental Groups on Posttest and Transfer Tasks

	Control		Group 1		Group 2		Group 3	
Strategy use	M	SD	M	SD	M	SD	M	SD
Posttest	.25	.39	1.24	.92	1.28	.72	1.78	.99
Transfer 1	1.50	.97	1.78	1.00	2.37	1.01	2.59	.87
Transfer 2	1.19	.75	2.00	.69	2.00	.47	2.59	.87

Transfer Strategy Use Scores

A repeated-measures ANOVA was performed to assess number of strategies used on the transfer tasks (see Table 4.8). The experimental groups were defined as a between factor, and the two transfer tasks as a within factor (first and second trials).

Table 4.8
Repeated measures ANOVAS for Strategy Use Scores on the Transfer Tasks

Test of within-subjects effects

Source	df	SS	MS	*F*	*p*
Within factor	1	.458	.458	.853	ns
Within factor * group	3	2.06	.686	1.28	ns
Error (within factor)	66	35.49	.54		

Test of between-subjects effects

Source	df	SS	MS	*F*	*p*
Group	3	27.25	9.084	10.21	.001
Error (within factor)	66	58.72	.890		

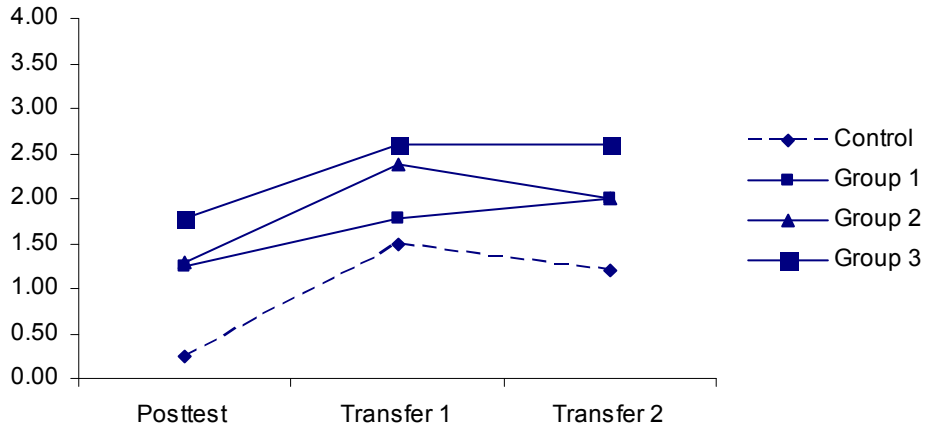
Univariate within-subjects effects indicated that the within factor was not significant, as well as the interaction of this factor with the groups. On the other hand, between-subject analysis showed significant differences among the groups, $F(3,66) = 10.21$, $p < .001$. Figure 4.2 displays the means on the posttest and transfer tasks.

To test for differences among the groups on the transfer tasks regular ANOVAS were carried out for each transfer task. Post hoc HSD Tukey analyses showed that there were no significant differences between the control group and group 1 on the number of strategies used on the first transfer task. However, the other two groups outperformed the control group. Both differences were significant at the .01 level.

Post hoc Tukey HSD analyses indicated that all the groups used significantly more strategies than the control group. All differences were significant at the .001 level.

In general, students used more writing strategies during the transfer tasks than on the posttest problems. As expected, students in the experimental groups used more strategies to solve the writing tasks. However, the behavior of the control group is quite interesting because even when they did not receive explicit directions regarding the writing strategy, they developed unique mechanisms to answer the tasks.

Figure 4.2
Strategy Use Scores: Means on the Posttest and the Transfer Tasks



Self-Efficacy Beliefs and Self-Evaluation Judgments

Contrary to what it was expected, there were no significant correlations between self-efficacy beliefs and writing performance (see Table 4.1). Strategy use was not correlated with self-efficacy beliefs and self-evaluations judgments on the posttest and both transfer tasks.

Posttest self-evaluation judgments were not correlated with posttest writing performance scores. Self-evaluation judgment on the first transfer task had a small correlation with writing

performance on this task, $r = .25$, $p < 05$. Yet, self-evaluation judgment on the second transfer task were not correlated with writing performance on second task

Self-efficacy beliefs scores were highly correlated with self-evaluation scores on the posttest, $r = .69$, on the first transfer task, $r = .55$, and on the second transfer task, $r = .61$ (all correlations significant at the .01 level).

Posttest Self-Efficacy and Self-Evaluation Scores

ANOVA tests indicated no significant differences among the groups in the self-efficacy and self-evaluation scores (see Table 4.3). Tables 4.9 and 4.10 display the means and standard deviations. An ANOVA analysis was conducted with the pretest scores as covariates and the self-efficacy or self-evaluation scores as dependent variables. The pretest scores were not a significant predictor in the model, and the differences among the groups did not reach significance levels.

Table 4.9
Self-Efficacy Beliefs: Means and Standard Deviations for the Control and Experimental Groups on the Posttest and Transfer Tasks

	Control		Group 1		Group 2		Group 3	
Self-efficacy	M	SD	M	SD	M	SD	M	SD
Posttest	61.56	12.84	67.31	24.25	66.23	19.30	70.39	16.28
Transfer 1	64.38	14.13	63.89	23.30	62.89	17.35	71.17	11.66
Transfer 2	69.38	11.81	68.61	23.57	67.11	23.47	75.58	15.60

Table 4.10
Self-Evaluation Judgments: Means and Standard Deviations for the Control and Experimental Groups on the and Transfer Tasks

	Control		Group 1		Group 2		Group 3	
Self-evaluation	M	SD	M	SD	M	SD	M	SD
Posttest	66.25	13.33	65.00	21.42	67.01	19.40	70.78	13.28
Transfer 1	70.94	10.99	68.33	22.82	71.57	17.72	76.76	11.45
Transfer 2	72.19	10.80	69.17	18.88	69.47	18.55	76.18	13.05

Transfer Self-Efficacy and Self-Evaluation Scores

Repeated-measures ANOVA were performed to assess self-efficacy beliefs and self-evaluation judgments on the transfer tasks (see Tables 4.11 and 4.12). The experimental groups were defined as a between factor, and the two transfer tasks as a within factor (first and second trials). Posttest scores were not included in the model because previous analyses indicated that they were not significant covariates.

Table 4.11
Repeated measures ANOVAS for Self-Efficacy Beliefs on the Transfer Tasks

Test of within-subjects effects

Source	df	SS	MS	*F*	*P*
Within factor	1	733.13	733.13	9.84	.001
Within factor * group	3	3.128	1.043	.014	Ns
Error (within factor)	66	4915.44	74.48		

Test of between-subjects effects

Source	df	SS	MS	*F*	*P*
Group	3	1471.30	490.43	.80	Ns
Error (within factor)	66	40242.28	609.73		

Table 4.12
Repeated measures ANOVAS for Self-Evaluation Judgments on the Transfer Tasks

Test of within-subjects effects

Source	df	SS	MS	*F*	*P*
Within factor	1	.811	.811	.006	Ns
Within factor * group	3	62.19	20.73	.162	Ns
Error (within factor)	66	8423.70	127.63		

Test of between-subjects effects

Source	df	SS	MS	*F*	
Group	3	1139.68	379.89	.938	Ns
Error (within factor)	66	26719.069	404.8		

Between-subject analyses showed no differences among the groups on their self-efficacy and self-evaluation scores. A univariate analysis indicated that students' self-efficacy beliefs were significantly lower on the first transfer task in comparison to the second one, $F(1,66) = 9.84$, $p < .001$ (see Table 4.11). On the other hand, there were no significant differences between self-evaluation judgments on the two transfer tasks.

Self-Efficacy and Self-Evaluation Accuracy

Further analyses compared the control group and the third experimental group on how accurate the students were in their self-efficacy and self-evaluation judgments in comparison to actual posttest and transfer writing scores. A deviation of 20 points or less was considered "on target" (e.g., if the self-efficacy or the self-evaluation score was 80 and the actual score on the posttest was 60, the difference was considered on target). Deviations equal to or above 21 points were "off target" (e.g., if the self-efficacy or the self-evaluation score was 70 and the actual score on the posttest was 40, the difference was considered off target). In each group the percentage of students on target was estimated. Table 4.13 depicts these percentages.

Table 4.13
Self-Efficacy and Self-Evaluation Accuracy (Percentage of Students "On Target") for the Control and Third Experimental Groups on the Posttest and Transfer Tasks

	Control		Group 3	
	Self-efficacy accuracy	Self-evaluation accuracy	Self-efficacy accuracy	Self-evaluation accuracy
Posttest	44%	63%	65%	65%
Transfer 1	69%	69%	88%	88%
Transfer 2	50%	50%	94%	94%

To test for differences between the groups, chi-square tests were conducted. On the posttest, there were no significant differences between the control group and group 3 on self-efficacy and self- evaluation accuracy. A similar number of students made accurate judgments in both groups. The percentage of students in group 3 who were accurate on the first transfer task was larger than students in the control group (88 % vs. 69%). However, this difference was not statistically significant. On the other hand, the percentages changed significantly on the second transfer task, X^2 (1) = 6.02, $p < .01$ — since the distribution on the control group and group 3 was the same on both self-efficacy and self-evaluation measures, the same outcomes were obtained in the two chi-square analyses. The majority of students in the third group were on target with their predictions (94%) whereas only half of the students in the control group made accurate judgments.

Perceived Similarity and Adaptation Scores

Students who perceived the transfer tasks as similar to the sentence combining problems also had higher adaptation scores, $r = .45$, $p < .01$ and $r = .50$, $p < .01$ for the first and second transfer tasks, respectively (see Table 4.1). The correlation between the two similarity measures was very high, $r = .76$, $p < .01$, as well as the correlation between the two adaptability measures, $r = .77$, $p < .01$.

There were no correlations between similarity scores and writing performance on the first transfer task, but there was a low correlation between these variables on the second transfer task, $r = .24$, $p < .05$. There was no relation between adaptation scores and writing performance on either transfer task. Also, there were no significant correlations between perceived similarity and adaptation and strategy use.

Perceived similarity was correlated with self-efficacy beliefs and self-evaluations judgments. On the first transfer task, the correlations were $r = .42$, $p < .01$ and $r = .28$, $p < .05$, respectively. On the second transfer task they were $r = .45$, $p < .01$ and $r = .52$, $p < .05$, respectively. Tables 4.14 and 4.15 display the similarity and adaptation score means and standard deviations.

Table 4.14
Similarity Scores: Means and Standard Deviations for the Control and Experimental Groups on the Transfer Tasks

	Control		Group 1		Group 2		Group 3	
Similarity	M	SD	M	SD	M	SD	M	SD
Transfer 1	71.56	18.41	79.72	20.90	72.32	20.67	82.94	14.80
Transfer 2	69.69	15.97	80.00	17.82	74.21	22.38	85.59	13.56

Table 4.15
Adaptation Scores: Means and Standard Deviations for the Control and Experimental Groups on the Transfer Tasks

	Control		Group 1		Group 2		Group 3	
Adaptation	M	SD	M	SD	M	SD	M	SD
Transfer 1	77.18	17.51	86.11	18.52	89.21	18.58	91.47	8.43
Transfer 2	77.81	19.58	85.00	15.44	89.21	16.00	89.12	8.70

A repeated-measures ANOVA was performed to assess the similarity scores on the transfer tasks (see Table 4.16). The experimental groups were defined as a between factor, and the two transfer tasks as a within factor (first and second trials). The posttest scores were not included in the model because previous analyses indicated that they were not significant covariates.

Within-subject analyses indicated that the similarity and adaptation scores did not vary from one transfer task to the other (see Tables 4.16 and 4.17). Between-subject effects showed that the groups' differences were not significant at the .05 level.

Table 4.16
Repeated measures ANOVAS for Similarity Scores on the Transfer Tasks

Test of within-subjects effects

Source	df	SS	MS	*F*	*P*
Within factor	1	33.90	33.90	.532	Ns
Within factor * group	3	127.81	42.60	.496	Ns
Error (within factor)	66	5669.52	85.90		

Test of between-subjects effects

Source	df	SS	MS	*F*	*P*
Group	3	4070.10	1356.70	.087	Ns
Error (within factor)	66	39215.80	594.179		

Table 4.17
Repeated measures ANOVAS for Adaptation Scores on the Transfer Tasks

Test of within-subjects effects

Source	df	SS	MS	*F*	*P*
Within factor	1	17.56	17.56	.278	Ns
Within factor * group	3	43.44	14.48	.230	Ns
Error (within factor)	66	4163.70	63.09		

Test of between-subjects effects

Source	df	SS	MS	*F*	p
Group	3	3334.88	1111.63	.066	Ns
Error (within factor)	66	29237.26	442.99		

Repeated measures polynomial contrasts were carried out to test if the similarity and adaptation scores followed a linear trend. The analyses showed that the similarity measured was very close to a significant value, $p = .07$ whereas the adaptation measure turned out to be significant at the .01 level. Figures 4.3 and 4.4 display the means.

Figure 4.3
Similarity Scores: Observed Means on the Transfer Tasks

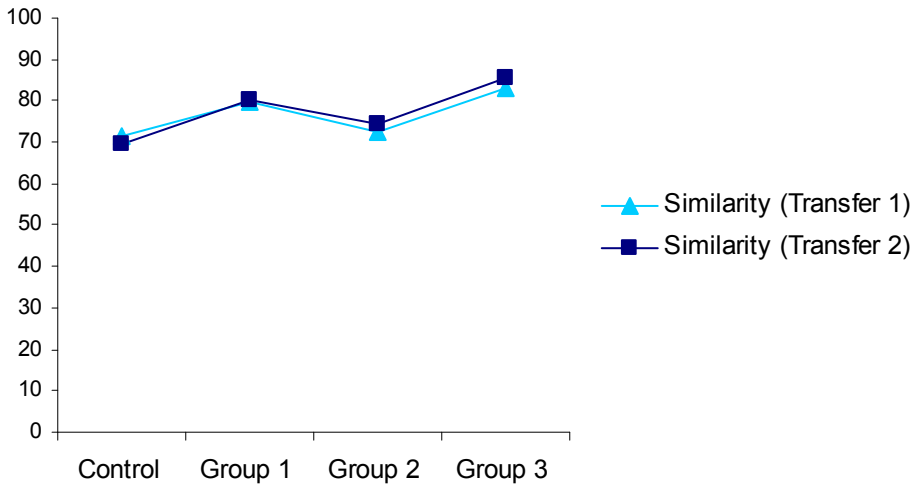
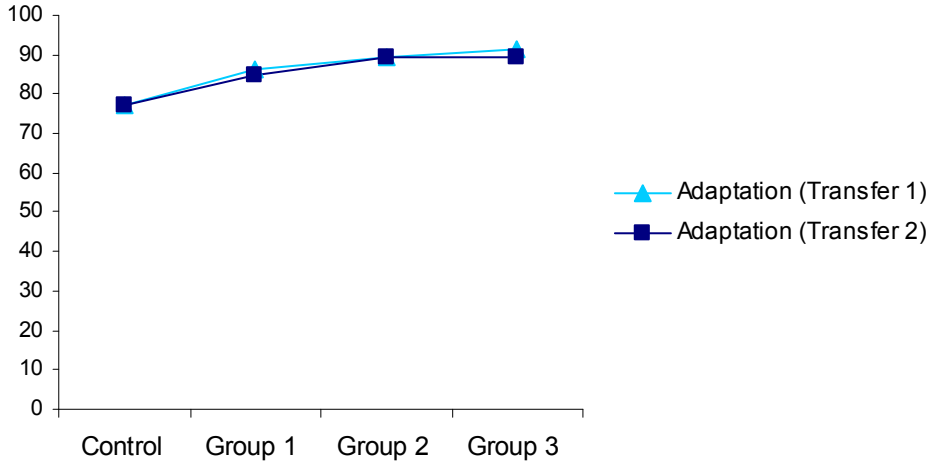


Figure 4.4
Adaptation Scores: Observed Means on the Transfer Tasks



CHAPTER 5
DISCUSSION

The long history of theory and research on the issue of transfer has uncovered the multidimensional and complex nature of this construct. As described in chapter two, early explanations of transfer that only looked at one dimension (e.g. mental faculties, identical elements, rules, or principles) were limited and deficient. However, these historical views contributed to more inclusive views of the circumstances and specific underlying mechanisms that facilitated transfer (see Table 1.1). The main contribution of the social cognitive view is to bring together into one theoretical framework the postulates of the traditional abstraction view, the situated view, and the metacognitive view by understanding successful transfer as the result of social interactions as well as proper implementation of cognitive and metacognitive strategies.

Based on a social cognitive model of academic self-regulation (Zimmerman, 1990; 2000), the present study sought to examine whether acquisition and transfer of a writing revision strategy would be enhanced by teaching college students key self-regulatory processes. This social cognitive model, like several other modern models (e.g., Bransford & Schwartz, 1999; Hatano & Greeno, 1999), views transfer as a dynamic phenomenon that continues to develop after it first emerges on a transfer task. Social cognitive theorists propose that self-regulatory processes that produce adaptation facilitate this development (Martinez-Pons, 2000; Zimmerman, 1989). Implicit in the idea of adaptation is the understanding of how transfer is achieved in the early phases before learners achieve full expertise.

Transfer, from a social cognitive perspective, is the process by which the student attempts to adjust to a new learning task. Therefore, successful transfer is the result of the self-regulatory processes that the individual applies when faced with a novel situation, and it is not determined

merely by the properties of the learning and transfer tasks. On the other hand, unsuccessful transfer is a consequence of deficient self-regulatory skills. The main implication of this perspective is that one's initial shortcomings on a transfer task are not definitive but instead represent the beginning of an adaptive process (Martinez-Pons, 2000; Zimmerman, 1989).

In terms of the generality and specificity of transfer, social cognitive theory considers these as emergent task properties that must be discovered and strategically self-regulated. When general metacognitive skills —goal setting, self-monitoring, and self-evaluation— are adapted to particular situations or are combined with specific knowledge, transfer is more likely to happen.

Dynamic explanations of transfer require methodological changes in the way transfer has been studied. These adjustments include not accepting single answers as the only correct response, giving more than one-shot tasks, and focusing on trial and error behaviors (Bransford & Schwartz, 1999). In addition to the notion of adaptation, current views of transfer have considered perceived similarity on the part of the learner to be more important than actual similarity between tasks for successful transfer to occur (Gick & Holyoak, 1987).

Eleven hypotheses were tested in the present study. The theoretical significance of these hypotheses is discussed in the first part of the chapter. The hypotheses were grouped in four areas according to the main dependent variables —writing performance and strategy use, self-efficacy beliefs and self-evaluation judgments, and perceived similarity and adaptation scores. The second half of the chapter addresses limitations of the study and recommendations for further research. At the end, a brief discussion on the educational implications is presented.

Writing Performance and Strategy Use

It was hypothesized that: 1) group three will outperform all the groups in the writing performance on the posttest and transfer tasks —and that group two will surpass group one and the control group, and that group one will outperformed the control group, 2) group three will use more writing strategies on the posttest and transfer tasks than all the groups —and that group two will use more than group one and the control group, and that group one will use more than the control group, and 3) those students who use more writing strategies will have higher scores on the posttest and transfer tasks.

The results revealed that the three experimental groups significantly outperformed the control group on the posttest writing task. The writing means of the experimental groups followed the expected progression (group 3> group 2 >group 1). Although the contrast differences between the groups did not reach significant values (see Figure 4.1), there was a significant linear relation between level of self-regulatory training and posttest performance. A similar pattern was observed on the number of strategies that students used on the posttest task (see Figure 4.2). All the experimental groups used significantly more writing strategies than the control group. The differences between the experimental groups were not significant, but they did follow the predicted trend (group 3> group 2 >group 1). Again, although the contrast differences between the groups did not reach significant values (see Figure 4.1), there was a significant linear relation between level of self-regulatory training and posttest strategy use. These outcomes support the first part of hypotheses one and two.

An additional analysis explored the relationship between number of problems solved during the practice session and number of strategies used on the posttest and transfer writing tasks. If students were using the four-step writing strategy, self-monitoring (group 2) its

implementation, and self-evaluating (group 3) its effectiveness during the practice period, they would have had less time to solve as many problems as control students (quality vs. quantity). The results indicated that the control group solved significantly more problems than the third experimental group. As indicated by polynomial contrast, all four groups followed a significant linear trend (control group > group 1 > group 2 >group 3). Negative correlations were found between number of problems solved during the practice session and number of strategies used on the posttest and transfer tasks. The data seems to support the fact that the self-regulatory quality of practice is more important than the quantity of problems solved.

The students' outcomes on the transfer writing tasks were more difficult to interpret, yet they were quite interesting and provide evidence of the importance of dynamic models to understand learners' behaviors when faced with novel tasks as well as the need for multiple tasks to assess transfer. Understandably, the writing performance on the transfer tasks dropped in comparison to posttest scores. However writing achievement was not the same between both tasks. On the first transfer writing exercise, the third group outperformed the second group which displayed very low performance.

On the second transfer task, the third group outperformed the control group. The second group improved considerably, although the differences between the control, group 1 and group 2 were not significant (see Figure 4.1). It should be noted that the influence of the literary content of the two transfer tasks was controlled experimentally through counter-balancing. Thus, the difference in performance between the two transfer tasks is due to only their sequence.

It is interesting to notice that pretest scores and instructional level (developmental vs. non-developmental) were not correlated with writing performance on the transfer tasks, which indicates that students' initial differences did not affect their achievement on the novel tasks.

In terms of strategy use on the first transfer task, groups 2 and 3 had significantly higher means than the control group. On the second transfer task students in the third group used more strategies than students in all the other groups. All groups outperformed the control (see Figure 4.2).

The data suggests that all groups of students tried to adapt their performance to the novel tasks. There was evidence that the control group students developed their own strategies to solve the writing transfer tasks, but these students were not as strategic as students in the third group. Although the control group students' strategy use scores were quite low (56 point on average out of 100), they were not passive in their approach towards the new tasks. Traditional studies of transfer have often overlooked the spontaneous use of strategies of control groups.

Although all students struggled with the first transfer task, groups 2 and 3 used significantly more strategies than the control group. On the second transfer task, all students, especially those in group 2, used the writing strategy more effectively, and the writing scores of the first and second groups increased. Although group 3 had a minor score increment, its performance turned out to be significantly different from the other groups.

It important to mention that the writing scores on the transfer tasks were modest in an absolute sense; the means were approximately 70 points on a 100 point scale. This indicates the importance of employing multiple transfer tasks to reveal fully the dynamic nature of transfer. Although transfer did not reach the level of high expertise, it can be concluded that teaching students self-monitoring and self-evaluation processes did enhance their acquisition and transfer of the writing revision strategy.

In terms of the generality and specificity of transfer, the data seems to support that when general metacogntive skills such as goal setting, self-monitoring, and self-evaluation were

adapted to the transfer tasks and combined with the writing strategy, transfer was more likely to happen. Using Barnett and Ceci's (2000) classification of transfer, both domain-specific skills (writing strategy) and domain-general skills (self-monitoring and self-evaluation) were successfully applied in the direction of far transfer in three dimensions: knowledge domain (i.e. school writing vs. current events writing), functional context (i.e. academic vs. journalistic) and modality (sentences vs. paragraphs). Table 3.3 displays how the transfer tasks used in the study were categorized according to this taxonomy.

The third hypothesis dealt with the relation between the students' writing scores and their use of writing strategies. The correlations between writing performance and strategy use on the posttest were significant ($r = .25$, $p < .05$) but lower than expected. The lack of correlation on the first transfer task was surprising because some students, in particular those in group 2, were using several components of the writing strategy and yet got some of the lowest scores. Zimmerman and Kitsantas (1999) have found evidence that students learning to write revisions who focus initially on strategy processes but shift to outcomes after the processes are mastered evinced the highest levels of writing skill. In support of this interpretation, the correlation on the second transfer task, $r = .35$, $p < .05$, reflects a relationship between strategy use and performance.

The outcomes of this study support the need to have multiple assessments of transfer tasks because the students' behaviors varied from the first attempt to the second. If only a single measure of transfer had been used (as in traditional designs), the outcomes would have led to the erroroneous conclusion that the learners did not transfer their writing skills —adding to the extensive literature that shows lack of transfer (e.g. Mayer & Wittrock, 1996; Detterman, 1993; Haskell 2001).

Self-Efficacy Beliefs and Self-Evaluation Judgments

Four hypotheses were tested in relation to students' self-efficacy beliefs and self-evaluation judgments: 1) group three will have higher self-efficacy beliefs on the posttest and transfer tasks than all the groups —and that group two will surpass group one and the control group, and that group one will outperformed the control group, 2) group three will have higher self-evaluation scores on the posttest and transfer tasks than all the groups —and that group two will surpass group one and the control group, and that group one will outperformed the control group, 3) those students who have higher self-efficacy beliefs will have higher scores on the posttest and transfer tasks, and 4) those students who have higher self-evaluation scores will have higher scores on the posttest and transfer tasks.

Contrary to the hypotheses, self-efficacy beliefs and self-evaluation judgments were not different across groups, and they were not correlated with writing performance or strategy use. It might be possible that self-efficacy and self-evaluation have higher correlations with achievement when greater expertise is achieved but not during the early phases of acquisition. The comparison between the control group and the third experimental group on how accurate the students were in their self-efficacy and self-evaluation judgments in contrast to actual posttest and transfer writing scores seems to point in this direction. On the posttest, a similar number of students —around 60%— made accurate judgments in both groups. On the first transfer task, more students in the third group made more precise judgments than the controls (69% vs. 88%), although the differences did not reach significance. However, on the second transfer task, the majority of students in the third group were on target (94%) whereas only half of the students in the control group made accurate judgments.

The lack of correlations between self-efficacy beliefs and self-evaluation judgments with achievement might be related to students' poor calibration (i.e. the match between self-efficacy beliefs or self evaluation judgments and writing performance) during the early phases of acquisition. It seems that control students were not able to judge properly the quality of their writing skill whereas the data suggests that students who received self-regulatory training were aware, over time, of their writing improvement and became more accurate on judging their own performance.

Perceived Similarity and Adaptation Scores

Four hypotheses were tested in relation to students' perceived similarity and adaptation scores: 1) group three will have higher similarity scores than all the groups —and that group two will surpass group one and the control group, and that group one will outperformed the control group, 2) group three will have higher adaptability scores than all the groups —and that group two will surpass group one and the control group, and that group one will outperformed the control group, 3) those students who have higher similarity scores will have higher scores on the transfer tasks, and 4) those students who have higher adaptability scores will have higher scores on the transfer tasks.

The data supported the first two hypotheses (see Figures 4.3 and 4.4): Students in group 3 had the highest scores, followed by students in group 2, group 1, and control. Even when pairwise contrast differences in means were not significant, polynomial contrasts showed evidence of a linear trend on the adaptation measure at the .01 level, and on the similarity measure at the .10 level.

Contrary to the predictions, perceived similarity was not correlated with writing performance on the first transfer task, and it had a very significant correlation with the second

transfer task ($r = .24$, $p < .05$). Adaptation scores were not correlated with writing performance during either transfer task. Again, several factors may explain this lack of relationships. It might be possible that perceived similarity and adaptation have higher correlations with achievement when greater expertise is achieved and not during the early phases of acquisition.

Bi-dimensional explanations of transfer that only take into account the concept of similar (as near transfer) versus dissimilar (as far transfer) do not capture the complex relation between "objective similarity" and "perceived" similarity. Barnett and Ceci's (2000) classification of transfer divides the application of what transfers in six dimensions a long a continuum of near and far transfer. The transfer tasks used in the present study were ranked as near in two of these dimensions, and as medium-far in four dimensions (see Table 3.3). However, this classification does not necessarily corresponds to how students' perceived the learning and transfer tasks. It seems that greater expertise was achieved students in the third group perceived the transfer tasks as more similar to the learning tasks.

A very interesting finding was the relationship between similarity and adaptation scores with self-efficacy and self-evaluation scores. The correlations among self-efficacy beliefs, self-evaluation judgments, perceived similarity and adaptation were relatively high. Students with higher perceived similarity scores reported also higher self-efficacy beliefs, rated their performance higher and saw the one sentence problems as very useful in helping them solve the transfer tasks.

Limitations of the Study and Recommendations for Further Research

A major limitation of this study was the inclusion of only two transfer measures. Future studies should include additional transfer tasks to see if students' performance continues to improve over time and if their motivational beliefs improve as well, especially as the students

approach full expertise. The issue of specific and general transfer needs to be studied in different contexts. For example, once expertise is achieved would students transfer the metacognitive skills in solving math problems or would they transfer the writing strategy into other kinds of writing problems. More research is also needed to understand how perceived similarity evolves as students master different skills. Finally, the relation between perceived similarity and self-efficacy beliefs and self-evaluation judgments needs to be investigated further. Social cognitive theory combined with multidimensional taxonomies of transfer provides a strong framework to guide future studies.

Educational Implications

The present study addressed the important issue of how teaching self-regulatory skills and associated motivational beliefs affects the dynamic properties of transfer on an academic writing task. Focusing on self-regulatory processes in a study of transfer is beneficial because it provides a more complete account of how students learn important skills on their own. During the present study, students anecdotally and repeatedly expressed how useful the intervention had been in helping them understand their own mistakes and in providing them with helpful strategies to test their writing.

In the world outside schools, people rely heavily on self-regulatory processes to function effectively. They adjust their behavior by taking into account contextual conditions, available resources – strategies and social support –, and use their own feedback to modify future behavior. Initial failure on a transfer task is not definitive if a student is equipped with the self-regulatory resources to adjust during further transfer efforts. What really matters is the quality of one's adjustment following early attempts to transfer. The present results revealed that successful transfer does not occur immediately. Although it is crucial to understand how people maintain

motivation over time, additional research is needed to document the impact of training on key self-regulatory beliefs, such as self-efficacy and self-evaluation.

This study provides a demonstration of how teachers can modify their instructional practices in writing to include training in self-regulation through modeling as a powerful pedagogic tool. The successfulness of the present study also shows that a self-regulatory intervention was effective with an ethnically diverse at-risk populations of students. Instructors could also benefit from seeing how strategy use and monitoring and self-evaluative responses not only assist immediate transfer of an important writing skill but also students' development of long-term motivational beliefs. Furthermore, current instructional writing models such as the Self-Regulated Strategy Development Model (Graham, Harris, & Troia, 1998) and the Transactional Strategy Instruction Model (Pressley et al., 1998) fit very well with social cognitive models of self-regulation and have developed very specific ways to implement modeling, strategy development, and evaluations techniques in classroom situations. By focusing on self-regulatory processes and beliefs that underlie transfer, instructors can prepare their students to learn more effectively on their own in non-school settings.

APPENDICES

APPENDIX 1
STUDENT DEMOGRAPHIC QUESTIONNAIRE

Please fill in the following information:

Name: _____

Date: / /

Phone number: _____ E-mail address: _____

1. Date of birth: / / 2. Gender: Male ___ Female: ___ 3. Major: _____

4. Ethnicity: Black ___ Hispanic ___ White ___ Asian ___ American Indian ___ Other (specify) _____

5. In which country were you born? _____

a. If not the U.S., how long have you been here? _____ years

6. What language did you learn first? _____

If not English,

a. do you read in this language? No ___ Yes ___
b. do you write in this language? No ___ Yes ___
c. how long have you been using spoken English? _____ years
d. how long have you been using written English? _____ years

7. Have you ever taken the ACT writing exam? Yes ___ No, I was exempt ___ Not yet, I still need to take it ___

If yes,

a. how many times have you taken the ACT writing exam? _____
b. have you passed the ACT writing exam? No ___ Yes ___

8. Are you currently enrolled in a writing / English composition course? No ___ Yes ___

If yes, indicate the course

___ ESL courses (EL 012, EL 021, EL 022, EL 031, EL 032)
___ EG 090 Developmental Writing I
___ EG 092 Developmental Writing II
___ EG 101 English Composition I
___ EG 121 English Composition II
___ Other (indicate) _____

9. In the past, have you been enrolled in a writing / English composition course? No ___ Yes ___

If yes, indicate the course (s)

___ ESL courses (EL 012, EL 021, EL 022, EL 031, EL 032)
___ EG 090 Developmental Writing I
___ EG 092 Developmental Writing II
___ EG 101 English Composition I
___ EG 121 English Composition II
___ Other (indicate) _____

APPENDIX 2
SCRIPTS USED IN THE FIRST AND SECOND SESSIONS

Scripts used in the first session

Instruction phase and Practice Phase

Control Group

Instruction phase

GREET STUDENT(S). HAND IN DEMOGRAPHIC QUESTIONNAIRE AND CONSENT FORM.

HAVE STUDENT(S) FILL OUT THE DEMOGRAPHIC QUESTIONNAIRE AND READ THE CONSENT FORM.

REMIND STUDENT(S) TO ANSWER ALL THE QUESTIONS.

GO OVER THE MAIN POINTS WITH THE STUDENT(S).
ASK IF STUDENT(S) HAS (HAVE) QUESTIONS.
ASK IF STUDENT(S) WOULD LIKE TO PARTICIPATE AND SIGN THE CONSENT FORM.
COLLECT CONSENT FORMS.

NOTE DATE AND START TIME ON LOG.

GET INSTRUCTION PHASE HANDOUT(S) READY. HAVE MAIN SENTENCE ON THE WHITEBOARD.

*(*Researcher hands in handout) *"Today, I am going to ask you to work on some writing problems. The purpose of these problems is to combine several sentences into a one-long sentence without repeating unnecessary information. Let's look at an example* (researcher reads aloud each sentence*):* 1. Hispanic authors produce poetry. 2. The poetry is superb, 3. They produce novels. 4. The novels are exciting. 5. They produce short stories. 6. The short stories are engaging.

"In order to combine the sentences, there are SOME restrictions:

- *You must use the minimum number of words possible.*
- *You can also add words to link ideas.*
- *You must include all relevant information, that is, all key words should be in the final sentence.*
- *Your sentence must be GRAMMATICALLY correct*

I am going to ask you to try to combine all six sentences into one sentence. Don't worry about getting it right, just try to combine them in any way you think is best (while student(s) work(s) researcher walks around)

ONCE STUDENT(S) HAS (HAVE) FINISHED, THE RESEARCHER SAYS:

"This is how I solved the sentence"

Hispanic authors produce superb poetry, exciting novels, and engaging short stories.

"Are there any questions?"

"Look at your handout. I am going to ask you to solve the second writing problem to make sure you understand the directions (while student(s) work(s) on the problem, the researcher walks around making sure everybody understood the task). Once student(s) has (have) finished, the researcher shows the second sentence:

> Coming off the water, the sun glittered and sparkled in the green eddies while around us were the lazy sounds of insects, rustling leaves, and trees.

"Are there any questions?"

Practice phase procedure

GIVE STUDENT(S) PRACTICE HANDOUT(S) AND READ DIRECTIONS[5]:

"For each practice problem, combine all the sentences into a single non-repetitive sentence. Try to use the *minimum* number of words possible, but include all relevant information".

"*Now, I am going to give you some problems for you to practice. You have 20 minutes to work on them. Remember that the sentences have to be grammatically correct. Afterwards, I'll give you three more problems to see how well you have learned to combine sentences".*

SET TIMER

WHEN TIME IS UP, LET STUDENT(S) KNOW THAT THE PRACTICE PERIOD IS OVER.
COLLECT PRACTICE FORM(S) AND TELL STUDENT(S) GOOD JOB.
MAKE SURE ALL FORMS HAVE NAMES.

[5] Appendix 4 shows the handouts used during the practice session. Each group was given a different handout.

Experimental Group 1

Instruction phase

GREET STUDENT(S). HAND IN DEMOGRAPHIC QUESTIONNAIRE AND CONSENT FORM.

HAVE STUDENT(S) FILL OUT THE DEMOGRAPHIC QUESTIONNAIRE AND READ THE CONSENT FORM.

REMIND STUDENT(S) TO ANSWER ALL THE QUESTIONS.

GO OVER THE MAIN POINTS WITH THE STUDENT(S).
ASK IF STUDENT(S) HAS (HAVE) QUESTIONS.
ASK IF STUDENT(S) WOULD LIKE TO PARTICIPATE AND SIGN THE CONSENT FORM.
COLLECT CONSENT FORMS.

NOTE DATE AND START TIME ON LOG.

GET INSTRUCTION PHASE HANDOUT(S) READY. HAVE MAIN SENTENCE ON THE WHITEBOARD.

*(*Researcher hands in handout) *"Today, I am going to ask you to work on some writing problems. The purpose of these problems is to combine several sentences into a one-long sentence without repeating unnecessary information. Let's look at an example* (researcher reads aloud each sentence*):* 1. Hispanic authors produce poetry. 2. The poetry is superb, 3. They produce novels. 4. The novels are exciting. 5. They produce short stories. 6. The short stories are engaging.

"In order to combine the sentences, there are SOME restrictions:

- *You must use the minimum number of words possible.*
- *You can also add words to link ideas.*
- *You must include all relevant information, that is, all key words should be in the final sentence.*
- *Your sentence must be GRAMMATICALLY correct*

I am going to ask you to try to combine all six sentences into one sentence. Don't worry about getting it right, just try to combine them in any way you think is best (while student(s) work(s) researcher walks around)

ONCE STUDENT(S) HAS (HAVE) FINISHED, THE RESEARCHER SAYS:

"To solve these writing problems, I will teach you a four-step strategy. The steps are in the handout that I just passed around, on the second page (researcher reads):

1. Circle all the words standing for new ideas in each sentence.
2. Group similar ideas together.
3. Organize/ number ideas in proper sequence.
4. Choose connecting words (e.g. and, but, because, etc.) or change word endings (e.g. -ing) to link ideas.

"Lets start with step 1, circle all the words standing for new ideas in each sentence, (researcher circles Hispanic authors produce poetry, superb, novels, exciting, short stories and engaging).

1. ***Hispanic authors produce poetry.***
2. ***The poetry is superb .***
3. ***They produce novels .***
4. ***The novels are exciting .***
5. ***They produce short stories .***
6. ***The short stories are engaging .***

"Now lets look at step 2, group similar ideas together (researcher links sentences 1 and 2, 3 and 4, 5 and 6).

1. ***Hispanic authors produce poetry.***
2. ***The poetry is superb .***
3. ***They produce novels .***
4. ***The novels are exciting .***
5. ***They produce short stories .***
6. ***The short stories are engaging .***

"Now let's look at step 3, organize/ number ideas in proper sequence. I could arrange the sentences in different orders, but for this example I am going to keep the original order, but I am going to move "superb" in front of "poetry"," exciting" in front of "novels" and "engaging" in front of "short stories".

1. ***Hispanic authors produce poetry.***
2. ***The poetry is superb .***
3. ***They produce novels .***
4. ***The novels are exciting .***
5. ***They produce short stories .***
6. ***The short stories are engaging .***

"Finally, let's look at step 4, *choose connecting words or change word endings to link the phrases* (the researcher adds the word "and"). Our final sentence reads as follows:

Hispanic authors produce superb poetry, exciting novels, <u>and</u> engaging short stories.

"Are there any questions?

"Look at your handout. I am going to ask you to solve the second writing problem to make sure you understand the directions. Remember to use the four-step strategy. All the steps are numbered and explained in your handout (while students work on the problem, the researcher walks around making sure everybody understood the task.)"

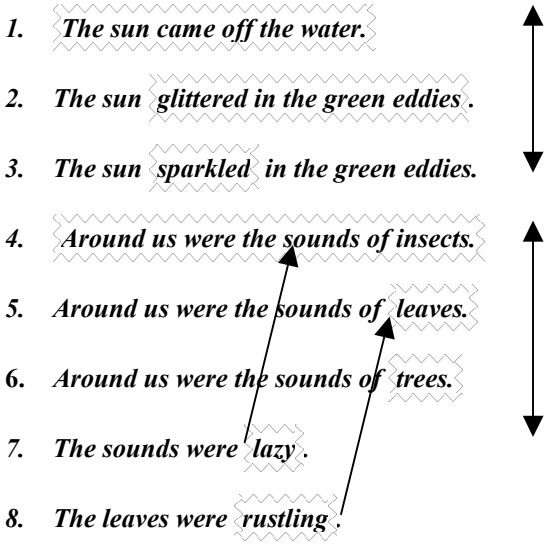
Once students have finished, the researcher models the process briefly again. He or she writes the following problem on the board and circles the new ideas. Remember, the f*irst step says "circle all the words standing for new ideas in each sentence"*

1. ***The sun came off the water.***
2. ***The sun glittered in the green eddies.***
3. ***The sun sparkled in the green eddies.***
4. ***Around us were the sounds of insects.***
5. ***Around us were the sounds of leaves.***
6. ***Around us were the sounds of trees.***
7. ***The sounds were lazy.***
8. ***The leaves were rustling.***

"Remember that the second step is to group similar ideas together. The first three sentences talk about the sun, so they should go together (the researcher draws a line that links all of them) *and the last three sentences talk about the sounds of different elements, so they could also go together* (the researcher links the three sentences).

1. ***The sun came off the water.***
2. ***The sun glittered in the green eddies.***
3. ***The sun sparkled in the green eddies.***
4. ***Around us were the sounds of insects.***
5. ***Around us were the sounds of leaves.***
6. ***Around us were the sounds of trees.***
7. ***The sounds were lazy.***
8. ***The leaves were rustling.***

The third step is about organizing or numbering ideas in a proper sequence. I am going to keep the original order, but I am going to move "lazy" in front of "sounds", and "rustling" in front "leaves".



Finally, I have to choose connecting words or change word endings. How can I link "the sun came off the water, glittered in the green eddies and sparkled"? I could say something like "The sun came off the water glittering and sparkling in the green eddies" (the researcher writes the sentence on the board). *Notice that I have changed the ending of the words "glittered" and 'sparkled" to "glittering" and "sparkling"* (the researcher circles the word), *and also notice that I linked the phrases by adding the word "and"* (the researcher circles the word).

The sun came off the water glittering and sparkling in the green eddies

*"For the next phrases I could say something like "***around us were the sounds of insects, leaves and trees"*** (the researcher writes the sentence on the board).*

Around us were the sounds of insects, leaves and trees

Around us were the lazy sounds of insects, rustling leaves and trees

"Finally, I just have to link these two sentences together, and I could do so by adding the word "while". The final sentence reads as follows:

> **The sun came off the water glittering and sparkling in the green eddies while around us were the lazy sounds of insects, rustling leaves, and trees.**

"Are there any questions?"

Practice phase procedure

GIVE STUDENT(S) PRACTICE HANDOUT(S) AND READ DIRECTIONS[6]:

"For each practice problem, combine all the sentences into a single non-repetitive sentence. Try to use the *minimum* number of words possible, but include all relevant information".

"*Now, I am going to give you some problems for you to practice. You have 20 minutes to work on them. Remember that the sentences have to be grammatically correct. Afterwards, I'll give you three more problems to see how well you have learned to combine sentences".*

SET TIMER

WHEN TIME IS UP, LET STUDENT(S) KNOW THAT THE PRACTICE PERIOD IS OVER.
COLLECT PRACTICE FORM(S) AND TELL STUDENT(S) GOOD JOB.
MAKE SURE ALL FORMS HAVE NAMES.

[6] Appendix 4 shows the handouts used during the practice session. Each group was given a different handout.

Experimental Group 2

Instruction phase

GREET STUDENT(S). HAND IN DEMOGRAPHIC QUESTIONNAIRE AND CONSENT FORM.

HAVE STUDENT(S) FILL OUT THE DEMOGRAPHIC QUESTIONNAIRE AND READ THE CONSENT FORM.

REMIND STUDENT(S) TO ANSWER ALL THE QUESTIONS.

GO OVER THE MAIN POINTS WITH THE STUDENT(S).
ASK IF STUDENT(S) HAS (HAVE) QUESTIONS.
ASK IF STUDENT(S) WOULD LIKE TO PARTICIPATE AND SIGN THE CONSENT FORM.
COLLECT CONSENT FORMS.

NOTE DATE AND START TIME ON LOG.

GET INSTRUCTION PHASE HANDOUT(S) READY. HAVE MAIN SENTENCE ON THE WHITEBOARD.

*(*Researcher hands in handout) *"Today, I am going to ask you to work on some writing problems. The purpose of these problems is to combine several sentences into a one-long sentence without repeating unnecessary information. Let's look at an example* (researcher reads aloud each sentence*):* 1. Hispanic authors produce poetry. 2. The poetry is superb, 3. They produce novels. 4. The novels are exciting. 5. They produce short stories. 6. The short stories are engaging.

"In order to combine the sentences, there are SOME restrictions:

- *You must use the minimum number of words possible.*
- *You can also add words to link ideas.*
- *You must include all relevant information, that is, all key words should be in the final sentence.*
- *Your sentence must be GRAMMATICALLY correct*

I am going to ask you to try to combine all six sentences into one sentence. Don't worry about getting it right, just try to combine them in any way you think is best (while student(s) work(s) researcher walks around)

ONCE STUDENT(S) HAS (HAVE) FINISHED, THE RESEARCHER SAYS:

"To solve these writing problems, I will teach you a four-step strategy. The steps are in the handout that I just passed around, on the second page (researcher reads):

1. Circle all the words standing for new ideas in each sentence.
2. Group similar ideas together.
3. Organize/ number ideas in proper sequence.
4. Choose connecting words (e.g. and, but, because, etc.) or change word endings (e.g. -ing) to link ideas.

"Lets start with step 1, circle all the words standing for new ideas in each sentence, (researcher circles Hispanic authors produce poetry, superb, novels, exciting, short stories and engaging).

1. ***Hispanic authors produce poetry.***
2. ***The poetry is superb .***
3. ***They produce novels .***
4. ***The novels are exciting .***
5. ***They produce short stories .***
6. ***The short stories are engaging .***

"Now lets look at step 2, group similar ideas together (researcher links sentences 1 and 2, 3 and 4, 5 and 6).

1. ***Hispanic authors produce poetry.***
2. ***The poetry is superb .***
3. ***They produce novels .***
4. ***The novels are exciting .***
5. ***They produce short stories .***
6. ***The short stories are engaging .***

"Now let's look at step 3, organize/ number ideas in proper sequence. I could arrange the sentences in different orders, but for this example I am going to keep the original order, but I am going to move "superb" in front of "poetry"," exciting" in front of "novels" and "engaging" in front of "short stories".

1. ***Hispanic authors produce poetry.***
2. ***The poetry is superb .***
3. ***They produce novels .***
4. ***The novels are exciting .***
5. ***They produce short stories .***
6. ***The short stories are engaging .***

"Finally, let's look at step 4, *choose connecting words or change word endings to link the phrases* (the researcher adds the word "and"). Our final sentence reads as follows:

Hispanic authors produce superb poetry, exciting novels, <u>and</u> engaging short stories.

"Are there any questions?

"Look at your handout. I am going to ask you to solve the second writing problem to make sure you understand the directions. Remember to use the four-step strategy. All the steps are numbered and explained in your handout (while students work on the problem, the researcher walks around making sure everybody understood the task.)"

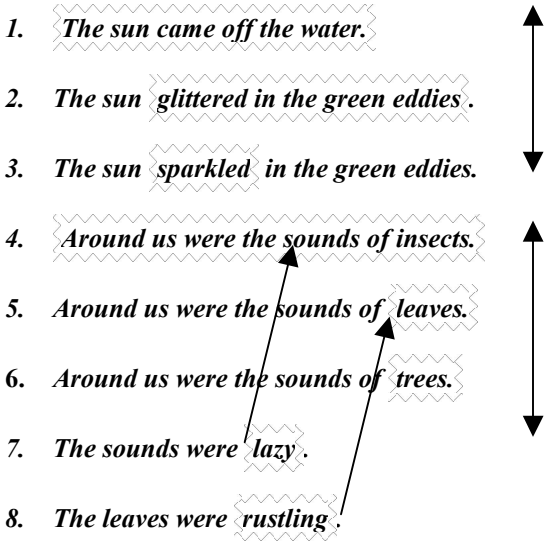
Once students have finished, the researcher models the process briefly again. He or she writes the following problem on the board and circles the new ideas. Remember, the f*irst step says "circle all the words standing for new ideas in each sentence"*

1. ***The sun came off the water.***
2. ***The sun glittered in the green eddies.***
3. ***The sun sparkled in the green eddies.***
4. ***Around us were the sounds of insects.***
5. ***Around us were the sounds of leaves.***
6. ***Around us were the sounds of trees.***
7. ***The sounds were lazy.***
8. ***The leaves were rustling.***

"Remember that the second step is to group similar ideas together. The first three sentences talk about the sun, so they should go together (the researcher draws a line that links all of them) *and the last three sentences talk about the sounds of different elements, so they could also go together* (the researcher links the three sentences).

1. ***The sun came off the water.***
2. ***The sun glittered in the green eddies.***
3. ***The sun sparkled in the green eddies.***
4. ***Around us were the sounds of insects.***
5. ***Around us were the sounds of leaves.***
6. ***Around us were the sounds of trees.***
7. ***The sounds were lazy.***
8. ***The leaves were rustling.***

The third step is about organizing or numbering ideas in a proper sequence. I am going to keep the original order, but I am going to move "lazy" in front of "sounds", and "rustling" in front "leaves".



Finally, I have to choose connecting words or change word endings. How can I link "the sun came off the water, glittered in the green eddies and sparkled"? I could say something like "The sun came off the water glittering and sparkling in the green eddies" (the researcher writes the sentence on the board). *Notice that I have changed the ending of the words "glittered" and 'sparkled" to "glittering" and "sparkling"* (the researcher circles the word), *and also notice that I linked the phrases by adding the word "and"* (the researcher circles the word).

The sun came off the water glittering and sparkling in the green eddies

*"For the next phrases I could say something like "***around us were the sounds of insects, leaves and trees"*** (the researcher writes the sentence on the board).*

Around us were the sounds of insects, leaves and trees

Around us were the lazy sounds of insects, rustling leaves and trees

"Finally, I just have to link these two sentences together, and I could do so by adding the word "while". The final sentence reads as follows:

> **The sun came off the water glittering and sparkling in the green eddies while around us were the lazy sounds of insects, rustling leaves, and trees.**

"Are there any questions?"

Practice phase procedure

GIVE STUDENT(S) THE PRACTICE HANDOUT(S) AND READ DIRECTIONS[7]:

For each practice problem, combine all the sentences into a single non-repetitive sentence. Try to use the ***minimum*** number of words possible, but include all relevant information.

"*Now, I am going to give you some problems for you to practice. You have 20 minutes to work on them. Before you start,* PUT YOUR HANDOUT WITH THE FOUR-STEP STRATEGY IN FRONT OF YOU. When writing your sentence, make sure you follow the four-step strategy. Write a check mark once as you start each step.

Remember that the sentences have to be grammatically correct. Afterwards, I'll give you three more problems to see how well you have learned to combine sentences".

SET TIMER

WHEN TIME IS UP, LET STUDENT(S) KNOW THAT THE PRACTICE PERIOD IS OVER.
COLLECT PRACTICE FORM(S) AND TELL STUDENT(S) GOOD JOB.
MAKE SURE ALL FORMS HAVE NAMES.

[7] Appendix 4 shows the handouts used during the practice session. Each group was given a different handout.

Experimental Group 3

Instruction phase

GREET STUDENT(S). HAND IN DEMOGRAPHIC QUESTIONNAIRE AND CONSENT FORM.

HAVE STUDENT(S) FILL OUT THE DEMOGRAPHIC QUESTIONNAIRE AND READ THE CONSENT FORM.

REMIND STUDENT(S) TO ANSWER ALL THE QUESTIONS.

GO OVER THE MAIN POINTS WITH THE STUDENT(S).
ASK IF STUDENT(S) HAS (HAVE) QUESTIONS.
ASK IF STUDENT(S) WOULD LIKE TO PARTICIPATE AND SIGN THE CONSENT FORM.
COLLECT CONSENT FORMS.

NOTE DATE AND START TIME ON LOG.

GET INSTRUCTION PHASE HANDOUT(S) READY. HAVE MAIN SENTENCE ON THE WHITEBOARD.

*(*Researcher hands in handout) *"Today, I am going to ask you to work on some writing problems. The purpose of these problems is to combine several sentences into a one-long sentence without repeating unnecessary information. Let's look at an example* (researcher reads aloud each sentence*):* 1. Hispanic authors produce poetry. 2. The poetry is superb, 3. They produce novels. 4. The novels are exciting. 5. They produce short stories. 6. The short stories are engaging.

"In order to combine the sentences, there are SOME restrictions:

- *You must use the minimum number of words possible.*
- *You can also add words to link ideas.*
- *You must include all relevant information, that is, all key words should be in the final sentence.*
- *Your sentence must be GRAMMATICALLY correct*

I am going to ask you to try to combine all six sentences into one sentence. Don't worry about getting it right, just try to combine them in any way you think is best (while student(s) work(s) researcher walks around)

ONCE STUDENT(S) HAS (HAVE) FINISHED, THE RESEARCHER SAYS:

"To solve these writing problems, I will teach you a four-step strategy. The steps are in the handout that I just passed around, on the second page (researcher reads):

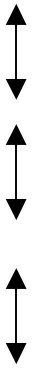
1. Circle all the words standing for new ideas in each sentence.
2. Group similar ideas together.
3. Organize/ number ideas in proper sequence.
4. Choose connecting words (e.g. and, but, because, etc.) or change word endings (e.g. -ing) to link ideas.

"Lets start with step 1, circle all the words standing for new ideas in each sentence, (researcher circles Hispanic authors produce poetry, superb, novels, exciting, short stories and engaging).

1. ***Hispanic authors produce poetry.***
2. ***The poetry is superb .***
3. ***They produce novels .***
4. ***The novels are exciting .***
5. ***They produce short stories .***
6. ***The short stories are engaging .***

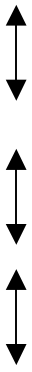
"Now lets look at step 2, group similar ideas together (researcher links sentences 1 and 2, 3 and 4, 5 and 6).

1. ***Hispanic authors produce poetry.***
2. ***The poetry is superb .***
3. ***They produce novels .***
4. ***The novels are exciting .***
5. ***They produce short stories .***
6. ***The short stories are engaging .***



"Now let's look at step 3, organize/ number ideas in proper sequence. I could arrange the sentences in different orders, but for this example I am going to keep the original order, but I am going to move "superb" in front of "poetry"," exciting" in front of "novels" and "engaging" in front of "short stories".

1. ***Hispanic authors produce poetry.***
2. ***The poetry is superb .***
3. ***They produce novels .***
4. ***The novels are exciting .***
5. ***They produce short stories .***
6. ***The short stories are engaging .***



"Finally, let's look at step 4, *choose connecting words or change word endings to link the phrases* (the researcher adds the word "and"). Our final sentence reads as follows:

Hispanic authors produce superb poetry, exciting novels, <u>and</u> engaging short stories.

"Are there any questions?

"Look at your handout. I am going to ask you to solve the second writing problem to make sure you understand the directions. Remember to use the four-step strategy. All the steps are numbered and explained in your handout (while students work on the problem, the researcher walks around making sure everybody understood the task.)"

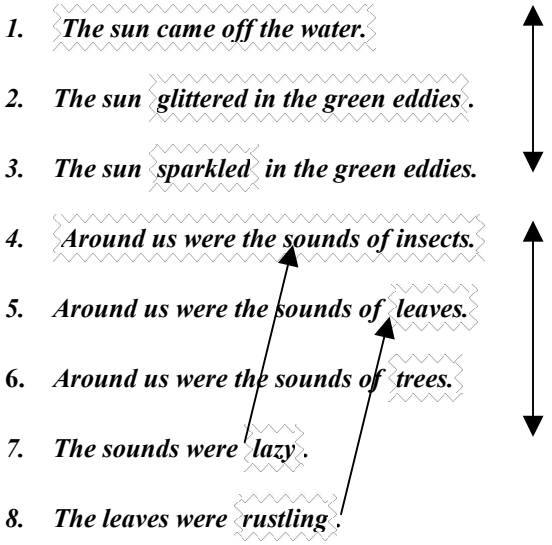
Once students have finished, the researcher models the process briefly again. He or she writes the following problem on the board and circles the new ideas. Remember, the f*irst step says "circle all the words standing for new ideas in each sentence"*

1. ***The sun came off the water.***
2. ***The sun glittered in the green eddies.***
3. ***The sun sparkled in the green eddies.***
4. ***Around us were the sounds of insects.***
5. ***Around us were the sounds of leaves.***
6. ***Around us were the sounds of trees.***
7. ***The sounds were lazy.***
8. ***The leaves were rustling.***

"Remember that the second step is to group similar ideas together. The first three sentences talk about the sun, so they should go together (the researcher draws a line that links all of them) *and the last three sentences talk about the sounds of different elements, so they could also go together* (the researcher links the three sentences).

1. ***The sun came off the water.***
2. ***The sun glittered in the green eddies.***
3. ***The sun sparkled in the green eddies.***
4. ***Around us were the sounds of insects.***
5. ***Around us were the sounds of leaves.***
6. ***Around us were the sounds of trees.***
7. ***The sounds were lazy.***
8. ***The leaves were rustling.***

The third step is about organizing or numbering ideas in a proper sequence. I am going to keep the original order, but I am going to move "lazy" in front of "sounds", and "rustling" in front "leaves".



Finally, I have to choose connecting words or change word endings. How can I link "the sun came off the water, glittered in the green eddies and sparkled"? I could say something like "The sun came off the water glittering and sparkling in the green eddies" (the researcher writes the sentence on the board). *Notice that I have changed the ending of the words "glittered" and 'sparkled" to "glittering" and "sparkling"* (the researcher circles the word), *and also notice that I linked the phrases by adding the word "and"* (the researcher circles the word).

The sun came off the water glittering and sparkling in the green eddies

*"For the next phrases I could say something like "***around us were the sounds of insects, leaves and trees"*** (the researcher writes the sentence on the board).*

Around us were the sounds of insects, leaves and trees

Around us were the lazy sounds of insects, rustling leaves and trees

"Finally, I just have to link these two sentences together, and I could do so by adding the word "while". The final sentence reads as follows:

> **The sun came off the water glittering and sparkling in the green eddies while around us were the lazy sounds of insects, rustling leaves, and trees.**

"Are there any questions?"

Practice phase procedure

GIVE STUDENT(S) THE PRACTICE HANDOUT(S) AND READ DIRECTIONS[8]:

For each practice problem, combine all the sentences into a single non-repetitive sentence. Try to use the ***minimum*** number of words possible, but include all relevant information.

"*Now, I am going to give you some problems for you to practice. You have 20 minutes to work on them. Before you star writing,* PUT YOUR HANDOUT WITH THE FOUR-STEP STRATEGY IN FRONT OF YOU. When writing your sentence, make sure you follow the four-step strategy. Write a check mark as you start each step. Then, reread your sentence and write a check mark next to each statement below your sentence.

Put attention to the things you are missing so you will correct them for the next sentence.

Remember that the sentences have to be grammatically correct. Afterwards, I'll give you three more problems to see how well you have learned to combine sentences".

SET TIMER

WHEN TIME IS UP, LET STUDENT(S) KNOW THAT THE PRACTICE PERIOD IS OVER.
COLLECT PRACTICE FORM(S) AND TELL STUDENT(S) GOOD JOB.
MAKE SURE ALL FORMS HAVE NAMES.

[8] Appendix 4 shows the handouts used during the practice session. Each group was given a different handout.

Posttest Phase Procedure
(Same Directions for all Groups)

"Now I'll ask you to solve three more problems to see how well you learned to combine sentences. For each writing problem you will have to answer three questions (researcher gives handout).

"*Let's look at the first problem, (*researcher reads sentences). *Before writing your sentence, I want you to answer the first question*: *how sure are you that you can solve this writing problem in one sentence? If you are very sure about solving this writing problem, you will circle a high number* (researcher circles 90). *On the other hand, if you are not very sure, you will circle a low number* (researcher circles 10). *Notice that there are also options for "somewhat sure" and "pretty sure".*
Are there any questions?"

HAVE STUDENT(S) READ PROBLEM AGAIN AND ANSWER THE QUESTION.

"Remember, I want you to answer this question before writing the problem".

"After writing your sentence, you will have to answer the second question: how well did you combine all sentences into a single sentence?. Again, if you believe you did a good job, you will circle a high number, if you believe you did an average job, you will circle a medium number, and if you believe you did not do a good job, you will circle a low number. Are there any questions?"

"Finally, I'll ask you to answer the last question: did you use any particular method to write the sentence problem? Just describe the procedure or method you used. Are there any questions?"

"Remember to answer all three questions"

"Now, let's begin and don't forget to write grammatically correct sentences".

WHEN STUDENT(S) FINISHES (FINISH) COLLECT ALL FORMS AND THANK STUDENT(S).
REMIND STUDENT(S) THAT THERE IS ANOTHER SESSION.
WRITE DATE, TIME AND LOCATION OF NEXT SESSION ON THE BOARD.
NOTE END TIME.
FILE FORMS IN RESPECTIVE FOLDERS.

Scripts Used in the Second Session

(Half of the students in each group started with the "robbery-snake sequence and the other half with the "snake-robbery" sequence)

Transfer Task Procedures: First Sequence (Robbery – Snake)

NOTE DATE AND START TIME ON LOG.
THANK STUDENT(S) FOR PARTICIPATING.
GET TRANSFER TASK HANDOUT #1 READY

*"Today, I am also going to ask you to work on two writing problems. The purpose of these problems is to combine several sentences into one paragraph without repeating unnecessary information. R*esearcher gives handout #1 *and reads aloud the directions:*

Imagine that you are a newspaper reporter for the New York Times, and you were assigned to cover the story of the robbery of some very expensive diamonds. You have gathered all the information from the police department. Your task is to write an article of the incident. Remember, the newspaper has limited space; therefore, try to use the minimum number of <u>words</u> and <u>sentences</u> possible but include all relevant information.

"*Before writing your paragraph, I want you to answer the first question*: *how sure are you that you can solve this newspaper article using the minimum number of words?* (Researcher writes scale on the board). *If you are very sure about solving this writing problem, you will circle a high number* (researcher circles 90). *On the other hand, if you are not very sure, you will circle a low number* (researcher circles 10). *Notice that there are also options for "somewhat sure" and "pretty sure". Are there any questions?"*

GIVE STUDENT(S) TIME TO READ THE SENTENCES AND THEN HAVE STUDENT(S) ANSWER THE SELF-EFFICACY QUESTION.

*"After writing your paragraph, you will have to answer three more questions using the same scale". (*Researcher reads the questions). *"So far, are there any questions?*

Finally, I'll ask you to describe how you solved the newspaper article. Are there any questions?"

"Now, let's begin".

Now that you have understood the writing problems, I will ask you to do one more.

RESEARCHER GIVES SECOND PROBLEM.

WHEN STUDENT(S) FINISHES (FINISH) HAVE HIM OR HER (THEM) LOOK AT THE SHEET WITH ALL THE EXAMPLES (ANSWERS). REMIND STUDENT(S) NOT TO WRITE ANYTHING ON HIS OR HER (THEIR) WORK.

COLLECT ALL FORMS. ASK FOR ANY "SCRATCH" PAPER.

MAKE SURE ALL FORMS HAVE NAMES.
GIVE ENVELOPE WITH FIVE DOLLARS TO STUDENT(S).
THANK STUDENT(S).
NOTE END TIME. FILE FORMS IN RESPECTIVE FOLDERS.

Transfer Task Procedures: Second Sequence (Snake –Robbery)

NOTE DATE AND START TIME ON LOG.
THANK STUDENTS FOR PARTICIPATING.
GET TRANSFER TASK HANDOUT #2 READY

"Today, I am also going to ask you to work on two writing problems. The purpose of these problems is to combine several sentences into one paragraph without repeating unnecessary information (researcher gives handout) and reads directions:

Imagine that you are a newspaper reporter for the New York Times, and you were assigned to cover the story of a large snake that attacked a high school student. You went to the school and gathered information about the incident. You have a page with all your notes. Your task is to put your notes together and write a brief article about the incident. Remember, the newspaper has limited space; therefore, try to use the minimum number of <u>words</u> and <u>sentences</u> possible but don't exclude relevant information.

"*Before writing your paragraph, I want you to answer the first question*: *how sure are you that you can solve this newspaper article using the minimum number of words?* (Researcher writes scale on the board). *If you are very sure about solving this writing problem, you will circle a high number* (researcher circles 90). *On the other hand, if you are not very sure, you will circle a low number* (researcher circles 10). *Notice that there are also options for "somewhat sure" and "pretty sure". Are there any questions?"*

GIVE STUDENT(S) TIME TO READ THE SENTENCES AND THEN HAVE STUDENT(S) ANSWER THE SELF-EFFICACY QUESTION.

*"After writing your paragraph, you will have to answer three more questions using the same scale". (*Researcher reads the questions). *"So far, are there any questions?*

Finally, I'll ask you to describe how you solved the newspaper article. Are there any questions?"

"Now, let's begin".

Now that you have understood the writing problems, I will ask you to do one more.

RESEARCHER GIVES SECOND PROBLEM.

WHEN STUDENT(S) FINISHES (FINISH) HAVE HIM OR HER (THEM) LOOK AT THE SHEET WITH ALL THE EXAMPLES (ANSWERS). REMIND STUDENT(S) NOT TO WRITE ANYTHING ON HIS OR HER (THEIR) WORK.

COLLECT ALL FORMS. ASK FOR ANY "SCRATCH" PAPER.

MAKE SURE ALL FORMS HAVE NAMES.
GIVE ENVELOPE WITH FIVE DOLLARS TO STUDENT(S).
THANK STUDENT(S).
NOTE END TIME. FILE FORMS IN RESPECTIVE FOLDERS.

APPENDIX 3
HANDOUTS PRETEST AND INSTRUCTION PHASE

Handout for Control Group

Name_____ Date _____

1. Hispanic authors produce poetry.
2. The poetry is superb.
3. They produce novels.
4. The novels are exciting.
5. They produce short stories.
6. The short stories are engaging.

Your sentence:

_____
_____
_____

Write example here:

_____
_____
_____

1. The sun came off the water.
2. The sun glittered in the green eddies.
3. The sun sparkled in the green eddies.
4. Around us were the sounds of insects.
5. Around us were the sounds of leaves.
6. Around us were the sounds of trees.
7. The sounds were lazy.
8. The leaves were rustling.

Your sentence:

_____
_____
_____

Write example here:

_____
_____
_____

Handouts for Experimental Groups

Name_____ Date _____

1. Hispanic authors produce poetry.
2. The poetry is superb.
3. They produce novels.
4. The novels are exciting.
5. They produce short stories.
6. The short stories are engaging.

Your sentence:

_____
_____
_____

Write example here:

_____
_____
_____

Four-step strategy

1. Circle all the words standing for new ideas in each sentence.
2. Group similar ideas together.
3. Organize/ number ideas in proper sequence.
4. Choose connecting words (e.g. and, but, because, etc.) or change word endings (e.g. -ing) to link ideas.

1. The sun came off the water.
2. The sun glittered in the green eddies.
3. The sun sparkled in the green eddies.
4. Around us were the sounds of insects.
5. Around us were the sounds of leaves.
6. Around us were the sounds of trees.
7. The sounds were lazy.
8. The leaves were rustling.

Your sentence:

_____
_____
_____

Write example here:

_____
_____
_____

APPENDIX 4
HANDOUTS PRACTICE SESSION

Handout for Control Group and Experimental Group 1

Name_____ Date _____

For each practice problem, combine all the sentences into a single non-repetitive sentence. Try to use the ***minimum*** number of words possible, but include all relevant information.

Problem 1

1. Education efforts must be taken on.
2. Education efforts must begin today.
3. This is to promote conservation among citizens.
4. The citizens waste electric power.
5. The citizens bum trash illegally.
6. The citizens ignore public transportation.
7. The citizens buy oversized automobiles.

Your sentence:

_____
_____
_____

Problem 2

1. Kathy slouched at her desk.
2. She chewed a fingernail nervously.
3. She stared at the final exam.
4. The exam was for her sociology course.
5. She could picture the first day of the course.
6. The instructor had explained the syllabus.
7. The syllabus called for independent thinking.
8. The syllabus called for creative thinking.

Your sentence:

_____
_____
_____

Problem 3

1. The talent of Mohawks became legendary.
2. The grace of Mohawks became legendary.
3. The agility of Mohawks became legendary.
4. The fearlessness of Mohawks became legendary.
5. They worked as construction laborers.
6. They worked on thousands of skyscrapers.
7. These included the Empire State Building.
8. These included the United Nations Building.

Your sentence:

_____
_____
_____

Problem 4

1. The world has two kinds of people.
2. One kind is the optimist.
3. The other kind is the pessimist.
4. An optimist is a person.
5. The person sees a water glass.
6. The water glass is partially filled.
7. The person declares it “half full”.
8. A pessimist sees the same glass.
9. The pessimist declares it “half empty”.

Your sentence:

_____
_____
_____

Problem 5

1. Angie took a deep breath.
2. She approached the foul line.
3. Her teammates were gathered there.
4. They were urging her to relax.
5. She bounced the ball twice.
6. She tried to concentrate on the basket.
7. She tried to ignore the deficit.
8. The deficit was two points.
9. There was only a minute to play.

Your sentence:

_____
_____
_____

Problem 6

1. Mona sees herself as a winner.
2. Mona sees herself not as a loser.
3. Her self-image is strong and upbeat.
4. Her self-image is decidedly optimistic.
5. She knows her strengths.
6. She acknowledges her weaknesses.
7. She acknowledges her fears.
8. She sets goals for herself.
9. The goals are realistic and achievable.

Your sentence:

_____
_____
_____

Handout for Experimental Group 2

Name_____ Date _____

For each practice problem, combine all the sentences into a single non-repetitive sentence. Try to use the ***minimum*** number of words possible, but include all relevant information. When writing your sentence, make sure you follow the four-step strategy. Write a check mark as you start each step.

Problem 1

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. Education efforts must be taken on.
2. Education efforts must begin today.
3. This is to promote conservation among citizens.
4. The citizens waste electric power.
5. The citizens bum trash illegally.
6. The citizens ignore public transportation.
7. The citizens buy oversized automobiles.

Your sentence:

_____
_____
_____

Problem 2

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. Kathy slouched at her desk.
2. She chewed a fingernail nervously.
3. She stared at the final exam.
4. The exam was for her sociology course.
5. She could picture the first day of the course.
6. The instructor had explained the syllabus.
7. The syllabus called for independent thinking.
8. The syllabus called for creative thinking.

Your sentence:

_____
_____
_____

Problem 3

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. The talent of Mohawks became legendary.
2. The grace of Mohawks became legendary.
3. The agility of Mohawks became legendary.
4. The fearlessness of Mohawks became legendary.
5. They worked as construction laborers.
6. They worked on thousands of skyscrapers.
7. These included the Empire State Building.
8. These included the United Nations Building

Your sentence:

_____
_____
_____

Problem 4

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. The world has two kinds of people.
2. One kind is the optimist.
3. The other kind is the pessimist.
4. An optimist is a person.
5. The person sees a water glass.
6. The water glass is partially filled.
7. The person declares it “half full”.
8. A pessimist sees the same glass.
9. The pessimist declares it “half empty”.

Your sentence:

_____
_____
_____

Problem 5

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. Angie took a deep breath.
2. She approached the foul line.
3. Her teammates were gathered there.
4. They were urging her to relax.
5. She bounced the ball twice.
6. She tried to concentrate on the basket.
7. She tried to ignore the deficit.
8. The deficit was two points.
9. There was only a minute to play.

Your sentence:

_____
_____
_____

Problem 6

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. Mona sees herself as a winner.
2. Mona sees herself not as a loser.
3. Her self-image is strong and upbeat.
4. Her self-image is decidedly optimistic.
5. She knows her strengths.
6. She acknowledges her weaknesses.
7. She acknowledges her fears.
8. She sets goals for herself.
9. The goals are realistic and achievable.

Your sentence:

_____
_____
_____

Handout for Experimental Group 3

Name_____ Date _____

For each practice problem, combine all the sentences into a single non-repetitive sentence. Try to use the ***minimum*** number of words possible, but include all relevant information.

When writing your sentence, make sure you follow the four-step strategy. Write a check mark as you start each step. Afterwards, reread your sentence and write a check mark next to each statement below your sentence.

Problem 1

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. Education efforts must be taken on.
2. Education efforts must begin today.
3. This is to promote conservation among citizens.
4. The citizens waste electric power.
5. The citizens bum trash illegally.
6. The citizens ignore public transportation.
7. The citizens buy oversized automobiles.

Your sentence:

_____
_____
_____

_____You have ONE sentence (no periods).

_____You included <u>all</u> the <u>circled</u> words.

_____You don't <u>repeat</u> the same <u>word</u>.

_____You have <u>a connecting</u> word in between ideas (<u>not</u> only <u>commas</u> separating ideas).

_____The <u>meaning</u> of your sentence is <u>clear.</u>

_____Your ideas follow a <u>reasonable</u> <u>sequence</u>.

Problem 2

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. Kathy slouched at her desk.
2. She chewed a fingernail nervously.
3. She stared at the final exam.
4. The exam was for her sociology course.
5. She could picture the first day of the course.
6. The instructor had explained the syllabus.
7. The syllabus called for independent thinking.
8. The syllabus called for creative thinking.

Your sentence:

_____
_____
_____

_____You have ONE sentence (no periods).

_____You included all the circled words.

_____You don't repeat the same word.

_____You have a connecting word in between ideas (not only commas separating ideas).

_____The meaning of your sentence is clear.

_____Your ideas follow a reasonable sequence.

Problem 3

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. The talent of Mohawks became legendary.
2. The grace of Mohawks became legendary.
3. The agility of Mohawks became legendary.
4. The fearlessness of Mohawks became legendary.
5. They worked as construction laborers.
6. They worked on thousands of skyscrapers.
7. These included the Empire State Building.
8. These included the United Nations Building

Your sentence: _____
_____
_____

_____You have ONE sentence (no periods).

_____You included all the circled words.

_____You don't repeat the same word.

_____You have a connecting word in between ideas (not only commas separating ideas).

_____The meaning of your sentence is clear.

_____Your ideas follow a reasonable sequence.

Problem 4

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. The world has two kinds of people.
2. One kind is the optimist.
3. The other kind is the pessimist.
4. An optimist is a person.
5. The person sees a water glass.
6. The water glass is partially filled.
7. The person declares it “half full”.
8. A pessimist sees the same glass.
9. The pessimist declares it “half empty”.

Your sentence:

_____
_____
_____

_____You have ONE sentence (no periods).

_____You included all the circled words.

_____You don’t repeat the same word.

_____You have a connecting word in between ideas (not only commas separating ideas).

_____The meaning of your sentence is clear.

_____Your ideas follow a reasonable sequence.

Problem 5

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. Angie took a deep breath.
2. She approached the foul line.
3. Her teammates were gathered there.
4. They were urging her to relax.
5. She bounced the ball twice.
6. She tried to concentrate on the basket.
7. She tried to ignore the deficit.
8. The deficit was two points.
9. There was only a minute to play.

Your sentence:

_____
_____
_____

_____You have ONE sentence (no periods).

_____You included all the circled words.

_____You don't repeat the same word.

_____You have a connecting word in between ideas (not only commas separating ideas).

_____The meaning of your sentence is clear.

_____Your ideas follow a reasonable sequence.

Problem 6

___ Step 1
___ Step 2
___ Step 3
___ Step 4

1. Mona sees herself as a winner.
2. Mona sees herself not as a loser.
3. Her self-image is strong and upbeat.
4. Her self-image is decidedly optimistic.
5. She knows her strengths.
6. She acknowledges her weaknesses.
7. She acknowledges her fears.
8. She sets goals for herself.
9. The goals are realistic and achievable.

Your sentence:

_____
_____
_____

_____You have ONE sentence (no periods).

_____You included all the circled words.

_____You don't repeat the same word.

_____You have a connecting word in between ideas (not only commas separating ideas).

_____The meaning of your sentence is clear.

_____Your ideas follow a reasonable sequence.

APPENDIX 5
HANDOUTS POSTTEST TASKS

Name_____ Date _____

Problem 1

1. The hula is an elegant dance.
2. It expresses the culture of the islands.
3. It expresses the history of the islands.
4. It expresses the story of the islands.
5. Missionaries suppressed the hula.
6. This was during the nineteenth century.
7. They did not understand its complexity.
8. They did not understand its significance.

How sure are you that you can solve this writing problem in one sentence? (Answer the question before writing the sentence)

10 20 30 40 50 60 70 80 90 100

Not sure Somewhat sure Pretty sure Very sure

Your sentence:

_____
_____
_____

How well did you combine all sentences into a single sentence?

10 20 30 40 50 60 70 80 90 100

Not well Somewhat well Pretty well Very well

Describe how you solved the sentence problem:

_____
_____
_____

Problem 2

1. Air quality has reached a point of crisis.
2. Legislators must pass laws.
3. The laws carry penalties for polluters.
4. The penalties are stiff.
5. Industries must comply with measures.
6. The measures are preventive.
7. Industries must decrease their discharge.
8. The discharge is of atmospheric emissions.

How sure are you that you can solve this writing problem in one sentence? (Answer the question before writing the sentence)

10 20 30 40 50 60 70 80 90 100

Not sure Somewhat sure Pretty sure Very sure

Your sentence:

_____
_____
_____

How well did you combine all sentences into a single sentence?

10 20 30 40 50 60 70 80 90 100

Not well Somewhat well Pretty well Very well

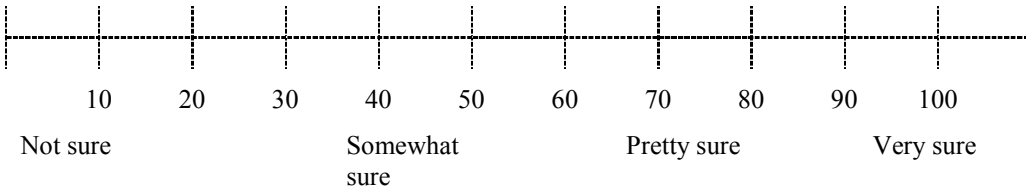
Describe how you solved the sentence problem:

_____
_____
_____

Problem 3

1. We savored the afternoon's warmth.
2. We savored the afternoon's quiet.
3. We hiked to an open grassy ridge.
4. It was there we could have lunch.
5. It was there we could rest.
6. City noise was far away.
7. Diesel stench was far away.
8. A memory of final exams was far away.
9. This was at least for now.

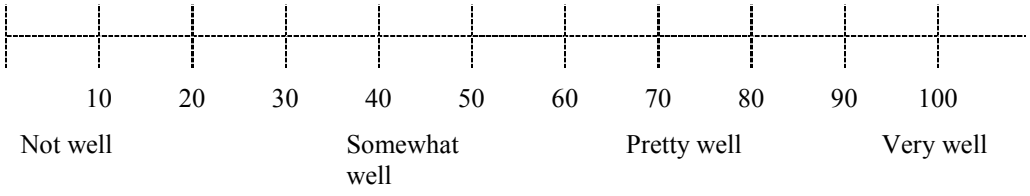
How sure are you that you can solve this writing problem in one sentence? (Answer the question before writing the sentence)



Your sentence:

_____
_____
_____

How well did you combine all sentences into a single sentence?



Describe how you solved the sentence problem:

_____
_____
_____

APPENDIX 6
HANDOUTS TRANSFER TASKS

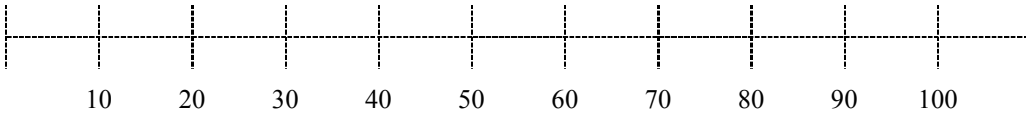
Handouts Transfer Tasks
(Handout #1: Sequence Robbery-Snake)

Name_____ Date _____

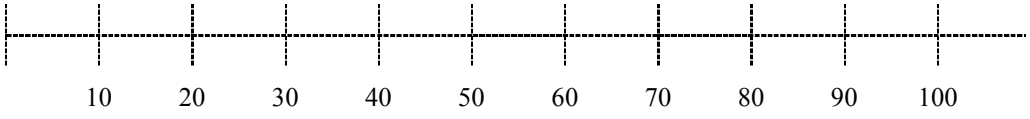
Imagine that you are a newspaper reporter for the New York Times, and you were assigned to cover the story of the robbery of some very expensive diamonds. You have gathered all the information from the police department. Your task is to write an article of the incident. Remember, the newspaper has limited space; therefore, try to use the minimum number of words and sentences possible but include all relevant information.

1. A police officer joined the chase.
2. A police officer caught one suspect.
3. The courier lost a tooth.
4. The courier suffered burns from the stun gun.
5. The robbery happened yesterday.
6. The robbery was outside a famous hotel.
7. The famous hotel is in Midtown.
8. A courier was robbed.
9. The courier was 68 years old.
10. The courier was a female.
11. The courier was robbed of $80, 000.
12. The $80,000 were in diamonds.
13. The $80,000 were in jewelry.
14. The diamonds were recovered.
15. The jewelry was recovered.
16. The suspect was charged with robbery.
17. The suspect was charged with weapons possession.
18. Two men robbed the courier.
19. Two men struck the courier in the face.
20. Two men shocked the courier with a stun gun.
21. The men fled.
22. Hotel guards chased the men.
23. The chase was into Central Park South.

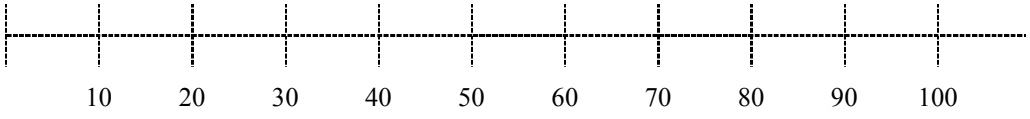
How sure are you that you can write this newspaper article using the minimum number of sentences? (Answer the question before writing the newspaper article)



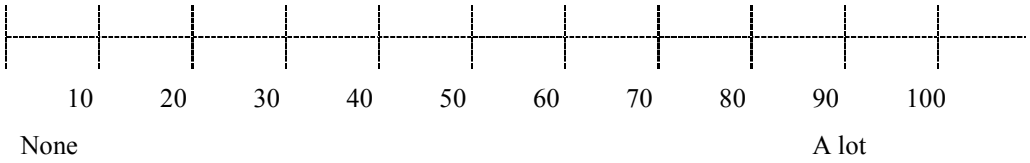
How well did you combine the sentences into a newspaper article?



How similar is the newspaper article task to the one-sentence problems from last session?



How much did the one-sentence problems from last session help you to create the newspaper article task?



Describe how you solved the newspaper article task:

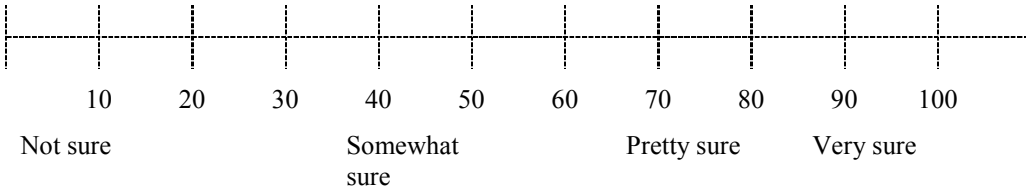
_____
_____
_____

Name_____ Date _____

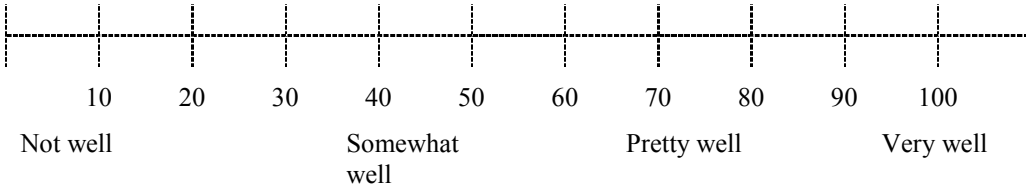
Imagine that this time you were assigned to cover the story of a large snake that attacked a high school student. You went to the school and gathered information about the incident. You have a page with all your notes. Your task is to put your notes together and write a brief article about the incident. Remember, the newspaper has limited space; therefore, try to use the minimum number of words and sentences possible but don't exclude relevant information.

1. The student was taken to the hospital.
2. The student received five stitches.
3. The stitches were above his right eye.
4. The student was released from the hospital.
5. The student was released some hours later.
6. A student was bitten.
7. The bite was near his right eye.
8. A Burmese python bit the student.
9. The Burmese python is a snake.
10. The Burmese python was more than three feet long.
11. The Burmese python is not poisonous.
12. The student was in the zoology classroom.
13. The student was in the zoology classroom with a friend.
14. The student was feeding the snake mice
15. The friend was feeding the snake mice.
16. The snake attempted to get out of its tank.
17. The friend went to close the classroom door so the animal couldn't escape.
18. The student remained behind with the snake.
19. The student tried to approach the snake.
20. The snake responded by biting the student.
21. The student is 14 years old.
22. The student is in high school.
23. The high school is in Manhattan.

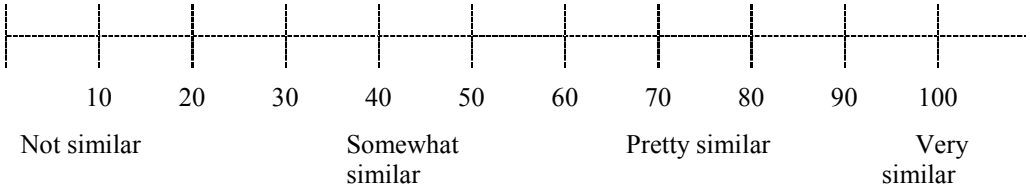
How sure are you that you can write this newspaper article using the minimum number of sentences? (Answer the question before writing the newspaper article)



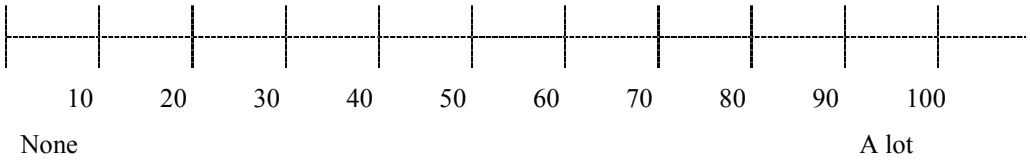
How well did you combine the sentences into a newspaper article?



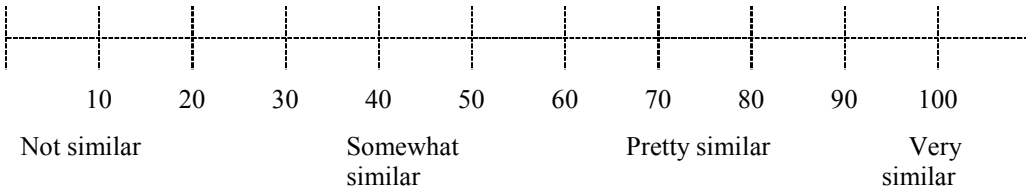
How similar is the newspaper article task to the one-sentence problems from last session?



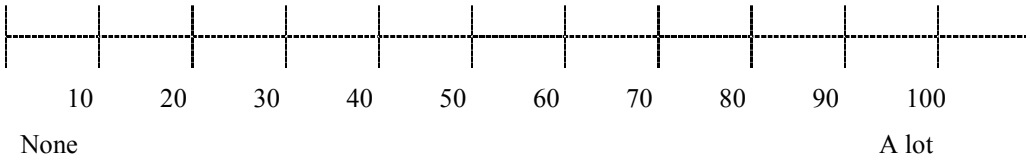
How much did the one-sentence problems from last session help you to create the newspaper article task?



How similar is the "jewelry robbery" article to this article?



How much did the "jewelry robbery" article help you to write this article?



Describe how you solved the newspaper article task:

_____
_____
_____

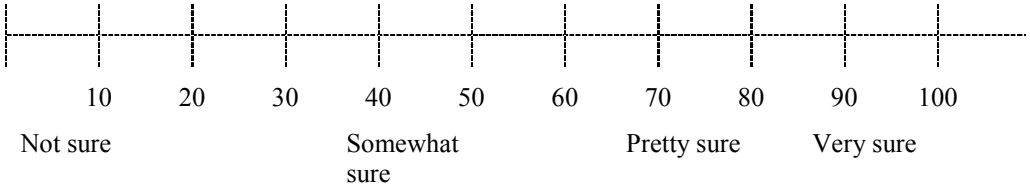
Handouts Transfer Tasks
(Handout #2: Sequence Snake –Robbery)

Name_____ Date _____

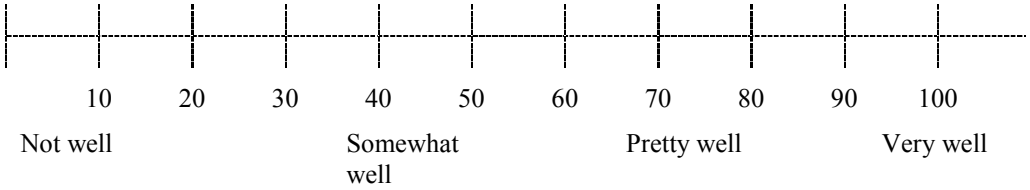
Imagine that you are a newspaper reporter for the New York Times, and you were assigned to cover the story of a large snake that attacked a high school student. You went to the school and gathered information about the incident. You have a page with all your notes. Your task is to put your notes together and write a brief article about the incident. Remember, the newspaper has limited space; therefore, try to use the minimum number of words and sentences possible but don't exclude relevant information.

1. The student was taken to the hospital.
2. The student received five stitches.
3. The stitches were above his right eye.
4. The student was released from the hospital.
5. The student was released some hours later.
6. A student was bitten.
7. The bite was near his right eye.
8. A Burmese python bit the student.
9. The Burmese python is a snake.
10. The Burmese python was more than three feet long.
11. The Burmese python is not poisonous.
12. The student was in the zoology classroom.
13. The student was in the zoology classroom with a friend.
14. The student was feeding the snake mice
15. The friend was feeding the snake mice.
16. The snake attempted to get out of its tank.
17. The friend went to close the classroom door so the animal couldn't escape.
18. The student remained behind with the snake.
19. The student tried to approach the snake.
20. The snake responded by biting the student.
21. The student is 14 years old.
22. The student is in high school.
23. The high school is in Manhattan.

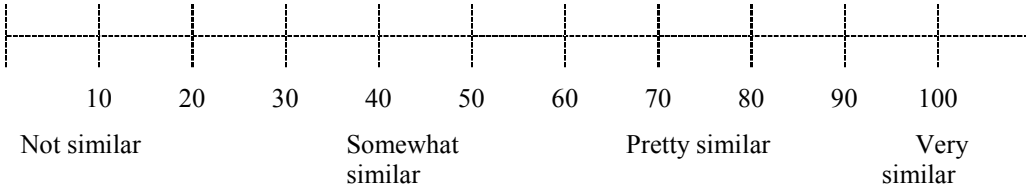
How sure are you that you can write this newspaper article using the minimum number of sentences? (Answer the question before writing the newspaper article)



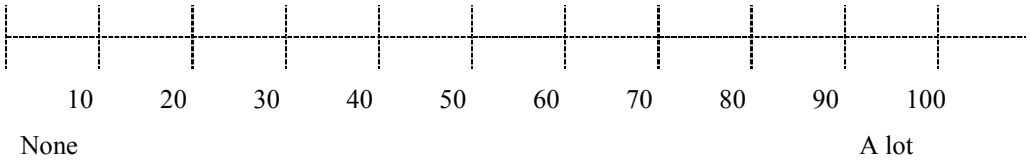
How well did you combine the sentences into a newspaper article?



How similar is the newspaper article task to the one-sentence problems from last session?



How much did the one-sentence problems from last session help you to create the newspaper article task?



Describe how you solved the newspaper article task:

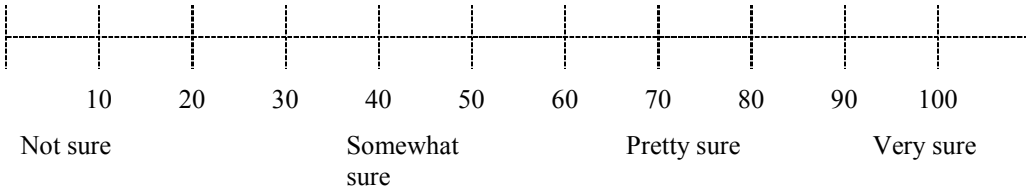
_____
_____
_____

Name_____ Date _____

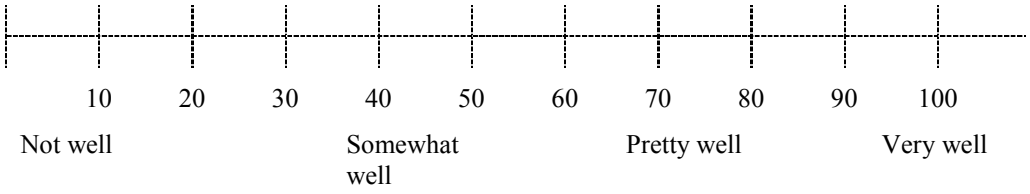
Imagine that this time you were assigned to cover the story of the robbery of some very expensive diamonds. You have gathered all the information from the police department. Your task is to write an article of the incident. Remember, the newspaper has limited space; therefore, try to use the minimum number of words and sentences possible but include all relevant information.

1. A police officer joined the chase.
2. A police officer caught one suspect.
3. The courier lost a tooth.
4. The courier suffered burns from the stun gun.
5. The robbery happened yesterday.
6. The robbery was outside a famous hotel.
7. The famous hotel is in Midtown.
8. A courier was robbed.
9. The courier was 68 years old.
10. The courier was a female.
11. The courier was robbed of $80, 000.
12. The $80,000 were in diamonds.
13. The $80,000 were in jewelry.
14. The diamonds were recovered.
15. The jewelry was recovered.
16. The suspect was charged with robbery.
17. The suspect was charged with weapons possession.
18. Two men robbed the courier.
19. Two men struck the courier in the face.
20. Two men shocked the courier with a stun gun.
21. The men fled.
22. Hotel guards chased the men.
23. The chase was into Central Park South.

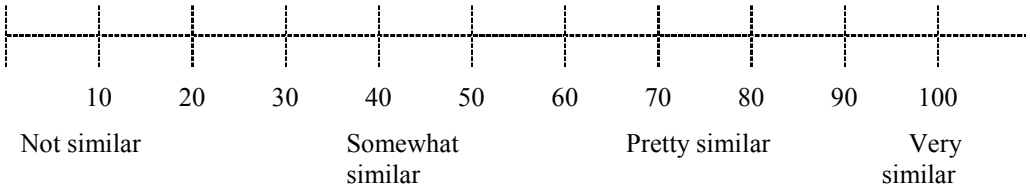
How sure are you that you can write this newspaper article using the minimum number of sentences? (Answer the question before writing the newspaper article)



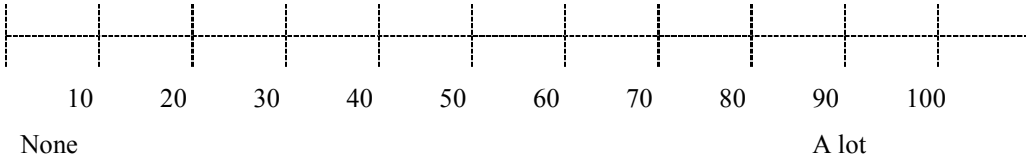
How well did you combine the sentences into a newspaper article?



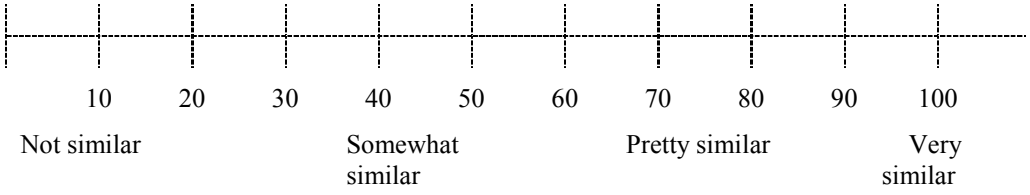
How similar is the newspaper article task to the one-sentence problems from last session?



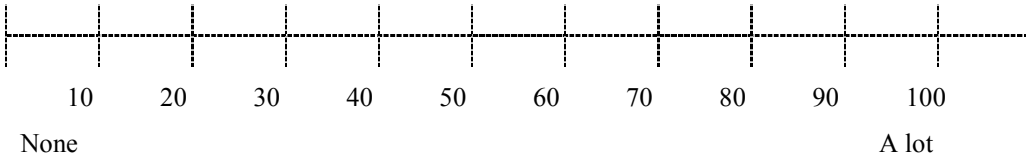
How much did the one-sentence problems from last session help you to create the newspaper article task?



How similar is the "snake" article to this article?



How much did the "snake" article help you to write this article?



Describe how you solved the newspaper article task:

_____
_____
_____

APPENDIX 7
EXAMPLES

Sentence Combining Examples

1. The hula is an elegant dance.
2. It expresses the culture of the islands.
3. It expresses the history of the islands.
4. It expresses the story of the islands.
5. Missionaries suppressed the hula.
6. This was during the nineteenth century.
7. They did not understand its complexity.
8. They did not understand its significance.

During the nineteenth century, missionaries suppressed the hula, an elegant dance that expresses the culture, history and story of the island, because they did not understand its complexity and significance.

Not understanding the complexity and significance of the hula, an elegant dance that expresses the culture, history and story of the islands, missionaries suppressed it during the nineteenth century.

1. Air quality has reached a point of crisis.
2. Legislators must pass laws.
3. The laws carry penalties for polluters.
4. The penalties are stiff.
5. Industries must comply with measures.
6. The measures are preventive.
7. Industries must decrease their discharge.
8. The discharge is of atmospheric emissions.

Air quality has reached a point of crisis pressing legislators to pass laws that carry stiff penalties for polluters, and making industries comply with preventive measures to decrease their discharge of atmospheric emissions.

Given that air quality has reached a point of crisis, legislators must pass laws that carry stiff penalties for polluters, and industries must comply with preventive measures to decrease their discharge of atmospheric emissions.

1. We savored the afternoon's warmth.
2. We savored the afternoon's quiet.
3. We hiked to an open grassy ridge.
4. It was there we could have lunch.
5. It was there we could rest.
6. City noise was far away.
7. Diesel stench was far away.
8. A memory of final exams was far away.
9. This was at least for now.

Savoring the afternoon's warmth and quiet, we hiked to an open grassy ridge where we could have lunch and rest, far away from city noise, diesel stench and a memory of final exams, at least for now.

Newspaper Articles Examples

Jewelry robbery article:

Two men robbed a 68-year-old female courier of $80,000 in diamonds and jewelry yesterday outside a famous hotel in Midtown. They struck her in the face and shocked her with a stun gun. The men fled into Central Park South as hotel guards chased them. A police officer joined the chase and caught one suspect who was later charged with robbery and weapons possession. The courier lost a tooth and suffered burns from the stun gun, but the diamonds and the jewelry were recovered.

5 sentences

Snake article

A 14-year-old Manhattan high school student was bitten near his right eye by a Burmese python, a three- foot-long, non-poisonous snake. The student and a friend were feeding the snake mice in the zoology classroom when the reptile attempted to get out of its tank. The friend went to close the classroom door so the animal couldn't escape. Remaining behind, the student tried to approach the snake who responded by biting him. The 14 year old was taken to the hospital and was released some hours later after receiving five stitches.

5 sentences

APPENDIX 8
SCORING SHEETS

Scoring Sheet Pretest and Posttest Tasks

_____ C1. More than one sentence (deduct 50 points)

_____ C2**.** Complete clause missing (deduct 10 points for each)

_____ C3**.** Misplaced clauses that change the meaning, or don't follow a reasonable sequence or organization (deduct 10 points for each).

_____ C4. Run on sentences (deduct 10 points for each)

_____ C5**.** Comma splices (5 points for each)

_____ C6. Wrong connecting word linking two clauses or not a good transition (deduct 5 points)

_____ C7. "Extra" words not included in original clause that are not necessary (deduct 3 points from each)

_____ C8. "Extra" words or "repeated" words from original clause (deduct 3 points for each)

_____ C9. Missing words from original clause (deduct 3 points for each)

_____ C10. Missing "subject", "and" or a "key" comma within a clause (deduct 2 points for each)

Total _____

Number of strategies _____

Comments:

Scoring Sheet Transfer Tasks

_____ C1. Sentences in paragraph are not organized (they follow the same sequence as the list of facts) (deduct 50 points)

_____ C2**.** Complete clause missing (deduct 10 points for each)

_____ C3**.** Misplaced clauses that change the meaning, or don't follow a reasonable sequence or organization (deduct 10 points for each).

_____ C4. Run on sentences (deduct 10 points for each)

_____ C5**.** Comma splices (5 points for each for each)

_____ C6. Wrong connecting word linking two clauses or not a good transition (deduct 5 points)

_____ "C7. Extra" words not included in original clause that are not necessary (deduct 3 point from each)

_____ C8. "Extra" words or "repeated" words from original clause (deduct 3 point for each)

_____ C9. Missing words from original clause (deduct 3 point for each)

_____ C10. Missing "subject", "and" or a "key" comma -within a clause (deduct 2 point for each)

Number of sentences_____

Total _____

Number of strategies _____

Comments:

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