Topical Review

This month's Topical Review describes an intervention technique that appears to be helpful with learning-disabled children who have difficulty sustaining attention to classroom tasks. The review should prove particularly helpful to teachers because it provides an in-depth description of the actual implementation of the technique with several children. Another helpful feature of this paper is that it presents the broad theoretical context for the use of self-monitoring techniques in a way that shows how the method is responsive to the special needs of learning-disabled children. —JKT

Self-Monitoring of Attention with Learning-Disabled Children: Past Research and Current Issues

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*The primary focus of this article is a review of self-monitoring of attention studies with learning-disabled children. A rationale for the use of this procedure, based upon results obtained from laboratory research in the areas of memory, metacognition, and personal control, is discussed briefly. Following a detailed presentation of two studies conducted at the University of Virginia Learning Disabilities Research Institute, conclusions from the entire series are summarized. Finally, issues related to the use of self-monitoring of attention in a mainstream setting, the question of accuracy in self-monitoring, and self-recording of academic responses are discussed.**

In the last few years, there has been a rapid growth in the development of cognitive behavior modification procedures for use with learning-disabled children, particularly learning-disabled children with attentional problems. *Cognitive behavior modification,* as it will be used in this article, refers to the modification of overt behavior through the manipulation of covert thought processes. *Cognitive behavior modification* is a most descriptive term in that it emphasizes the fact that this type of treatment approach is based on a blend of behavioral and cognitive psychology. It is behavioral with respect to (a) the fact that change in overt behavior is the goal and (b) learning principles are assumed to be operating in some way to result in that change. It is cognitive, however, in the sense that treatment, in some way, also involves modifying a person's cognitive operations in order to achieve a change in his or her overt behavior.

Another way of looking at the area of cognitive behavior modification is from the point of view of measurement of change. In cognitive behavior modification an attempt may be made to change an individual's covert behavior, but the method used to determine whether the change has occurred is restricted to the assessment of overt behavior.

There are a number of different procedures applicable to the classroom that fall under the rubric of cognitive behavior modification. In this article we will restrict ourselves to a discussion of the use of one particular type of cognitive behavior modification procedure—self-monitoring. In addition, we will further restrict our review to studies that have focused on the use of self-monitoring to improve attentional abilities in learning-disabled children. These studies were conducted at the University of Virginia Learning Disabilities Research Institute.

RATIONALE

Although our discussion of actual educational procedures will focus on self-monitoring of attention, the rationale for the use of these techniques is also applicable to cognitive behavior modification procedures, in general. Hallahan and his colleagues have already spelled out in some detail the rationale for using cognitive behavior modification with learning-disabled children (e.g., Hallahan, Kneedler, & Lloyd, in press; Hallahan, Lloyd, Kauffman, & Loper, 1983; Kauffman & Hallahan, 1979; Kneedler & Hallahan, in press). Therefore, our presentation of the rationale will be brief.

The results from three general areas of laboratory research—memory, metacognition, and personal control—serve as a basis for the use of cognitive behavior modification with the learning disabled. Researchers studying these three relatively different aspects of learning-disabled children's cognition have reached strikingly compatible conclusions. Taken as a whole, these conclusions are in general agreement with Torgesen's (1977) conceptualization of the learning-disabled child as a passive learner and Hallahan's (Hallahan & Reeve, 1980) view of the learning-disabled child as lacking in task-approach skills.

Memory

Starting in the early 1970s, a number of researchers became interested in the memory processes of the learning disabled. Borrowing heavily from the experimental paradigms of researchers in experimental and developmental psychology, these investigators compared the memory abilities of learning-disabled children with their normal peers on a variety of memory tasks. Probably the most popular of the memory tasks they used was the short-term, free-recall task. Typically, this task involves presenting the child with stimuli (e.g., words or pictures) for a short period of time (e.g., several seconds) and then asking the child to recall as many of them as possible.

Although some variation was evident in their findings, for the most part, these different investigators (Bauer, Hallahan, Torgesen, Vellutino, and others), working in different parts of the country with slightly different samples and using slightly different tasks, all obtained very similar results. Their major findings can be summarized by the following points:

1. Learning-disabled children, between the ages of about eight to 12 years,

This paper was supported by a contract (300-80-0623) from the Office of Special Education, US Department of Education and by a grant from the Home Beneficial Life Insurance Company. Reprint requests should be addressed to Daniel P. Hallahan, Department of Special Education, School of Education, Ruffner Hall, Charlottesville, Virginia 22903

generally fall about two to three years behind their nonhandicapped peers on short–term, free recall tasks.

2. The primary reason why they perform more poorly is that they do not spontaneously use efficient strategies, such as verbally rehearsing the stimuli in groups (for example, saying the names of all the stimuli within particular categories, e.g., animals or foods, over and over again).

3. If they are taught strategies, such as verbal rehearsal, learning–disabled children perform similarly to their nonhandicapped peers.

Metacognition

Again, taking the cue from researchers in developmental psychology, investigators of the memory processes of the learning disabled expanded their interests in the late 1970s to include the emerging area of metacognition. It consists of:

> (1) an awareness of what skills, strategies, and resources are needed to perform a task effectively, and (2) the ability to use self-regulatory mechanisms to ensure the successful completion of the task, such as planning moves, evaluating the effectiveness of ongoing activities, checking the outcomes of efforts, and remediating whatever difficulties arise (Baker & Brown, in press), (Baker, 1982, pp. 27-28).

Metacognition is a broad term that covers a number of different skills. There have, for example, been studies of meta–attention (e.g., Loper, Hallahan, & Ianna, 1982) meta–memory (e.g., Torgesen, 1979), and meta–comprehension (e.g., Owings, Petersen, Bransford, Morris, & Stein, 1980) in learning–disabled children. Although not yet as extensively studied as memory abilities, there is already a considerable body of literature supporting the notion that learning–disabled children are generally behind their nonhandicapped peers in metacognitive development. We will briefly mention the findings of two studies that are representative of this literature.

Torgesen (1979), using a meta-memory questionnaire developed by Kreutzer, Leonard, and Flavell (1975), questioned learning–disabled and nonhandicapped children concerning how they would go about trying to remember things. For example, he asked them questions like, "If you wanted to phone a friend and someone told you the phone number, would it make a difference if you called right away after you heard the number, or if you got a drink of water first? Why? What would you do if you wanted to try to remember a phone number?" He found that the learning–disabled children could not come up with as many alternatives as the nonhandicapped children as to how they would go about trying to remember.

Owings et al. (1980) presented good and poor readers with easy versus difficult prose passages to read. They found that, in contrast to the successful readers, the poor readers did not adjust their reading style according to which of the two passages they were reading. In particular, they spent an equal amount of time on each of the reading tasks whereas the successful readers allocated more study time to the difficult passages than they did to the easy ones.

Personal Control

There is also ample evidence that many learning–disabled children do not feel in control of their own lives. They exhibit what has been referred to as an external locus of control (Hallahan, Gajar, Cohen, & Tarver, 1978; Pearl, Bryan, & Donahue, 1980). In connection with this external locus of control, learning–disabled children are also candidates for "learned helplessness." This refers to a person's belief that his or her efforts will not lead to desired outcomes (Seligman, 1975). Pearl, Bryan, and Donahue (1980), for example, found that when learning–disabled children fail on a task they are less likely than nonhandicapped children to blame their failure on a lack of effort.

Summary

As noted above, findings from research on memory, metacognition, and personal control have led some to refer to the learning–disabled child as a passive learner. As Hallahan and Kauffman (1982) sumarize:

> Many of the psychological and behavioral characteristics we have mentioned can be summed up by saying that the learning–disabled child is a passive individual lacking in strategies for attacking academic problems. Specifically, research points to the learning–disabled child as one who tends not to believe in his or her own abilities (learned helplessness), have an adequate grasp of what strategies are available for problem solving (poor metacognitive skills), and be unable to produce appropriate learning strategies spontaneously. The picture we get is of a child who does not actively involve himself or herself in the learning situation. (p.116)

EDUCATIONAL METHODS FOR ATTENTIONAL PROBLEMS

Traditional Approaches

Over the years there have been primarily three methods for dealing with the attentional problems of the learning disabled —stimulus reduction, drugs, and behavior modification. Although each of these approaches have met with some success, it is fair to say that none of them has been overwhelmingly efficacious (see Hallahan & Reeve [1980] and Kauffman & Hallahan [1979] for reviews of these approaches).

Hallahan and his colleagues have suggested that perhaps these methods have not been more successful because they unwittingly reinforce the passive–learning styles of many learning–disabled children. All three of these approaches place the child in the role of a passive recipient of treatment.

Cognitive Behavior Modification—Self–Monitoring

Self–monitoring (as well as other cognitive behavior modification techniques) differs from the approaches discussed in that it emphasizes having the child participate actively in the treatment process. It stresses self–initiative by having the child monitor whether or not he or she is on– or off–task. It was for this reason that we, at the University of Virginia Learning Disabilities Research Institute, decided to make self–monitoring a major focus of our research.

In the remainder of this article we will review our self–monitoring research. Be-

cause of space limitations we will only present two of our studies in some detail (in order to provide the reader with information pertaining to the specifics of the treatment procedures). After that, we will present a list of conclusions that have emanated from a series of studies. Finally, we will mention a few of the important issues that still remain to be resolved in the area of self–monitoring of attention in learning–disabled children.

The self–monitoring procedures we have used are an adaptation of techniques that were first used by Glynn and his associates (Glynn & Thomas, 1974; Glynn, Thomas, & Shee, 1973). It is questionable, however, whether the subjects in Glynn's studies had learning problems severe enough to be classified as learning disabled. We have focused our investigations on a relatively homogeneous group of learning–disabled children. For the most part, the children under study were: (a) classified as learning disabled based on a discrepancy between achievement and IQ, (b) nominated by teachers as having attentional problems, (c) between the ages of seven and 12 years, (d) within an IQ range of 85 to 125, (e) attending a special class for the learning disabled, and (f) taught to use the procedures by the classroom teacher or aide.

In the first of a series of studies, we had the teacher of a seven–year, 11–month–old learning–disabled boy teach him to self–monitor his on– and off–task behavior by using an audio-tape recorder to cue his self–recording. The tape recorder was placed near his desk, and he was told that every time he heard a tone he was to ask himself the question, "Was I paying attention?" He was then to record his answer by making a check ("Yes" or "No") on a self–recording sheet on his desk. The tones occurred randomly with the mean length between tones being 45 secs. (range = 10 to 90 secs.). His assigned seatwork was handwriting and math—two tasks that the teacher stated he was capable of doing—even though his inattention was excessive. He engaged in these two activities back-to-back with the average handwriting session being 15.4 mins. and the average math assignment being 10.9 mins. We measured two dependent variables—on–task behavior (obtained by an observer) and academic productivity (the number of correct words produced per minute during handwriting and the number of correct answers written per minute during math). Because the student rarely made errors, rate instead of percent correct was the dependent variable of choice.

We used an experimental design that was a combination of multiple baseline across responses (handwriting and math) and reversal designs. A total of six conditions were used (ABABCD)—A = baseline, B = self–monitoring with tape, C = self-monitoring without tape, and D = self-praise. The last two conditions (C and D) were included in order to see if we could wean the student from reliance upon, first, the tones and, then, the tones plus the recording sheet.

In introducing the self–monitoring treatment we had the teacher follow the steps outlined by Mahoney (1977). The teacher: (a) defined clearly what she meant by on– and off–task behavior, (b) told him how to mark the recording sheet, (c) modeled for him what he was supposed to do using the tape recorder with the tones and the recording sheet, and (d) asked him to repeat the definitions and instructions.

The results of this study clearly pointed to the efficacy of the self–monitoring treatment. The student's on–task behavior increased dramatically with self–monitoring, during both handwriting and math. Furthermore, we were successful in keeping his on-task behavior at a high level during the last two phases when treatment components were withdrawn systematically. Also, we conducted a one–month followup of the math seatwork and found that a high level of attention was maintained. The data for academic productivity, although not as dramatic as those for attention, definitely indicated that self–monitoring effectively increased academic productivity.

The other experiment we will describe differs from this one in that we have had a teacher's aide teach the children to implement self–monitoring during small group instruction (Hallahan, Marshall, & Lloyd, 1981). We had the aide implement the procedure while she was instructing three children using the SRA Corrective Reading Program (Engelmann, Becker, Hanner, & Johnson, 1980). Because the children were engaged in group instruction rather than individual seatwork, we made two changes in the self–monitoring procedure. First, the aide had to be much more specific in what she meant by on– versus off–task behavior. She told the children that on–task meant that they had to have their eyes on her face while she was talking, or on her workbook when she was pointing to it. In this study, the child's eyes were to be on his seatwork. Second, instead of a recording sheet, the children were each given a wristcounter on which they were to press the button if they were on–task whenever they heard a tone from the tape recorder.

Similar to the previous study, we used an ABABCD design in which A = baseline, B = self-recording, C = self-monitoring without the wristcounter (the children simply said "Yes" or "No" to themselves rather than pushing the button on the watch), and D = self–praise without either the wristcounter or the tape recorded tones (whenever they thought about it they were to ask themselves "Was I paying attention?" and then answer "Yes. Good job." or "No. I'd better start paying attention.").

Again, the results were clear–cut. Self–recording led to increases in attention, and treatment effects were evident in the final two phases as elements of the procedure were withdrawn. In addition, high levels of attention were maintained six weeks after the last day of the D phase.

Our description of these two studies should provide the reader with an idea of the basic aspects of the self–monitoring procedures we have used. From these and a number of other studies looking at the various components of the technique, we have reached a set of conclusions. Hallahan, Kneedler, and Lloyd (in press) have categorized these conclusions into those that are or are not data–based:

Data–based conclusions

1. Self–monitoring of attention during academic work leads to increases in attentional behavior.
2. Although the results are not as dramatic as for the dependent variable of attention, self–monitoring of attention during academic work also leads to increases in academic productivity.
3. The cue (tone) to record is a neces-

sary element in the procedure, but the child can be weaned from reliance on it.
4. The recording response is a necessary element in the procedure, but the child can be weaned from reliance on it.
5. The self–monitoring procedure has been used with a high degree of success with no reliance upon backup reinforcers.
6. Maintenance of effects has been demonstrated for a period of up to 2½ months (this is the longest duration we have tested).

Nondata–based conclusions

1. It is our opinion that the self–monitoring technique works best when children are working on tasks for which they already have the skills. In other words, we are skeptical about how successful the procedure would be for children when they are in the acquisition stages of learning.
2. We have found it easiest to implement the procedure during seatwork. It can, with appropriate modifications be used in group settings.
3. We strongly suspect that one major reason for the success of self– monitoring, the way we have used it, is that we have attempted to "seduce" the child as much as possible into believing that he/she is a co–teacher in the instructional process. (Hallahan, Kneedler, & Lloyd, in press).

Some Self–Monitoring Issues in Need of Further Study

We are comfortable in setting forth the previous list of conclusions because they are based on a number of separate investigations. However, we recently, have conducted some further studies that will need further refinement and replication before we are willing to consider them conclusive. They are, nevertheless, worthy of reporting here because they are concerned with some of the issues that we believe need to be addressed in further research.

In the first study (Rooney, Hallahan, & Lloyd 1983), we were concerned with assessing whether or not self–monitoring could be used with learning–disabled children in a mainstream setting. In this study, an entire class of second graders was taught to self–monitor for approximately 20 minutes per day, during language arts activities. Data were taken on four target children who were nominated for study by the teacher on the basis of attentional problems. Results indicated that self–monitoring led to noticeable improvements in attention. Because of the nature of the academic material on which the students were working we were not able to gain information on any academic output effects. Even though the effects of self–monitoring were substantial (the mean levels of on–task behavior for the four children during self–monitoring phases [60%] was almost triple those during baseline phases [24%]), there was still much room for improvement. It was our observation that the children might not have been using the procedure consistently. In fact, a review of their self–recording sheets indicated that they often did not even mark their sheets. In an attempt to remedy this situation we had the teacher tell the children that a record would be kept each session of the number of times the tone sounded. Children who had the correct number of boxes checked regardless of whether they were "Yesses" or "Nos" (i.e., children whose number of responses matched the exact number of tones that had occurred) received a piece of candy or snack cracker. This self–recording with reinforcement condition resulted in even higher levels (mean = 86%) of attention than self–recording by itself (mean = 60%).

The Rooney et al. study provides tentative support for the notion that the self–monitoring routine can be successfully implemented in the context of the regular classroom. Under these circumstances, however, in which several students are simultaneously using the procedure, it appears that getting the children to actually use the technique correctly may be a problem. The results also suggest that reinforcing the students for using the procedure is an effective means of increasing their consistent use of the technique and thus increasing attention.

Somewhat related to the concern of this study is the issue of how important it is that the child be an accurate self–recorder. Previous literature on this, using other than learning–disabled children as subjects, is not clear. In our previous studies we sometimes found that our subjects were highly accurate (i.e., their assessments of "Yes" or "No" in answer to the question, "Was I paying attention?" on their recording sheets matched closely the assessments made by our observor), and sometimes we found that they were not.

In a recent study, Marshall (1983) explored whether accuracy was a factor in the effectiveness of self–monitoring with learning–disabled children. She selected four children from a class of 11 students, all of whom had already been using the self–monitoring procedure. The four were selected on the basis of being low in both on–task behavior and self–monitoring accuracy (as measured by a comparison between the child's observations and the observer's data). She then introduced an accuracy training session in multiple–baseline fashion across the four children. The training consisted of a brief session in which the teacher had the child attempt to match his assessments with those of the teacher, first, while the teacher engaged in self–monitoring and, then, while the child used the self–monitoring procedure. The results were dramatic. The mean proportion of time on–task before accuracy training for each of the four children was .56, .52, .43, and .43. After training the means were .91, .90, .93, and .92.

The final issue we will discuss concerns whether it is more advantageous to have children self–record their attentional behavior, or whether it is better to have them self–record their academic responses in some way. As we have already mentioned, our series of studies indicates that having learning–disabled children self–record their attentional behavior leads to increases in both attention and academic productivity. However, the question does remain as to whether direct self–recording of academic responses would lead to greater benefits in the academic arena. Our opinion, at this point, is that recording performance would not be more effective for the kinds of learning–disabled children with whom we have been working.

There are no published reports available that have compared self–monitoring of attention to self–monitoring of academic responses with learning–disabled children who have been identified as hav-

ing attentional problems. There are, however, a number of studies using children with learning and/or behavioral problems that have looked at the efficacy of self–recording academic responses, e.g., number of problems completed and number of problems completed correctly (Ballard & Glynn, 1975; Holman & Baer, 1979; Neilans & Israel, 1981; Paquin, 1978; Rieth, Polsgrove, McLeskey, Payne, & Anderson, 1978; Schunk, 1982/83; Wall, 1982). For the most part, these studies have shown that using some type of self–regulation procedure to monitor academic responding leads to increases in academic productivity and/or accuracy. Some of these studies (Ballard & Glynn, 1975; Neilans & Israel, 1981; Wall, 1982), however, indicate that the self-monitoring needs to be accompanied by some type of reinforcement in order for it to be effective.

In a recent presentation of a model of behavioral intervention, Treiber and Lahey (1983) posit that it is never necessary to focus on behaviors, such as inattention, that are incompatible with learning. The data from the behavioral literature that they present on this subject is convincing; reinforcement of academic responses has been more successful than reinforcement of attention. It should be pointed out, however, that most of the subjects for these studies were not specifically designated as having attentional problems. Also, although the behavioral literature does support their position, as we have pointed out the jury is still out regarding whether a cognitive–behavioral approach such as self–monitoring is better focused on attention or on academic responses. What we do know is that self–monitoring of attention in inattentive learning–disabled children does increase attention and academic productivity (higher rates of academic responding on tasks that are within the repertoires of the children) in these children.

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