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Learning Strategy Instruction and Use: A Study in Keywording

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ABSTRACT

Learning Strategy Instruction and Use:
A Study in Keywording

Debi Kaporovsky Parush

The role of learning strategies for achieving educational objectives has drawn much attention. However, questions related to the effects of learning strategy instruction remain unclear. This thesis was concerned with learning strategy instruction in the classroom. Specifically, the experiment explored the effects of training in keywording, via learning modules, on retention of foreign language vocabulary words. In addition, it examined metacognitive training and an embedded cue as additional support to keywording strategy use. It was found that students receiving keywording instruction alone performed significantly better than those in the control group. The metacognitive training and embedded cue groups did not outperform the control group, and thus, failed to support the keywording strategy. The results suggested that keywording can be taught in the classroom using learning modules and that children enjoy learning keywording in this manner. The significant effects of keywording group instruction were interpreted in terms of automization of strategy use as a result of adequate practice.

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Chapter 1

Introduction

Background and Context

A large proportion of children in schools do not achieve the learning objectives. It has been estimated that approximately one fifth of the children in the United States did not attain the level of literacy necessary for employment and a similar number did not gain the understanding necessary for effective citizenship (Sperry, 1972). Student's failure to achieve the objectives has been attributed to such factors as lack of motivation, lack of ability, etc. (Gagne, 1967). A new wave of accountability has pushed teachers and educators to reevaluate the situation. More and more, teachers and educators are expected to be accountable for their students. No longer are students considered to be the only ones responsible for their learning.

As a result, attention has been directed to other possible causes for students' failure to achieve the objectives. New ways to improve education are being sought. One such direction, which began in the late 60's and early 70's, is matching instruction to learners' aptitudes. It was hoped that by looking for Aptitude-Treatment-Interactions (ATI) it would be possible to teach different pupils the same thing using different methods which suit their individual aptitudes. This direction is based on the assumption that since

everyone has their own idiosyncratic ways of learning, their own cognitive styles, and their own aptitudes, a single teaching strategy cannot possibly reach them all.

Educators hoped it would be possible to discover instructional treatments that would compensate for individuals' weaknesses and amplify their strengths (Winn, Note 4).

However, as research progressed, more and more difficulties were encountered which led to a reconsideration of this alternative. One major problem with teaching to the learners' stronger aptitudes is that if the learners are only given activities that they are good at, then they will not develop skills in other important activities. Although it is not desireable for everyone to be the same, people should know how to learn from many different sources. Matching instruction to learners' stronger cognitive styles does not help accomplish this goal (Cronbach & Snow, 1977).

While research continues in the path of matching instruction to individual differences in learning, a new direction has emerged. This new path involves teaching learners new strategies for learning. Teaching learning strategies has two major advantages over the original ATI approach. First, by teaching learning strategies, learners learn 'how to learn'. They can become increasingly independent of instruction. This is important since one central goal of education is to prepare learners for life out of school. The second

advantage of this approach is that it does not require the teacher to determine each learner's aptitude before proceeding. Jones (Note 2) reported that by embedding learning strategy instruction into a curriculum, most of the students benefitted and no negative effects were found. However, questions about the ways such strategies can be used or whether they can be taught remain unclear.

Learning Strategies Instruction

Through day-to-day living, people encounter problems that must be solved. With experience in solving problems we develop strategies that we use to cope with classes of problems. These strategies or "coping mechanisms" are rich sources for learning strategies (Rigney, 1980). As a result of such factors as experience, intelligence, and aptitude, learners develop their own idiosyncratic learning strategies naturally. More successful learners develop highly effective strategies, such as forms of elaboration and grouping, while lower achievers generally resort to low level methods such as rote learning (Canelos, Taylor, & Altschuld, 1983).

The implications of identifying effective learning strategies is that they may be taught to learners who have less effective strategies. One assumption of this approach to instruction is that unsuccessful learners might have difficulty learning because they do not know

how to learn or because they do not know when to use a skill that they have, and not because they are not capable of learning. Therefore, the process of developing learning strategy instruction should include both the identification of effective learning strategies for specific contexts, and the effective teaching of these methods. Keywording is an example of this process. Keywording is a mnemonic technique for learning foreign language vocabulary. It was developed by Atkinson (1975) somewhat accidently when he asked more successful second language vocabulary learners how they remembered the new words. Based on the responses of the students, he put together the keywording method. Thus, keywording is a synthesis of a number of high achiever's naturally occuring learning strategies for learning foreign vocabulary.

The keywording method has exhibited such success that keywording subjects have sometimes outperformed controls by over a 2:1 margin (Pressley & Levin, 1978). However, difficulties were encountered when keywording studies were implemented in the classroom (Fuentes, 1979; Hall, 1983) These problems may have been encountered because it is more difficult to manipulate the learners' cognitive processes in a large group than in a tightly controlled experiment. It appears to be necessary to compensate, in some way, for learners not using the strategy effectively. Training specific techniques might not be enough; additional direction

might contribute to the instructional process. This may be achieved a number of ways.

Additional support to learning strategy instruction. Instructions encouraging learners to use strategies appropriately might be embedded in the task or detached from it. Embedding instruction into the task implies giving the learner a cue or task which triggers the learning strategy. Detached instructions are given separately from the task. This demands more of the learners since they are expected to apply the skills independently.

Skills which act as planners of a strategy based on the assessment of both the task and the learners' available tactics have been called "metacognitive skills" (Flavell, 1973; Brown, 1977). It has been found that when children are explicitly informed that an instructed strategy improves their performance, they continue to use that strategy on subsequent memory tasks (Kennedy and Miller, 1976; Ringel and Springer, 1980). Hence, it seems that metacognitive training can enable the learner to recognize the benefits of various strategies for different tasks and to decide to use a strategy that is appropriate for the requirements of the given task.

Brown (1979) suggested a list of metacognitive skills which are required of an executive or central processor in order to use strategies effectively. These include: 1. to predict the system's capacity

limitations; 2. to be aware of its repertoire of heuristic routines and their appropriate domain of utility; 3. to identify and characterize the problem at hand; 4. to plan and schedule appropriate problem-solving strategies; 5. to monitor and supervise the effectiveness of those routines called into service; and 6. to dynamically evaluate those operations in the face of success or failure so that termination of strategic activities can be strategically tuned. Of Brown's list of skills, the present study focused on isolating the task requirements, choosing a strategy to accomplish the task based on available strategies, and evaluating the effectiveness of the strategy for metacognitive training.

While there has recently been much discussion on the importance of addressing learners' metacognitive skills, little is known about how to actually train them (Gerber, 1983). One study, which was successful in metacognitive training (Lodico, Ghatala, Levin, Pressley, and Bell, 1982), demonstrated to the subjects how different strategies lead to different results. Then, subjects were given three trials requiring application of either a rote or elaboration strategy. One trial required use of a rote strategy and another required an elaboration strategy. On the third trial, subjects were forced to choose between the two. The majority of subjects in the experimental group chose the more effective strategy and performed better on the task

than the control group, whose attention was not drawn to the different results of different strategies.

Another body of research on training strategy-monitoring skills is that of Dansereau (1978). Dansereau developed a learning strategy curriculum which teaches both primary strategies, which are the techniques people can use to learn something (keywording would be an example of a primary strategy) and support strategies which involve motivation and monitoring. Dansereau's category of support strategies seems to parallel aspects of what would be required of a good metacognitive strategy. The metacognitive treatment of this study has drawn particularly from Dansereau's contribution of including self-motivating activities.

In summary, trends toward accountability in education have forced educators to develop new directions in instruction that will enable more of the learners to achieve more of the objectives. One such direction has been learning strategy instruction. While the benefits of learning strategy instruction have been clarified, there is still much to learn about how to actually go about teaching learning strategies in the classroom. Questions regarding the amount of training and practice, as well as the type of support necessary for effective learning strategy instruction remain to be answered.

The purpose of this study was to explore learning strategy training and use. In general, this study

questioned whether children can learn to execute learning strategies effectively in the classroom. Metacognitive training and an embedded cue were examined as further support to learning strategy use.

Rationale

Learning a second language is difficult for many people in most circumstances. This difficulty must be much greater when the learner has no exposure to the language except in the classroom. The teacher's role in this situation is two-fold: motivating the learner as to the relevance of the language, and then teaching the language. Such is the case for teachers of Hebrew as a second language in North America. Another difficulty associated with teaching Hebrew as a second language is that it is very different from English. The Hebrew alphabet has completely different letters. Words are written from right to left. In addition, Hebrew includes velar fricative sounds which are non-existant in English. Because of these multiple differences, Hebrew appeared to be an ideal topic for learning strategy instruction.

The strategy: keywording. It has been recognized that some learners are better at learning a second language than others. Naiman, Frohilch, Stern, and Todesco (1978) raised the question as to whether good learners tackle the problem differently from poor learners. Atkinson (1975) found that good learners

introspect 'a bag of tricks' for learning vocabulary items, whereas poor learners are incredibly inept when trying to describe what they are doing. Putting together some of the reports of his subjects, Atkinson described a two step strategy creating an acoustic link and an imagery link between the new word and a familiar word that sounds like the new word. He called this method keywording. Because keywording allows learners to draw upon their past experience (already learned first language words) it might alleviate some of the difficulty associated with the foreignness of the Hebrew language. Since it allows learners to be creative by instructing them to generate images which are of interest to them, it might also contribute to motivation. Therefore, keywording may be an especially appropriate learning strategy for learning Hebrew vocabulary.

Keywording was chosen as the strategy for testing effective learning strategy instruction since it has already proven its success in many laboritory-type studies with many variations (Atkinson, 1975; Pressley, 1977; Levin et al, 1982; Pressley and Levin, 1982). There are many advantages to using keywording as a mnemonic device. Some of these include keywording's potency with material that is difficult to remember, that it is time effective, it may work in a classroom, it does not impede other skills, and children enjoy it (Levin 1981).

Strategy support: training versus embedded cues.

In order to compare the effects of metacognitive training and embedded cues on keywording instruction, a metacognitive learning module was developed based on a combination of Brown's list of metacognitive steps and Dansereau's support strategies. The embedded cue was added to the list of words the learners were to be tested on. It was a cartoon telling the learners to use keywording for learning the words. By comparing the metacognitive, embedded cue and keywording-only groups, it was possible to see whether additional support (in the form of metacognitive training or an embedded cue) for a specific learning technique (e.g., keywording) would help learners use it more effectively.

Practice. Another variable which was unique to this study was practice. For two sessions following administration of the modules, subjects were given guided practice in keywording and metacognitive training. In these sessions subjects were given words to learn and a reminder of how the strategies should be used. It was hoped that by giving the learners additional practice beyond learning the steps of the strategy per se, the learner would become more fluent in its use and the strategy might become automatic.

Learning modules. Learning modules were used as the medium of instruction. A learning module is a self-contained, self-instructional unit which provides students with the information needed to acquire specific

knowledge and skills (Dick and Carey, 1978). Most modules require students to perform various learning tasks and receive feedback on performance. This medium was chosen because of its suitability to selective use. If learning modules proved to be an effective medium for learning strategy instruction then they could be applied to individualizing instruction as well. Students having difficulty with a particular type of learning activity could be prescribed a learning module that would help develop that specific skill.

Retention. Retention is an important variable in this study. Immediately following training of keywording, it was expected that the learners would not have trouble applying it to a vocabulary task since the technique, as well as the vocabulary words, would be fresh in their minds. The real test of appropriate strategy use would take place some time after instruction. It was hoped that by providing learners with metacognitive training they would independently evaluate keywording as a strategy and use it for other vocabulary learning tasks. It was expected that the embedded cue would remind the learners in that group to use keywording and thus improve performance. Ultimately, however, developing independent study skills seems to be a more desireable goal than creating dependence on cues and other compensatory measures. Nevertheless, during the acquisition stage, such cues may be beneficial.

Field experiment. A field experiment was chosen as the format for answering these questions for two reasons: (1) the discrepancy between lab versus field studies in the literature leads to questions regarding keywording's effectiveness in the classroom context, and (2) the importance of being able to generalize to other classroom situations.

In summary, the experimental questions addressed in this study are:

1. Does training in the use of keywording facilitate learning Hebrew vocabulary compared to the strategies the learners already use?
2. What are the relative effects of metacognitive training and embedded cues keywording on use?
3. What other learning strategies are used spontaneously for learning new vocabulary?

Chapter 2

Review of Related Literature

This chapter begins by exploring some theoretical aspects of learning strategies, its definition, and various studies in learning strategy instruction. Then, keywording is discussed within the theoretical framework of learning strategies. A review of training in keywording, as related to learning strategy instruction in general, follows. Finally, the present study is described as an outgrowth of the discussion of learning strategies in general, and keywording in particular.

What is a Learning Strategy?

The events of our daily life stimulate the development of 'coping mechanisms' that enable us to deal with these experiences. The coping mechanisms may be seen as sources for cognitive learning strategies (Rigney 1980). Learning strategies are techniques we use to help us acquire, retain, and retrieve information. Just as different coping mechanisms are more effective than others for dealing with a given class of problems, different learning strategies are more appropriate for different subject matter, or tasks within a subject matter, given particular objectives. Thus, an interesting question for research in learning strategies is how different learners use different learning strategies to achieve the same goal.

Learning strategies may be seen as a form of

orienting tasks which prescribe uses of processing resources (Rigney, 1978). They can be self-assigned or externally assigned. Cognitive learning strategies may vary in their generality of application, scope of content affected, and complexity of goals. Thus, any cue which causes the learner to use a particular cognitive process, either self-determined or externally assigned, seems to fit into Rigney's definition of a learning strategy. An example of a learner's self assigned strategy to activate a cognitive process may be his/her decision to scan a paper looking for the main ideas. The decision refers to the metacognitive stage. Scanning is the strategy and the actual acquisition of main ideas is the cognitive process. Similarly, in a memorizing task, the recognition of the task to be memorizing and the plan to memorize are metacognitive skills, using a mnemonic device is the learning strategy, and the act of memorizing is the cognitive process.

Winn (Note 3, 1982) defines learning strategies as applications of mental (cognitive) skills to appropriate learning tasks. He goes on to say that instruction involves controlling cognitive processes by inducing learners to use learning strategies that are appropriate to the task at hand. Learning how to learn involves cognitive skills and metacognitive skills (to decide and plan how to learn something), which result in learning strategies. Thus, according to Winn, the successful

application of a mental skill to a given task constitutes a learning strategy.

It seems that Winn and Rigney differ in their definition of a learning strategy. While Rigney includes elements of instruction in his definition of learning strategies, Winn defines learning strategies as a learner's mental skills properly applied to a given task. Winn adds that the use of learning strategies or the appropriate application of mental skills can be attributed either to the internal, metacognitive abilities of the learner or to the external attributes of the instructional strategy.

The distinction between mental skills and learning strategies becomes more difficult with the introduction of metacognitive skills (see Figure 1). Figure 1 illustrates the relationships among the concepts related to learning strategies in order to clarify what learning strategies are and how they may contribute to learning and instruction. Cognitive processes refer to the ways people process information, (i.e., acquire, retain, and retrieve information). They are "the processes that underlie people's ability to learn, understand and remember information" (Bransford, 1979, p. 4). Some people are better at certain types of learning than others. Winn (1982, 1983) calls mental skills those types of learning processes that a learner is 'skilled' in or strong at. However, it is not enough to be skilled in a process; one must also know when to use it

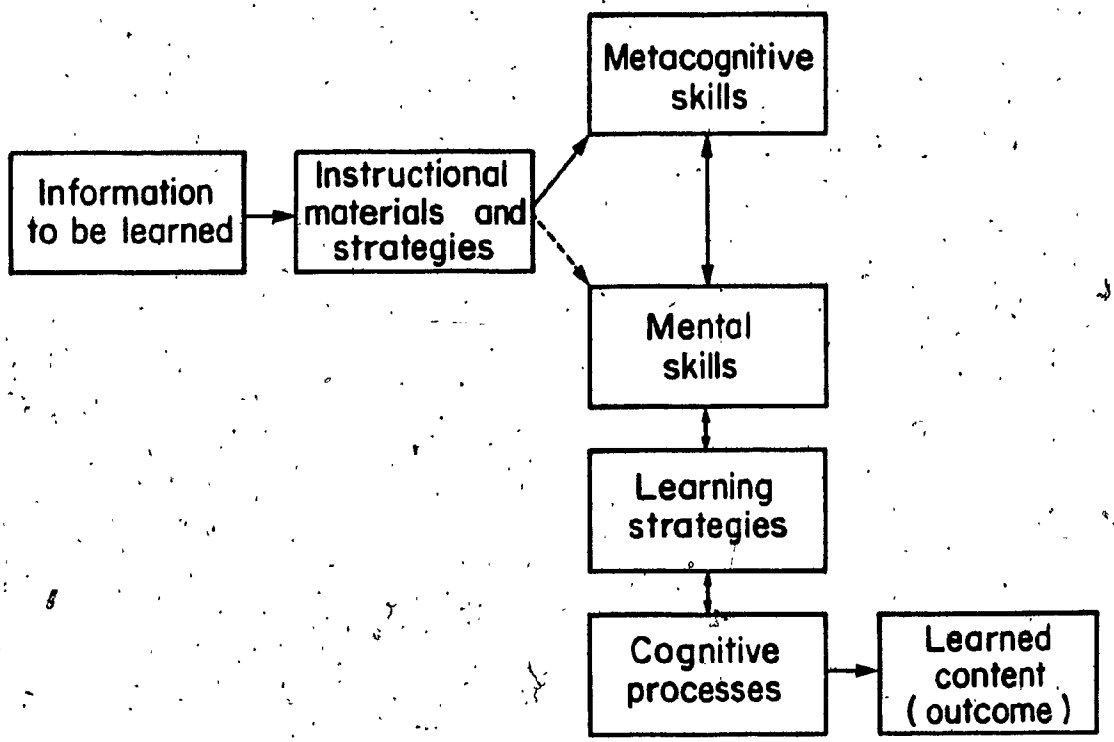

Figure 1 An illustration of the relationships among cognitive processes, mental skills, metacognitive skills, and learning strategies.

(Bovy, 1981). As Bovy wrote, "... the success or failure of individual learners depends to a great extent on whether they can successfully apply previously acquired cognitive skills to solve specific learning problems" (p. 206).

If successful learning requires the learner to apply mental skills effectively, the process of effective learning may be described as follows. The learner determines the requirements of the task to be performed. Based on that, s/he examines what available mental skills or tactics may be recruited to help achieve the task requirements. The learner uses metacognitive skills to plan a learning strategy based on the requirements of the task and available tactics or mental skills. A person may be considered skilled in metacognitive processing when s/he evaluates task requirements accurately and chooses appropriate mental skills to achieve these tasks. Therefore, an effective learning strategy is a product of the mating of mental skills and metacognitive skills. It should be noted that the stage of metacognitive processing may be bypassed by at least two conditions. One is when the learner does not consider what s/he has to learn and how to go about learning it. Another situation is when the directions of how to learn something are embedded in the task itself.

Inducing Learning Strategy Use

A number of procedures for teaching learning strategies have already been isolated. Three of these include modelling, embedded strategies, and direct instruction. Modelling learning strategies is a teaching strategy that has had success in the field. The Chicago Mastery Learning Reading curriculum is such an example. This curriculum is based on the assumption that reading is thinking. To help learners develop appropriate thinking skills, effective thinking processes are modelled within the instruction. Strategy instructions include "Think" statements and "Ask Yourself" questions. The teacher also presents sequences of thinking strategies such as Look - Say - Decide - Circle - Write. Another example of successful learning strategy modelling is Salomon's work with film in which the camera models focusing in on important details by zooming in. Salomon (1972, 1974, 1979) found that instructional treatments that model the internal processing requirements of the task result in superior learning.

Embedded strategies are designed into the instructional system so that the learner must use a particular processing resource in order to accomplish the task. Examples of embedded strategies are pre-, during, and post- activity questions or assignments.

Detached learning strategy instruction is of greatest interest to this study since a major purpose of

education is to enable the learners to become independent of instruction. Instructions to learners to form mental images, state the material in their own words, and reorganize the material are examples of strategies shown to increase comprehension through direct teaching. Already, studies have shown that it is possible to develop learners' cognitive skills. Feuerstein (1980), and De Bono (Note 1) have developed curricula which train learners' thinking processes. Weinstein (1977) and Dansereau (1977) have developed other learning strategy curricula which have been shown to improve learners' achievement in prose learning. On a more specific level, Levin (1980) and Pressley (1977) have shown the success of teaching mnemonic devices for improving learners' memory. Still, questions related to teaching learners new learning strategies in the classroom remain to be explored.

We have seen that it is possible to train learners to use mental skills. However, according to our definition of "learning strategies", it is also important to know how to decide when to use them. Therefore, another component of learning strategy instruction might be to develop learners' metacognitive skills, which act as planners of a strategy based on the assessment of both the task and the learners' available tactics. This instructional goal may be approached a number of ways. One way is to teach metacognitive skills directly. Another method is to reinstruct the

learners to use the appropriate mental skill just before they perform the task.

In a study training children to monitor their use of learning strategies, Lodico et al. (1983) found that young children (grade two) can be trained to monitor the relationship between strategic behavior and performance and this training does enhance their selection of an efficient strategy on a memory task. They described the children's behavior as generalizing the use of a strategy to a new situation. In an earlier experiment by Pressley and Dennis-Rounds (1980), it was found that transfer of strategy use was spontaneous for 18 year olds but that 12 year olds only transfered if they were given a cue to do so ("use a technique like the one you used before"). From their experiment, Pressley and Dennis-Rounds concluded that "maximum performance may be achieved only be reinstructing the learners in strategy usage in the new task situation" (Pressley & Dennis-Rounds, 1980, p. 581).

The results of these two studies reflect a contrasting issue for teaching how to learn. Lodico et al.'s study seems to imply that learners can be taught when and how to use different strategies and how to monitor their use. Pressley and Dennis-Rounds's study seems to point to a contradictory implementation. They suggest that cues need to be embedded into the material to remind the learners to use the strategy and how. Pressley and Dennis-Rounds recommend supplanting the

metacognitive skill of planning a strategy which might be teachable according to Lodico et al. Both supplantation of metacognitive skills and training in metacognition may act as support for mental skills. One question that requires clarification is the nature of metacognitive support necessary to increase the effectiveness of the training of mental skills, if any.

Keywording: An Example of Learning Strategy Instruction

Definition. Keywording is a mnemonic technique for learning foreign language vocabulary developed by Atkinson (1975). This method involves two steps. The first step is to associate the foreign word to an English word that sounds like some part of the foreign word. The second stage is to create a mental image of the keyword interacting in some way with the new, foreign word (Raugh, Schupbach, & Atkinson, 1975). For example, if the learner wants to learn the Hebrew word "Bayit" which means house, s/he could imagine a person pointing to a house and saying "buy it".

There can be a number of theoretical explanations for how keywording works. These explanations can be drawn from elaboration theory, dual-processing theory, and depth of processing theory. It draws on the seemingly natural advantage of imaginal encoding (Rohwer, 1977).

Levin (1981) describes a number of keywording operations and the principles that may be derived from

them. For a summary of the principles and operations of keywording see Table 1.

Keywording as Learning Strategy or Mental Skill.

According to Rigney's definition, keywording may be seen as a typical learning strategy since it "cues" the cognitive process of "memorizing". Instructions can be provided to prescribe the use of keywording or students can assign themselves to do it.

Keywording was developed from what may be called expert, foreign language, vocabulary learners. Atkinson (1975) described these learners as able to introspect a 'bag of tricks' for learning vocabulary items. Keywording can be used to help retain and retrieve information. Most of the research involving keywording has been done with learning foreign language vocabulary. However, research has been done to explore its generality of application. For example, its use has been explored for learning English vocabulary, contents of prose, and geography (Levin, Shriberg, Miller, McCormick & Levin, 1980).

According to Winn's definition, keywording can also be seen as a mental skill. Mental skills are the types of learning processes that a learner is skilled in or strong at (Winn 1982, 1983). Mental skills only become learning strategies when applied to an appropriate task. Thus a learner might be skilled in a combination of processes that are associated with keywording but might lack the implicit direction of when to use them.

Table 1

Operations and Principles of Keywording

Principles	Operations
1. meaningful stimuli are more reliably encoded than non meaningful stimuli	the keyword acts as the meaningful stimuli which helps encode the new word
2. interacting items are more reliably associated than non-interacting items	the keyword and the new word are encoded with a thematic interaction
3. the greater the similarity between the keyword and new word, the more reliably one will evoke the other	the keyword evokes the new word

The definition of keywording as either a complete learning strategy or a mental skill has implications for instruction. If keywording is considered a learning strategy then it must contain within itself the decision as to when to use it. If it is a mental skill that can be used as a learning strategy then further metacognitive instruction as to when to use keywording would be required.

Lab versus Field Experiments. The methods to implement learning strategy instruction in order to make it effective are not clear. Large effects for using keywording in laboratory studies, with one subject at a time, have been reported (Levin, 1980; Levin, et al., 1982; Pressley, 1977; Pressley, Levin, Kuiper, Bryant, & Michener, 1982). However, in classroom experiments little if any differences have been found (Levin, Pressley, McCormick, Miller, & Shriberg, 1979; Hall, Wilson, & Patterson, 1981). Because of the discrepancy between these studies, one might ask if it was the effectiveness of keywording or the method of instruction that prevented the treatment groups from performing better than the control groups in the classroom setting. If keywording is found to be less effective in the classroom regardless of the method of instruction, an explanation is necessary to explain why such large effects were found in the laboratory. If it is the method of instruction that needs improvement, what kinds of changes or additions are required?

A number of studies have been performed in the classroom, evaluating keywording's contribution to learning foreign language vocabulary. Fuentes (1976) randomly assigned second-year high school Spanish students to either keywording or control groups. The novel aspects of this study were (1) the classroom context, (2) that the list of words (5 per day for 4 days) was presented simultaneously for a study period of ten minutes, (3) the subjects were experienced second language learners, (4) the study lasted 6 weeks. Previously, all keywording studies were performed in laboratory type settings, in which the experimenter paced the subject's study of at least 10 new words. Usually retention was not studied. This experiment found no significant differences between keywording and control groups.

Levin et al. (1979) explained that Fuentes' results might have been caused by the subjects' previous experience as second language learners; they might have already developed their own strategies for learning vocabulary. They also suggested that the length of the study might have caused the effects of keywording instruction to leak. To compensate, Levin et al. (1979) performed a similar experiment with high school students, this time including first year Spanish students in addition to second year, and again found no significant differences between the keywording and control groups. When Levin et al. (1979) performed a

classroom study with grade 5 students that was experimenter paced, significant effects were found favoring keywording. They suggested that (1) the experimenter's pronunciation of each Spanish word contributed to this effect and (2) the younger learners are less strategic in comparison to high school students so the keyword method would be more beneficial to elementary school children.

Hall, Wilson, and Patterson (1981) compared keywording to control groups in a classroom context. No significant differences were found either on Spanish-English or English-Spanish recall when the study period was not paced. When a similar group was experimenter-paced, the keywording group did perform significantly better than the control group. Hall et al. (1981) proposed that a particular imposed study strategy will be maximally useful when ordinary study conditions are minimally facilitative of learning. Since students do not usually study new words with someone pacing them, they benefitted from the imposed strategy (keywording) more than they would have under more familiar conditions. In addition, Hall etal. suggested that keywording may be particularly useful as a supplement to learners' own strategies for particularly difficult words.

To summarize, studies with first and second year high school Spanish students and college students with no background in Spanish, given detached instructions

and free study time showed no difference between keywording and control groups. In comparison, fifth grade keywording students in an experimenter-paced, classroom based study did perform significantly higher than a similar control group. The features which were suggested as critical to keywording success in the field were: (1) the age of the learners, i.e., the younger learners, having less strongly formed idiosyncratic strategies would benefit more than older, more experienced learners; and (2) the pacing of the experimenter kept the learners' attention and motivation.

Problems with Learning Strategy Instruction. It seems that the pacing of the experimenter acts as a form of embedded strategy. In experimenter paced studies, subjects are given brief instructions on keywording and then given the new word to learn as follows: "The Spanish word _____, which sounds like the English word _____, means _____." Before hearing the new words in this format, learners are instructed to form an image of the new word and keyword doing something together. This structure practically forces the learner to use the keywording method. On the other hand, given free time, the learner can employ any of a number of strategies.

A number of hypotheses may be drawn from these results. One interpretation may be that, although it is possible to isolate and even teach effective learning

strategies, it is quite a different, and more complicated matter, to get learners to use them as their own. The reason for this might be motivational. Learners might not recognize the advantages for learning new strategies for tasks that they think they already know how to tackle or will not be able to handle anyway. Another reason for this might be related to the issue of automaticity in thinking (Rigney, 1980). Just as it is much easier to learn fingering on the piano correctly the first time but considerably more difficult to change the way one plays a piece after having practiced it, so it must be much more difficult to change one's thinking, studying, and learning strategies after having adopted idiosycratic learning strategies.

If this is true then another dimension to keywording instruction should be some kind of additional support that allows for greater control over the learners' cognitive processes. This extra help should encourage the learner to apply his or her skill in keywording to an appropriate vocabulary learning task. Thus, in addition to teaching learners learning skills, the conditions and criteria necessary for it to be used appropriately (or in other words, the relevant metacognitive processes) might be taught. Possibly, in order to effectively teach more of the learners a given subject matter, instruction must address a learner's mental skills for learning something and the metacognitive skills which may be used to execute and

monitor an appropriate strategy. Pressley and Dennis-Rounds' conclusion that "maximum performance may be achieved only by reinstructing the learners in strategy usage in the new task situation" (Pressley & Dennis-Rounds, 1980, p. 581) might have been different had the learners been trained in metacognitive skills in addition to keywording in their experiment.

Thus it might not be enough to train specific strategies; additional direction on ways of approaching learning situations might contribute to the instructional process. In this case the other component of instruction should aim to develop the learner's metacognitive skills, which act as planners of a strategy based on the assessment of both the task and the learner's available tactics.

Although evidence has been provided that it is possible to develop and implement generalizable learning strategies programs for education and training (Weinstein, 1975; Dansereau, 1978; Dansereau, Collins, McDonald, Holley, Garland, Diekhoff, & Evans, 1979; Brooks and Dansereau, 1981), questions still remain as to how to incorporate learning strategy instruction into specific content instruction. This question seems to be demonstrated by the difficulties associated with teaching keywording in a classroom with a group of students.

One more possible explanation for the difficulties associated with teaching keywording in the classroom

might relate to individual differences in learning. Even assuming that all the learners used keywording with the necessary motivation and "loyalty" to its rules, it is still unknown whether the same strategy would be equally effective for all learners. As much as it is desirable to be able to reach all learners without designing a complicated aptitude-treatment instructional program, it is questionable whether we can escape adapting the curriculum for individuals.

One way of getting closer to an adaptive curriculum while aiming for an effective learning strategies training program is to provide the instruction in the form of individual learning modules. This way, modules can be prescribed to different learners for different needs at convenient times.

Summary

Learning strategies are techniques people use to help them acquire, retain, and retrieve information. A learning strategy may be broken down into two components: a mental skill and a metacognitive prescription to use it appropriately. Learning strategies evolve naturally but may be taught to others to use by methods such as modelling, embedded strategies, and direct instruction. Keywording is an example of a technique to help people retain information. It has been proven to be useful in laboratory type experiments but has encountered

difficulties in the classroom context. Reasons for this might include (1) problems in motivating learners to use it, (2) difficulty enabling learners to use it automatically without resorting to their more natural, idiosyncratic techniques, or (3) individual differences in aptitude.

Possibly, an effective metacognitive program, with sufficient practice, might help the learner to overcome the first two problems. One way of including a measure of adaptiveness in the curriculum is to provide learning strategy instruction in modular form. This way units can be prescribed as the need presents itself rather than imposing the same strategies on everyone.

The Hypotheses. In order to explore the effect of training in keywording alone, and in conjunction with added metacognitive training or an embedded cue, the following hypotheses were tested.

It was expected that since keywording was already proven to be an effective technique for learning new vocabulary, subjects receiving training in keywording would remember more vocabulary than subjects without it. Therefore the first hypothesis was:

1. The retention of vocabulary words, as measured by scores on a delayed post test, would be significantly higher among learners who received training in keywording.

Furthermore, it was expected that subjects who received either metacognitive training or an embedded cue, would perform better than subjects without training

or with training in keywording alone, since they would be more likely to use keywording when learning the new words. Therefore, the second hypothesis was:

2. The retention of words, as measured by a delayed post test, would be greater by subjects receiving metacognitive training or an embedded cue than by subjects who learned keywording alone or did not receive training in vocabulary learning.

If the second hypothesis would be accepted, a third hypothesis, comparing the two forms of additional support, may be interesting. If subjects in the metacognitive training group would outperform subjects with an embedded cue then metacognitive training may have been recommended as a form of support to learning strategy instruction. Conversely, if the embedded cues group would have outperformed the metacognitive group, embedded cues may be explored further as additional support to learning strategy instrucion. Therefore, the third and fourth hypotheses were:

3. The retention of words, as measured by a delayed post test, would be greater by subjects receiving metacognitive training than those receiving an embedded cue.
4. The retention of words, as measured by a delayed post test, would be greater by subjects receiving metacognitive training than those receiving an embedded cue.

Chapter 3

Method

Design

The design of this experiment constituted a 4 X 2 factorial design with one between factor and one within factor. The between factor consisted of four instructional strategies for learning Hebrew vocabulary: control, keywording, keywording and metacognitive training, and keywording with an embedded cue on the dependent measure. Retention was the within groups factor. Subjects were provided with an immediate post test directly after studying the new words. A delayed post test were given one week following instruction on the same words (see Figure 2).

Subjects

Subjects included 24 grade four students, 49 grade five students, and 42 grade six students, ranging in age from 9 years, 9 months to 12 years, 5 months. There were 52 males and 52 females. There was no reason to believe that gender would confound the study since no reliable sex differences have ever been reported in associative learning/elaboration research (Paivio, 1971; Pressley, 1977 in Pressley and Dennis-Rounds, 1980). None of the subjects speak Hebrew as a first language. The subjects all attend Solomon Schechter Academy, a private, Jewish day school whose curriculum is taught in French and Hebrew immersion. Most of the subjects first language is

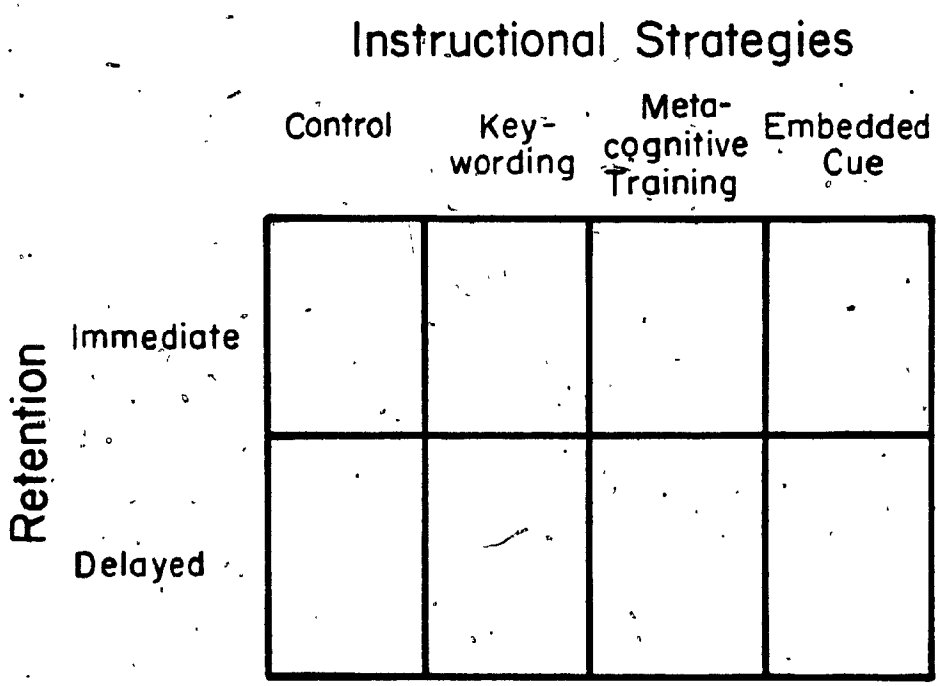

Figure 2 Experimental design for the study of immediate and delayed foreign vocabulary recall as a function of learning strategy instruction.

English. These children began learning Hebrew in Kindergarden. All subjects are from middle to upper middle class backgrounds. Within each grade subjects were randomly assigned into each of four conditions. Because the study lasted six days over a period of two weeks, some experimental mortality was expected due to illness on at least one of the days. No other reasons for attrition were found. Subjects were randomly assigned to four groups and at the time of the delayed post test there were 24 subjects in the control group, 14 in the keywording group, 21 in the embedded group, and 20 in the metacognitive group. Thus, 4 subjects failed to attend all sessions from the control group, 13 from the keywording group, 7 from the embedded cue group, and 8 from the metacognitive group. Distribution of dropouts was proportionalte to the grade samples.

Materials

Self instructional modules. Printed material was constructed for each of the four experimental groups. These self-instructional modules were prepared according to Dick and Carey's (1978) method of instructional design. This method includes outlining behavioral objectives, criterion referenced testing and a careful breakdown of the instructional strategy. This way, the students' comprehension of the material was easily verified.

The three groups who learned keywording (keywording alone, keywording plus metacognitive training, and

keywording and an embedded cue) were provided with a self-instructional module which trained students to use keywording for learning new vocabulary. The keywording module began by defining the word image and how people use mental imagery. It also introduced keywording as a technique to help people learn new words. Then it explained what a keyword is. Finally, the module showed how images can be created by interacting the keyword with the new word they had to learn. Subjects had the opportunity to try keywording with five new words during this session. (See Appendix A for a copy of the keywording module).

The keywording plus metacognitive training group received a supplement to the keywording module. This module emphasized that the learner should take an active approach to learning. It provided guidelines for solving learning problems. The steps outlined were to: (1) Be willing to try, (2) Evaluate possible strategies and decide how to solve the problem, (3) Make it interesting, (4) Try it, (5) Evaluate and edit the strategy, (6) Enjoy your success. For each of these steps, learners were given an opportunity to test their understanding with an exercise. Following each exercise, feedback was provided. The end of this module included a brief introduction to the keywording module saying that the next booklet would teach them a technique that might help them learn new words. Learners were instructed to evaluate the technique and

decide if and when to use it. (See Appendix B for a copy of the supplemental module). Parts of the module were derived from Brown's (1979) list of elements of metacognitive ability and parts were derived from Dansereau's (1978) support strategies. The major goal of the module was for the learners to actively decide to use a learning strategy that is particularly appropriate for the task at hand.

In addition to the keywording module, subjects in the embedded cue group had a message on the post test word list, in the form of a cartoon, which reminded the subjects to use keywording (i.e., "Use keywording now.").

Both the keywording and metacognitive modules were pilot tested 4 weeks prior to administration of the experiment with a similar population. Small changes and corrections were made based on the participants' comments and performance.

During the learning sessions (Days 1 to 3), suggested keywords were provided to the learners to familiarize them with the concept of keywords and what might be acceptable examples. At this time, subjects were still encouraged to try to find their own keywords and only to use the list if they needed it. However, when the words for the dependent measure were given, students were not provided with suggested keywords because this study tested students' application of what they learned independent any further instruction or aid

(except for the embedded group which included a cue on the post test reminding them to use keywording).

The control group was also provided with a self-instructional module. However, this only provided the list of five words to be learned and instructions "to learn the words as well as you can".

On the second day, subjects received a review of the modules they did and were asked to learn ten Hebrew vocabulary words. This is the number of new words that the children are assigned every week. Because the next session followed a weekend, one more review with ten new words was given prior to administering the dependent measure.

Dependent variables. Subjects were tested on ten new words immediately after studying them as well as after an interval of one week. All the words were the same for the three grades on the testing day. These words were new to all three grades but were not too difficult for the learners. They were selected from the school curriculum and class teachers verified that the learners had not been taught these words. An attempt was made to select words that were orthographically similar to other English words and low imagery items were avoided. However, these criteria were not emphasized because the study aimed to maintain as much of the natural learning environment as possible.

In addition to being tested on the new words, subjects were asked directly about their use of

strategies, both prior to and after doing the module. The questionnaire immediately following use of the module focused in on the students' use of imagery and acoustic links for learning new words as well as whether they felt they learned from and enjoyed the module(s). The questionnaire following the immediate post test asked about students' use of imagery, acoustic links, and keywording during the study, about learners' perceived learning, and whether they felt they would continue to use what they learned. The students were asked to respond to this questionnaire on a scale of one to five, where one is "not at all" and five is "always" or "a lot".

Procedure

All grade four, five and six classes were randomly divided into the four instructional treatments. Students were given the modules and tested during their scheduled Hebrew class time by the experimenter. All students were allowed to work until they completed the modules. Upon completion of the modules, students were given a written quiz on the words and requested to fill out a questionnaire evaluating the module(s) they read. Students who finished early were provided with puzzle type activities to pass the time so that everyone left the class together. Instruction lasted three days. On day one the students in the keywording groups received the keywording module and those in the metacognitive

group received the metacognitive module in addition to the keywording module. Included with the keywording module were five new words to practice with. Five words were chosen, as opposed to ten, because the aim was just to introduce the learners to the method. On day two the students were able to practice using the strategies they learned in the modules. A brief review of the strategies was given to the subjects in addition to the ten new words they practiced learning. Because the next day came on the following week, another reminder in the form of a comic was provided on day three with ten new words to practice with. On day four the dependent measure was administered. One week following that the delayed post test took place. The post test consisted of a list of the same ten words which the learners had to translate from Hebrew to English. In addition to the post test the subjects filled out a questionnaire describing their strategy use. It should be noted that translating words is not the usual way these students are tested on new words, since the school's policy is to teach Hebrew in Hebrew only.

Approximately three weeks following the study, the experimenter returned to discuss the study with the classes during regular Hebrew periods.

Chapter 4

Results

The data obtained in this study were used to assess the following: (1) learning module comprehension, (2) the effects of keywording alone and with extra intervention, and (3) elementary school children's idiosyncratic learning strategies, particularly for learning foreign language vocabulary. This chapter begins by evaluating the learners' understanding of the learning modules. It evaluates their effectiveness in teaching keywording and metacognitive skills. Then the effects of the different treatment groups are analyzed. Finally, learners' idiosyncratic learning strategies are summarized.

The Modules

The learning modules were evaluated first to determine whether learners understood the main ideas. Two sources of data were examined to check learners' understanding of the modules: (1) the students' responses on the criterion referenced tests for each of the subconcepts of the two modules, and (2) the students' evaluations of the modules on the attitudinal questionnaire which followed the modules. To check learners' application of the concept of keywording their drawings of keywording images interacting with the new words was examined. Metacognitive subjects' responses to a questionnaire were also examined to check their

application of the metacognitive skills.

The keywording module. The three objectives of the keywording module were (1) to be able to define the word 'image', (2) to be able to define 'keywording', and (3) to demonstrate the ability to do keywording by drawing images of the keyword interacting with the word that had to be learned.

Students were asked to define the words 'image' and 'keywording' in sentences. Their responses are summarized in Table 2. On the image-definition question, 74% of the learners included both relevent aspects of the word image; (a) a picture or something you see, and (b) it is in your mind. Ten percent mentioned only the idea that it is a picture, and 15% wrote other, less relevent, answers (eg., "someone's face", "you remember what it looks like but not what it is called"). Two children left this question blank.

On the keywording-definition question, 69% stated that keywording is a way to help people learn new words more easily and 22% wrote that it is a simple way to remember something. Both these answers were considered adequate. Eight percent gave an answer that did not fit into either acceptable category, although was not necessarily wrong (eg., "keywording is help", "keywording is something like vocabulary").

The second source for a general evaluation for the modules was the attitudinal questionnaire which was filled out upon completion of the learning modules. To

Table 2

Proportions of Responses to Two Questions about the Keywording Module

Question	Response	Percentage
What is an image?		
	Something in your mind	74%
	A picture of something	10%
	Other	15%
What is keywording?		
	A way to help people learn new words more easily.	69%
	A simple way to remember something	22%
	Other	8%

Note. The proportions were pooled across all groups.

verify whether subjects felt they learned from the keywording module they were asked six questions. The responses to these questions are summarized in Table 3. From these responses it is possible to infer that for many of the subjects, part of the keywording method is not entirely new. Sixty nine percent of the learners who did the keywording module already used imagery as a learning strategy for other tasks while only 59% said they used it in the keywording exercise. Judging from subjects' responses to questions three and four, the acoustic aspect of keywording was more novel. However, learners did not seem to adopt it. Only 38% of the children used rhymes or similar sounding words before doing the keywording module while 56% stated that they used it for this exercise. Although the great majority of learners enjoyed the keywording module (77%), just over half (60%) reported having learned a lot. This seems to indicate that the module was interesting but did not give many of the learners the feeling that what they were learning was important or new.

Students' drawings of their images of keywords and new words interacting were evaluated by two judges who did not have experience with keywording or children's art. The judges were provided with specific criteria for determining whether learners applied keywording properly to the set of pictures for each new word. First the judges were shown the instructions for keywording from the learning module. Then they were

Table 3

Proportion of Yes and No Responses to Questions about the Learning Modules

Question	yes (%)	no (%)
Did you ever use imagery before doing the module?	69	30
Did you use imagery in this exercise?	60	40
Did you use rhymes or similar sounding words to help you learn before doing the module?	38	62
Did you use rhymes or similar sounding words to help you in this exercise?	56	44
Did you learn something new from the module?	60	40
Did you enjoy doing the module?	77	33

Note. The proportions are pooled across all groups.

given the following list of conditions:

(1) If the student draws the picture with an interaction between the two words then the score should be: 2;

(2) If the student draws pictures of the two words separately in the third column, with no association then score that picture: 1;

(3) If the student does not draw anything related to the two words or if the student only draws a picture of one word then the score should be: 0;

Five image drawings were evaluated for each subject, corresponding to the five new words to learn. Therefore, scores ranged from zero (no drawings at all) to ten, (five drawings with clear interactions). A score of six was considered adequate to demonstrate the ability to apply keywording, since it includes at least one clear interaction. Eighty eight percent of the subjects for Judge A, and 81% of the subjects for Judge B, demonstrated their ability to apply keywording successfully.

In summary, the keywording module was considered highly effective for teaching both the concept of keywording as well as its application based on the responses to the criterion referenced tests, the image drawing evaluations, and the students' evaluation of the module.

The metacognitive module. The objectives of the metacognitive module were for the learner to become aware of six steps for solving learning problems and to be able to apply the step of choosing an appropriate stategy. The responses to the criterion referenced tests of the metacognitive module are summarized in Table 4. All but two subjects were able to suggest a variety of learning strategies for learning new words. Eighty eight percent of the subjects were able to give different situations in which they would (1) use a dictionary and (2) learn the new words by heart. Therefore, with respect to the metacognitive module, most of the learners demonstrated understanding that there may be many different ways of approaching one task and that they may choose a method that is most appropriate for what they are required to do. A variety of suggestions were made for how to make learning interesting. When asked to list the steps for solving learning problems, 39% refered to at least the first three steps. Twenty-nine percent of the learners gave examples of actual learning strategies, (for example, "repeat it over and over"), 19% reported the steps in terms of playing a game instead of in terms of learning, and 13% did not respond. Thus, while the majority of learners demonstrated understanding that there may be a variety of ways to learn something, less of the subjects learned a series of steps that they may use to solve learning problems.

Table 4

The Question from the Metacognitive Training along with Selected Responses and their Corresponding Proportion

Question	Response	(%)
Suggest some ways to learn new words		
	Write it over and over	50
	Use a dictionary	35
	Repeat it over and over	21
	Get someone to test/help you	21
	Study the word	21
	Make sentences with the word	17
	Other	60
When do you think it would be better to use a dictionary?		
	When doing a composition	21
	When you need to know a meaning	28
	When you never heard of it before	10
	In a test	7
	Blank	25
	Other	10
When is it better to learn you new word off by heart?		
	When you have a test	57
	When you have spare time	14
	Just for learning and knowing words	7
	When you think you know them	7
	Other	10
	Blank	17
What kinds of things would you do to make learning interesting for yourself?		
	Make it into a joke	21
	Use it in sentences	14
	Pretend you will get a reward when you finish	10
	Rhyme it with another word	10
	Get help	10
	Make it into a game	07
	Other	21
	Blank	7

Note. The reported proportions are relative to the entire group size.

To evaluate the students responses to the metacognitive module, "Solving Learning Problems", question four was examined in addition to a seventh question:

> (7) If you did another booklet (the metacognitive module), did you enjoy doing it?

Just over half of the metacognitive group reported that they learned something new (from question four) and enjoyed the second module (58% and 57%, respectively).

The metacognitive questionnaire reveals that almost all subjects were willing to try their best (86%). (See Appendix C). The other 14% did not respond to the first question. The second question asked the learners to ask themselves "Exactly what do I have to do?". Some confusion as to the task was found; only 45% viewed the purpose of the task as learning new words. Twenty two percent (not wrongly) viewed the task as learning keywording and 18% percent gave irrelevant answers. The majority of learners gave keywording as the answer to the question of "What methods do I have to learn the words?" (54%). A number of subjects (27%) listed a variety of other strategies, while only 9% gave a combination of strategies including keywording. Nine percent of the learners did not respond. The next question, "Which is right to use now?", seems to have revealed some confusion on the part of he learners. Thirty six percent of the learners left this question

blank. It seems as if the learners could not distinguish between 'taking inventory on the available strategies' and choosing an appropriate one for the task. Still, 36% chose keywording as the right strategy to use for the task, and 22% chose a different strategy for learning the new words (e.g., cover the meaning and read the words"). Finally, 59% of the subjects affirmed that the strategies they chose worked, 31% left this question blank, one person said it did not work, and one person said it usually worked.

The above three sources of evaluation led the author to the following conclusions about the metacognitive module: the learners did understand the idea that they can choose between many strategies to tackle a learning problem. However, they did not use the steps as a guide for solving learning problems, nor did they feel that they learned from or enjoyed the metacognitive module.

Once the effectiveness of the modules is established, it is possible to evaluate the content of the modules -- the experimental treatments.

Recall Scores

Mean scores and standard deviations on vocabulary recall on both the immediate and delayed post tests are displayed in Table 5.

Scores on the immediate post test are so high that a ceiling effect is apparent. Levin et al. (1979) found

Table 5

The Means ($\bar{X}$) and Standard Deviations (SD) of the Number of Words Recalled in each of the Four Groups, for Immediate and Delayed Tests

	Immediate		Delayed	
	$\bar{X}$	SD	$\bar{X}$	SD
Control	9.62	0.77	4.70	2.92
Keywording	9.86	0.53	6.57	1.98
Embedded Cue	9.55	0.98	5.45	2.62
Meta-cognitive Training	9.14	1.52	5.19	2.29

that fifth grade students are capable of learning approximately 18 new words in ten minutes. This finding provides evidence of a ceiling effect since this study asked learners to learn only 10 words in a session. However, the aim of classroom learning is not that the learner will be able to repeat meanings of words immediately after studying them. A more important goal is for the learner to remember them so s/he may use them in the future. For this reason, the effects of the treatments of this study will be examined with respect to the delayed post test alone.

Three mutually orthogonal planned comparisons were performed to test three specific hypotheses. The alpha level for each comparison was set at .05 since contemporary practice in the behavioral sciences favors setting the type I error probability at alpha for each comparison for planned orthogonal comparisons (Kirk, 1968, p. 78; Keppel, 1982, p. 146).

The first question considered in this study is whether keywording helped the subjects with learning foreign language vocabulary. In order to answer this, a planned comparison was performed between the keywording group and the control group. The results of this comparison reveal a statistically significant difference ($t(75) = 2.17$, $p < .032$) in favor of the keywording group (See Table 6).

The next two questions refer to the effects of the additional intervention: the embedded cue

Table 6

Summary Table for the Planned Comparisons Between Control and Keywording (1), Embedded and Metacognitive (2), and the Combination of Control and Keywording Compared to the Combination of Embedded and Metacognitive (3)

Comparison	t	df	p
1	-2.17	75	.032
2	.32	75	.745
3	.54	75	.585

and the metacognitive module (See Table 6). First, the keywording and control groups were looked at as control groups with respect to the embedded and metacognitive groups to see if the added intervention contributed to learning. It was expected that both the embedded and metacognitive groups would significantly outperform the keywording and control groups because they would not only have a strategy but also the knowledge of when to use it. No significant differences were found for this comparison, $t(75) = .54$, $p = .58$.

The last comparison asked whether the effects of the embedded treatment and the metacognitive treatment differed? To answer this, a planned comparison between these two groups was performed. It was hoped that if these two groups outperformed the keywording and control groups and if no differences were found between groups then it would be possible to suggest that learners can develop the metacognitive skills necessary to apply mental skills effectively independently of embedded cues. The desired result of no significant differences was found between scores of the embedded group versus the metacognitive group in vocabulary learning ($t(75) = .327$, $p = .7$). However, because these two groups did not outperform the keywording and control groups, no implications can be drawn on the relative benefits of metacognitive training versus embedded cues. Instead, aspects of metacognitive training will be discussed for future research.

Students' Use of Strategies

Treatment groups' strategy use. Following the immediate post test, subjects were given a questionnaire asking them about the strategies they used to learn the words. This questionnaire focused on the strategies taught in the learning modules. The questions and responses, on a scale of one to five, are listed in Table 7. Examination of the responses indicated that across groups, little difference was noticeable. It is interesting to note that between grades and groups, subjects in each group responded quite differently. Overall, grade 6 had the most negative attitude about the modules, indicated by the low average of ratings on the scale. This is particularly evident in the responses of grade 6, in all groups for questions 4 and 6. Interestingly, the grade 4 control group reported having learned a lot about solving learning problems both relative to the other groups in grade 4 and to the other grades. This is reflected in the high average of ratings on the scale for questions 4 and 6.

Idiosyncratic learning strategies. Four sources were used to determine subjects' use of idiosyncratic learning strategies. First, following study of the learning modules, subjects in the control group were given an open-ended questionnaire asking them how they learned the new words. Second, subjects were given space to write other strategies they used on the bottom

Table 7

The Eight Questions in the Attitudinal Questionnaire along with the Mean Responses on a 5 Unit Scale Presented for each of the Four Groups by the Three Grades

Question		Grade 4	Grade 5	Grade 6
1. I used keywording to help me learn all the words in this exercise.	C	1.40	2.10	2.00
	K	3.00	2.00	2.00
	E	2.75	2.20	1.75
	M	2.75	2.70	2.00
2. I made an image in my mind to help me learn the new words in this exercise.	C	1.40	2.95	1.77
	K	2.40	3.00	1.60
	E	3.50	2.62	2.00
	M	2.75	2.90	2.50
3. I thought of words that sound like the words I had to learn to help me.	C	1.00	1.70	1.90
	K	2.40	2.80	1.60
	E	2.25	2.30	1.60
	M	2.00	2.65	1.60
4. I learned something new about solving learning problems.	C	4.20	3.00	2.40
	K	3.20	4.30	1.80
	E	3.25	3.30	2.75
	M	2.75	3.20	2.00
5. I enjoyed keywording.	C	1.80	2.60	1.75
	K	3.00	3.30	2.50
	E	3.50	2.80	2.50
	M	2.50	3.00	1.50
6. I enjoyed learning the steps for making learning easier.	C	4.20	3.30	2.25
	K	3.40	4.20	1.60
	E	3.00	2.75	1.75
	M	3.25	2.90	1.25
7. I will continue to use the steps in other situations.	C	4.00	3.00	2.27
	K	3.00	2.60	1.75
	E	2.25	3.55	2.00
	M	3.00	3.15	1.50
8. I will continue to use keywording in other situations.	C	1.80	2.80	2.15
	K	2.80	2.80	1.80
	E	3.25	3.05	2.12
	M	3.75	2.95	1.60

of the attitudenal questionnaire which followed the post test. Third, subjects in the metacognitive group were instructed to write down their choice of learning strategies for learning the first ten words on Day 2 as part of their review of the metacognitive strategy. Finally, subjects discussed their own strategy use during the debriefing session, one month following administration of the experiment. Table 8 summarizes the different categories of learning strategies, provides examples taken from the children's reports, and shows the frequencies of strategy use.

Evidence was found that upper elementary school children have clearly defined strategies to achieve specific learning objectives. These strategies include (1) rote, (2) physical strategies, (3) verbal/imaginal elaboration (Weinstein, 1978), and a variety of self-monitoring and organizational strategies (Dansereau, 1978).

Summary

The keywording module was effective in training learners in this new strategy, while the metacognitive module was effective mainly for illustrating that there are many ways of learning one thing (an attitude not necessarily acquired via the module). The keywording group outperformed the control group in recall of vocabulary on the delayed post test. The expected result that the embedded and metacognitive groups would

Table 8

Selected Idiosyncratic Strategies and their Corresponding Proportions, Classified by 4 Types of Learning Strategies

Rote Strategies	(%)	Physical Strategies	(%)
looked, covered words, wrote	8	first letter mnemonic	3
looked, covered words, checked	41	learn order of words	3
looked over words	3		
repeat words over and over	3		
memorize words	2		
studied them and tested myself	1		
get help	1		

Elaboration Strategies	(%)	Organizers	(%)
Make a sentence	5	Think about meaning before looking at meaning	3
use abbreviations	3	tick off what you do not know then come back later	5

outperform the keywording and control groups was not found. Another interesting finding of this study was that upper elementary school children may be considered relatively sophisticated users of learning strategies in that the strategies they use for a specific, simple task such as learning vocabulary is already clearly defined.

Chapter 5

DISCUSSION

This study addressed two central issues of learning-strategy instruction. The first question this study addressed was whether a specific learning strategy such as keywording can be taught in the classroom context. Additional metacognitive training and an embedded cue were also looked at as support for keywording use, directing the learner to use keywording appropriately. These questions were examined by teaching keywording in the classroom with learning modules. In addition to doing the keywording module, the metacognitive group received another module emphasizing choosing appropriate strategies to achieve tasks. The embedded cues group was simply given a reminder to use keywording in the form of a cartoon before the post test was administered. A control group was included which was just asked to learn the list of words without any further instruction.

The findings of this study indicated that the keywording group's performance was superior to that of the control group. The metacognitive and embedded groups' scores did not differ from each other nor did their scores differ significantly from the control or keywording groups. Thus, it seems that keywording can be taught in the classroom using learning modules. However, when keywording was supported with a metacognitive module or an embedded cue, the benefits of

using keywording disappeared. The effect of these two processes seems to have been to inhibit the acquisition of keywording.

Keywording in the Classroom

Before the above results can be interpreted, several issues regarding the complexity of this type of learning situation need to be considered. Some debate concerning the critical factors for successful keywording instruction exists. These factors include: group versus individual implementation, experimenter-paced versus subject-paced presentation of the words, characteristics of the vocabulary items, mode of presentation (auditory versus visual), keywords-provided versus subject-generated-keywords, subjects' age, and subjects' previous experience with second language learning. Studies with different combinations of these factors have obtained results varying from highly significant differences in favor of keywording in comparison with the control group (Pressley et al., 1983), to significant differences favoring the control group in comparison with the keywording group (Levin et al., 1979; Hall et al., 1981). For example, Hall et al. (1981) performed two studies with group implementation; one in which the subjects paced themselves and the other which was experimenter-paced. In the self-paced study, control subjects scored significantly higher than keywording

subjects. However, in the experimenter-paced study, the keywording group remembered significantly more. They concluded that pacing was a central factor for keywording success. In response, Pressley et al. (1983) conducted another study, following the design of Hall et al.'s study except that it was implemented individually instead of in a group. In both cases the keywording group performed significantly higher than the control. Pressley et al. thus concluded that pacing was not a key factor but rather, group versus individual implementation is. They did not elaborate on a reason for this.

The underlying factor of the above discrepancies may well be whether the learners are called upon to activate the proper cognitive processing of the words or they are left to their own strategies. Generally, good learners develop more effective strategies in comparison to poor learners. Furthermore, a learner might have strong mental skills for such tasks as memorizing, but might lack the metacognitive skill to apply the mental skill at the right time (Bovy, 1981).

If the learners have ample experience in a given learning situation which enables them to develop their own effective strategies, then it is more likely that those in the control group will do at least as well as those in the keywording group, given sufficient time. However, in situations where the learners have not had the opportunity to develop their own effective

idiosyncratic strategies, or are not given time to draw upon them, an effective strategy imposed on them might compensate for the lack of experience or time. Thus, it may be expected that the closer the conditions resemble those of an actual classroom, the less likely the keywording (or any specific cognitive skill) group will have an advantage over a "control group".

The present study was performed in actual classroom conditions. The study took place in the subjects' regular classroom. The vocabulary words were presented together, thus allowing the subjects to pace themselves. Finally, since the school policy does not consider concreteness of words or their similarity in sound to English words when designing the curriculum, these conditions were not emphasized in this study. The regular classroom environment was represented more closely in the present study than individually-implemented, experimenter-paced studies with words chosen according to their suitability to keywording imagery. Therefore, any differences between the groups would be even more defensible.

In this study, those in the keywording group did score significantly higher than those in the control group, in spite of the similarities between the subjects' usual classroom learning environment and the design of this experiment. On the other hand, the experimental groups with additional support did not score significantly better than the control.

This suggests that keywording does have a contribution to make to classroom learning. However, it appears that additional support, as represented here, does not contribute to effective keywording use. On a more general level, this result may indicate that even experienced learners with effective idionsyncratic learning strategies may benefit from instruction in other effective learning strategies.

Automaticity

Some further discussion is required to explain the contrast between the findings of this study and others, which also simulated classroom conditions but did not find significant differences between keywording and control groups. One explanation for the success of the keywording group and the lack thereof with the metacognitive and embedded groups in this study, may be a phenomenon called "automaticity" (Rigney, 1980). This process involves a transition of processing from conscious to unconscious levels. It has been described by Rigney (1980) as the major hallmark of human learning.

Consciousness has been described as having five adaptive functions: (1) a scratch pad for choice and selection of actions; (2) a modifier and interrogator of long-range plans; (3) it participates in retrieval programs from long term memory; (4) it comments on the organism's current activities, and (5) it acts as a

troubleshooter (Mandler, 1975). Routine events do not call upon conscious action except to monitor progress. Nonroutine events do require the efforts of consciousness to derive semantic interpretations, and to organize, execute and monitor a plan of action to cope with the perceived implications of the nonroutine event (Rigney, 1980).

Automization makes the actions so simple that they require little or no conscious control. To be able to use knowledge in difficult, stressful situations, it must be encoded in such a way as to draw a minimum amount of computing resources (Norman, 1976). If the learner has to invest energy in remembering and performing the learning strategy, then possibly, attentional capacity is taken away from the task itself, which in this case, is learning the new words.

A learning strategy must become automatic in order to activate a cognitive process unconsciously, thereby maximizing the amount of computing resources available to achieve the task itself. This means that to be effective, learning strategies themselves must be well enough learned to support rather than interfere with learning the subject matter. They must displace or augment the students' own, already well learned, though less effective, cognitive learning strategies (Rigney, 1980).

Three steps have been described by Norman (1976) which enable a task to move from consqious to automatic

processing. The first step is to develop a schema of the task. In the case of keywording the schema might be: (1) Create keyword, (2) Create image between new word and keyword. The schema of the metacognitive module might be: (1) Be willing to try, (2) Decide how to solve the problem based on available techniques, (3) Make it interesting, (4) Try it, (5) Evaluate it, and (6) Congratulate yourself.

The keywording technique can be seen as a "particular schema" (Norman, 1976) while the metacognitive module attempted to develop a general schema. The advantage of a particular schema is that it gives a particular result with great efficiency; it requires little conscious computation. The disadvantage of this type of schema is that it will fail anytime a question is asked that does not fall into the range of the particular schema.

The general schema can be applied to a wide variety of situations, choosing particular schemas as they are required and developing new ones when particular ones are not available. However, the application of general schemas requires a good deal of reasoning and computation and a great deal of mental effort.

The next two steps are to practice and debug the schema so that the task is done with sufficient accuracy. It is not enough to have a schema for solving learning problems. Just as in playing the piano, one can know everything that must be done and still not be

able to actually play. The problem, according to Norman (1976), is resource allocation, (more resources are needed than are available); the solution is automatization. Automaticity can only be achieved through adequate training and practice. The role of practice has been aptly described by Norman (1976) with reference to musicians:

> "One contemporary composer has said that before a professional musician feels ready to give a solo performance, there must be sufficient training that one can enter the 'mindless' state. That is, it is necessary to practice so much, to know the entire situation so well, that the actions rattle off effortlessly without conscious awareness...The 'mindless' state of performance is what could be called 'automatization' - the automatic, unconscious performance of a skill."
>
> (p. 201)

As more and more practice accumulates, the direct link becomes automatic (Mandler, 1954). By automating a task such as keywording, the necessary components flow directly from the memory system to whatever mechanism controls action, thereby freeing the learner to achieve the task.

Possibly the extra practice the keywording learners had, enabled them to incorporate the strategy into their

own repertoire and to be automatic in its use. Therefore, adequate practice might have been the critical factor which facilitated greater performance by the keywording group in spite of the fact that the study was performed in groups with all the words provided simultaneously for learner-paced study.

However, automaticity did not seem to work for the metacognitive group. By trying to learn two types of techniques (metacognitive skills and keywording) almost simultaneously, each module may have interfered with learning the other and the learners in the metacognitive group may have been prevented from learning either skill. Evidence for this explanation may be the confusion about "which strategy to use", cited by many of the subjects during the debriefing session. In future studies, more direction should be provided to the learners to help them cope with the somewhat contradictory demands of these two tasks. Teacher involvement in the implementation of studies, such as this, might help provide this type of support. Teacher involvement has already been suggested as a critical factor for the success of previous classroom studies (Wade, 1983).

The metacognitive module, as a general schema, seems to be more appropriate for situations that require a lot of reasoning and computation. This type of situation is more likely to be a "non routine" event and therefore is more likely to be dealt with on a conscious

level. The type of task provided, on the other hand, was a very routine event for Hebrew immersion students. Therefore, another important variable might be problem complexity. The metacognitive steps should be particularly helpful in difficult learning situations. If the subjects learn these steps with a relatively easy task, they may not find a need for them -- choice of mental skills may seem obvious. It is in the more complex learning situations that these skills may help, but since the learners did not see the need for them when they learned the skills, it is not likely that they will use them in more difficult situations (Steinberg, 1983). Future studies should choose an appropriate problem size for metacognitive instruction.

This explanation might also reflect the scores of the subjects in the embedded group. By forcing the subjects to call keywording to the conscious level they may have lost the benefit of automizing the process. The following poem illustrates this point:

"A centipede was happy quite until a frog in fun,
said, 'Pray, which leg comes after which?'
This raised her mind to such a pitch,
She laid distracted in a ditch
Considering how to run."

[Anonymous]

In summary, the findings of this study on keywording in the classroom lead to the conclusion that keywording can be used as one strategy for learning new

vocabulary. It has suggested that given instruction and practice in keywording, it is possible to improve learners' recall of foreign vocabulary with upper elementary school children.

Further questions remain on whether it is necessary, and if so, how to encourage learners to use keywording appropriately. It seems that one important factor is adequate practice. Possibly, practice is not enough. If keywording is a mental skill, (which only involves being able to perform the task itself), then further metacognitive skills would be necessary to ensure the proper use of keywording. However, if keywording already has metacognitive aspects in it, (e.g., knowing when to use it), then it is already a learning strategy that stands on its own and no further support should be necessary (See Figure 1). The results of this study seem to indicate preference for keywording as a learning strategy in and of itself since the additional support did not improve performance. However, further research is necessary to verify this hypothesis.

Future Research

This section explores other types of embedded cues, keywording instruction, and metacognitive training in order to suggest other directions which are outgrowths of this thesis and might benefit from further study.

Embedded instruction. An embedded cognitive strategy is designed so that the student must use

particular processing resources in order to accomplish the orienting tasks in the subject matter (Rigney, 1978). It sets the students up such that if they follow the instructions they will accomplish the task while otherwise they may fail. An embedded question in the text is an example of an embedded cognitive strategy. This causes the learner to think about issues just by trying to answer the question.

Experimenter pacing in keywording studies (e.g., Pressley, 1977) may be seen as a form of an embedded cognitive strategy because it seems to conform to the definition described above. Objectives and other instructions given prior to doing some activity are more accurately described as cues reminding the learner to do something (e.g., Try to achieve four out of five objectives, Use imagery, etc.).

Each of these 'learning aids' may be appropriate for different learning activities. For example, knowing what one is expected to do via objectives may be adequate for the facilitation of better text comprehension, but this would probably not be enough to help someone who already knows s/he has to learn a list of words.

The findings in this study indicated that an embedded cue was not only inadequate for encouraging keywording use, but also may have interfered with subjects' performance. Other types of aids need to be explored to discover if they are useful, and to see if

they might better help the learner to use strategies effectively. However, it is not enough for a cue to invoke the learner to use a strategy. The goal described in this study was to help the learner use the strategy on his/her own. In the above discussion on automaticity, it was suggested that through practice, strategies become automatic and thus more effective. But practice itself might not be sufficient. Gagne (1962) found that only by informing learners on the correct procedures to be used did significant gains result. Further research is required exploring the relationship among objectives, the types of instructions and practice given, and their effects on learning.

Keywording instruction. Another way of supporting keywording use in the classroom is to instruct the learners to draw their images in a "keywording dictionary". Instructions to draw pictures of one's images is another example of an embedded cognitive strategy since it is necessary have an image before one can draw it. The additional values of this type of activity are: (1) that the teacher does not have to be present for the learners to do it, (2) with practice, imagery-generating might become automatic, and (3) it may expand the learners' creativity by encouraging them to create connections between concepts that were previously unconnected.

These connections aid in facilitating recall by linking the new information to something the learner

already knows well. Reigeluth (1983) has defined this type of knowledge as "arbitrarily meaningful knowledge". The benefit of this type of knowledge is that it increases recall. However, the educational value of this type of information must be examined further. The importance of acquiring an integrated knowledge structure rather than individual meanings cannot be ignored since this should greatly affect the learners' transfer of learning. In the case of keywording, the learners are learning a strict definition of each word. This training procedure may fail to provide the learner with the breadth of knowledge needed to understand the word when it occurs in other contexts (Meznynski, 1983). Thus, although keywording has proven to be effective in aiding recall of translations of new words, keywording is not a solution to all vocabulary learning problems. The question of when it should be used and when it is not necessary (or even counterproductive) should not be overlooked. Studies on keywording until now have indicated that keywording is effective for memorizing translations of new words. Therefore, it can only be recommended for tasks which require learning meanings of words. Future studies should explore other strategies that facilitate transfer of words learned through keywording (or other strategies) to broader contexts. An example of this might be to draw a variety of interaction pictures to represent the variety of meanings or contexts of a given word.

Metacognitive instruction. After the discussion of automaticity, it seems counterproductive to encourage the learner to allocate conscious processes for deciding to use a strategy like keywording. Instead, learners should automatically call upon such strategies as soon as the requirements of a given task are recognized.

The question that remains is whether metacognitive skills should be developed, and if so, how. The direction taken in studies in which the students are given practice in problem solving and then are interviewed in such a way as to make them aware of what they did to get the result they got and to speculate on how other results might be achieved (e.g., Feuerstein 1979), is recommended. This technique has been successfully implemented in both one-to-one and classroom contexts.

Brown (1978) describes another approach to metacognitive training as training the child to think dialectically, as in the Socratic method. First, the teacher questions the students' basic assumptions and probes weak areas using techniques like generalizations and counter-example. Then the student will (hopefully) internalize these functions and come to perform the teacher's functions for himself via self interrogation. These types of training methods might indirectly develop the types of strategy monitoring skills essential for good learning strategy use.

In summary, this section suggested that research is

needed exploring the relationship among objectives, types of embedded strategies and cues, and their effect on learning. One embedded cognitive strategy that was recommended was instructing the learners to draw their keywording images. The advantages of this are that it could be done independently, it might facilitate automatic imagery generation, and it is a creative activity. The danger of developing too narrow a definition for each word was mentionned and one remedy was suggested as an example of modifying keywording to accomodate the different contexts in which one word may be used.

With respect to metacognition, it was concluded that it is not desireable to include direct metacognitive instruction in keywording instruction since this seems to inhibit the benefit of automatic processing. Separation of tasks and additional time appear to be essential. Other recommended contexts for metacognitive instruction are exemplified by Feuerstein (1979), Brown (1978), and Lodico et al.'s (1983) work.

Children's Spontaneous Strategy Use

The subjects who participated in this study were unique in that they study two foreign languages in immersion (French and Hebrew). Therefore, the strategies that they use for learning foreign vocabulary probably differ from other children with less experience in second language instruction. However, the

sophistication with which they use strategies for learning vocabulary might be comparable to the sophistication of other children's strategy use for subject matter with which they have much practice.

Evidence was found in the control group's questionnaire that learners use a variety of strategies ranging from rote to elaboration for learning new words. However, the majority of subjects used rote strategies to learn the vocabulary (see Table 8). Six subjects reported using other, more sophisticated strategies including: anticipating the meaning before looking at it, ticking off what you do not know and then coming back, studying the order of the words, thinking of a sentence or a catchy phrase, and using a tape recorder.

The emphasis on rote strategy use may be because the learners are young and have not yet developed more effective strategies. From self-reports provided by the students, it seems that the task itself required no more than rote strategies for success, or that rote memory is typically demanded of them in the classroom.

During the debriefing session, some learners from the experimental groups confirmed this observation by saying that they preferred their own simple strategies to keywording for learning simple words. Keywording was seen to be more appropriate for learning harder words. This suggestion is in agreement with Hall et al. (1981), who suggested that keywording should be applied to the more difficult words that students learn in combination

with other strategies. However, if schools are to include learning strategy instruction in the classroom, the entire system must foster strategy use if any real inroads are to be made.

The Learning Modules

Educators have become increasingly aware of the need for developing a curriculum that responds to the interests and needs of individuals. One stream of responses to this need includes adapting the learning environment to accomodate learners' preferences or styles and compensating for their lack of skills. This direction has been supported or paralleled with research in aptitude-treatment-interaction.

However, this direction does not help students to overcome their limitations and grow as learners. A more 'educational' approach might be to teach actual learning strategies to those learners who need it. Again, this requires some adaptive instruction since not everyone needs instruction in the same learning strategies. If modules could effectively teach learning strategy use then they can be used as a source of individualized instruction. That is, they can be prescribed to learners who seem to lack skills of their own for learning a type of subject matter.

The use of modules for teaching learning strategies is new to classroom instruction. The results of this study seem to indicate that learning modules may be an

effective method of teaching learning strategies, especially for teaching strategies like keywording. The keywording module was highly effective in teaching the strategy since the majority of the learners were able, not only to define keywording, but also to apply it.

With respect to the metacognitive module, it is clear from the criterion referenced tests that the majority of learners did not understand the idea that there is a list of steps to go through for solving learning problems. A number of aspects may be corrected in the learning module for future research. Possibly, the learners were overwhelmed by the large amount of information that they had to learn at once. Instead of providing one module for teaching all six steps, the module might be broken down into smaller, logical parts such that the skills can be developed in more manageable units. In addition, learners should be provided with more practice so that the steps may become automatic. Feedback seems to be a particularly important factor in metacognitive instruction as opposed to more 'straightforward' strategies such as keywording, since the learners need to see the consequences of each decision before they can come to any conclusions about the relative benefits of different strategies (eg., Feuerstein, 1979, Brown, 1978, Lodico et al., 1982). Finally, it must be recognized that specific strategies may encompass the steps of a more general approach, thus rendering the general strategy unnecessary. Future

studies might analyze the relative benefits of both general and specific strategies, and how they interact with naive to expert learners.

Experimental Issues

Scores on the immediate post test were not considered for a number of reasons. One reason for emphasizing the delayed post test, as opposed to the immediate one, was because long term memory is of greater concern to the development of instructional design (Miller, 1956; Moore, 1973) and to education in general. Also, students generally are not provided with study time immediately prior to taking a test. There is almost always a lag in time between instruction and evaluation of the learner. Therefore examination of the delayed post test gives a more accurate view of what would happen if keywording was adopted in actual schools. Finally, the high scores of all four groups yielded a "not-undesireable" ceiling effect. This was to be expected since the learners received the test immediately after studying the words. There was little time to forget the meanings, there were only ten words to learn, and the instructonal environment obviously presented the opportunity for mastery. Other studies having ten or less words had similar results (Fuentes, 1976; Hall, 1981).

While it would be highly useful to replicate this study, a number of modifications are in order. During

the implementation of the experiment, the different experimental groups received different treatments. The metacognitive group had two modules to do, the keywording group had one, and the control group did not spend any time reading before learning the vocabulary words. This meant that some of the subjects finished quite quickly and moved on to puzzle type stencils while others spent a good deal more time working. This situation may have lead to a condition called "resentful demoralization" (Wade, 1983), in which subjects with "less desireable" treatments felt they were treated unfairly. Future studies may avoid this situation by creating the illusion that everyone has the same amount of work or by separating the groups.

Another area for improvement may be greater variety in the treatment. While it was necessary to provide practice, overexposure to one technique may have lead to boredom among the students. Simple variations in presentation, such as changing the source of vocabulary words (e.g., in sentences, stories, with pictures, etc.) might help alleviate this condition.

Summary

The results of this study indicate that keywording can be used as an effective tool for learning foreign vocabulary in the elementary school classroom. However, the question of whether it is necessary to provide further support to learners to help use the strategy

appropriately remains to be answered. Possibly, the keywording strategy does not need any further metacognitive encouragement. Further studies might be useful to determine if learners could benefit from metacognitive training, and if so what the content of this training should be. Providing further practice and including the teacher in the program might make future applications more successful.

The importance of appropriate embedded cues was also touched on, in this study. Care should be taken to ensure that if the goal of instruction is action of some kind, the embedded cue should strongly encourage the learner to do that action. If the goal is to know something, then telling the learner that information might be adequate. Future research might contribute to verifying the relationship between objectives and types of cues. However, encouraging the learner to become independent of cues, to learn how to learn from a wide variety of texts and resources, should not be replaced with highly structured texts alone. One goal of education must be to teach learners to learn without instruction, cues, or other imposed aids, since they might not always be there when the learner has to find something out.

Another finding of this study is that upper elementary school children should be recognized as learning strategy users, having already formed learning strategy habits. Possibly, the problems associated with

teaching children of this age new learning strategies would not be different from teaching learning strategies to adults. The importance of enabling the strategies taught to become automatic is basic to any effective learning strategy instruction because otherwise the learners will revert back to their idiosyncratic strategies when the new strategies are most needed (Rigney, 1980).

Finally, this study suggests that learning modules might be a good medium for learning strategy instruction. One reason is that they can be very effective. In addition, they can be used selectively with those children who need help most. This means that by using learning modules for learning strategy instruction, adaptive, individualized instruction may be brought one step closer to the classroom.

Reference Notes

1. De Bono, E. (1983) Teaching thinking skills. A paper presented at the PAPCT annual convention, Montreal.

2. Jonas, B.F. (1983) Learning strategies research; implementation models and key development variables. Paper presented at the annual meeting of the American Educational Research Association, Montreal.

3. Winn, W. (1981, June). Visual instructional strategies: an emerging theory. Proceedings of the Annual Conference of the Association for Media in Education in Canada. Winnipeg, 221-231.

4. Winn, W. (1983). Learning strategies and adaptive instruction. Annual meeting of American Educational Research Association. Montreal.

References

Atkinson, R.C. (1975). Mnemotechnics in second language learning, American Psychologist , 30 , 821-8.

Ausburn, L. J. and Ausburn, F. B. (1977). Cognitive styles: some information and implications for instructional design. Educational Communication and Technology Journal , Vol. 26, No. 4, 337-354.

Board of Education - City of Chicago. (1982). Chicago Mastery Learning Reading . Massachusets: Mastery Education Corporation.

Bovy, R.C. (1981). Successful instructional methods: a cognitive information-processing approach. Educational Communication and Technology Journal , 29 , 4, 203-217.

Bransford, J. D. (1979). Human Cognition , California: Wadsworth Publishing Company.

Brooks, L. W., and Dansereau, D. F. (1981). Knowledge schema training and descriptive prose processing . Fort Worth: Texas Christian University, (ERIC Document Reproduction Service No. ED 199 288).

Brown, A.L. (1977). Rating the importance of structural units of prose passages: a problem of metacognitive development, Child Development , 48 , 1-8.

Brown, A.L. (1978). Knowing when, where, and how to remember: a problem of metacognition. In R. Glaser (ed) Advances in Instructional Psychology (Vol. 1) , Hillsdale, New Jersey: Lawrence Erlbaum.

Canelos, J., Taylor, W., & Altschuld, J. (1982). Networking versus rote learning strategies in concept acquisition, Educational Communication and Technology

Journal , 30 , 3.

Cronbach, L.J. (1967). How can instruction be adapted to individual differences? In R. Gagne, Learning and Individual Differences. Ohio: Charles E. Merrill Books Inc.

Cronbach, L. & Snow, R. (1969). Individual differences in learning ability as a function of instructional variables . (Final Report) Stanford California: School of Education, Stanford University.

Cronbach, L. & Snow, R. (1977). Aptitudes and Instructional Methods , New York: Irvington Press.

Dansereau, D. (1978). The development of a learning strategies curriculum. In O'Neil, H. F. Learning Strategies , New York: Academic Press.

Dansereau, D.F., Collins, K.W., McDonald, B.A., Holley, C.D., Garland, J., Diekhoff, G., & Evans, S.H. (1979). Development and evaluation of a learning strategy program. Journal of Educational Psychology , 71 , 64-73.

Dick, W. and Carey, L. (1978). The Systematic Design of Instruction , Illinois: Scott, Foresman and Co.

Feuerstein, R. (1980). Instrumental Enrichment . Maryland: University Park Press.

Flavell, J. H., & Wellman, H.M. (1977). Metamemory. In R.V. Kail, Jr. & H.W. Hagen (Eds.), Perspectives on the Development of Memory and Cognition. Hillsdale, N.J.: Lawrence Erlbaum.

Fuentes, E. J. (1976). An investigation into the use of imagery and generativity in learning a foreign language

vocabulary (Doctoral dissertation, Stanford University, 1976). Dissertation Abstracts International.

Gagne, R.M. (1962). Simulators. In R. Glaser (ed.), Training Research and Education. Pittsburg: University of Pittsburg Press.

Gerber, M.M. (May, 1983). Learning Disabilities and cognitive strategies. Journal of Learning Disabilities , Vol. 16, no.5, 251-259.

Glaser, R. (1972). Individuals and Learning. Educational Researcher , I , 6, 5-12.

Hall, J.W., Wilson, K.P., & Patterson, R. J. (1981). Mnemotechnics: Some limitations of the mnemonic keyword method for the study of foreign language vocabulary. Journal of Educational Psychology , 73 , 3, 345-357.

Jonassen, D.H. (Summer, 1982). Aptitude- versus content-interactions: implications for instructional design. Journal of Instruction Design , 5 , 4, 15-27.

Jones, B.F. and Hall, J.W. (1982). School applications of mnemonic keyword method as a study strategy for eighth graders. Journal of Educational Psychology , 74 , 230-237.

Kennedy, B. and Miller D. (1976). Persistent use of verbal rehearsal as a function of information about its value. Child Development , 38 , 953-966.

Keppel, G. (1982). Design and Analysis: A Researcher's Handbook. New Jersey: Prentice Hall.

Kirk, R.E. (1968). Experimental Design: Procedures for the Behavioral Sciences. California: Wadsworth Publishing Co.

Levin, J.R. (1981). The Mnemonic '80s: keywords in the classroom. Educational Psychologist , 16 , 65-82.

Levin, J.R.; McCormick, C.B.; Miller, G.E.; Berry, J.K. and Pressley, M. (1982). Mnemonic versus nonmnemonic vocabulary-learning strategies for children. American Educational Research Journal , 19 , 121-136.

Levin, J. R., Pressley, M., McCormick, C. B., Miller, G. E., & Shriberg, L. K. (1979). Assessing the classroom potential of the keyword method. Journal of Educational Psychology , 71 , 583-594.

Levin, J.R., Shriberg, L.J., Miller, G.E., McCormick, C.B., and Levin, B.B. (1980). The keyword method in the classroom: How to remember the states and their capitals. Elementary School Journal , 80 , 185-191.

Lodico, M.G.; Ghatala, E.S.; Levin, J.R.; Pressley, M.; and Bell, J.A. (1983). The effects of strategy-monitoring training on children's selection of effective memory strategies. Journal of Experimental Child Psychology , 35 , 263-277.

Mandler, G. (1954) Response factors in human learning. Psychological Review , 61 , 235-244.

Miller, G.A. (1956) The magical number seven, plus or minus two: Some limits on our capacity for processing information. Psychological Review , 63 , 81-97.

Mezynski, K. (1983). Issues concerning the aquisition of knowledge: Effects of vocabulary training on reading comprehension. Review of Educational Research , 53, 2 , 253-279.

Naiman, N.; Frohlich M.; Stern, H.H. and Todesco, A.

(1978). The Good Language Learner . Toronto: OISE.

Norman, D. (1976). Memory and Attention. New York: Wiley & Sons.

Paivio, A. (1971). Imagery and Verbal Processes. New York: Holt, Rinehart & Winston.

Pressley, M. (1977). Children's use of the keyword method to learn simple Spanish vocabulary words. Journal of Educational Psychology , 69 , 465-472.

Pressley, M. and Dennis-Rounds, J. (1980). Transfer of a mnemonic strategy at two age levels. Journal of Educational Psychology , 72 , 4, 575-582.

Pressley, M. and Levin, J.R. (1978). Developmental constraints associated with children's use of the keyword method of foreign language vocabulary learning. Journal of Experimental Child Psychology , 26 , 359-372.

Pressley, M., Levin, J., Digdon, N., Bryant, S.L. and Ray, K. (1983). Does method of item presentation affect keyword method effectiveness? Journal of Educational Psychology , 75, 5 , 686-691.

Pressley, M.; Levin, J.R.; Kuiper, N.A.; Bryant, S.L. and Michener, S. (1982). Mnemonic versus non-mnemonic vocabulary learning strategies: additional comparisons. Journal of Educaional Psychology , 74 , 693-707.

Raugh, M.R. and Atkinson, R.C. (1975). A mnemonic method for learning a second language vocabulary. Journal of Educational Psychology , 67 , 1-16.

Rigney, J.W. (1978). Learning strategies: a theoretical perspective. In O Neil, H. Learning Strategies , New

York: Academic Press.

Rigney, J.W. (1980). Dualities in information processing. In Snow, R.; Frederico, J. and Montague, Aptitude, Learning and Instruction , New Jersey: Lawrence Erlbaum.

Ringel, B.A. & Springer, C.J. (1980). On knowing how well one is remembering: The persistence of strategy use during transfer. Journal of Experimental Child Psychology, 29 , 322-333.

Rohwer, W.D. (1973). Elaboration in childhood and adolescence. In H.W. Reese (ed.) Advances in Child Development and Behavior (Vol. 8). New York: Academic Press.

Rubin, J. (1975). What the "Good Language Learner" can teach us. TESOL Quarterly , Vol. 9, no.1, 41-51.

Salomon, G. (1972). Heuristic models for the generation of aptitude - treatment interaction hypotheses. Review of Educational Research , 42 , 327-343.

Salomon, G. (1974). Internalization of filmic schematic operations in interaction with learners' aptitudes. Journal of Educational Psychology , 66 , 513-518.

Salomon, G. (1976). Cognitive Approach to Media. Educational Technology , 16 , 5, 25-28.

Salomon, G. (June, 1977). The language of media and the cultivation of mental skills. Report submitted to the Spencer Foundation. Jerusalem, Israel: Hebrew University, (ED 145 808).

Sperry, L. (1972). Learning Performance and Individual Differences. United States: Scott, Foresman, and

Company.

Snow, R. (1980). Aptitude processes. In Snow, R.; Frederico, J., and Montague, W. Aptitude, Learning and Instruction . New Jersey: Lawrence Erlbaum.

Stern, H.H. (1975). What can we learn from the "Good Language Learner"? The Canadian Modern Language Review , 31 , 304-318.

Wade, S.E. (1983). A synthesis of the research for improving reading in the social sciences. Review of Educational Research , 53, 4 .

Weinstein, C.E. (1978). Elaboration skills as a learning strategy. In H. F. O Neil, Learning Strategies New York: Academic Press.

Wiens, J.W. (1983). Metacognition and adolescent passive learner. Journal of Learning Disabilities 16, 3 .

Winn, W. (1982). Visualization in learning and instruction: a cognitive approach. Educational Communication and Technoloy Journal , 30 , No. 1, 3-25,

Appendix A

Keywording,

a Tool for Learning New Words

Name: _____

Grade: _____

Beginning Time: _____

Finishing Time: _____

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People do different things with the information they see.

Sometimes they ignore it.

Sometimes they repeat it to themselves.

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Sometimes they draw a picture of it in their minds.

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An image is a picture
that people draw in their minds.
Different people may have a different image for the same thing.

A

The image I have in my mind for "friend" is my best friend Joey and I having sailboat races in the bathtub.

I sometimes remember people's faces but not their names. That is because I only remembered the image of their faces.

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Do you understand what an image is?

Write a sentence saying what you think an image is.

_____

_____

_____

Turn the page upside down to check your answer.

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An image is a picture we have in our minds of things from outside of us.

If you did not answer something similar to the above answer

OR

If you still do not feel sure about what an image is

Go back and review.

Then

Try the question again.

If you do understand what an image is then go on.

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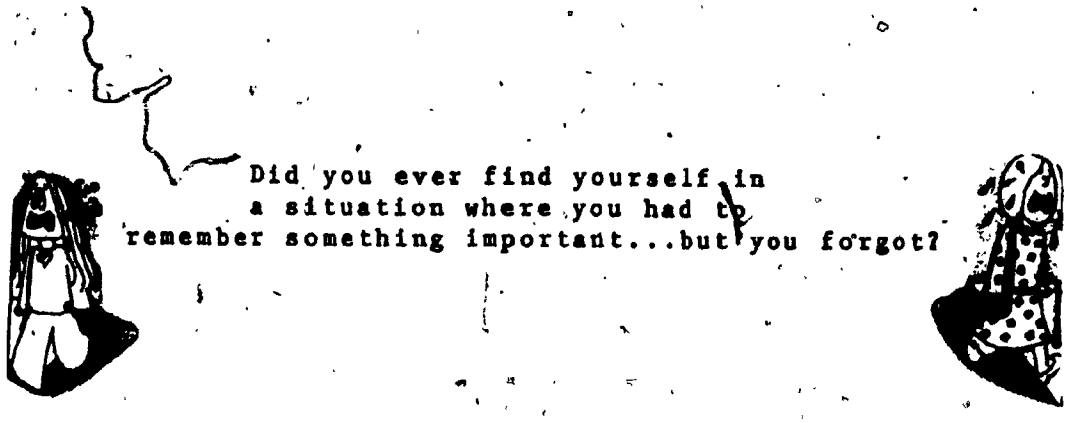

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You are about to learn a powerful way for remembering words.
It is called keywording.

Keywording is a technique that can be used to help people learn new words.

If you have to learn new words in a new language keywording should be able to help you.

Creating your own keywords is like creating the tool that will make your memorizing work easier.

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Please write what Keywording is.

Turn page upside down for the answer.

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Keywording is a technique to help learn new vocabulary words.
It can be used any time new words need to be learned.

Instructions for Keywording

To do keywording,
you will have to find a word that sounds
like the new word you have to learn.

Let us say you have to learn the words , , and

Here are a few examples. The middle column is for the keywords.

New Word	Keyword	Meaning
בַּיִת	buy it	house
עֵץ	eights	tree
יֶלֶד	yell	boy

So you see, the keyword sounds like the word you have to learn.

Before beginning, put your My Own Keywords stencil near you because it has the words you have to learn on it.

put your Image Drawings stencil near by since you will soon have to draw your images.

put the stencil with Suggested Keywords under you My Own Keywords stencil. It is there to help you if you have trouble making your own keywords.

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Are you ready to start keywording?

Are your <u>My Own Keywords</u> stencil, <u>Suggested Keywords</u> stencil and <u>Image Drawings</u> stencil ready?

Yes? then

First, <u>think</u> of a word, in any language, that sounds like your first new word (like בית - buy it and עץ - eights).

If you have trouble finding a keyword look on the stencil with suggested keywords.

<u>Write</u> down your keyword beside your first new word in the <u>keyword</u> column of your <u>My Own Keywords</u> stencil.

Then, <u>draw</u> your image of the new word in the <u>New Word</u> column of your <u>Image Drawings</u> stencil.

<u>Draw</u> your image of your keyword in the <u>Keyword</u> column of your <u>Image Drawings</u> stencil.

And then,

<u>think</u> of something your new word can be doing together with your keyword.

For example, for the new word בית and the keyword "buy it", I imagine a house salesperson pointing to a house and saying "Buy it!"

For the new word עץ and the keyword eights, I imagine a tree with eights (8,8,8) growing on it.

So you see, it could be funny or silly or even outrageous!

Let your imagination go!

<u>Draw</u> your image of the new word and the keyword doing something together in the <u>Both Together</u> column of the <u>Image Drawings</u> stencil.

As long as you can recognize your pictures you are doing great.

You do not have to spend too much time on each picture.

Then do the same thing for the rest of your new words.

1. Create a keyword for the new word you have to learn and write it in the Keywords column of your My Own Keywords stencil.

2. Draw your image for your new word in the first box of each row of your Image Drawings stencil. Notice that the Image Drawings stencil has titles which help you to remember where to draw each picture.

3. Draw your image of your keyword in the second box of your Image Drawings stencil.

4. Create an image in your mind of your new word and keyword doing something together.

5. Draw that image in the third box of your Image Drawings stencil.

When you have completed these instructions for all your new words then turn the page.

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After you have created images of your keywords doing something together with your new words it is important to practice them until you know them well.

Look at your list of new words.
As you read each new word remember the image you created for the new word doing something together with the keyword (from the Both Together column).

If you have trouble remembering any of your images, then look over your drawings and then follow the instructions above.

Then fold your My Own Keywords stencil to cover the Keywords column and the Meanings column, leaving only the New Words column showing. Beside each new word write its meaning, so you can make sure you know the meanings of all the new words.

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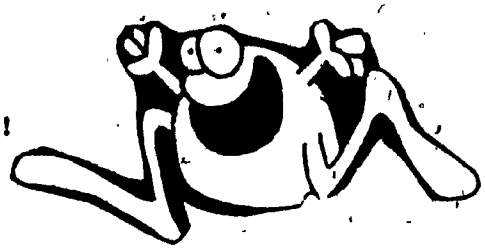
Are the meanings of the words clear in your mind?

If not then follow the instructions to review.

If they are then

CONGRADULATIONS!



you have just learned keywording.

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Appendix B

Solving Learning Problems

Name: _____

Grade: _____

Beginning Time: _____

Finishing Time: _____

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Can you imagine not being confused
about how to learn something?
Wouldn't it be nice to have all kinds
of tricks that make learning easier?

Well, you can do it... if only you knew how.

Are you ever confused about playing with a friend?
Probably not.

First you and your friend decide that you want to play.

Then you decide on a game.

After that, you agree on the rules for the game
and you try to make it interesting.

And then, you play!

Afterwards you think to yourself:

Are we going to play this game again?

Are we going to use the same rules?

Believe it or not, you can do exactly the same things
in order to learn.

Let us see how it is done.

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Imagine that you have to learn something,

like multiplication or new words.

Is this a problem for you?

Well, here are six steps that can help you:

First you have to agree to try to solve the problem.
Are you ready to deal with it ? Yes?

O.K., the next step is to decide how .
There can be all kinds of ways to solve a problem.
We will look at some examples later.

Whichever way you choose, you should
make it interesting for yourself.

Let us say you decided how to solve your problem.
What are you waiting for? Go ahead and try it !

Now, did it work ?

Well, if it did not, maybe you should try another way.

If it did, CONGRADULATIONS .

So you see, it is as if you take several steps, one after another.

Each step is another question you ask yourself.

These steps, help you to do something with your assignment

instead of just waiting around for the learning to happen.

This is just like inviting a friend to come and play instead

of waiting for a friend to come to you.

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Now let us look at each step so you can do them yourself.

Whenever you have to learn something, ask yourself:

Is my mind open? Do I really feel ready to try my best?
(Yes, I am ready to try really hard.)

Do I know what to do? What?
(Yes, I have to read this booklet to learn these steps to learning.)

Of course, you must understand what you are supposed to do because you cannot agree to do something that you cannot do.

Do I know why?
(One reason is so that I can become a better learner, achieving much more without that much more effort.)

Knowing why you have to do something helps you to do it better.

It does not matter if the teacher does not tell you.

Make up your own reason.

As long as you are satisfied you are doing O.K.

So far you know that when you have a problem you should:

First, open your mind so you can try your best.

Then , find out exactly what you have to do.

And then, make up a reason why you should do it.

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You are ready to try your best.
You understand what you have to do.
You know why you should do it.

Now you have to decide how to solve your problem (just like you have to decide how to play a game with your friend, right?).

Let's say you have to learn to multiply numbers, you might have several tricks to do it:

-repeat the multiplication table over and over in your head;

-use a calculator;

-do some examples from the book.

Here are two different situations!.

If you have a few minutes to do a lot of multiplication examples which way would you choose? (Circle your choice.)

a) Repeat the multiplication table over and over until you know it by heart

b) Use a calculator.

c) Practice written examples.

Which way would you use to practice if you had a multiplication test next week and you would only be able to use a pencil and eraser for the test? (Circle your choice.)

a) Repeat the multiplication table over and over until you know it by heart.

b) Use a calculator.

c) Practice written examples.

Did you choose different ways for these two different situations? Let's see what some other kids chose.

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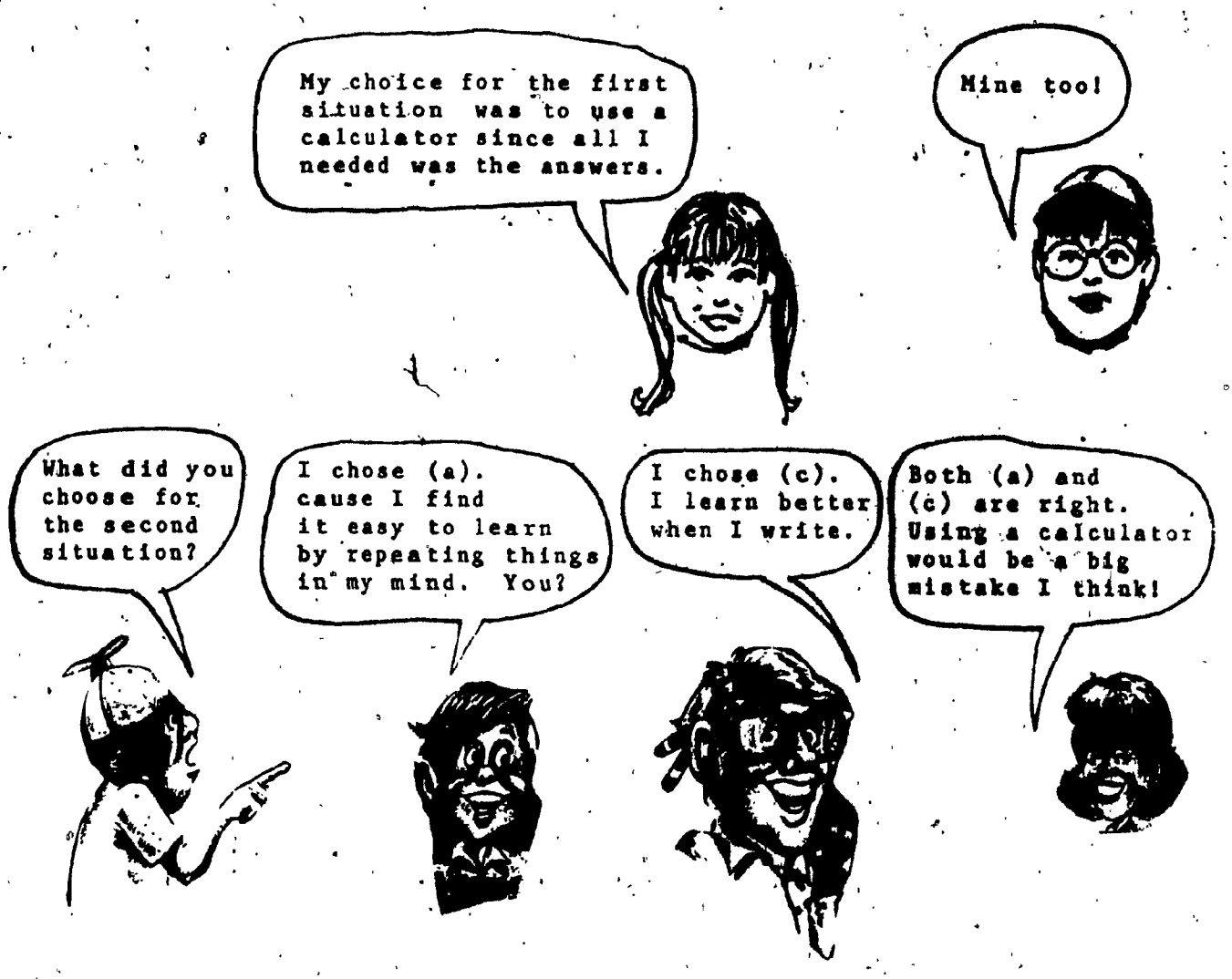

So you see, it actually depends on what you have to do,

and that is why it was so important to understand

what you have to do before you decide how to do it!

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Now you suggest some ways you might learn new words.

Other kids suggested these ways:

-use a dictionary,

-write your own dictionary,

-make up sentences with your new word,

-repeat it over and over again in your mind.

When do you think it would be better to use a dictionary for learning new words.

When is it better to learn your new words off by heart?

Did you include in your answer that sometimes you cannot use a dictionary (like in a test or in the middle of a conversation)?

If you did then you are on the right track.

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Its not enough to decide how to solve the problem.

You should try to make it interesting for yourself.

(Remember, when you play with your friend you also try to make it interesting!)

When you have to learn something, what kind of things would you do to make it interesting for yourself?

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Let's see what we have done so far:

You decided that you are ready to try your best.

You understand what has to be done, and

You know why..

You also found an interesting way to solve your problem.

Now it is time to try and see if it works.

The most important thing is to do it exactly the way you decided.

Making a plan and doing it are two different things.

Sometimes a person makes a terrific plan but he doesn't succeed because he didn't listen to himself. So don't forget to stick to your plan.

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The next step is to find out how you did.

Did you manage to do your assignment?

Did your plan help you?

If it did help, would you remember to use it whenever you have to do a similar assignment?

If it did not help you, what went wrong? Was it done properly?

Where did the trouble begin?

Then tell yourself

how you might do better next time.

Keep the parts of your plan that you like.

Get rid of the parts you do not, and

include what might make it better.

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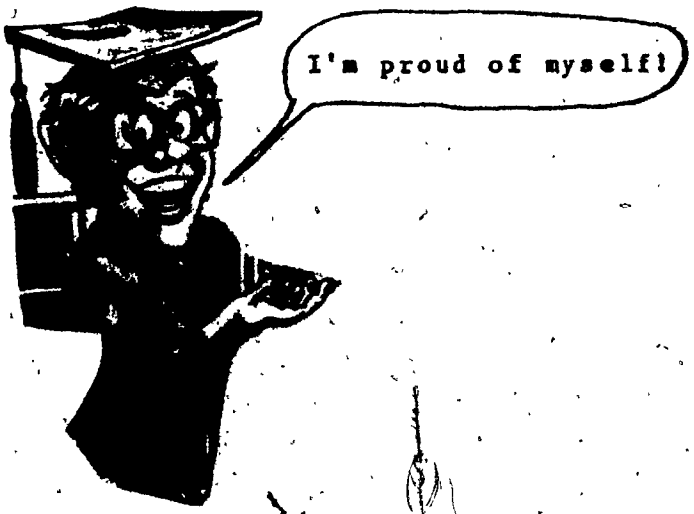
Finally,

Enjoy your achievement! You deserve it!

It is important to reward yourself when you did a good job.

Don't take yourself for granted.



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Congradulations! You have just gone through the steps for being able to deal with all kinds of problems.

So, whenever the feeling of

"I don't know how to learn this."

creeps into your mind, you know what to do.

Follow the steps that we went through!

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Now, let's see if you remember what steps we suggested to help you how to solve new problems.

Just <u>write down the steps</u> in your own words.

If you don't remember one of the steps, or the order of the steps, you can go back to page 2 and check. Pay special attention to the underlined words.
Then, try again.

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Remember, at the beginning of this booklet
we asked you if you thought it would be nice
to have all kinds of tricks that make learning easier.
Well, in the next booklet you will learn one trick
that can help you learn new words.

Use the steps you learned in this booklet to help you decide
if you should use this trick or a different one and when.

Good Luck!

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Appendix C

Questions to ask yourself:

1. Am I ready to try my best?
   - yes 19 (86%)
   - blank 2 (13%)
2. Exactly what do I have to do?
   - learn the words 10 (45%)
   - keywording 5 (22%)
   - blank 3 (13%)
   - other 4 (18%)
3. What methods do I have to learn the words?
   - keywording 12 (54%)
   - other 6 (27%)
   - keywording 2 (9%)
   - blank 2 (9%)
4. Which is right to use now?
   - keywording 8 (36%)
   - blank 8 (36%)
   - other 6 (22%)
5. Try it, then ask did it work?
   - yes 13 (59%)
   - blank 7 (31%)
   - no 1 (4%)
   - usually 1 (4%)