EFFECTS OF GUIDED NOTES ON
THE ACADEMIC PERFORMANCE AND OFF-TASK/DISRUPTIVE
BEHAVIORS OF STUDENTS WITH SEVERE BEHAVIOR
HANDICAPS DURING SCIENCE INSTRUCTION

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the
Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

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* * * * *

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To my parents,
Leo Antonio and Marjorie Carter Bullara
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Severe Behavior Handicaps
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CHAPTER I
INTRODUCTION

Educators are presented with the task of providing a quality education while maintaining classroom discipline. This dual task can become even more difficult when children have chronic behavior problems. Educators consistently rate children who are disruptive as their number one school problem (Muscott, 1987). For some children, these behaviors are severe enough and/or frequent enough to qualify them for special education services as specified in PL 94-142 and PL 101-476, which labeled children with behavioral disabilities as "seriously emotionally disturbed". The Ohio Department of Education, Division of Special Education designates this disability as "severe behavior handicaps" (SBH). The terms, "severe behavior handicaps" and "behavioral disabilities" are used simultaneously throughout this document.

Given the legal provisions for special services for students with severe behavior handicaps, and given that discipline is viewed by educators as the number one school problem, it is disconcerting that these students are one of the most underserved special needs populations (Garrett, 1990). In addition to the low number of students with severe
behavior handicaps being served, professionals have found that the overall quality of services provided to these students needs to improve (Epstein, Foley, & Cullinan, 1992).

Students who are identified as having SBH are placed in mainstream settings less than 50% of the time (U. S. Department of Education, 1986). By definition, students with SBH have learning problems that cannot be explained by other disabilities (e.g., physical or sensory problems). Students with SBH dropout at a rate of approximately 50% (U. S. Department of Education, 1992). Of those students who leave school without graduating, 40% will have criminal records (i.e., having been arrested for a crime) shortly after leaving school (Jay & Padilla, 1987). In order to address this problem, educators must identify academic and social strategies which will promote appropriate behavior for an educational environment. If students with SBH are more successful in school, that success may increase the probability of them remaining in school and completing the requirements for their diploma.

One possible tactic to increase the success of students with SBH in school is to use teaching strategies that have demonstrated effectiveness in improving the academic performance of other students. Strategies that increase the accurate responding of students to instructional stimuli have proven to be effective at improving the academic
performance of students. For example, Direct Instruction strategies have proven to be effective in helping both disabled and typical learners to increase their academic achievement (Becker & Carnine, 1980). Strategies that promote students' opportunity to respond (OTR) during instruction have also proven to be effective with disadvantaged and minority students (e.g., Greenwood, Delquadri, & Hall, 1984). There are, however, few empirical studies that involve the academic performance of students with SBH (Colvin, Greenberg, & Sherman, 1993). One possible reason that there are so few studies involving the academic performance of students with SBH is educators have been more interested in the social behavior of the students with SBH than their academic performance. Academic and social behaviors, however, are not mutually exclusive behaviors. In fact, Cartledge and Milburn (1986) indicate that these two classes of behaviors are linked together in the classroom. Other researchers, too, have found a clear relationship between academic achievement and improved social behavior (Ayllon & Roberts, 1974; Broughton & Laikey, 1978; McKenzie & Henry, 1979). Therefore, it may be possible to simultaneously improve the academic and social behavior of students.

Two strategies that have proven effective in increasing the academic participation and achievement of students are response cards (Gardner, Heward, & Grossi, 1994; Narayan,
Heward, Gardner, Courson, & Omness, 1990) and guided notes (Courson, 1989; Pados, 1989). Response cards are either preprinted cards with answers on them (e.g., true and false cards) or reusable cards that allow students to write short answers in response to teacher posed questions which are then erased in preparation for the next question. Gardner, Bullara, Heward, Cooper, and Sweeney (1992) compared the effects of 2 modes of active student responding (ASR). One mode was hand-raising and the second mode was write-on response cards (to teacher posed questions during whole class instruction). An ABAB reversal design was used in this study with at-risk fourth graders in an urban school in central Ohio. Results from that study were an increase in active student responding by the students and a corresponding decrease in disruptive and off-task behaviors during response cards conditions.

Guided notes have also proven effective at increasing ASR and academic performance (Courson, 1989; Pados, 1989). Hamilton and Gardner (1992) also demonstrated the effectiveness of guided notes on the social studies performance of high school juvenile delinquents. In this study, they compared the academic performance of students on quizzes from lessons in which guided notes were provided. Results indicated that each student's academic performance improved when guided notes were used. Further, the classroom
teacher noted that the students’ classroom behavior improved when guided notes were used.

In another study conducted by Bullara, Gardner, and Weber (1993), the effects of guided notes on the academic behavior of students with SBH was investigated. Results from this study indicated that guided notes positively affected the academic behaviors of students with SBH, and anecdotal information indicated improved social behavior of the students during guided notes conditions.

**Purpose of the Study**

The purpose of this study was to systematically replicate the effects of the Bullara et al. (1993) study. Specifically, the present study examined the effects of guided notes on the academic performance of adolescents with SBH during whole class science instruction and to further analyze the effects of this ASR strategy on the social behavior of these students. The primary dependent variables were students’ scores on daily science quizzes, scores on bi-weekly review tests, and percentage of time students engaged in disruptive and/or off-task behaviors during science instruction. Secondary dependent variables were the students notetaking preference during science class and the teacher’s instructional preference for student notetaking.
Research Questions

1. Will students answer more items correctly on daily science quizzes during guided notes or own notes conditions?

2. Will students answer more items correctly on daily science quizzes from guided notes or own notes sessions on bi-weekly review tests?

3. During which condition, guided notes or own notes, will students be less disruptive during science instruction?

4. During which condition, guided notes or own notes, will students have lower rates of off-task behaviors during instruction?

5. Do students prefer guided notes over their own notes during whole class instruction?

6. Does the teacher prefer teaching lessons in which guided notes are used as compared to lessons in which students take their own notes?

Terminology

All special terms used in this study and their definitions are listed below.

Bi-weekly Review Tests. Bi-weekly review tests consisted of 40 items randomly selected from the previous 8 to 11 daily quizzes (roughly 4 questions from each quiz).

Daily Quizzes. Daily quizzes consisted of 12 items covering information from the previous sessions. Eleven items were recall questions requiring students to fill the
blank with one to three words to answer to the questions correctly. One question was a true or false question requiring students to circle the correct answer.

**Disruption.** Disruption was defined as one or more of the following: engaging others in conversation during teacher directed instruction, provoking others (e.g., laughing at, making faces at, throwing objects at or touching others), making sounds with voice, objects or actions (e.g., pounding on desk, non specific auditory responses voicing disapproval, tapping, or other disruptions that are not person specific). An example would be passing notes during the lecture. A non example will be a student coughing during class (provided the teacher does not provide corrective feedback).

**Guided Notes.** Guided notes were handouts that "guides" the student through the material to be covered by the teacher. Guided notes set the occasion for the student to write key concepts, facts, and relationships (Heward, Courson, Narayan, & Kline, 1988). In this study, guided notes included basic information and give the student cues for writing in the key facts, concepts, and/or relationships presented during the lesson (Appendix C).

**Instructional Transparencies.** For the purpose of this study, instructional transparencies were made from the lecture notes and included all the facts/concepts to be instructed during the lessons. Each lecture had from four to
six instructional transparencies. The transparencies were made using a print out from a computer, Key words were listed first and reviewed before the lesson. Transparencies were projected on to a moveable screen using an overhead projector.

Lecture Notes. Lecture notes included 15 to 18 main ideas or concepts/facts for the teacher to present during the lecture to the class. Lecture notes contained the same information as instructional transparencies.

Off-task Behavior. Off-task was defined as one or more of the following: out of seat during in-seat work time, eyes directed away from their work, the teacher, or another student answering teacher posed questions, head rested on desk, working on projects not part of current lesson, doodling or drawing, playing with objects, or other behaviors in which the student is directed away from the person(s) providing information relevant to the lesson being taught. An example of off-task would be having one's head on a desk or staring out of a window. A non-example would be turning around towards a student who was called upon to answer a question.

Own Notes. Own notes were the notes written by the student during whole class lecture instruction in which students are instructed to write down important facts about the information presented. Students were given college ruled paper and pencils or pens at the beginning of each lesson.
They were instructed to "take notes" and to make sure to include the important points on the information provided by the teacher.

**Recall.** On daily quizzes and bi-weekly review tests, students were generally required to recall from memory one to three word phrases needed to answer a question posed or to complete a sentence. The student was required to write these answers on the quiz and bi-weekly review tests.

**Social Behavior.** For the purpose of this study, social behavior referred to the number of times a given student was disruptive or on/off-task during a lesson.

**Student Preference.** Student preference was defined as each student’s notetaking preference during whole class instruction.

**Systematic Disclosure.** Systematic disclosure was defined as the process during lecture presentation in which the teacher used a separate paper (21.59 cm x 27.94 cm) to cover the transparency so only the information being discussed in the lesson was showing.

**Teacher Preference.** Teacher preference was defined as the teacher’s preference for student notetaking during whole class instruction.
CHAPTER II
REVIEW OF THE LITERATURE

This chapter examines related research and other professional literature relevant to this study. The definition of severe behavior handicaps (SBH) is presented along with the prevalence in the educational system. The social behaviors of students with SBH are explored followed by related research that presents strategies to positively impact students' social and academic behavior in the classroom. Also reviewed is the literature related to: Instructional strategies for students with SBH, increased active student engagement during instruction, and academic achievement. Finally, notetaking strategies and research on guided notes (and their importance to student academic achievement) are presented.

Students with Severe Behavior Handicaps
Definition and Characteristics

PL 94-142 designated children with behavior disorders as "seriously emotionally disturbed". These children exhibit one or more of the following characteristics that affects educational performance adversely:
1. An inability to learn which can not be explained by intellectual, sensory, or health factors;

2. An inability to build or maintain satisfactory interpersonal relationships with peers and teachers;

3. Inappropriate types of behaviors or feelings under normal circumstances;

4. A general, pervasive mood of unhappiness or depression; or

5. A tendency to develop physical symptoms or fears associated with personal or school problems.

The term includes children who are schizophrenic. The term does not include children who are socially maladjusted unless it is determined they are seriously emotionally disturbed (Federal Register, 42 (163), August 23, 1977, p. 42478).

The Ohio Department of Education, Division of Special Education, designates this disability as "severe behavior handicaps" (SBH). Hewett and Taylor (1980) describe levels of learning competence in which students with behavior problems tend to demonstrate either too much or too little of these competencies (e.g., math or reading skills) as compared to their non-disabled peers in the classroom. Most notably, students with severe behavior handicaps have learning problems that cannot be explained by other learning
disabilities, their academic performance in the classroom is negatively affected by their conduct.

Students with SBH are also more likely to leave school before graduation, receive little or no job training, and are more likely to engage in criminal activity after they leave school. Specifically, the dropout rate for these students is approximately 50% (U. S. Department of Education, 1993). Of those who leave school without graduating, 40% will have criminal records shortly after leaving (Jay & Padilla, 1987). Finally, mental health difficulties are often found in these students later in life as the result of the combination of behavior problems and poor academic performance (Kazdin, 1985).

Prevalence

The Federal Department of Education, Office of Special Education and Rehabilitative Services, reports that in 1990-1991, 392,559 students with severe emotional disturbances were served. This figure is approximately nine percent of all students with disabilities ages 6 through 21. They further report, however, these students to be one of the most underserved special needs populations (Kaufmann, 1989). For example, the 1991-1992 figures from the Ohio State Department of Education show that of the 196,196 students who received special education services, only 1,727 students received services for severe behavior disorders. This figure amounts to .88% of the student population or the
state of Ohio, meaning fewer students are being served for SBH in Ohio as compared to national norms for services to this population.

Social Behaviors

One of the defining deficits of students with severe behavior handicaps that sets them apart from their typical peers are inappropriate social interactions. Students with SBH lack appropriate social skills (Gresham, 1986; Kauffman, 1989), tend to be poorly accepted by their peers (Gresham, 1986; Sabornie, 1985) and, are often viewed by teachers as having inadequate social skills for the mainstreamed classroom (Meadows, Neel, Parker, & Timo, 1991).

Poor social skills can often impact a student negatively throughout life. Students who lack social skills often experience psychological problems as adults (Gottman, Gonso, & Schuler, 1976; Meadows, et al., 1991) and may experience unsuccessful employment opportunities (Knold, 1985; Neel, Meadows, Levine, & Edgar, 1988). It is generally agreed upon by health, educational, and employment professionals that early interventions of social deficits should occur in the school (Meadows et al., 1991).

One concern when teaching social skills is the identification of what skills are needed to enhance the opportunity for success by students in the mainstreamed classroom. Kauffman (1989) stated many social skills training programs have not increased the acceptance of
students with disabilities by their peers. One reason for this may be teachers and students view specific social skills differently in terms of importance. For example, Meadows et al. (1991) surveyed students with disabilities and their non-disabled peers, their teachers, and their parents. They found students with behavior disabilities were more likely to rate compliance and cooperation as less important than their teachers or their general education peers. Researchers have demonstrated the ability to successfully teach students with SBH social skills (Bullara, 1990; Bullara et al., 1993; Gardner et al., 1992). McConnell (1987), however, suggested that these social skills does not generalize to other educational settings.

Other theoretical approaches address social skills from a psychological or developmental perspective. For example, the psychodynamic model approaches the development of social skills from the perspective of a presumed interaction between experiences and internal mental processes. This approach relies on therapy and creativity rather than academic remediation. The psychoeducational approach, like the psychodynamic approach relies on therapy to allow children to understand their behavior. This approach also does not rely on specific training of the social skills. The Humanistic model of educating social skills is rooted in the concept of self-fulfillment (e.g., feeling of self worth). From this perspective, social skill development occurs in a
non-structured, non-directive learning environment in which the child explores his or her feelings, thereby experiencing an empathy for others. Finally, the behavioral model of educating students social skills is based on the perspective that all behaviors are learned. Hence, students who do not demonstrate social skills do so because they have not yet learned the appropriate behaviors. The behavioral model is the most widely used approach in educating students with special needs (Kavale & Hirshoren, 1980). Strategies that treat social behavior as a measurable behavior or a skill students acquire is presented below.

One possible tactic to address this problem would be to increase appropriate academic responding of students with SBH in the educational setting. Cartledge and Milburn (1986) view the relationship between social skills that promote academic achievement (i.e., sitting quietly while reading or listening, or following directions) and academic performance as inseparable. They argued that when a reinforcer is given for student academic performance, the social behavior that allows the academic response to be completed successfully is also reinforced. Therefore, increasing a student’s appropriate academic responding may lead to improved social behavior (Gardner et al., 1992; Bullara et al., 1993).

Instructional Strategies

The effective practice of educating students with SBH requires the identification of skills needed by these
students in order for successful mainstreaming to occur. Specifically, Heller and Schilit (1987) suggest that successful mainstreaming requires students to have social, academic, and behavioral skills appropriate for the general education setting. More specifically, Downing, Simpson, and Miles (1990) identified 16 critical skills that both general and special education teachers felt were essential for successful mainstreaming. These skills are:

- Asking for help when needed;
- Attempting to complete tasks before giving up;
- Attending class regularly;
- Avoiding fights;
- Avoiding swearing;
- Beginning assigned task promptly;
- Following oral instructions;
- Following written instruction;
- Demonstrating an adequate attention span;
- Interacting appropriately with peers;
- Interacting appropriately with teachers;
- Obeying class rules;
- Respecting the property of others;
- Respecting feelings of others;
- Telling the truth; and
- Working independently, (p. 222)

Even though there was agreement on skill identification (e.g., asking for help when needed or avoiding fights), there was a disagreement as to when students actually possessed these skills competently. In light of this discrepancy, the strategies to teach these skills must also be considered.

According to Gable, Hendrickson, Young, & Shokoohi-Yekta (1992) teachers of students with behavioral disabilities need competencies in the following areas: assessment, planning, instruction, behavior management,
consulting, and administrative tasks. Though these skills are generally agreed upon, the degree to which these competencies translate to best teaching practices is largely unknown (Wood, 1987). Two competencies found to be especially important are behavior management and individualized instruction (Gable et al., 1992). Since theories of behavior management and of individualized instruction are extensively found in basic and applied experimental literature, it is not surprising that the most commonly taught perspective of educating students with behavioral disabilities is rooted in behavior theory of education (Kavale & Hirshoren, 1980). In behavioral approaches to education, the identification of observable and measurable responses to instructional antecedents are central to the concept of instruction. Strategies that have focus on these types of responses follows.

**Academic Learning Time (ALT)**

The concept of Academic Learning Time (ALT) arose in response to the literature surrounding the discrepancies between allocated time of instruction and academic gains. According to Heward (1994) ALT is: "A measure of the time a student spends actively engage in academically relevant materials that are moderately difficult for them" (p. 288). Specifically, California State Department of Education's Office of Program Evaluation and Research were concerned with the declining third grade reading scores across a three
year period from 1973 to 1976 and commissioned SRI International to conduct a study. The purpose of this study was the identification of classroom processes that related to comparatively high rates of student achievement (Stallings, Corey, Fairweather, & Needels, 1977). In 1979, a two-phase correlational and regression analysis study, in which academic achievement and absenteeism was related to classroom processes. This study was conducted to investigate what specific reading activities correlated with the most academic gains and what group of achievers benefitted the most from these specified reading activities (Stallings, Needels, & Stayrook, 1979). Results from this study indicated that interactive on-task instruction (i.e., discussion, oral reading, and contingent feedback) was highly correlated with academic gains. Further, low achieving students exposed to interactive on-task instruction made the most academic gains. One of the results of this study was the correlation between off-task behavior and less gain in reading.

Focusing on the on-task component of the study, ALT was developed at the Far West Regional Laboratory in the Beginning Teacher Evaluation Study (BTES) (Fisher, Berliner, Filby, Marliave, Cahen, & Dishaw, 1980). In the BTES, ALT for second graders ranged from 62 to 123 minutes per day and 49 to 105 minutes per day for fifth graders. The results from this correlational study were mixed because both
directed instruction in math and reading were lumped together with process learning such as problem solving and art instruction. ALT involving time spent reading, mathematics and academic verbal interactions was significantly related academic gains. ALT in more exploratory activities was positively related to problem solving and lower student absences.

When considering variables that relate to student academic success, one of the most common measure of instructional antecedents and student participation is the amount of time allocated (i.e., hours per day & school days in the year) (Heward, 1994). A growing concern of educators is that allocated time is not entirely related to academic achievement (Guthrie, Martuza, & Seifert, 1976; Hall, Delquardi, Greenwood, & Thurston, 1982). For example, Harnischfeger and Wiley (1978) found little variance between the amount of time students spend in class. More significantly, they found these variables not relating to academic gain. One reason for this may be that much of the time allocated for instruction is spent engaging in tasks other than instruction (e.g., behavior management, getting materials, providing directions on how to use instructional materials). As little as 25% of time is spent by students actively engaged with the instructional materials (Hall et al., 1982). For example, students' on-task behaviors are generally thought of as productive instructional time even
though it may only refer to passively listening to a teacher’s lecture presentation as opposed to students actively answering teacher posed questions, engaging in classroom discussions, or reading aloud. Researchers have found that academic gains are not correlated with passive on-task behaviors (Stallings, 1980).

In summary, ALT was the first empirically produced measure that produced positive correlations with academic achievement (Rosenshine & Berliner, 1978). The concept of ALT does not, however, specify or describe academic engagement in such a way that student behavior can be analyzed and functional relationships found which may actually produce academic gains. One strategy which is amenable to empirical testing is direct instruction.

**Direct Instruction**

Becker and Carnine (1980) reported academic instruction taught in structured daily sessions characterized by a high degree of student responding produced the highest level of student achievement. One way teachers can accomplish this goal of increased student responding is a method of teaching called Direct Instruction. Direct instruction strategies have proven to be effective in helping learners with, or without, disabilities to increase their academic achievement. Direct Instruction uses six principles of instructional design (Gersten, Carnine, Heiry, & White, 1984). These principles are as follows:
1. Explicit teaching of rules and strategies.
2. The use of wide varieties of examples.
3. Sequencing examples with minimal difference to demonstrate exemplars to maximal differences to demonstrate non-exemplars of the rules and concepts.
4. Covertization in which the student makes overt responses at each step to ensure correctness of responding.
5. Teaching General Case strategies so that student can make correct responses to novel stimuli.
6. Correction procedures in which the teacher gives corrective feedback on incorrect responses.

The use of direct instruction was shown to be beneficial to the academic achievement of disadvantaged students in reading and language skills (Becker, 1977). Further, the use of Direct Instruction strategies was investigated and evaluated as part of the U. S. Office of Education's "Project Follow Through". Results from this longitudinal study indicated that those students that were using Direct Instruction learned more basic skills than the students taught using the other strategies. Students were also more likely to: Have a higher reading grade when entering high school, graduate from high school, and apply to college than students with similar profiles who had not receive Direct Instruction in elementary school (Gerstein et al, 1984).
Opportunity to Respond

Opportunity to Respond (OTR), Direct Instruction, and ALT are similar in that they focus on student activities during instruction and are concerned about increasing the amount of time the student is engaged in academic tasks. There are also differences between ALT, Direct Instruction, and OTR. ALT is more general and does not qualify the type of on-task student behaviors except to say that students should have a high rate of success. Direct Instruction and OTR emphasize the accuracy of student responding to the instructional stimuli so the teacher can provide corrective feedback and praise. A consistent functional relationship has been found between academic achievement and the number of opportunities students have to respond to instructional materials (Greenwood et al., 1984). Opportunity to respond (OTR), a measure of active student participation during instruction, is defined as the interaction between instructional antecedents and desirable student responses implied by the materials employed (Greenwood et al., 1984). The emphasis of this measure is the instructional antecedent that evokes the occasion for the desired student responses. For example, setting up a reciprocal peer tutoring program in which students instruct each other on sight word recognition allows both students the opportunity to be a tutor and tutee. This tactic also increases their opportunities to respond to instruction. Compared to whole
group instruction, in which the teacher poses a question and calls upon one student to respond, peer tutoring enables more students more opportunities. OTR was first described by Hall, Delquadri, and Harris (1977) as an ecobehavioral assessment that describes the three term contingency of instruction: instructional antecedent, the desired student response, and the consequence of those responses (e.g., feedback from the teacher) (Greenwood et al., 1984).

OTR arose in response to previous literature surrounding the academic performance of at-risk students (e.g., students with learning delays, students from environmentally disadvantaged home settings or inner-city schools) that looked exclusively at the students' environment as the focus of understanding academic success or failure. Initially, a descriptive study was undertaken to gain information on the amount of time students are actually engaged with instructional material. Results from this study indicated that on the average students receiving less than 20 seconds of directed reading per day and fewer than 5 seconds of practice for math skills per day (Hall et al., 1977).

The first systematic study to assess what was termed "eco-behavioral interaction" was initiated by using a classroom observation system to record instructional antecedents (i.e., activity of the class, behavior of the teacher and defined task of the students) and student
responses (Delquadri, Greenwood, & Hall, 1979). This observational system, The Code for Instructional Structure and Student Academic Response (CISSAR), describes as many as 53 different events during instruction that can be used to analyze the instructional antecedents functionally related to the desired student response. These events include classroom structure, mode of responding, teacher's locale (e.g., in front of class or moving around the class), and competing responses such as disruptions from students or visitors. Results from this systematic study indicated that while 75% of the day was assigned to instruction in academic subjects, only 25% of the day was spent by students actively engaged in responding to instructional materials. Specifically, writing comprised 16% of the day, talking about instructional materials comprised four percent of the day, and silent reading comprised three percent. Surprisingly, reading aloud, answering or asking questions, and reciting occurred during less than one percent of the school day (Stanley and Greenwood, 1983). These results were alarming since it has been demonstrated that academic achievement is highly correlated with students' academic responses (Stallings et al., 1979).

An experimental analysis was undertaken to increase students' opportunity to respond to instructional antecedents without altering the instructional material itself. Altering this single variable served the dual
purpose of determining the relationship between the variable and academic achievement while using academic materials familiar to the teachers. This study was conducted in a classroom for students with specific learning disabilities using a classwide tutoring program for 10 minutes each day during oral reading (Delquadri, Greenwood, Whorton, Carta, & Hall, 1986). Results from this study demonstrated that tutoring was effective in achieving an increase in the amount of time students responded to academic stimuli. Further, the increase in the students' opportunity to respond led to an improvement in oral reading as measured by oral reading assessments.

Greenwood et al. (1987) conducted a field replication of the classwide peer tutoring study conducted in 1984 to measure the effects of elementary students' opportunity to respond on academic achievement (Greenwood, Dinwiddle, Bailey, Carta, Dorsey, Kohler, Nelson, Rotholz, & Schultz, 1987). In this group design, the effects of peer tutoring among first- and second-graders in four inner-city schools that served students from low socioeconomic backgrounds was compared to traditional teacher instructional procedures. Results obtained indicated that classwide peer tutoring produced greater spelling gains than did the traditional teacher instructional procedures. Interestingly, when students were pretested on spelling and divided into high and low spelling groups, classwide peer tutoring still
produced relatively higher gains than did traditional teacher procedures replicating the effects from the previous study.

Finally, Greenwood, Delquadri, & Hall (1989) reported on an investigation that looked at the long term effects of classwide peer tutoring on low SES students as compared to their peers with high SES. This longitudinal study followed three groups of students from first grade through fourth grade. The three groups were a low SES experimental group, a low SES control group, and a high SES comparison group. The experimental group was exposed to classwide peer tutoring to increase students' opportunity to respond for at least one academic subject. The control and comparison group were exposed to traditional teacher procedures used in their classrooms for all of their academic subjects. Results from this investigation indicated that both the experimental group and the comparison group received more academic instruction and demonstrated higher academic gains than did the control group. The study indicated that using OTR strategies narrows the difference in academic performance of students with low SES and students with high SES. A major finding of this study was that students who were academically at-risk because of SES status could greatly benefit from instruction that promotes students' opportunity to respond.
Research relating strategies adjusting instructional antecedents to promote desired student responding has demonstrated a strong relationship between the amount of time students engage instructional materials and subsequent academic gains. OTR has proven to be an effective device to analyze the controlling contingencies of student responding that is functionally related to academic gains (Greenwood et al., 1984). Presently, the relationship between lower rates of responding to lower rates of academic stimuli, academic growth, achievement, and other socially significant concerns (i.e., the effective treatment of developmental disabilities) are being continued (Greenwood, Hart, Walker, & Risley, 1994). Concurrently, a similar concept which has grown out the OTR literature is active student responding (ASR).

**Active Student Response**

Active student responding, like OTR, emphasize the three term contingency of antecedent, behavior, and reinforcement. Both ASR and OTR emphasize the frequency of student responding. ASR, however, is not just a student’s opportunity to respond, but a detectable response to instructional stimuli. A number of strategies that increase student responding have been employed to meet this instructional aim.
Strategies to Increase Active Student Responding

The term, "active student responding," has been defined as the number of measurable and observable responses that a student displays in response to instructional antecedents (Courson & Heward, 1988). Whole class ASR instructional strategies such as choral responding (Heward, Courson, Narayan, 1989), peer tutoring (Heward, Heron, & Cooke, 1982), response cards (Narayan, Heward, Gardner, Courson, Omness, 1990), and guided notes (Courson, 1989; Hamilton & Gardner, 1992) have yielded some promising results with various school populations.

Choral Responding

A form of unison responding is choral responding. Choral responding is a strategy in which the teacher prompts the class as a whole to vocally respond to teacher-posed questions. Choral responding is used to increase the active responding of students during whole class instruction. Choral responding is best suited for teacher-posed questions requiring one to three word responses from the students (Courson & Heward, 1988). The relative effectiveness of choral responding, write-on response cards, and hand-raising was investigated using an alternating treatment design among general education elementary students (Lockhard, 1993). In this study, academic achievement, as measured by daily quiz scores, and the amount of active student during social studies instruction were the dependent variables. Results
from this study indicated that write-on response cards produced the greatest academic gains. Choral responding, however, produced greater academic gains than hand-raising. Importantly, both choral responding and response cards substantially increased ASR.

Peer Tutoring

Peer tutoring can positively affect the academic and social behaviors of students through increased responding (Greenwood et al., 1994; Heward et al., 1982; Miller, Barbetta, & Heron, 1994). Sulzer-Azaroff and Mayer (1991) discuss the benefits of peer tutoring from the preschool level to the university level. Specifically, they state that peers are a good choice for behavior change because they have frequent contact with their peers, thereby providing a natural contact for instruction. They further state that in some peer tutoring situations, tutors are in a good position to act as contingency managers, thereby increasing the likelihood of cuing the tutee in non-tutoring situations. Miller et al. (1994) also discuss the importance of peer tutoring in achieving instructional objectives related to student outcomes. Miller et al. (1994) describe the START Tutoring Program that outlines the steps in the design, implementation, adaptation, and evaluation of tutoring programs. START is an acronym for each step in the program: Select a tutoring format, train the tutors, arrange the environment, run the program, and test for effectiveness.
For example, selecting a tutoring format directs the reader to five common tutoring formats found in previous research that resulted in improved academic performance or social behavior of students. These formats are: 1:1 dyads, Small group, Classwide, and Cross-age tutoring, Home-based.

According to Miller (1992) most tutoring experiments have been conducted with a small number of students who participated in tutoring programs involving one-to-one situations. In one-to-one tutoring, only select tutees participate. The selection of tutees is usually based upon identified skill deficits in need of remediation. For example, in a study investigating peer tutoring and social skills training, Bullara (1990) used a multiple baseline experimental design to investigate the effectiveness of peer tutoring to teach social skills. This peer tutoring program was conducted with adolescent boys in a residential treatment facility for behavior disorders. The results of that study demonstrated that social skills (i.e., following staff directions, saying thank you when assisted, or apologizing when in error) can be effectively taught by peers. The tutors are typically students with competencies in the skill needed by the tutee. Training of tutors may involve specific instruction on tutoring procedures (Miller, 1992), training students on basic social skills such as praise and corrective feedback (Bul lara, 1990), or playing board games to facilitate discussion among students.
(Campbell, Scaturro, & Lickson, 1983). In conclusion, an advantage of this tutoring format is flexibility. A possible disadvantage is monitoring the tutoring sessions (Bullara, 1990; Miller et al., 1994).

In small group tutoring, students who need additional practice can be grouped in pairs to work on the skills in need of strengthening. Another way small group tutoring can be used in the classroom is having the whole class participate on a rotating basis. Finally, small group tutoring can be employed by counselors with students to promote positive feedback from one’s own peer group (Suzer-Azaroff & Mayer, 1991). Like one-on-one tutoring, one advantages of small group tutoring is flexibility. A disadvantage may be the teacher may not have the time to monitor the tutoring sessions because of other instructional demands (Miller et al., 1994).

Another type of tutoring involves using the whole class in the tutoring process. Heward et al. (1982) reported on a case study in which reciprocal classwide peer tutoring was used in a first-grade classroom that served 26 regular education students and two mainstreamed students—one student with learning disabilities and one who was diagnosed with Down’s syndrome. In this study, a tutor huddle was implemented in which student tutors reviewed sight words with other tutors prior to tutoring their respective tutees. A tutor huddle was devised to meet the challenge of enabling
tutors to learn new skills and concepts while simultaneously providing instruction to peers on the same skills. At the end of the five-month program, the tutors and tutees, as a group, demonstrated academic performance on sight word identification above their expected grade placement. One of the conclusions of this study was that using the tutor huddle enabled the teacher to use an untapped resource, the students themselves, to provide direct individualized instruction to every student in the class.

The long-term effects of classwide peer tutoring has also been investigated. In a longitudinal study conducted by Greenwood et al., (1989) the enduring effects of whole class peer tutoring was investigated among first graders for a period of three years. In this study, the investigators measured the academic performance of at-risk first graders exposed to peer tutoring for at least one academic subject a day for four days a week. This whole group design compared the experimental group to a control group of at-risk first graders and a comparison group of non at-risk first graders. The length of the tutoring session was approximately 30 minutes with each student acting as tutor for 10 minutes and reporting back to the teacher and public posting lasting approximately 10 minutes. The results of this investigation indicated that both the experimental group and the comparison group were more academically engaged and produced significantly greater achievement scores than the control
group. Findings from this investigation indicated that students who were at-risk were less academically engaged than their normal achieving peers and that academic engagement is functionally related to academic achievement.

Cochran, Feng, Cartledge, and Hamilton (1993) reported on an experiment in which the effects of cross-age tutoring on the academic behaviors of African American male students with behavior disorders. In this investigation, the researchers initiated tutoring for second grade students in a self-contained elementary school for students with severe behavior handicaps. Fifth graders at the same school served as tutors. Tutoring took place outside of the classroom thereby not disturbing the regular routine of the other students not receiving tutoring. Results from this investigation indicated that sight word recognition was greater for both tutors and tutees as compared to a control group of students matched according to age and reading achievement scores. Additionally, the classroom teacher felt that peer tutoring program had a positive effect on the students' social behaviors. Other researchers have also found peer tutoring to have a positive effect on students' social behavior (Custer & Osguthorpe, 1983; Polirstok & Greer, 1986).

In home-based tutoring, tutoring occurs outside of the school and is usually conducted by a family member (a parent, brother, or sister). The tutoring in this format is
usually done in the home with the parent or guardian reporting back to the teacher the progress obtained from the tutoring. According to Elksnin and Elksnin (1991) parents or guardians can be taught to act as co-teachers in the home setting and positively affects their child's school performance. The major advantage of this tutoring format is that it affords students the opportunity to practice developing skills that the student has not mastered (Heron & Harris, 1993; Miller et al., 1994).

Peer tutoring has been effective in increasing student responses to academic stimuli, improving academic performance, and increasing positive peer interactions (Carta & Greenwood, 1988; Heward et al., 1982). All instruction is not amenable to a peer tutoring format. In fact, much of the instruction in schools is done through a teacher-directed lecture.

Response Cards

Response cards (facilitating unison responding) have been used to increase the number of student responses and academic achievement during teacher directed lecture for all students in the class (Narayan et al., 1990; Gardner et al., 1994).

The first two response cards studies were conducted to determine if the use of the overhead projector would be an effective tool in conducting whole class lecture instruction (Heward, 1994). Lenox (1982) used response cards among
secondary students with developmental disabilities in a special education classroom. The dependent measures were ASR rate and accuracy, scores on a job mastery application, and scores on job mastery application in which no instruction was provided. The multiple baseline design across two modes of the independent variable; write-on response cards and preprinted response cards. Results from this study indicated response cards facilitated the number of accurate student response, gains on job mastery applications, and similar gains on generalization applications.

In the second response card study, Hoagland (1983) used response cards among secondary students with specific learning disabilities in a special education classroom. The dependent measures were ASR rate and accuracy, and scores on a 20 item test of traffic signs and laws. The study employed a multiple baseline design across two modes of the independent variable; write-on response cards and preprinted response cards across three groups of signs and laws. Results from this study indicated response cards facilitated the number of accurate student responses, gains on 20 item tests (i.e., from 55% to over 91%), and similar gains on generalization as demonstrated by the successful completion of the state driving test taken three months later.

More recently, however, Narayan et al. (1990) and Gardner et al. (1994) investigated the effects of response cards on the academic performance of general education
elementary students. In both of these studies, the researchers used a reversal experimental design to analyze the effects of two modes of student responding (hand-raising and write-on response cards) during whole class instruction on ASR and student academic performance. Results from these studies indicated that students engaged in more academic responding during instruction and correctly answered more quiz items which were instructed during sessions in which write-on response cards were used as the mode of student responding.

In another study conducted by Gardner et al. (1992), the researchers investigated the effects of write-on response cards on the academic and social behaviors (e.g., off-task and disruptive behavior) of fourth grade academically at-risk students in a general education elementary school. Using a reversal experimental design, the researchers found a dramatic drop in the off-task and disruptive behaviors of students and an increase in the positive behavior of target students when response cards were used for student responses during whole class instruction.

Guided Notes

Notetaking is observable and measurable to the teacher and is a form of active student responding. Strategies that promote notetaking, such as guided notes, increase the ASR of students during whole class instruction (Bullara et al.
1993, Courson, 1989; Kline, 1986; Lazarus, 1991/1993; Pados, 1989; Yang, 1989). There are other considerations, however, related to notetaking that sets the occasion for effective responding of students during whole class lecture instruction—especially in secondary schools where notetaking competencies are assumed. The concept of notetaking is discussed below followed by a review of the guided notes literature.

**Notetaking**

In secondary schools, much of the teaching that takes place is the teacher-led lecture. For this type of instruction, notetaking becomes a critical skill for students to acquire content (Moran, 1980; Suritsky & Hughes, 1991). Accurate notetaking enables the student to review important details of the lesson prior to taking tests (Anderson & Armbruster, 1986). Taking notes from lectures, however, requires the coordination of a number of prerequisite skills in order for students to accurately record the pertinent information. These skills include listening, watching, asking questions, and recording the most important information for future studying (Heward, 1994). Other possible skills include discriminating, reading, and writing. While researchers have found that taking and reviewing personal notes assist students in greater academic achievement (Lazarus, 1988, 1991), little attention has been given to notetaking instruction (Sasaki,
Swicegood, & Carter 1983). Further, while the accurate recording of information during the lecture is important for all students, it is a skill that many students with severe behavior handicaps do not possess. Since this skill may have a direct relationship on the degree of success the student with severe behavior handicaps has in the regular classroom environments, where less individualized attention is provided, strategies that promote notetaking competencies should be considered. The elements of notetaking that are related to academic achievement are presented below. These elements include the encoding function, teacher and instructional variables, listener controlled variables. Following these elements are strategies that promote effective notetaking among students with special needs. Specifically, these strategies include two formats of the notetaking to facilitate the transmission of information and the use of guided notes to increase the amount of active student responding during the whole class lecture.

Notetaking Viewed as Encoding Function

One theory relating notetaking to academic achievement comes from the cognitive psychology literature concerning information processing. Specifically, notetaking is viewed as an encoding, or listening and writing down, function of student cognitive behavior (Anderson & Armbruster, 1986). According to this theory of learning, encoding and external storage (i.e., the finished notes) is beneficial to the
student because it permits the student to engage in deeper processing (recall and generalization of presented material) while taking the notes, and later for studying the notes for exams. Anderson and Armbruster (1986) state that taking notes occur at any level of processing from verbatim transcription to elaboration and synthesis of lecture material. Further, according to this theory of encoding, pace of lecture presentation, difficulty of lecture material, and the past learning history of the student (in relationship to the material) affects the degree of processing during the encoding process.

Aiken, Thomas, and Shennum (1975) argued that lecture characteristics affects cognitive processing. In their comparison group design study, two conditions of notetaking were compared. One condition was parallel notetaking and the other was spaced notetaking. In this study, students were required to either take notes during the lecture (parallel condition) or during short breaks given at regular intervals throughout the lesson (spaced condition). Results from this study indicated that spaced notetakers recalled more information units than parallel notetakers. These results supported Anderson and Armbruster’s contention that pace of lecture presentation affects the degree of processing and encoding for students.
Lecturer-Controlled Variables

Lecturer-controlled variables refer to the behavior of the teacher who is presenting the lesson. These variables include the type of lecture information, cues to important information, the rate of presentation, the amount of information provided, the method of presentation (Craik & Lockart, 1972), other factors (e.g., headings, highlights, lists of key points and review of key points also affects the student in attending to key information needed for recall when studying for exams (Ladas, 1980). Finally, an perhaps most importantly, teacher preparation and organization of lecture materials affects notetaking of key information needed later for recall. For example, teachers who use guided notes must carefully plan lessons in advance in order to make guided notes for the students to use (Heward, 1994). In addition to lecturer-controlled variables, there are student controlled variables that must also be considered.

Listener-Controlled Variables

The quality and quantity of notes taken may affect the subsequent usefulness of the notes when studying for exams (Pepper & Mayer, 1978). For example, if a student is unable to record presented information quickly because of poor writing skills, the student may not write enough information that will assist him or her when reviewing the notes for required recall. Another variable that affects the
usefulness of the student's notes is the student's schema or prior knowledge of the subject matter (Suritsky & Hughes 1991). Finally, the ability to simultaneously listen and record notes effects the degree to which a student can accurately record the pertinent information used later for review (Vogal, 1987). Taken together, notetaking competencies require a number of prerequisite skills (i.e., listening, writing, and reading skills) that must be addressed in order to assist the student in learning information presented in lecture format. These skills must then be used in concert in order for a student to take accurate notes. Further, addressing these issues may enable educators to assist students in receiving maximum benefits from class lectures.

**Notetaking for Students with Learning Disabilities**

Since taking notes is not a singular process (e.g., requires listen and writing skills), special consideration should be noted for students with specific learning disabilities (Saski et al., 1983). Many authors, however, suggest a traditional outlining format stressing subordinate ideas of lecture content (Alley & Deshler, 1979) that many find ineffective (Devine, 1981). Others suggest summarizing pertinent information as an efficient means to effective notetaking (Devine, 1981). Finally Deese and Deese (1979) suggest a system called the 5-R's of notetaking whereby students are instructed to record notes, reduce the notes to
key elements, recite the reduction, reflect on the notes, and review the notes. This multi-step procedure is recommended most often but is usually cumbersome and difficult for adolescents with specific learning disabilities (Saski et al., 1983).

Saski and his associates recommend a columnar format for notetaking by students with learning disabilities. Specifically, a student would be given one or two formats to be used for notetaking. The first format would have three columns for the student to fill. The first column of this format would prompt students to write known information related to the lecture based upon information obtained from previous lectures. The second column would be used for new information presented during that day’s lesson. The last column would be used to write questions that would assist in clarifying points of the lesson presented. In the second format, three columns are also used. The first column, however, prompts the student to write the basic ideas of the lesson (i.e., facts, figures, and dates)—ideas that will be pertinent to future exams. The second column prompts the student to write background information of interest to him. Finally, the last column prompts the student to write down questions regarding unclear information or information in need of elaboration.
Another notetaking technique found to be effective with students who have specific learning disabilities is called guided notes.

**Guided Notes**

Guided notes is a strategy that has been proven effective in helping students to record key points during whole class lectures (Courson, 1989). The research involving guided notes indicated that this notetaking strategy assists the students in later recall of information presented on exams. A summary of the relevant research involving guided notes follows.

Kline (1986) conducted an initial study examining the use of guided notes. In her study, guided notes were used to instruct American history to secondary students with specific learning disabilities. The students were exposed to two types of notetaking conditions. One condition was a traditional notetaking procedure in which the students were encouraged to write down important information on notebook paper during the teacher's lecture. The other condition involved the use of guided notes. A reversal experimental design was used to examine the effects of students taking their own notes during lectures and students using guided Notes provided by the experimenter. The study lasted 24 sessions and the results indicated that when students used guided notes, they performed better on same day quizzes. Specifically, the average quiz grade was an "A-" when guided
notes conditions were in effect as compared to a "D" when students' own notes conditions were in effect.

Yang (1988) conducted a systematic replication of this study (using a reversal experimental design) to determine whether the students would perform better on next-day quizzes when guided notes are used. In this study, guided notes were used to teach mainstreamed students with learning disabilities and general education students in a middle school science class for 25 class sessions. The two conditions of the independent variable were students' own generated notes and guided notes completion during 20 minute science lecture presentations. The dependent variable was academic achievement as measured by the score obtained on 10-item next day quizzes. The results from this study indicated that when guided notes were used, 17 out of 18 students improved their performance on next day quizzes over their scores during baseline conditions.

Pados (1989) in a systematic replication, investigated whether the initial positive effects of guided notes were maintained on next day quizzes. In this study, the researcher evaluated the effects of guided notes on the performance fifth-graders during American history class using a reversal design. The duration of this investigation was 35 sessions. The two conditions of the independent variable were students' own generated notes and guided notes completion during 20 minute U. S. history lecture
presentations. The dependent variables were academic achievement as measured by the score obtained on 10-item next day quizzes and notetaking accuracy as measured by the percentage of key concepts accurately recorded in students' notes. Results from this study indicated that not only did students with specific learning disabilities perform better on next day quizzes, but so did regular education students when guided notes were used. What is interesting is that in both studies, all the students with specific learning disabled showed improvement and in Pados's study, six of the seven gifted students enrolled also showed improvement when guided notes were used. Finally, the accuracy of notetaking also improved as the result of guided notes use for all the students in the class.

**Guided Notes Accuracy**

Guided notes have proven to be effective at improving academic performance (Courson, 1989; Kline, 1986; Pados, 1989; & Yang, 1988). But what function guided notes play in producing the effect? To answer this question, one must consider the purpose of notetaking. According to Heward (1994), notetaking serves at least two purposes: a process function (e.g., actively engaging in the lesson); and a product role (e.g., written summary of key information). Pados (1989) examined this issue by measuring the accuracy of student notes during both students own notes conditions guided notes conditions. Results indicated that all the
students in the study recorded more accurate information during guided notes conditions as compared to own notes conditions.

Guided Notes and Notes Review

After notes are taken, the next consideration is note review. Lazarus (1991) investigated the role of supervised review of previous notes. In her study, students with specific learning disabilities performed better on tests when students reviewed their notes under supervision of the resource teacher (in a resource room). Test scores were higher when students used guided notes and were able to review those notes prior to testing as compared to conditions in which guided notes alone were used.

In 1993, Lazarus conducted a replication of her 1991 study. Three conditions of the independent variable were compared in the 1993 investigation: guided notes, guided notes with a whole class review, and students own generated notes. In each condition, students were required to take notes from teacher led history instruction. In the guided notes condition, students completed guided notes during instruction and given a 10-minute study period prior to the chapter test instructed from. During the own notes condition, students generated their own notes to teacher led instruction. During the guided notes with whole class review, the students completed guided notes but were also given a whole class review at the end of each lecture.
presentation. The conditions where compared in a reversal design with intervention counterbalancing. The subjects were four students with specific learning disabilities and one student with behavior disabilities in two 11th grade general education history classes. Results from this study indicated that students performed better on teacher generated chapter review tests when guided notes are used compared to conditions when students used their own generated notes. Interestingly, when the teacher instituted a review period after the lesson presentation, student did significantly better than when guided notes were used without a review. Implications from this study suggest that using guided notes and conducting a whole class review period increase the academic performance of students with learning and behavior disabilities.

Long- and Short-Form Guided Notes

Guided notes and review of those notes have demonstrated effectiveness with learning disabled, gifted, and general education students. One question that arises is how much of a "guide" is necessary to prepare the notes for students to use. Is there a relationship between the amount of words students are required to write in order to complete the guided notes and the academic achievement of the students? Courson (1989) investigated this question with seventh grade students who are learning disabled and academically at-risk. The investigator was interested in
three dependent variables: next-day quiz scores, performance on delayed exams, and accuracy of student notes. The investigator used a reversal experimental design with an alternating treatment design within guided notes phases. The terms she used were short-form guided notes and long-form guided notes. Short-form guided notes indicated that students were required to write single words or short phrases (one to three words) only for each blank on the guided notes. Long-form guided notes indicated that students were required to write sentences or phrases in open spaces with the student being cued only by an asterisk. Results from this study indicated that on next day exams, students did not significantly differ in their test performance when the two forms of guided notes were used. Both forms of guided notes, however, produced superior test results as compared to exams following lectures in which the student was required to take their own notes.

Guided Notes and Generality

Notetaking using guided notes can become costly to the teacher who has a large number of students in his or her classroom. Further, students may find themselves in classrooms where teachers do not use guided notes. One important variable is whether guided notes will lead to better note taking skills in situations in which guided notes are not provided by the teacher. White (1991) investigated this question with secondary students with
learning disabilities during American history class. White’s study differed from the previous studies in that she had the student use guided notes and their own notes during the same lesson by dividing the 20 minute lesson into two 10 minute sessions. The design used in this study was an alternating treatment design with the final phase of the study involving the student taking their own notes for the entire 20 minute lesson. Results from this study indicated that students began to record their notes more accurately during the conditions in which guided notes were used and, when guided notes were withdrawn, the students continued to maintain the accuracy of recorded information included in their own notes. These results suggest that maybe using guided notes will positively affect students’ ability to take notes.

Guided Notes and Differing Populations

To date, most of the research on guided notes and its effect on academic performance has been conducted with students who have learning disabilities, students academically at-risk, or with general education students. Hamilton and Gardner (1992), however, systematically replicated these guided notes studies to determine their effectiveness with incarcerated juvenile delinquents. In their study, social studies was taught to juvenile offenders across 22 sessions lasting approximately 15 minutes. The design they employed was a reversal experimental design. Further, they found that when guided notes were used, the
academic performance of the students markedly improved over quizzes covering information when students were required to take their own notes. Additionally, the classroom teacher indicated he felt the students' social behavior was greatly improved during sessions when guided notes were used.

Finally, the effects of guided notes on the academic performance of high school students with severe behavior handicaps was investigated with secondary students with severe behavior handicaps. The academic subject taught was general science for ninth grade students. Using a reversal design, students were exposed to two conditions (own notes and guided-notes) during whole class instruction. Results indicated that students performed better academically when guided notes were used (Bullara et al., 1993). Further, disruptive behavior during instruction decreased (as reported by the teacher) during lessons in which guided notes were used. The classroom teacher and all but one student stated they preferred using guided notes during general science lessons. The classroom-aid, assisting with informal frequency measures of off-task and disruptive behaviors stated students were more behaved during lessons in which guided notes were used.

In summary, students with severe behavior handicaps are more likely to drop out of school than their general education peers. Researchers have found that students who are more successful academically are less likely to drop out
than those who are not successful (U. S. Department of Education, 1992). In order for a student to demonstrate academic skills, he or she must emit enabling social behaviors (e.g., working quietly, following directions, taking turns). Therefore, academic performance and social behaviors are key variables that directly influence the likelihood of success for these students.

A review of the strategies that promote student academic achievement and positive social behavior were reviewed. Specifically, allocated academic learning time, direct instruction, opportunity to respond, and active student responding were reviewed in terms of their impact on the academic achievement and/or social behavior of students with disabilities. A growing body of literature clearly indicates that there is a functional relationship between the frequency of student participation and their academic achievement (Heward, 1994).

Finally, notetaking strategies, variables associated with notetaking, and guided notes were reviewed with emphasis on its impact on academic achievement and social behaviors among students with behavioral disabilities. Research has demonstrated a clear improvement in academic achievement when guided notes are used as compared to student taking their own notes (Gardner et al., 1994).
CHAPTER III

METHOD

Chapter three describes the subjects, setting, procedures and experimental design used in this study. The independent and dependent variables along with their respective measurement are discussed in detail.

Subjects

The targeted students consisted of five ninth graders in a self-contained classroom for adolescents with severe behavior handicaps. Prior to participation in this study, parent or guardian consent was obtained for each student in the class. Letters to parents of all students in the class were sent out by the experimenter explaining the study and requesting their consent for their child to participate (see Appendix A). Parents were asked to return the signed consent form to the school. A phone call was made to parents and a verbal consent obtained for each student who did not return a signed consent form.

The five target students, three boys and two girls, were selected based upon the criterion of attendance (i.e., present for more than 80% of the class days prior to the initiation of the study). All five students were attending the SBH school because of a primary educational disability.
related to emotional and or behavioral difficulties. Each of
these students attended this school for their entire
academic day. All five target students were required to
follow the school's ninth grade curriculum despite the fact
four out of five of these students had intelligence test
scores in the moderate to mild mentally handicapped range of
the Wechsler Intelligence Scale for Children-III, Revised.
The fifth student was administered the Stanford--Binet and
scored at the normal range of intelligence. Table 1 has
information the subjects' age, sex, overall intelligence
performance, and assigned grade at the school where the
study took place.

Setting

This study was conducted in a high school exclusively
for students with severe behavior handicaps. The subjects
received all their academic instruction in the classroom.
The students went to other classrooms for physical
education, art, and home economics. The subject matter
analyzed in this study was general science and the
information instructed corresponded with the school
district's curriculum for secondary students. The duration
of each lesson was approximately 25 minutes with a range of
20 to 35 minutes. The lessons were conducted during their
second period class convening at 10:00 A.M. to approximately
10:25 A.M. The classroom is square measuring approximately
610 cm by 610 cm. One wall of
Table 1

**Student Information**

<table>
<thead>
<tr>
<th>Student</th>
<th>Sex</th>
<th>Age yr./mo.</th>
<th>WISC-R III</th>
<th>Stanford Binet</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>15-6</td>
<td>f=65</td>
<td>---</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>15-0</td>
<td>f=78</td>
<td>---</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>15-1</td>
<td>f=63</td>
<td>---</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>16-3</td>
<td>f=86</td>
<td>---</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>15-4</td>
<td>---</td>
<td>c=105</td>
<td>9</td>
</tr>
</tbody>
</table>

**Notes.**

a = Students 1 through 4 were given Wechsler Intelligence Scale for Children-Revised. Report score for each student is the full range (f). b = Student 5 was given the Stanford-Binet. Reported score is the composite (c).
the classroom had windows extending from approximately 61 cm from the floor to the ceiling (Figure 1). The opposite wall was used for storing the students' belongings while at school. There is also an exit/entrance door to the room located on this wall. The other two walls were equipped with a screen, chalk board, and bulletin boards. Furniture in the room included book shelves, student desks, the teacher's desk, file cabinet, a book case, and an overhead projector for whole class presentations. The students' desks were arranged in such a manner that each student had an unobstructed view of the screen during the lessons.

Experimenter

The experimenter was a third-year doctoral student majoring in special education and applied behavior analysis with an emphasis in the study of students with severe behavior handicaps. The experimenter had a master's of science degree in experimental psychology and a service credential in guidance counseling. The experimenter had four years of public school experience, and four years of residential psychiatric treatment supervisory experience. The experimenter was currently completing requirements for teacher certification in the area of severe behavior handicaps.

Classroom Teacher

The teacher had a Bachelors degree in special education with a specialty degree to educate students with severe
Figure 1. Diagram of the classroom where the science lessons were taught.
behavior handicaps. The teacher had 2 1/2 years teaching experience with SBH high school students. The teacher has experience using the overhead projector to present lessons and key information during lecture presentation, but did not have previous experience with using guided notes.

**Dependent Variables: Definition and Measurement**

Dependent measures were taken during this study on students' quiz performance, bi-weekly review tests, off-task behaviors and disruptive behaviors.

**Daily Quiz Scores**

All quizzes consisted of 11 fill-in-the-blank items requiring students to write one to three-word answers and one true or false question. Quizzes for each lesson were administered on the same day that the lesson was taught. For the first two conditions of the study, the lessons occurred during early morning and quizzes were administered in the afternoon during the first period after the lunch break, between 12:30 P.M. and 1:00 P.M. During the last two conditions of the study, the lessons occurred during early morning and quizzes occurred after a 10 min. study period and water break. This change in the time of the quizzes was necessary because students were performing so poorly on the quizzes and students refused to take the quiz after returning from lunch. The quizzes were 11 point fill-in-the-blank questions and one point true or false question that covered the important information presented during that
day's lesson. The experimenter graded quizzes daily. Quizzes were scored using an answer key that contained all the correct responses for each quiz item. Items were scored as correct when a student's response matched the response for that item on the answer key. Also, responses were recorded correct if the experimenter identified the appropriate match even if it is was poorly written or misspelled. An example of a daily quiz can be found in Appendix B. A sample quiz key can be found in Appendix C.

**Bi-weekly Review Tests**

These bi-weekly review tests were administered at the end of 11, 8, and 8 consecutive lessons. On days before the bi-weekly review tests were administered, the students were given the opportunity to take their notes home for review and study. On the day of the bi-weekly review test, students were given 15 minutes to review their notes prior to taking the test. The bi-weekly review tests consisted of 40 point fill-in-the-blank and true or false problems, randomly selected from the previous 11, 8, or 8 lessons conducted. An example of a bi-weekly review test can be found in Appendix D. A sample bi-weekly review test key can be found in Appendix E.

**Social Behavior**

Two types of social behavior relevant to learning were recorded for all subjects during each lesson. The occurrence of off-task and disruptive behavior was measured using a
partial interval time sampling recording procedure. An example of off-task was having one’s head on a desk or staring out of a window. A non-example was a student turning around towards another student who was called upon to answer a question. An example of disruption was passing notes during the lecture (even though the teacher was instructed to ignore minor disruptions, observers recorded minor disruptions according to the definition). A non example of disruption was a student helping another student with their notes. One target student was observed during each interval (on a rotating basis) throughout the duration of the lesson. The experimenter was the primary observer. The second observer was a second year doctoral student in the Applied Behavior Analysis Program. A tape player was used to cue the observer when to observe each student and when to record data on the observation form (see Appendix F). The cues were recorded commands to "observe Student 1" followed by a recorded command 10 seconds later to "record the data for Student 1." The tape player was equipped with an earphone that allowed only the experimenter and second observer to hear the taped cues.

**Off-task.** Off-task was defined as one or more of the following: out of seat during in-seat work time, eyes directed away from work or teacher, head rested on desk, or working on projects not part of lesson taught. The duration of each observation interval was 10
seconds during which any occurrence of the behavior was recorded as off-task for that interval. At the end of each observation interval, the observer(s) was cued to record the behavior on the rating form found in Appendix F. The observer had 5 seconds to record the data prior to being cued to observe the next target student. At the end of the lesson, the observer counted the number of intervals in which the off-task behavior occurred and divided it by the total number of intervals in which the student was observed. The resulting quotient, multiplied by 100 yielded a percentage of time each student was off-task during the lesson.

Disruption. Disruption was defined as one or more of the following: engaging in conversation with others during teacher directed instruction, provoking others (i.e., laughing at, making faces at, or touching others), making sounds with voice, objects or actions (i.e., pounding desk, non specific auditory responses voicing disapproval, tapping, or wondering around the class. A rating form similar to the one found in Appendix F was used to measure the off-task and disruptive behaviors of the target students. Each student was observed individually for 10 second intervals during which any occurrence of the behavior was recorded as disruptive for that interval. This
dependent measure and the off-task dependent measure was observed at the same time. At the end of each interval, the observer had five seconds to record the behavior on the rating form found in Appendix F. At the end of the lesson, the observer counted the number of intervals in which the disruptive behavior occurred and divided it by the total number of intervals in which the student was observed. The resulting quotient, multiplied by 100 yielded a percentage of time each student was disruptive during the lesson.

**Accuracy of Permanent Product Data**

The experimenter used an answer key to grade each quiz (Appendix C) and bi-weekly review test (Appendix E). The number of correct responses to the 12 items by each student quiz was recorded on a data sheet for each student in the class (see Appendix G). A second observer received an answer key to grade each student’s daily quizzes. Bi-weekly review tests consisted of 40 point fill-in the-blank randomly selected questions from the quizzes given after 11, 18, or 8 lessons were taught. The second observer was also given an answer key to grade each of the bi-weekly review tests. For quizzes and bi-weekly review tests in which there was less than 100% agreement between the two scorers, the experimenter and second observer met to review the disputed item(s) and resolve the disagreement using the answer key.
**Interobserver Agreement Data**

For the social behavior dependent measures, a tape player was used to cue the experimenter and secondary observer when to observe each student and when to record each student. Each observer had an ear phone (plugged into the same tape recorder) enabling the observers to simultaneously hear the taped cues while ensuring that the students and teacher did not hear the tape cues. The pre-programmed tape announced to the observers to "Observe Student One.......record........observe Student Two.....and so on". Inter-observer agreement assessments were taken on the total intervals each student was observed. Inter-observer agreement assessments were taken for at least 25% of the total lessons for each condition of the independent variable. IOA was calculated for each student using the following formula:

\[
\frac{\text{Agreements}}{\text{Agreements} + \text{Disagreements}} \times 100
\]

**Procedural Reliability**

**Baseline and Reversal Phases**

The teacher was supplied with a script to use during each lesson throughout the study (Appendix H). The second observer was supplied with a sequential checklist of the procedures the teacher followed during each lesson and during the administration of the quizzes and bi-weekly
review tests. The second observer observed the procedures the teacher followed during the lessons and recorded observations on a checklist (see Appendix I).

Procedural reliability was conducted using a checklist form measuring the occurrence of correctly followed procedures. The reliability observer marked a "plus" (+) if the procedure occurred and a "minus" (-) if the procedure did not occur. Appendix I is an example of the checklist form used by the second observer for procedural reliability assessments. These assessments were taken for at least 25% of the total lessons for each condition of the independent variable. IOA was calculated for procedural integrity using the below formula:

\[
\frac{\text{Procedural steps followed correctly (+'s)}}{\text{Procedural steps followed correctly (+'s)}} + \frac{\text{Procedural steps followed incorrectly (-'s)}}{\text{Procedural steps followed correctly (+'s)}} \times 100
\]

**Experimental Phases**

The teacher followed the same procedures during the experimental phases with the exception of handing out guided notes during the guided notes condition. Procedural reliability was rated and calculated as in the baseline and reversal conditions described above.

**Subject Matter and Curriculum Design**

The subject matter for all instructional sessions in this study was ninth grade general science. The lessons were printed on transparencies that were used on an overhead
projector for whole class instruction. A sample set of transparencies can be found in Appendix J. The transparencies consisted of all lecture information used for the lesson and a list of key terms and concepts for that lesson. The curriculum resource of science instruction was extracted from chapters 23 through 27 of General Science (Watkins, Emiliani, Chiaverina, Harper, and LaHart, 1989).

Materials

Parental Consent Form

Parental consent granting the student permission to participate in the study was requested for each subject. A consent form was signed by, or phone authorization was secured from a parent or guardian for each student in the classroom (see Appendix A).

Textbook

The textbook used in this study was General Science (Watson et al., 1989). All lessons used in this study were developed from chapters 23 through 27 of this text.

Lecture Notes

Each lesson included a script for the teacher to use when presenting the lesson. Each lesson was developed by the experimenter with input from the science teacher. An example of a script is found in Appendix K.

Instructional Transparencies

Each lesson included 15 concepts or main ideas of the lesson. Each of the 15 concepts was presented on the
transparencies. An example of transparency for a lesson can be found in Appendix J.

**Overhead Projector**

An overhead projector was set up in the front of the class each day for science instruction. The overhead projector was used to display the science lessons typed written (18 point font) on transparencies.

**Screen**

A white screen was set up in front of the chalk board allowing all students to have an unobstructed view of the screen.

**Notebooks**

A three ring notebook was provided for each student. All notes taken during science lesson for the duration of this study were placed in each student’s notebook.

**Daily Quizzes**

A 12-point quiz was prepared by the experimenter for each lesson. Each question on the quiz required a written recall response by the student. Appendix B is an example of a daily quiz and Appendix C is a sample key to go along with the lesson found in Appendix B.

**Bi-weekly Review Tests**

A 40 point bi-weekly test was prepared by the experimenter. Items on the bi-weekly review tests were selected randomly from the daily quizzes given during the previous 11, 8, and 8 lessons. Each item on the bi-weekly
review tests required students to recall information from the lessons taught during the previous lessons in the two week period just prior to the test (see Appendix D).

**Answer Keys**

Answer keys to the daily quizzes (see Appendix C) and bi-weekly review tests (see Appendix E) were developed by the experimenter at the time the quizzes were made. Three copies of the answer keys were printed: one for the teacher, one for the experimenter, and one for the observer conducting accuracy checks.

**Guided Notes**

Guided notes were formatted with key words that were important terms used in the day’s lesson presented first. The key words were followed by the guided notes. The guided notes were divided into three sections: Introduction (review of most important points of most recently taught lesson), instruction (presentation of new information), and review of that day’s lesson in question and answer format. Each student was provided with a pencil (if needed) to be used for taking notes during the lesson. Appendix L is an example of the guided notes for the lesson found in Appendix J.

**Own Notes**

Each student was provided with lined paper and a pencil to be used to take notes during the baseline conditions.
Data Collection Sheets

A form for recording the amount of time off-task and disruptive behavior was used by the observers during the duration of each lesson. Appendix F is an example of the observation form used.

Tape Recording Equipment

A small table top tape recorder was used to cue the experimenter when to observe and when to record the observed behavior for each student. A two earphone jack attached to earphones with 5' cords were used to prevent students from hearing the cued tape while allowing both the first and second observer to hear the same cues.

Experimental Design

A single subject ABAB reversal design (Cooper, Heron, & Heward, 1987) was used to analyze the effects of own notes and guided notes on the dependent variables.

General Procedures

A practice session was conducted before the initial baseline session. A science lesson not part of the study was used for this practice lesson. During this sessions, the teacher was trained to use the experimental procedures (e.g., how to use systematic disclosure and what steps to follow during science lessons). Students were also instructed that class notes should include all important information from the lectures. The experimenter and the second observer used the in the practice sessions as a
training opportunity to collect inter-observer reliability data.

The teacher was trained to use the experimental procedures before the practice session. During the practice lessons, a third observer recorded the teacher behavior using the procedural reliability form. Students were told that each lesson had important information that was printed in bold face and/or underlined. The students were instructed to included such information in their notes. The students were given examples of good notes and poor notes. They were praised for accurate recording of information or given corrective feedback on incorrect notes.

This research was conducted during whole class science instruction. Prior to the students entering the class, the teacher or the experimenter would set up the overhead projector and screen. At the beginning of each session (except for Session 1), the teacher passed out the graded quizzes from the last session. The teacher praised the students for their effort and performance on the quiz. The teacher collected the graded quizzes prior to beginning the lesson for that day. The teacher had the instructional transparencies prepared, and stacked in the order of their presentation during the lesson. The transparencies were placed next to the overhead projector (Appendix J). Each student was supplied with a notebook. During baseline conditions, the notebook contained lined notebook paper and
during guided notes conditions, the guided notes were handed out before the lesson and placed by each student in their notebook immediately after the lesson. The teacher passed out the students' notebooks and pencils prior to the lesson and collected them at the end of each lesson.

The teacher introduced each lesson by saying, "Today we will be learning about _____. Class, remember to try and include all the important information in your notes." The teacher began the scripted lesson by placing the first transparency on the overhead projector. The teacher used a progressive disclosure to gradually reveal the information to the students. The teacher placed the transparency on the overhead with a sheet of white paper covering all the information except for the paragraph being presented. Once the information was presented, the teacher recovered the information and asked questions about the information just presented. For example, the teacher asked, "Name the largest planet in our solar system." The teacher called on a student to answer the question. If the student responded correctly, the teacher gave out specific praise (e.g., good, the answer is ____). If the student responded incorrectly, the teacher praised the effort and gave another student the opportunity to answer the question. If the second student did not know the answer, the teacher allowed another student the opportunity to provide the answer. The teacher only supplied the answer and after every student with a hand
raised had the opportunity to answer the question. The teacher answered questions or reviewed and clarified key points as requested by students throughout the lesson.

At the end of each lesson, the teacher asked a series of review questions covering the key points of the lesson. The students were allowed to use their notes to help them remember the answers to the questions. The teacher called upon a student to respond to the question. If the student answered incorrectly, the teacher provided corrective feedback (e.g., nice try, close—not exactly, that is incorrect) and called upon another student. If the student who was called upon answered correctly, the teacher gave contingent praise to that student. The teacher attempted to give every student the opportunity to answer a question during review. At the end of the review, the teacher instructed the students to place their notes in their notebooks. The teacher collected each student’s notebook and placed them on the classroom shelf. The students had the opportunity to review and study their notes during any free time throughout the school day.

During the first two experimental phases, the teacher distributed the notebooks for a 10 minute review after the lunch period and just prior to the daily quiz. During the last two phases, the teacher distributed the notebooks for a 10 minute review after a brief water break and just prior to the daily quiz. The teacher collected the notebooks and then
distributed a quiz to each student face down. The students were instructed not to turn over or begin responding to the quiz until the teacher stated, "You may begin". The teacher read each quiz item orally to account for the different reading levels in the class. At the conclusion of the quiz, the teacher collected the papers. Daily quizzes had 11 point recall (fill in the blank) items and one true or false item. Appendix H is an example of the script used by the teacher to conduct lessons and administer quizzes during each phase of the study.

Bi-weekly review tests consisted of 40 point recall items. Items on the tests were randomly selected from the daily quizzes taken during the previous 11, 8 or 8 lessons. The same procedures used for daily quizzes were followed for bi-weekly review tests. The students were allowed to take home notes prior to the bi-weekly review tests at which time they were allowed to keep their notes permanently.

**Own Notes Condition (Baseline and reversal condition)**

During the own notes sessions, the general procedures were followed. Students were provided with notebooks containing lined paper. Students were provided with a pencil if they did not have a pencil or pen. The teacher instructed the students to take out lined paper from the notebooks to take notes on the information provided in the lesson. The students took out the lined paper and a pencil or pen from
their respective notebooks. When all students were ready, the teacher began the lesson.

Guided Notes Condition (Intervention)

During guided notes sessions, the general procedures were followed. The notes were prepared and duplicated and were available prior to the beginning of the session. Prior to instruction, students were handed the guided notes required for that lesson. The students' notebooks were also handed out. The teacher instructed the students to take notes, using the guided notes, on the information provided in the lesson. The students took out a pencil or pen from their respective notebooks. When all students were ready, the teacher began the lesson. At the end of the lesson, the students were instructed to place their notes in their notebooks. The teacher then collected their notebooks and placed them on the classroom bookshelf.

Testing Conditions

The students' notebooks, with both their own and guided notes, were kept in the classroom. Students were given the same access to their notebooks to study during daily free time activity and during a 10 minute period prior to the quiz. These study times were monitored by the teacher. The additional time for study was provided since the students were not allowed to take their notebooks home. (This minimized the chance of the notebooks getting lost or left at home). For bi-weekly review tests, students were given
the opportunity to take their notes home for review the day before the test was administered. Students were also given time to review their notes for fifteen minutes prior to the tests.

**Consumer Satisfaction**

At the completion of the study, the teacher and the students were interviewed by a researcher who did not participate in the data collection. The interview questions were open-ended questions focusing on note taking preference for the teacher and students. Questions related to guided notes and note taking competencies were also included. The interview asking the questions wrote down the responses for the students. The interviewer then read back the response and asked the students if that was correct. The interviewer followed the same procedures for the teacher. Appendix M is an example of the interview questionnaire to be used with the students and Appendix N is an example of the interview questionnaire to be used with the teacher.
CHAPTER IV

RESULTS

This chapter presents results of the study. Procedural reliability, accuracy measure, and interobserver reliability data are presented. Individual student data are presented for daily quiz scores, bi-weekly review tests, disruptive behavior, off-task behavior, and consumer satisfaction.

Procedural Reliability

A procedural reliability checklist was completed by a third observer for at least 25% of the sessions during each phase of the intervention. Procedural reliability was conducted in eight of the 27 session of the study. During the first session procedural reliability was conducted, reliability was calculated to be 86%. Procedural reliability for all subsequent sessions during both baseline phases and guided notes phases was calculated to be 100%.

Notetaking reliability was conducted for each phase of the study. The first observer, using a key, reviewed all the notes taken by each student and recorded the number of completed concepts written. A second observer, also using a key, independently review and recorded all the notes taken by each student. Notetaking reliability was calculated to be 100%.
Accuracy Measures

Daily Quizzes

All students' quizzes were checked by a fourth observer for each quiz score obtained. Disagreements occurred in two quizzes out of the 99 quizzes graded. All disagreements were resolved by the two observers simultaneously reviewing each disagreement by comparing the student's response to the answer key. The total interobserver agreement on daily quiz scores for each student was 100%.

Bi-weekly Review Tests

All students' bi-weekly review tests were checked by a fourth observer for each test score obtained. One disagreement occurred in the 16 tests graded. This disagreement was resolved by the two observers simultaneously reviewing each disagreement by comparing the student's response to the answer key. The total interobserver agreement on bi-weekly review test scores for each student was 100%.

Disruptive Behavior

Table 2 displays the average percentage of interobserver agreement on number of intervals disruptive behavior was observed for each student by experimental phase. Each day interobserver agreement checks were conducted, the total amount of intervals observed for each student was used to calculate the percent agreement for that particular student. All students were checked by the second
observer 29% of the total sessions. The total interobserver agreement checks for Baseline-1 was three. The total interobserver agreement checks for Baseline-2 was one. The total interobserver agreement checks for Guided Notes-1 was two and for Guided Notes-2 was one. Interobserver observation checks were taken for at least 25% of the lessons taught during each phase of the intervention.

**Off-task Behaviors**

Table 2 displays the average percentage of interobserver agreement on the number of intervals off-task behavior was observed for each student by experimental phase. Each day interobserver agreement checks were conducted, the total amount of intervals observed for each student was used to calculate the percent agreement for that particular student. All students were checked by the second observer 29% of the total sessions. The total interobserver agreement checks for Baseline-1 was three. The total interobserver agreement checks for Baseline-2 was one. The total interobserver agreement checks for Guided Notes-1 was two and for Guided Notes-2 was one. Interobserver observation checks were taken for at least 25% of the lessons taught during each phase of the intervention.

**Daily Quiz Scores**

This section presents the quiz scores of each target student. The average score for both baseline and guided notes conditions are presented next. Finally, the number of
Table 2

**Percentage of Interobserver Agreement on Disruptive and Off-task Behaviors by Experimental Phase**

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline-1 (3)</th>
<th>Guided Notes-2 (3)</th>
<th>Baseline-2 (1)</th>
<th>Guided Notes-2 (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>94</td>
<td>94</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>92</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**Notes.** Numbers in parentheses indicate the number of lessons Interobserver agreement measures were taken.
lessons each student was present during each condition, the average combined baseline scores, and the average combined guided notes scores for each student and group are provided. 

**Student 1**

Figure 2 shows Student 1’s performance on daily 12-item quizzes for both experimental conditions of the study. Student 1 was present for 15 lessons during baseline conditions and nine lessons during guided notes conditions.

**Baseline conditions.** During the Baseline-1 phase in which students were instructed to take their own notes, Student 1 answered an average of 1.4 items correctly out of a possible 12 points, with a range of 0.0-4.0 correct items. During the Baseline-2 phase, Student 1’s average quiz score was 0.8 with a range of 0.0-3.0. Student 1’s mean quiz score for the combined baseline phases was 1.1 correct items with a range of 0.0 to 4.0. Student 1’s quiz score performance decreased from the first baseline phase to the second. The range of scores earned, however, remained relatively the same.

**Guided notes conditions.** During the Guided Notes-1 phase, Student 1 earned an average score of 3.0 out of a possible 12 points, with a range of 2.0-5.0 items correct. During the Guided Notes-2 phase, Student 1’s average quiz score was 5.0 with a range of 0.0-8.0. Student 1’s mean quiz score for the combined guided notes phases was 4.0 correctly answered items with a range of 0.0 to 8.0. Student 1’s quiz
Figure 2. Daily quiz score for Student 1. Each quiz was worth 12 points. Breaks in data paths within phases represents student absences.
score performance increased during the second guided notes condition as compared to the first. The variability remained the same for both guided notes conditions. Student 1’s average quiz score for combined guided notes phases was greater than her average quiz score for combined baseline phases.

Student 2

Figure 3 shows Student 2’s performance on daily 12-item quizzes for both experimental conditions of this study. Student 2 was present for 11 lessons during baseline conditions and 10 lessons during guided notes conditions.

**Baseline conditions.** During the Baseline-1 phase of the study, in which students were instructed to take their own notes, Student 2 answered an average of 2.3 items correctly out of a possible 12 points, with a range of 0.0–5.0 correct items. During the Baseline-2 phase, Student 2’s average quiz score was 1.7 with a range of 0.0–3.0. Student 2’s mean quiz score for the combined baseline phases was 2.0 correctly answered items with a range of 0.0 to 5.0. Student 2’s quiz score performance decrease during the second baseline phase as compared to the first baseline phase. There was less variability, however, during Baseline-2 phase as compared to Baseline-1 phase.

**Guided notes conditions.** During the Guided Notes-1 phase, Student 2 earned an average score of 1.8 out of a possible 12 points, with a range of 0.0–4.0 items correct.
Figure 3. Daily quiz score for Student 2. Each quiz was worth 12 points. Breaks in data paths within phases represent student absences.
During the Guided Notes-2 phase, Student 2’s average quiz score was 3.3 with a range of 1.0-7.0. Student 2’s mean quiz score for the combined guided notes phases was 2.6 correctly answered items with a range of 0.0 to 7.0. Student 2 showed a small increase in quiz performance during the second guided notes phase. Student 2’s quiz scores demonstrated greater variability during the second guided notes phases. Student 2’s average quiz score for combined guided notes phases was greater than her average quiz score for combined baseline phases.

**Student 3**

Figure 4 shows Student 3’s performance on daily 12-item quizzes for both experimental conditions of the independent variable. Student 3 was present for 12 lessons during baseline conditions and 11 lessons during guided notes conditions.

**Baseline conditions.** During the Baseline-1 phase of the study in which students were instructed to take notes on the important information from the transparencies, Student 3 answered an average of 1.5 items correctly out of a possible 12 points, with a range of 0.0-3.0 correct items. During the Baseline-2 phase, Student 3’s average quiz score was 1.3 with a range of 0.0-2.0. Student 3’s mean quiz score for the combined baseline phases was 1.4 correctly answered items with a range of 0.0 to 3.0. Student 3’s quiz performance demonstrated a small decrease during the second baseline
Daily Quiz Score for Student 3

Figure 4. Daily quiz score for Student 3. Each quiz was worth 12 points. Breaks in data paths within phases represents student absences.
phase as compared to the first baseline phase. Student 3’s quiz scores were more variable in the first baseline phase.

**Guided Notes conditions.** During the Guided Notes-1 phase, Student 3 earned an average score of 1.1 out of a possible 12 points, with a range of 0.0–1.0 items correct. During the Guided Notes-2 phase, Student 3’s average quiz score was 0.7 with a range of 0–2.0. Student 3’s mean quiz score for the combined guided notes phases was 0.9 correctly answered items with a range of 0.0 to 3.0. Student 3’s quiz performance decrease during the second guided notes phase as compared to the first. The variability remained roughly the same. Student 3’s average quiz score for combined guided notes phases was less than his average quiz score for combined baseline phases.

**Student 4**

Figure 5 shows Student 4’s performance on daily 12-item quizzes for both experimental conditions of this study. Student 4 was present for eight lessons during baseline conditions and seven lessons during guided notes conditions.

**Baseline conditions.** During the Baseline-1 phase of the study in which students were instructed to take notes on the important information from the transparencies, Student 4 answered an average of 1.8 items correctly out of a possible 12 points, with a range of 0.0–7.0 correct items. During the Baseline-2 phase, Student 4’s average quiz score was 2.3 with a range of 1.0–3.0. Student 4’s mean quiz score for the
Figure 5. Daily quiz score for Student 4. Each quiz was worth 12 points. Breaks in data paths within phases represents student absences.
combined baseline phases was 2.1 correctly answered items with a range of 0.0 to 7.0. Student 3’s quiz performance improved slightly during the second baseline phase. There was also less variability during the second baseline phase.

**Guided notes conditions.** During the Guided Notes-1 phase, Student 4 earned an average score of 4.0 out of a possible 12 points, with a range of 3.0-6.0 items correct. During the Guided Notes-2 phase, Student 4’s average quiz score was 2.5 with a range of 1.0-3.0. Student 4’s mean quiz score for the combined guided notes phases was 2.1 correctly answered items with a range of 1.0 to 6.0. Student 4’s quiz performance decreased during the second guided notes phase as compared to the first guided notes phase. The variability, however, was less during the second guided notes phase. Student 4’s average quiz score for combined guided notes phases was greater than his average quiz score for combined baseline phases.

**Student 5**

Figure 6 shows Student 5’s performance on daily 12-item quizzes for both experimental conditions of the independent variable. Student 5 was present for 11 lessons during baseline conditions and six lessons during guided notes conditions.

**Baseline conditions.** During the Baseline-1 phase of the study, in which students were instructed to take their own notes, Student 5 answered an average of 5.0 items correctly
Daily Quiz Score for Student 5

Figure 6. Daily quiz score for Student 5. Each quiz was worth 12 points. Breaks in data paths within phases represents student absences.
out of a possible 12 points, with a range of 0-10.0 correct items. During the Baseline-2 phase, Student 5’s average quiz score was 2.5 with a range of 0.0-5.0. Student 5’s mean quiz score for the combined baseline phases was 3.8 correctly answered items with a range of 0.0-10.0. Student 5’s quiz score performance decreased during the second baseline phase as compared to the first. The variability also decreased during the second baseline phase.

**Guided Notes conditions.** During the Guided Notes-1 phase, Student 5 earned an average score of 3.0 out of a possible 12 points, with a range of 0.0-8.0 items correct. During the Guided Notes-2 phase, Student 5’s average quiz score was 6.5 with a range of 1.0-12.0. Student 5’s mean quiz score for the combined guided notes phases was 4.8 correctly answered items with a range of 0.0-12.0. Student 5’s quiz score performance increased during the second guided notes phase as compared to the first. The variability in quiz score performance, however, also increased in the second guided notes phase as compared to the first. Student 5’s average quiz score for combined guided notes phases was greater than his average quiz score for combined baseline phases.

**Group**

Table 3 displays the average quiz score for each student by condition. The group average quiz score for each
phase of the study is presented below. Also presented is the average score of combined baseline and guided notes conditions.

**Baseline conditions.** During the Baseline-1 phase of the study, in which students were instructed to take their own notes, the group average quiz score was 2.4 items correct out of a possible 12 items. During the Baseline-2 phase, the group average quiz score was 1.7. The group average quiz score for the combined baseline phases was 2.1 correctly answered items. The group’s average quiz score performance decreased during the second baseline phase as compared to the first.

**Guided notes conditions.** During the Guided Notes-1 phase of the study, in which students were instructed to take their own notes, the group average quiz score was 2.6 items correct out of a possible 12 items. During the Guided Notes-2 phase, the group average quiz score was 3.6. The group average quiz score for the combined guided notes phases was 3.1 correctly answered items. The group’s average quiz score performance increased during the second guided notes phase as compared to the first. The average quiz score for the group was greater during combined guided notes phases as compared to combined baseline phases.
Table 3

Average Quiz Score for Each Student by Condition

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline 1</th>
<th>Guided Notes 1</th>
<th>Baseline 2</th>
<th>Guided Notes 2</th>
<th>Combined Baseline</th>
<th>Combined Guided Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.4 (11)</td>
<td>3.0 (5)</td>
<td>0.8 (4)</td>
<td>5.0 (4)</td>
<td>1.1</td>
<td>4.0</td>
</tr>
<tr>
<td>2</td>
<td>2.3 (8)</td>
<td>1.8 (6)</td>
<td>1.7 (3)</td>
<td>3.3 (4)</td>
<td>2.0</td>
<td>2.6</td>
</tr>
<tr>
<td>3</td>
<td>1.5 (8)</td>
<td>1.1 (8)</td>
<td>1.3 (4)</td>
<td>0.7 (3)</td>
<td>1.4</td>
<td>0.9</td>
</tr>
<tr>
<td>4</td>
<td>1.8 (5)</td>
<td>4.0 (5)</td>
<td>2.3 (3)</td>
<td>2.5 (2)</td>
<td>2.1</td>
<td>3.3</td>
</tr>
<tr>
<td>5</td>
<td>5.0 (9)</td>
<td>3.0 (4)</td>
<td>2.5 (2)</td>
<td>6.5 (2)</td>
<td>3.8</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Average 2.4 2.6 1.7 3.6 2.1 3.1

Note. Number in parentheses indicate the number of quizzes taken by each student.
Bi-weekly Review Exam Scores

This section presents the bi-weekly review test scores of each target student. The first exam was made up of 40 items covered by the Baseline-1 condition. The second exam was made up of 40 items covered by the Guided Notes-1 condition. The third exam was made up of 40 items; 20 items were from the Baseline-2 condition and 20 items from the Guided Notes-2 condition. The number of lessons each student was present during each condition, the average score for both baseline and guided notes conditions are also presented. The average score for all items instructed during baseline conditions, and the average for all items instructed during guided notes conditions are provided. Finally, the group average scores for each condition is presented.

Student 1

Table 4 displays Student 1's performance on bi-weekly 40-item review tests for both experimental conditions of this study. Student 1 was present for 11 out of 11 lessons during Baseline-1 conditions covered by the first exam. Student 1 was present for five out of eight lessons during Guided Notes-2 condition covered by the second exam. Student 1 was present for four out of four lessons during Baseline-2 and four out of four lessons during Guided Notes-2 covered by the third exam.
## Table 4

**Number of Correctly Answered Items on Bi-weekly Review Tests**

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline 1 (I=40)</th>
<th>Guided Notes 1 (I=40)</th>
<th>Baseline 2 (I=20)</th>
<th>Guided Notes 2 (I=20)</th>
<th>Combined Baseline</th>
<th>Combined Guided Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.0</td>
<td>4.0</td>
<td>1.0</td>
<td>4.0</td>
<td>3.0 (5)</td>
<td>8.0 (13)</td>
</tr>
<tr>
<td>2</td>
<td>---</td>
<td>1.0</td>
<td>1.0</td>
<td>0.0</td>
<td>1.0 (6)</td>
<td>1.0 (2)</td>
</tr>
<tr>
<td>3</td>
<td>2.0</td>
<td>---</td>
<td>2.0</td>
<td>0.0</td>
<td>4.0 (8)</td>
<td>0.0 (0)</td>
</tr>
<tr>
<td>4</td>
<td>2.0</td>
<td>---</td>
<td>5.0</td>
<td>6.0</td>
<td>7.0 (4)</td>
<td>6.0 (30)</td>
</tr>
<tr>
<td>5</td>
<td>1.0</td>
<td>---</td>
<td>5.0</td>
<td>6.0</td>
<td>6.0 (12)</td>
<td>6.0 (30)</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>1.8</strong></td>
<td><strong>2.5</strong></td>
<td><strong>2.8</strong></td>
<td><strong>3.2</strong></td>
<td><strong>4.2 (07)</strong></td>
<td><strong>2.9 (16)</strong></td>
</tr>
</tbody>
</table>

**Note:** I = The number of items on bi-weekly review test. Number in parentheses indicate percent correct.
Baseline conditions. During the first exam covering information from Baseline-1, Student 1 answered two items correctly out of a possible 40 items. During the third exam, Student 1 answered one item correctly out of a possible 20 items instructed during Baseline-2 condition. Student 1's combined score for all items instructed during baseline conditions was three items correct out of a possible 60 items. When Student 1 recorded her own notes from lecture presentations, her percentage of correct items was five percent.

Guided Notes conditions. During the second exam covering information from Guided Notes-1, Student 1 answered four items correctly out of a possible 40 items. During the third exam, Student 1 answered four items correctly out of a possible 20 items instructed during Guided Notes-2 condition. Student 1's combined score for all items instructed during guided notes conditions was eight items correct out of a possible 60 items. When Student 1 used guided notes during lecture presentations, her percentage of correct items was 13%. Student 1’s percent correct on bi-weekly review tests was greater for the combined guided notes phases than for the combined baseline phases.

Student 2

Table 4 shows Student 2’s performance on bi-weekly 40 point review tests for both experimental conditions of the independent variable. Student 2 was present for eight of the
11 lessons taught during the Baseline-1 phase covered by the first exam. Student 2 was present for six of the eight lessons taught during the Guided Notes-1 phase covered by the second exam. Student 2 was present for three out of four lessons during Baseline-2 and four out of four lessons during Guided Notes-2 covered by the third exam.

**Baseline conditions.** During the first exam covering information from Baseline-1, Student 2 was absent and did not make up the exam. During the third exam, Student 2 answered one item correctly out of a possible 20 items instructed on during Baseline-2. Student 2's combined score for all items instructed during baseline conditions was one item correct out of a possible 20 items. When Student 2 recorded her own notes from lecture presentations, her percentage of correct items was five percent.

**Guided Notes conditions.** During the second exam covering information from Guided Notes-2, Student 2 answered one item correctly out of a possible 40 items. During the third exam, Student 2 answered zero items correctly out of a possible 20 items instructed during the Guided Notes-2 condition. Student 2's combined score for all items instructed during guided notes conditions was one item correct out of a possible 60 items. When Student 2 used guided notes during lecture presentations, her percentage of correct items was two percent. Student 2's percent correct
on bi-weekly review tests was less for the combined guided notes phases than for the combined baseline phases.

**Student 3**

Table 4 shows Student 3’s performance on bi-weekly 40 point review tests for both experimental conditions of the independent variable. Student 3 was present for eight of the 11 lessons taught during the Baseline-1 phase covered by the first exam. Student 3 was present for five of the eight lessons taught during the Guided Notes-1 phase covered by the second exam. Student 3 was present for four out of four lessons during Baseline-2 and three out of four lessons during Guided Notes-2 covered by the third exam.

**Baseline conditions.** During the first exam covering information from Baseline-1, Student 3 answered two items correctly out of 40 items. During the third exam, Student 3 answered two items correctly out of a possible 20 items instructed during Baseline-2. Student 3’s combined score for all items instructed during baseline conditions was four items correct out of a possible 60 items. When Student 3 recorded his own notes from lecture presentations, his percentage of correct items was seven percent.

**Guided notes conditions.** During the second exam covering information from Guided Notes-2, Student was absent and did not make up the exam. During the third exam, Student 3 answered zero items correctly out of a possible 20 items instructed during Guided Notes-2 condition. Student 3’s
combined score for all items instructed during guided notes conditions was zero items correct out of a possible 20 items. When Student 3 used guided notes during lecture presentations, his percentage of correct items was zero percent. Student 3's percent correct on bi-weekly review tests was less for the combined guided notes phases than for the combined baseline phases.

**Student 4**

Table 4 shows Student 4’s performance on bi-weekly 40 point review tests for both experimental conditions of the independent variable. Student 4 was present for five of the 11 lessons taught during the Baseline-1 phase covered by the first exam. Student 4 was present for five of the eight lessons taught during the Guided Notes-1 phase covered by the second exam. Student 4 was present for three out of four lessons during Baseline-2 and two out of four lessons during Guided Notes-2 covered by the third exam.

**Baseline conditions.** During the first exam covering information from Baseline-1, Student 4 answered two items correctly out of 40 items. During the third exam, Student 4 answered five items correctly out of a possible 20 items instructed during Baseline-2 condition. Student 4's combined score for all items instructed during baseline conditions was seven items correct out of a possible 60 items. When Student 4 recorded his own notes from lecture presentations, his percentage of correct items was 12%. 
Guided Notes conditions. During the second exam covering information from Guided Notes-2, Student 4 was absent and did not make up the exam. During the third exam, Student 4 answered six items correctly out of a possible 20 items instructed during Guided Notes-2 condition. Student 4’s combined score for both guided notes conditions was six items correct out of a possible 20 items. When Student 4 used guided notes during lecture presentations, his percentage of correct items was 30%. Student 4’s percent correct on bi-weekly review tests was greater for the combined guided notes phases than for the combined baseline phases.

Student 5

Table 4 shows Student 5’s performance on bi-weekly 40 point review tests for both experimental conditions of the independent variable. Student 5 was present for nine of the 11 lessons taught during the Baseline-1 phase covered by the first exam. Student 5 was present for four of the eight lessons taught during the Guided Notes-1 phase covered by the second exam. Student 5 was present for two out of four lessons during Baseline-2 and two out of four lessons during Guided Notes-2 covered by the third exam.

Baseline conditions. During the first exam covering information from Baseline-1, Student 5 answered one item correctly out of 40 items. During the third exam, Student 5 answered five items correctly out of a possible 20 items
instructed during Baseline-2 condition. Student 5’s combined score for all items instructed during baseline conditions was six items correct out of a possible 60 items. When Student 2 recorded his own notes from lecture presentations, his percentage of correct items was 10%.

**Guided notes conditions.** During the second exam covering information from Guided Notes-2, Student 5 was absent and did not make up the exam. During the third exam, Student 5 answered six items correctly out of a possible 20 items instructed on during the Guided Notes-2 exam. Student 5’s combined score for all items instructed during guided notes conditions was six items correct out of a possible 20 items. When Student 5 used guided notes during lecture presentations, his percentage of correct items was 30%. Student 5’s percent correct on bi-weekly review tests was greater for the combined guided notes phases than for the combined baseline phases.

**Group**

Table 4 shows the group average performance on bi-weekly 40 point review tests for both experimental conditions of the independent variable.

**Baseline conditions.** During the first exam covering information from Baseline-1, the five subjects answered seven items correctly out of 160 items. Student 2 was not present for the bi-weekly review test. During the third exam, the group answered 14 items correctly out of a
possible 100 items instructed during Baseline-2 condition. The group’s combined score for both baseline phases was 21 items correct out of a possible 260 items. When the group recorded their own notes from lecture presentations, their percentage of correct items was seven percent.

Guided Notes conditions. During the second exam covering information from Guided Notes-2, the group answered five items correctly out of 80 possible items. Students 3, 4, and 5 were not present for the bi-weekly review test. During the third exam, the group answered 16 items correctly out of a possible 100 items. The group’s combined score for all items instructed during guided notes phases was 21 items correct out of a possible 180 items. When the group used guided notes during lecture presentations, their percentage of correct items was 16%. The group’s average percent correct on bi-weekly review tests was greater for the combined guided notes phases than for the combined baseline phases.

Disruptive Behavior

This section presents the percentage of intervals each student was observed to be disruptive. The average percentage score for both baseline and guided notes conditions are presented next. Finally, the average combined baseline and guided notes percentage scores for each student and the group as a whole is also provided.
**Student 1**

Figure 7 shows Student 1's average percentage of time engaging in disruptive behavior for both experimental conditions of the independent variable. Student 1 was present for 15 lessons during baseline conditions and nine lessons during guided notes conditions.

**Baseline conditions.** During the first phase of the study, students were instructed to take notes on the important information from the transparencies. Student 1's mean percentage of disruptive behaviors was 10% of the observed intervals, with a range of 0-100%, during instruction. During the Baseline-2 phase, Student 1's mean percentage of disruptive behaviors was seven percent of the time, with a range of 0-14%, during instruction. When Student 1 engaged in notetaking activities to teacher led instruction using her own notes, Student 1's mean percentage of disruptive behaviors was 13% of the observed intervals. Student 1 was less disruptive during the second baseline phase as compared to the first. There was also less variability of disruptive behavior during the second baseline phase.

**Guided notes conditions.** During the initial guided notes conditions, Student 1 engaged in disruptive behaviors a mean percentage of four percent of the observed intervals, with a range of 0-9%, during instruction. During the Guided Notes-2 phase, Student 1 engaged in disruptive behaviors a
Figure 7. Percentage of observed 10-second intervals Student 1 was disruptive. Breaks in data paths within phases represent student absences.
mean percentage of four percent of the observed intervals, with a range of 0-8%, during instruction. During combined guided notes phases, Student 1's average percentage of disruptive behavior was five percent of observed intervals. Student 1's disruptive behavior remained the same from the first guided notes phase to the second. Student 1 was less disruptive, however, during combined guided notes phases as compared to combined baseline phases.

**Student 2**

Figure 8 shows Student 2's average percentage of time engaging in disruptive behavior for both experimental conditions of the independent variable. Student 2 was present for 11 lessons during baseline conditions and 10 lessons during guided notes conditions.

**Baseline conditions.** During the first phase of the study, students were instructed to take notes on the important information from the transparencies. Student 2's mean percentage of disruptive behaviors was 26% of the observed intervals, with a range of 0-100%, during instruction. During the Baseline-2 phase, Student 2's mean percentage of disruptive behaviors was 17% of the time, with a range of 7-29%, during instruction. When Student 2 engaged in notetaking activities to teacher led instruction using her own notes, Student 2's mean percentage of disruptive behaviors was 22% of the observed intervals. Student 2 was less disruptive during the second baseline phase as compared
Figure 8. Percentage of observed 10-second intervals Student 2 was disruptive. Breaks in data paths within phases represent student absences.
to the first. There was also less variability of disruptive behavior during the second baseline phase.

**Guided notes conditions.** During the initial guided notes conditions, Student 2 engaged in disruptive behaviors a mean percentage of one percent of the observed intervals, with a range of 0-3%, during instruction. During the Guided Notes-2 phase, Student 2 engaged in disruptive behaviors a mean percentage of two percent of the observed intervals, with a range of 0-8%, during instruction. During combined guided notes phases, Student 2’s average percentage of disruptive behavior was two percent of observed intervals. Student 2 was less disruptive during the second guided notes phase as compared to the first. There was essentially no variability of disruptive behavior during either guided notes phase. Student 2 was less disruptive, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used.

**Student 3**

Figure 9 shows Student 3’s average percentage of time engaging in disruptive behavior for both experimental conditions of the independent variable. Student 3 was present for 12 lessons during baseline conditions and 11 lessons during guided notes conditions.

**Baseline conditions.** During the first phase of the study, students were instructed to take notes on the important information from the transparencies. Student 3’s
Figure 9. Percentage of observed 10-second intervals Student 3 was disruptive. Breaks in data paths within phases represent student absences.
mean percentage of disruptive behaviors was three percent of the observed intervals, with a range of 0-11%, during instruction. During the Baseline-2 phase, Student 3’s mean percentage of disruptive behaviors was four percent of the time, with a range of 0-7%, during instruction. When Student 3 engaged in notetaking activities to teacher led instruction using his own notes, Student 3’s mean percentage of disruptive behaviors was four percent of the observed intervals. Student 3 was less disruptive during the first baseline phase as compared to the second. There was also little difference in variability of disruptive behavior across the baseline phases.

Guided notes conditions. During the initial guided notes conditions, Student 3 engaged in disruptive behaviors a mean percentage of zero percent of the observed intervals. During the Guided Notes-2 phase, Student 3 engaged in disruptive behaviors a mean percentage of two percent of the observed intervals, with a range of 0-7%, during instruction. During the combined guided notes phases, student 3’s average percentage of disruptive behavior was one percent of the observed intervals. Student 3 was less disruptive during the first guided notes phase as compared to the second. There was also little change in variability of disruptive behavior across the guided notes phases. Student 3 was less disruptive, on the average, during
sessions in which guided notes were used as compared to sessions in which the own notes were used.

Student 4

Figure 10 shows Student 4's average percentage of time engaging in disruptive behavior for both experimental conditions of the independent variable. Student 4 was present for eight lessons during baseline conditions and seven lessons during guided notes conditions.

Baseline conditions. During the first phase of the study, students were instructed to take notes on the important information from the transparencies. Student 4's mean percentage of disruptive behaviors was 34% of the observed intervals, with a range of 0-70%, during instruction. During the Baseline-2 phase, Student 4's mean percentage of disruptive behaviors was 35% of the time, with a range of 6-36%, during instruction. When Student 4 engaged in notetaking activities to teacher led instruction using his own notes, Student 4's mean percentage of disruptive behaviors was 35% of the observed intervals. Student 4 was less disruptive during the first baseline phase as compared to the second. There was also a little less variability of disruptive behavior during the second baseline phase as compared to the first.

Guided notes conditions. During the initial guided notes conditions, Student 4 engaged in disruptive behaviors a mean percentage of six percent of the observed intervals,
Figure 10. Percentage of observed 10-second intervals
Student 4 was disruptive. Breaks in data paths
within phases represent student absences.
with a range of 0-24%, during instruction. During the Guided Notes-2 phase, Student 4 engaged in disruptive behaviors a mean percentage of two percent of the observed intervals. During the combined guided notes phases, Student 4’s average percentage of disruptive behavior was three percent of the observed intervals. Student 4 was less disruptive during the second guided notes phase as compared to the first. There was, however, less variability of disruptive behavior during the first guided notes phase as compared to the first. Student 4 was less disruptive, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used. Student 4 was less disruptive during the second guided notes phase as compared to the first. There was also less variability of disruptive behavior during the second guided notes phase as compared to the first. Student 4 was less disruptive, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used.

Student 5

Figure 11 shows Student 5’s average percentage of time engaging in disruptive behavior for both experimental conditions of the independent variable. Student 5 was present for 11 lessons during baseline conditions and six lessons during guided notes conditions.

Baseline conditions. During the first phase of the study, students were instructed to take notes on the
Percentage of Observed Intervals Student 5 was Disruptive

Figure 11. Percentage of observed 10-second intervals
Student 5 was disruptive. Breaks in data paths
within phases represent student absences.
important information from the transparencies. Student 5’s mean percentage of disruptive behaviors was 25% of the observed intervals, with a range of 0-80%, during instruction. During the Baseline-2 phase, Student 5’s mean percentage of disruptive behaviors was 60% of the time, with a range of 50-70%, during instruction. When Student 5 engaged in notetaking activities to teacher led instruction using his own notes, Student 5’s mean percentage of disruptive behaviors was 43% of the observed intervals. Student 5 was less disruptive during the first baseline phase as compared to the second. Student 5 was less disruptive during the first baseline phase as compared to the second. There was, however, less variability of disruptive behavior during the second baseline phase.

Guided notes conditions. During the initial guided notes conditions, Student 5 engaged in disruptive behaviors a mean percentage of eight percent of the observed intervals, with a range of 0-33%, during instruction. During the Guided Notes-2 phase, Student 5 engaged in disruptive behaviors a mean percentage of four percent of the observed intervals, with a range of 0-7%, during instruction. During the combined guided notes phases, Student 5’s average percentage of disruptive behavior was six percent of the observed intervals. Student 5 was less disruptive during the second guided notes phase as compared to the first. There was, however, less variability of disruptive behavior during
the second guided notes phase as compared to the first. Student 5 was less disruptive, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used. Student 5 was less disruptive during the second guided notes phase as compared to the first. There was also less variability of disruptive behavior during the second guided notes phase. Student 5 was less disruptive, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used.

**Group**

Table 5 shows the average percentage of time students were disruptive by condition. The average combined baseline scores and the average combined guided notes scores for each student is also provided.

**Baseline conditions.** During the first phase of the study, students were instructed to take notes on the important information from the transparencies. The group's mean percentage of disruptive behaviors was 21% of the observed intervals. During the Baseline-2 phase, the group's mean percentage of disruptive behaviors was 25% of the observed intervals. When the five students engaged in notetaking activities to teacher led instruction using their own notes, the mean percentage of disruptive behaviors was 23% of the observed intervals. The group was less disruptive during the first baseline phase as compared to the second.
Table 5

Average Percentage of Time Students Were Disruptive by Condition

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline 1</th>
<th>Guided Notes 1</th>
<th>Baseline 2</th>
<th>Guided Notes 2</th>
<th>Combined Baseline</th>
<th>Combined Guided Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>26</td>
<td>1</td>
<td>17</td>
<td>2</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
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<td>6</td>
<td>35</td>
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<td>25</td>
<td>3</td>
<td>60</td>
<td>4</td>
<td>43</td>
<td>6</td>
</tr>
<tr>
<td>Average</td>
<td>21</td>
<td>4</td>
<td>25</td>
<td>2</td>
<td>23</td>
<td>3</td>
</tr>
</tbody>
</table>
Guided notes conditions. During the initial guided notes conditions, the group engaged in disruptive behaviors a mean percentage of four percent of the observed intervals. During the Guided Notes-2 phase, the group engaged in disruptive behaviors a mean percentage of two percent of the observed intervals. During the combined guided notes phases, the group’s average percentage of disruptive behavior was three percent of the observed intervals. The group was, on the average, less disruptive during the second guided notes phase as compared to the first. The group was less disruptive, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used.

Off-Task Behavior

This section presents the percentage of intervals each student was observed to be off-task. The average percentage score for both baseline and guided notes conditions are presented next. Finally, the average combined baseline and guided notes percentage scores for each student and the group as a whole is also provided.

Student 1

Figure 12 shows Student 1’s average percentage of time engaging in off-task behavior for both experimental conditions of the independent variable. Student 1 was present for 15 lessons out of 15 lessons taught during
Percentage of Observed Intervals Student 1 was Off-task

Figure 12. Percentage of observed 10-second intervals Student 1 was off-task. Breaks in data paths within phases represent student absences.
baseline conditions and nine out of 12 lessons taught during guided notes conditions.

**Baseline conditions.** In the first phase of the study in which students were instructed to take notes on the important information from the transparencies. Student 1's mean percentage of off-task behaviors was 57% of the observed intervals, with a range of 6-100 percent, during instruction. During the Baseline-2 phase, Student 1's mean percentage of off-task behaviors was 43% of the observed intervals, with a range of 7-72 percent, during instruction. Student 1's mean percentage of off-task was 50% of the observed intervals during baseline conditions. Student 1 was less off-task during the second baseline phase as compared to the first. There was little change in variability of disruptive behavior across the baseline phases.

**Guided notes conditions.** During the initial guided notes condition, Student 1's mean percentage of off-task behaviors was 31% of the observed intervals, with a range of 6-100 percent, during instruction. During the Guided Notes-2 phase, Student 1's mean percentage of off-task behaviors was 5 percent of the time, with a range of 0-12 percent, during instruction. During the combined guided notes phases, Student 1's mean percentage of off-task behavior was 18 percent of the observed intervals. Student 1 was less off-task during the second guided notes phase as compared to the first. There was also less variability of off-task behavior.
during the second guided notes phase. Student 1 was less off-task, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used.

**Student 2**

Figure 13 shows Student 2's average percentage of time engaging in off-task behavior for both experimental conditions of the independent variable. Student 2 was present for 11 lessons out of 15 lessons taught during baseline conditions and 10 out of 12 lessons taught during guided notes conditions.

**Baseline conditions.** In the first phase of the study in which students were instructed to take notes on the important information from the transparencies, Student 2's mean percentage of off-task behaviors was 60 percent of the observed intervals, with a range of 31-100 percent, during instruction. During the Baseline-2 phase, Student 2's mean percentage of off-task behaviors was 32 percent of the observed intervals, with a range of 7-57 percent, during instruction. Student 2's mean percentage of off-task was 46 percent of the observed intervals during baseline conditions. Student 2 was less off-task during the second baseline phase as compared to the first. There was also less variability of off-task behavior during the second baseline phase.
Figure 13. Percentage of observed 10-second intervals Student 2 was off-task. Breaks in data paths within phases represent student absences.
Guided notes conditions. During the initial guided notes condition, Student 2's mean percentage of off-task behaviors was 20 percent of the observed intervals, with a range of 0-92 percent, during instruction. During the Guided Notes-2 phase, Student 2's mean percentage of off-task behaviors was 6 percent of the time, with a range of 0-16 percent, during instruction. During the combined guided notes phases, Student 2's mean percentage of off-task behavior was 13 percent of the observed intervals. Student 2 was less off-task during the first guided notes phase as compared to the second. There was also less variability of off-task behavior during the first guided notes phase. Student 2 was less off-task, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used.

Student 3

Figure 14 shows Student 3's average percentage of time engaging in off-task behavior for both experimental conditions of the independent variable. Student 1 was present for 12 lessons out of 15 lessons taught during baseline conditions and 11 out of 12 lessons taught during guided notes conditions.

Baseline conditions. In the first phase of the study in which students were instructed to take notes on the important information from the transparencies. Student 3's mean percentage of off-task behaviors was 70 percent of the
Percentage of Observed Intervals: Student 3 was off-task.

Figure 14. Percentage of observed 10-second intervals
Student 3 was off-task. Breaks in data paths
within phases represent student absences.
observed intervals, with a range of 20-100 percent, during instruction. During the Baseline-2 phase, Student 3's mean percentage of off-task behaviors was 39 percent of the observed intervals, with a range of 19-66 percent, during instruction. Student 3's mean percentage of off-task was 55% of the observed intervals during baseline conditions. Student 3 was less off-task during the second baseline phase as compared to the first. There was also less variability of off-task behavior during the second guided notes phase.

Guided notes conditions. During the initial guided notes condition, Student 3's mean percentage of off-task behaviors was 26 percent of the observed intervals, with a range of 0-100 percent, during instruction. During the Guided Notes-2 phase, Student 3's mean percentage of off-task behaviors was 25 percent of the time, with a range of 0-62 percent, during instruction. During the combined guided notes phases, Student 3's mean percentage of off-task behavior was 26 percent of the observed intervals. Student 3 was less off-task during the second guided notes phase as compared to the first. There was also less variability of off-task behavior during the second guided notes phase. Student 3 was less off-task, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used.
Student 4

Figure 15 shows Student 4's average percentage of time engaging in off-task behavior for both experimental conditions of the independent variable. Student 4 was present for eight lessons out of 15 lessons taught during baseline conditions and seven out of 12 lessons taught during guided notes conditions.

**Baseline conditions.** In the first phase of the study in which students were instructed to take notes on the important information from the transparencies. Student 4's mean percentage of off-task behaviors was 78 percent of the observed intervals, with a range of 71-92 percent, during instruction. During the Baseline-2 phase, Student 4's mean percentage of off-task behaviors was 56 percent of the observed intervals, with a range of 31-79 percent, during instruction. Student 4's mean percentage of off-task was 67% of the observed intervals during baseline conditions. Student 4 was less off-task during the second baseline phase as compared to the first. There was little change in variability of off-task behavior during either baseline phase.

**Guided notes conditions.** During the initial guided notes condition, Student 4's mean percentage of off-task behaviors was 24 percent of the observed intervals, with a range of 0-75 percent, during instruction. During the Guided Notes-2 phase, Student 4's mean percentage of off-task
Percentage of Observed Intervals Student 4 was Off-task

Figure 15. Percentage of observed 10-second intervals Student 4 was off-task. Breaks in data paths within phases represent student absences.
behaviors was 0 percent of the observed intervals. During the combined guided notes phases, Student 4’s mean percentage of off-task behavior was 12 percent of the observed intervals. Student 4 was less off-task during the second guided notes phase as compared to the first. There was also less variability of off-task behavior during the second guided notes phase. Student 4 was less off-task, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used.

**Student 5**

Figure 16 shows Student 5’s average percentage of time engaged in off-task behavior for both experimental conditions of the independent variable. Student 5 was present for 11 lessons out of 15 lessons taught during Baseline conditions and six out of 12 lessons taught during guided notes conditions.

**Baseline conditions.** In the first phase of the study in which students were instructed to take notes on the important information from the transparencies. Student 5’s mean percentage of off-task behaviors was 54% of the observed intervals, with a range of 13-100%, during instruction. During the Baseline-2 phase, Student 5’s mean percentage of off-task behaviors was 72% of the observed intervals, with a range of 64-80%, during instruction. Student 5’s mean percentage of off-task was 63% of the observed intervals during baseline conditions. Student 5 was
Percentage of Observed Intervals Student 5 was Off-task

Figure 16. Percentage of observed 10-second intervals Student 5 was off-task. Breaks in data paths within phases represent student absences.
less off-task during the first baseline phase as compared to
the second. There was, however, less variability of off-task
behavior during the second guided notes phase.

Guided notes conditions. During the initial Guided
Notes condition, Student 5's mean percentage of off-task
behaviors was 44% of the observed intervals, with a range of
11-76%, during instruction. During the Guided Notes-2 phase,
Student 5's mean percentage of off-task behaviors was seven
percent of the observed intervals, with a range of 0-14%,
during instruction. During the combined Guided Notes phases,
Student 5's mean percentage of off-task behavior was 26% of
the observed intervals. Student 5 was less off-task during
the second guided notes phase as compared to the first.
There was also less variability of off-task behavior during
the second guided notes phase. Student 5 was less off-task,
on the average, during sessions in which guided notes were
used as compared to sessions in which the own notes were
used.

Group

Table 6 shows the average percentage of time students
were off-task by condition. The average combined baseline
scores and the average combined guided notes scores for each
student is also provided.

Baseline conditions. During the first phase of the
study, students were instructed to take notes on the
important information from the transparencies. The group's
Table 6

Average Percentage of Time Students Were Off-Task by

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline 1</th>
<th>Guided Notes 1</th>
<th>Baseline 2</th>
<th>Guided Notes 2</th>
<th>Combined Baseline</th>
<th>Combined Guided Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>5</td>
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<td>44</td>
<td>72</td>
<td>7</td>
<td>63</td>
<td>26</td>
</tr>
<tr>
<td>Average</td>
<td>64</td>
<td>29</td>
<td>48</td>
<td>5</td>
<td>56</td>
<td>17</td>
</tr>
</tbody>
</table>
mean percentage of off-task behaviors was 64 percent of the observed intervals. During the Baseline-2 phase, the group's mean percentage of disruptive behaviors was 48 percent of the observed intervals. When the five students engaged in notetaking activities to teacher led instruction using their own notes, the mean percentage of off-task behaviors was 56 percent of the observed intervals. The group was less off-task during the second baseline phase as compared to the first.

**Guided notes conditions.** During the initial guided notes conditions, the group engaged in off-task behaviors a mean of 29 percent of the observed intervals. During the Guided Notes-2 phase, the group engaged in off-task behaviors a mean percentage of two percent of the observed intervals. During the combined guided notes phases, the group's average percentage of disruptive behavior was three percent of the observed intervals. The Group was less off-task during the second guided notes phase as compared to the first. The group was less off-task, on the average, during sessions in which guided notes were used as compared to sessions in which the own notes were used.

**Consumer satisfaction**

**Student Preference**

Table 7 is a summary of the students' preferences when taken notes to whole class lecture instruction. All five target students were present on the final day of the study
Table 7

Student Preference for Notetaking

<table>
<thead>
<tr>
<th>Question</th>
<th>Student</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you feel you took better notes with your own notes or with handout notes?</td>
<td>O G G G G</td>
<td>1=O 4=G</td>
</tr>
<tr>
<td>On which days do you feel that you did better on quizzes?</td>
<td>G G G N G</td>
<td>5=G 1=N</td>
</tr>
<tr>
<td>Did your own notes or the handout notes helped you to better understand the lesson taught?</td>
<td>B G G G G</td>
<td>4=G B=1</td>
</tr>
<tr>
<td>Which did you prefer to use while learning science?</td>
<td>G G G G G</td>
<td>5=G</td>
</tr>
<tr>
<td>Would you like to use handout notes for your other subjects</td>
<td>Y Y Y Y Y</td>
<td>5=Y</td>
</tr>
<tr>
<td>Do you feel that you were more confident to take the quiz on the days you used your own notes or on the days you used the guided notes?</td>
<td>G G G G G</td>
<td>5=G</td>
</tr>
</tbody>
</table>

Notes. G = Guided notes, O = Own notes, B = Both guided and own notes, N = Neither guided nor own notes, Y = Yes.
and were interviewed by a second year doctoral student in a special education program and was not previously involved in data collection for the study.

Four out of the five students reported that they took better notes during conditions in which guided notes were used. Four out of the five students believed they performed better on daily quizzes when guided notes were used. Student 4 believed that he did not do any better in either condition. Four out of five students preferred to use guided notes when learning science. Student 1 preferred both her own notes as well as the guided notes. All five students reported that they would like to use guided notes in their other academic subjects. Finally, all five students reported that they felt more confident to take the daily quizzes on the days in which guided notes were used.

**Teacher Opinion**

The cooperating teacher who conducted the lessons for the duration of the study was interviewed by the same second year doctoral student who interview the students. The teacher reported that she believed students took better notes on days in which guided notes were employed. The teacher also reported that she believed students performed better on daily quizzes on days students reviewed their guided notes as opposed to on days students reviewed their own notes. Finally, the teacher reported that students
behaved much better during the guided notes phases as opposed to the baseline phases.

The teacher was asked if she would continue to use guided notes after the completion of the study. The teacher reported that she would definitely use guided notes the following year and use her summer planning time to develop guided notes in the other subjects she taught.
CHAPTER V
DISCUSSION

This research study was conducted to investigate the effects of guided notes on the academic and social behaviors of high school students with behavior disorders; specifically, to analyze the effects of guided notes during whole class science instruction on students' daily quizzes and review test and disruptive and off-task behaviors. Two experimental conditions were used in this study during whole class instruction; the students' own generated notes (Baseline 1 and 2), and guided notes. This chapter contains a discussion of the results obtained relative to the six research questions, limitations of the study, implications for the classroom, and directions for further research. Finally, a summary of this study concludes the chapter.

Research Question One

Will students answer more items correctly on daily science quizzes during Guided Notes or baseline conditions?

For four out of the five students, quiz scores improved slightly during the combined guided notes phases with an overall average increase of 2.3. All five students, however, still failed to achieve an average percentage that would be
considered passing (7 or greater on daily quizzes). The improved academic performance by all the students during guided notes conditions compared to baseline conditions failed to replicate the effects found in previous studies (Courson, 1989; Hamilton & Gardner, 1992; Kline, 1986). Though a small improvement was found in daily quiz score performance, the improvement did not result in a socially significant difference in the students' academic achievement.

Student 1's average quiz score for baseline conditions was 1.1 compared to 4.0 for guided notes conditions. Student 1 did not attempt any quiz items on eight out of 15 quizzes during the baseline conditions as opposed to only one out of nine quizzes during the guided notes conditions. Student 1's only passing quiz grade out of 24 quizzes taken was earned during the Guided Notes-2 phase.

Student 3 performed better on daily quizzes during the baseline conditions as opposed to the guided notes conditions. Student 3's combined baseline phases quiz scores average was 1.4. Student 3's combined guided notes phases quiz scores averaged was 0.9. Student 3 did not receive a passing grade in any of the 25 quizzes taken.

Student 5 obtained the highest average quiz score in both conditions. Student 5 performed slightly better on quizzes taken during the guided notes phases as opposed to the baseline phases, with an average increase of 1.0.
Student 5 earned passing grades on three quizzes during the baseline phases and only two quizzes during the guided notes phases. Student 5 earned one perfect score out of the 17 quizzes taken during the study. The perfect quiz performance occurred during the Guided Notes-2 phase.

Though the five students' mean scores were slightly better on daily quizzes during the guided notes conditions as compared to the baseline conditions, the extent of the improvement was not meaningful. There are a number of environmental factors that might account for this occurrence. First, taking notes on lectured material was not a requirement in any of their academic classes. Typically, the students were required to read and complete work sheets independently in order to earn their grades. Second, their homeroom teacher stated that the students wrote very little, if anything at all, in the classes he taught. Third, another factor that may account for poor quiz scores is motivation. The classroom did not have incentives for academic performance. Classroom contingencies and incentives all focused on social behaviors. Students gained access to classroom and school activities by demonstrating appropriate behavior regardless of their academic performance. Fourth, quizzes and exams were used rarely to measure academic performance in this classroom. Perhaps, taking a daily quiz was punitive to the students because it differed from the norm and required additional effort (i.e., studying notes,
reading the quiz, recalling information, writing) not required in their other classes. Finally, perhaps the subject matter was too difficult for some of the students. Four out of the five target student were assessed far below their grade placement on standardized intelligence scales. This was, however, the curriculum material assigned to the students in this classroom by the school district. It should be noted that while the students did very poorly on quizzes, they did actively participate in class discussions and had a high rate of accurate responses to teacher posed questions during lesson reviews. They failed to, however, demonstrate the ability to correctly respond to test/quiz items.

The results of this study do not replicate the powerful academic effects guided notes demonstrated in previous studies (e.g., Courson, 1989; Lazarus, 1993; Yang, 1988). Nor did this study replicate the socially significant effects of guided notes found in other studies. Specifically, the results found in Kline's 1986 study indicated that students' same day quiz scores in American history class improved from a D+ to A- as the result of using guided notes. The present study, while in the same direction of improved performance, failed to replicate these results.

In summary, guided notes slightly improved the mean quiz score of four out of the five target students. These results did not demonstrate the magnitude of academic
improvement found in previous studies including one by the experimenter in the preceding academic year.

**Research Question Two**

**Will students answer more items correctly from guided notes or baseline sessions on bi-weekly review tests?** For three out of the five students, bi-weekly review test scores improved slightly, though insignificantly, during the combined guided notes phases with an overall average increase of nine percent. The five students failed to achieve an average percentage that would be considered passing (60% or greater on bi-weekly review tests).

Student 1, 4, and 5 demonstrated a small improvement in bi-weekly review test scores during the guided notes phases as compared to the baseline phases. Student 2 and 3's review test scores were greater in the baseline phases than in the guided notes phases. The same variables related to the students' lack of improvement on daily quizzes could also have caused a poor performance on the bi-weekly review tests.

There are environmental variables that may have affected the students' performance on bi-weekly review tests. First, the five target students were not previously exposed in this classroom with this type of assessment procedure. One student stated that there was too many problems to even try to complete the exam. She then put her head down on the desk and refused to try any of the
questions. The second possible variable is related to the first--motivation. Students were not given incentives for performing well on quizzes or exams other than public praise for their performance. A third possible factor may be the review tests were punitive to students. Students were not required in this class, or in other classes, to review previously learned academic material for recall on review exams. One student questioned the utility of studying information he learned a week ago since he was already tested on it (referring to the daily quiz). Finally, the difficulty of the subject material may have also contributed to the lack of improvement in bi-weekly review test scores. As previously stated, four out of the five students were evaluated below their grade placement on standardized tests and therefore the material may have been unfairly difficult for them to perform well. When probed after the completion of the second exam on selected problems, however, students were able to give correct answers. Therefore, motivation may have been more of a confounding variable than the difficulty of the material. In light of these possible confounding variables, the results of this investigation as compared to studies conducted previously needs to be analyzed.

One study, in particular, examined the enduring effects of learning when guided notes are used. Lazarus (1993) examined the effects of guided notes with whole class review on the daily quiz and chapter review test performance. In
this study, students performed significantly better during conditions in which guided notes were used and the teacher engaged in a whole class review at the end of each lesson. The results from the present study, while in the direction of Lazarus (1993) study, failed to replicate these results. One possible factor for the discrepancy may be the whole class review component. In the present study, while the teacher did give a brief review in the form of questions, it may not have been extensive enough of a review to impact their academic performance.

In summary, guided notes did not improve the bi-weekly review test performance of three out of the five target students. This differs from the findings in the original guided notes study conducted by Bullara et al. (1993) among the same population of students and using the same lessons.

Research Question Three

During which condition, guided notes or own notes, will students be less disruptive during science instruction? For all five students, the overall average percentage of observed intervals student engaged in disruptive behaviors decline 20%, from 23% to 3%. Discussed below are two of the five students who showed particular improvement in decreased disruptive behavior during the guided notes conditions.

On the average, Student 4 engaged in disruptive behavior 35% of the observed intervals during the baseline conditions. During the guided notes conditions, Student 4's
mean percentage of disruptive behavior was 3%. Further, during the Guided Notes-2 condition, Student 4 was not disruptive during any of the observed intervals. This improvement is significant for Student 4 who tended to be placed in time-out (e.g., placed in school hallway supervised by behavior-aids) for disruptive behavior. Due to the decrease in his disruptive behavior, he was able to remain in the classroom more than ever and therefore had increased exposure to academic stimuli and social reinforcement.

Student 5, like Student 4, tended to be placed in time-out for disruptive behavior. On the average, Student 5 engage in disruptive behavior 43% of the observed intervals during the baseline conditions. During the guided notes conditions, Student 5 engaged, on the average, only six percent of the observed intervals. Similar to Student 4, Student 5 was less disruptive during the guided notes conditions than during the baseline conditions. This reduction in disruptive behavior has the same implications for Student 5 as it did for Student 4 in regards to increased exposure to academic stimuli. The reduction in disruptive behavior of these students and the whole class as a function of guided notes use has implication relevant to the educational process in the classroom.

Primarily, disruptive behavior interferes with the effective instruction of all students because it often leads
to the teacher stopping the lesson and addressing the
disruption. This, alone, can reduce instructional time,
especially when more than one student is disruptive.
Further, disruptive behavior often distracts students
otherwise engaged in the learning activity and thereby
interfering with their opportunity to learn. Finally,
disruptive behavior has the greatest implications for the
student who is disruptive. Students who are disruptive tend
to be sent out of class and lose much needed instructional
time. Further, students who are disruptive experience a
punitive learning environment and are more likely to avoid
or escape the situation (Bullara, 1994) leading to fewer
opportunities to learn. Finally, upon evaluating the
quantity of notes written by students across conditions,
students wrote more notes during guided notes conditions
indicating more active student responding during guided
notes conditions. This replicates other studies that suggest
that increased academic engagement positively affect the
social behavior students demonstrate in class (Bullara et
al., 1993; Gardner et al., 1992).

In summary, guided notes reduced the amount of
disruptive behaviors of all five target students. The
reduction in disruptive behavior is significant because
educators are interested in interventions that will make
classrooms safer. Across five students, the average
percentage of observed interval dropped from over 20% to
under five percent during whole class science instruction. These findings are consistent with previous studies (Bullara et al., 1993; Hamilton & Gardner, 1992).

There were differential effects due to the frequency of disruptive behavior of some of the students. For Students 1 through 3, the percentage of intervals in which disruptive behavior was generally less than 20%. The use of guided notes did not have a meaningful impact on their disruptive behavior as it did for Students 4 and 5.

Finally, one consideration of disruptive behavior not addressed in this study was the magnitude of the disruptive behavior when it occurred. To what degree this qualitative measure of disruption may have impacted the student's subsequent disruptive behaviors or impact the other students' disruptive behaviors was not investigated and remains unknown.

Research Question Four

During which condition, guided notes or own notes, will students have lower rates of off-task behaviors during instruction? Partial interval time sampling of off-task behavior was used as one measure of social behavior. For all five students, the overall average percentage of observed intervals student engaged in off-task behaviors decline 39%. Discussed below are four of the five students, two of which showed particular improvement in off-task behavior during
the guided notes conditions and two which showed the least improvement.

On the average, Student 4 engaged in off-task behavior 67% of the observed intervals during the baseline conditions. During the guided notes conditions, Student 4 engaged, on the average, only 12% of the observed intervals. This amounts to a reduction in off-task behavior of 55%.

Further, during the Guided Notes-2 condition, Student 4 was not off-task during any of the observed intervals. This improvement is meaningful for Student 4 who tended to leave the class because he did not want to participate; Student 4 was afforded more opportunities to participate and engage in learning activities. Staying in class, whether by one's own volition or because of less time outs exposes the student to needed academic stimuli.

Student 5, like Student 4, tended to leave the classroom during whole class instruction. On the average, Student 5 engaged in off-task behavior 63% of the observed intervals during the baseline conditions. During the guided notes conditions, Student 5 engaged in off-task behavior, on the average, only 26% of the intervals. This amounts to a reduction in time out of 37%. Similar to Student 4, Student 5 was less off-task during the guided notes conditions than during the baseline conditions. This reduction has implication for more opportunities for Student 5 to participate in learning activities because of fewer time-
outs. The reduction in off-task behavior of these students as well as the whole class has implication relevant to exposure to academic stimuli.

Student 1 was off-task for 50% of the observed intervals during the combined baseline conditions and 18% of the observed intervals during combined guided notes conditions. This amounts to a difference of 32%. During the Guided Notes-1 phase, Student 1 was off-task for the whole lesson on the 14th day of the study. Student 1 was asleep during the class period because of an increase in medication that caused her to be drowsy. For all other lessons during the Guided Notes-1 phase, Student 1 was off-task for no more than 25% of the observed intervals—in other words, Student 1 was on the average 50% more on-task during the guided notes phases as compared to the baseline phases.

Student 3 had the smallest amount of improvement in off-task behavior. Student 3 was off-task an average of 55% of the time during baseline conditions. Student 3 was off-task an average of 26% of the time during guided notes conditions. This amounts to a decrease in off-task by 29% during guided notes conditions. Student 3 was on medication that also made him drowsy. Student 3 often slept in class or drew on scratch paper during the lesson. During the guided notes phases, Student 3's drawing decreased, at times he still slept in class. Noteworthy, Student 3 was on-task 100% of the observed intervals for 4 of the 11 lessons conducted.
during guided notes phases. During the baseline phases, Student 3 was off-task no less than 19% of the observed intervals.

Primarily, off-task behavior interferes with students' learning (Stallings, 1980). Because students who fall behind more than 2 years academically drop out at a rate of four times that of the general school population (Mayer, Mitchell, Clementi, Clement-Robertson, Wyatt, & Bullara, 1993), being on-task and actively engaged in instructional activity is especially important. Further, off-task behavior often distracts students otherwise engaged in the learning activity when the teacher has to stop and redirect the off-task student.

In summary, guided notes significantly reduced the amount of off-task behaviors of all five target students. For all five students, the average percent of off-task behavior during instruction dropped from 56 to 17% for an overall decrease of off-task behavior of 39%. These findings are consistent with a previous study (Bullara et al., 1993).

Research Question Five

Do students prefer guided notes over their own notes during whole class instruction? All five students were present on the last day of the intervention and were interviewed regarding notetaking preference. All five target students reported they preferred guided notes over their own notes during whole class instruction. One student in the
class refused to participate in the lessons unless guided notes were used. This student stated that the lessons were too hard for him to take his own notes and refused to participate unless he was given "the handout notes". All five target students took better care of their guided notes then they did their own notes. Specifically, students often got angry in class during baseline conditions and ripped up their own notes and threw them in the trash. No guided notes were ripped up or thrown away during guided notes conditions.

Four out of the five students believed that they took better notes during the guided notes phases. Student 1 reported that she took better notes with her own notes. Student 1, however, did not take any notes on four out of the 15 lessons present for during the baseline phases. Student 3 did not take any notes on any session during Baseline-1. Student 4 did not take any notes in either baseline phases. All five students accurately completed their guided notes during the Guided Notes-2 phase of the study.

All five students reported they believed they did better on daily quizzes on days they used the guided notes. Interestingly, even though they did not perform better, they reported that they were better prepared to take the quizzes after studying the guided notes.
All five students were asked which notetaking condition helped them to better understand the lecture presented. Four out of the five reported the guided notes. Student 1 reported both her own notes and the guided notes.

All five students were asked which notes they prefer to use to help them learn science. All five students reported that they prefer guided notes over their own notes while learning science. A related question was asked regarding their other subjects. Once again, all five students reported they would like to use guided notes in their other classes. This response was interesting because they were not required to take notes in their other class. Perhaps the guided notes were important to students because it helped them in understanding the lesson being taught.

In summary, all five students like to take notes using guided notes over their own notes. Further, they believed they understood the lesson better, were more prepared for quizzes, and performed better on quizzes when they used guided notes. Finally, all students liked using guided notes during science instruction and, would like to use guided notes in their other class even though they are not required to take notes in those classes. The students' preference reported above is consistent with other studies reporting that students with behavioral disabilities prefer guided
notes over their own notes for whole class instruction (Bullara et al., 1993; Hamilton & Gardner, 1992; Lazarus, 1991, 1993; Pados, 1989).

Research Question Six

Do teachers prefer teaching lessons in which guided notes are used as compared to lessons in which students take their own notes? The teacher was asked six question concerning her preference for student notetaking while teaching science. The teacher reported that she definitely favored guided notes use over students taking their own notes. Each question posed to the teacher is analyzed below.

The teacher was asked during which conditions, baseline or guided notes, did she believe students took better notes. The teacher stated, "Definitely with the handout notes!" The teacher was then asked on what days did she believe students performed better on daily quizzes. Once again, the teacher stated, "Definitely the days they used guided notes!" The teacher was then asked on what days did she believe that the students behaved better. The teacher reported on the guided notes days. The teacher was asked her preference for student notetaking format while teaching science. The teacher reported that she definitely preferred the guided notes format the best. Finally, the teacher was asked if she planned to use guided notes in any other subject she instructed. Her response was, "Yes, all of them, I plan to make guided notes this summer for all the subjects I teach."
At the end of the interview, the teacher was asked if she had any comments regarding the study. She stated she believed students in her class, who usually do not perform well academically, did so when allowed to use guided notes and that even though the students did not perform well on the daily quizzes, they all enjoyed the lessons.

In summary, the teacher favored the use of guided notes over own notes and intended to continue to use guided notes for science instruction and other subjects. This reported satisfaction with guided notes use is consistent with other studies reporting that teacher of students with behavioral disabilities prefer guided notes over own notes during whole class instruction (Bullara et al., 1993; Lazarus, 1991, 1993; Hamilton & Gardner, 1992).

Limitations

This study was limited by various uncontrolled environmental factors. Though there is surely factors that may have acted on the study unbeknown to the experimenter, the following factors have limited the extent to which the outcomes of the study can be generalized to other students with behavioral disabilities. These factors are: student characteristics, teacher characteristics, difficulty of material, absences, the setting and time of school year, time of school day, and the school ecology.
**Student Characteristics**

One factor that limited this study was the characteristics of the students. Specifically, four out of the five target students were assessed far below their grade placement. At the onset of the study, this concern was presented to the teacher and the administrator, who both reported that they felt that the students would benefit from the lessons. Another characteristic of the students was that three of the five students were multiply diagnosed. These were students who had behavioral disabilities as well as schizophrenia, bi-polar affective disorder, or undersocialized developmental disabilities. To what extent these medical conditions affected the academic and social behaviors of the students in the class was not investigated and remains an unanswered question. As stated above, two students were actively on medication for part of their therapeutic treatment and this medication had some effect on active participation, academic achievement, and social behavior in the classroom.

**Teacher Characteristics**

The general science teacher who taught all the lessons was relatively new to teaching students with behavior disorders. The teacher did not previously use a whole class lecture style in teaching her classes and rarely gave examinations. Results may have been different with a teacher who was accustomed to teaching using whole class lecture
style or a teacher who had more experience working with this population of students.

**Difficulty of the Material**

The difficulty of the material may have affected the academic performance of the students as measured by both daily quizzes and bi-weekly review tests. The lessons were taken from their ninth grade science text with a readability of 6 to 8th grade. The difficulty of the subject matter may have also affected the amount of time students were disruptive or off-task.

**Absences**

Absences and tardiness were a common occurrence in this particular classroom. Because of interpersonal dynamics, the number of student present on any particular day of the study ranged from 3 students to 9 or 10. It was evident that the teacher spent more time redirecting students when more students were present regardless of the condition. Towards the end of the study, only the target students came to class and this may have unduly biased the Guided Notes-2 phases of the study in terms of improved social behavior.

**The Setting and Time of School Year**

The setting was a school for students with behavior disabilities. Results may be different for students with behavioral disabilities in mainstreamed settings.

When the study commenced, the students had just finished taking their ninth grade proficiency examinations.
Further, the last grading period had passed and it was the last ten week term of the school year. Because of the moderate weather, and nearing school end, perhaps absences were greater than if the study was conducted during the fall or winter of the school year. To what extent these factors influenced the outcomes achieved academically or socially is unknown.

**Time of School Day**

The class met right after their physical education period and right before their lunch break. Students often came in upset from what happened during P.E. and transitioning often took as much as 10 minutes before the teacher could start the lesson. Also, because P.E. was often taught outside of the building, some of the students often left for a cigarette smoke break and arrived late to class. Results may have been different if the class met at an earlier time or in the afternoon.

**Time of Quizzes**

The change in the time the quizzes were administered could have affected the behavior of students during the instruction. Results may have been different if the time the quizzes were administered were held constant.

**School Ecology**

Unlike most general education high schools, this one had certain rules that administrator believed would be therapeutic and educationally beneficial. One such rule was
self "time-outs". If a student believed they could not control their behavior in the classroom, they may ask for a self "time-out". This rule was ended when students asked for time outs for cigarette breaks or to avoid academic activities. To what extent this rule and the later removal had on the outcomes achieved in this study is unknown.

**Implications for the Classroom**

This study investigated the impact of guided notes on the academic and social behavior of students with behavioral disabilities. From the results, a number of implications can be made for the classroom. First, even though students were not allowed to take home their notes, it is assumed that students would be encouraged to take their notes home to study. Students who take good notes and review those notes are more academically successful (Lazarus, 1993; Fisher & Harris, 1973). It was also noted that students often failed to study prior to quizzes. Since note review was not part of their normal routine, the implications of this component of guided note use can not be answered.

All five students did not make meaningful improvement in quiz scores as a result of guided notes use. The difficulty of the material or the incentive plan for academic performance may be reviewed to assist students to be more successful.

The use of guided notes positively appeared to affect all students social behavior in terms of disruptive and off-
task behaviors. A number of points about the process of guided notes that might account for this phenomenon follows. One, the lessons were pre-made, prepared and organized before the students’ science class. This consistency may have positively affected students who might have experienced stress as the result of not knowing what is planned for a particular class. Also, because the lessons were scripted, the teacher was more likely to stay on task than if she lectured from memory. This, too, may help students stay on task. Finally, the decrease in disruptive and off-task behaviors as a result of guided notes use may make the classroom more safe and learning more positive for the students.

One variable that was not taken into consideration of implication for the classroom was the amount of paperwork daily quizzes have on teachers and what additional time demands would be required to continue daily assessments. Though feedback is essential for instruction, the teacher must weight the amount of time to compose assessments against the benefits of receiving feedback from those assessments.

Finally, the length of time it takes to develop guided notes was not a concern of the teacher since all lessons were developed for her. The initial time commitment, however, can save teacher time in the future if the lessons are developed on a word processor and saved for future
years. Though information will be changed, the teacher would be saved the time it takes to develop lessons from scratch.

**Direction for Follow-up Research**

This study failed to replicate the results in previous studies when guided notes were compared to students' own notes. Because of this, it is advisable to address the limitations and confounding variables listed above and redo this study.

If replication becomes successful, a number of extensions of this study is recommended. First, the effects on increasing socially desirable behaviors such as asking for help when, or helping a peer who lost his or her place has yet to be explored. Second, another avenue of research related to this study is the effects of guided notes on notetaking competencies. A third possible study can replicate the above study while taking additional measures on notetaking in other academic areas to see if there is a carry over effect of guided notes use on students' own notetaking practices; in other words, do students who are trained in guided notes use demonstrate better notetaking skills as a result of using guided notes?

Another area of research is guided notes use and the quantity and quality of notetaking during guided notes phases as compared to own notes phases. Rather, do guided notes assist students in taking more accurate notes during
guided notes conditions and later when guided notes are removed?

Finally, since notetaking competencies are necessary in most general education programs, perhaps a study could be undertaken to teach notetaking with the help of guided notes. More specifically, perhaps requiring students to take more notes, using a shaping procedure, can facilitate error free learning on how to take notes that will include information tested later on exams.

**Summary**

The purpose of this study was to examine the effects of guided notes use on academic achievement as measured by daily quizzes. The effects of guided notes and students' own generated notes were compared in a reversal design study. Five 9th grade students, three boys and two girls, participated in the study.

Academic achievement, as measured by the scores on daily quizzes, was the primary dependent variable in the study. Bi-weekly review tests were used to measure the enduring effects of achievement. Results from this study indicated that all five students performed slightly better on same day quizzes during the guided notes conditions. Three out of the five target students performed slightly better on bi-weekly review test during guided notes conditions. The obtained results, though not meaningful academically, were in the same direction of previous
research showing major improvement in quiz scores as the result of using guided notes.

The secondary dependent variable was social behavior, measured by the percentage of intervals students engaged in disruptive and off-task behaviors. Results from this study indicated that all five students were less off-task and disruptive during the guided notes conditions. This is extremely important because it provided the teacher with another tool with which to positively and unobtrusively impact social behavior, making the classroom safer and more conducive to learning.

Finally, both the teacher and the students liked the guided notes. Specifically, the students believed the guided notes helped them understand the lessons, study for quizzes, and perform better on quizzes. The teacher, too, believed the guided notes helped the students to understand the lesson and to take quizzes. Most importantly, the teacher felt the students improved academically and behaviorally when guided notes were used.

In summary, guided notes use increased the active responding of students during whole class science instruction, apparently guided notes positively affected their social behavior and were preferred by students and the teacher as the way to take notes during whole class science instruction.
REFERENCES


APPENDIX A

PARENT/GUARDIAN CONSENT
Parent/Guardian Consent Form for Participating in a Research Project on Instructional Strategies to Improve Students’ Academic Performance

I agree to allow my child to participate in a research study at Alum Crest High School. The study will investigate the effectiveness of instructional strategies as a means to measure the students’ note-taking skills, academic performance, and on-task behaviors. Mr. Daniel Thomas Bullara, a Doctoral Candidate, will conduct the research. Mr. Bullara will be supervised by Dr. Ralph Gardner, Assistant Professor of Special Education at The Ohio State University’s College of Education. Mr. Bullara will working with your son or daughter’s 9th grade teacher, Ms. Verkest. The instruction will begin on March 23, 1994 and conclude around June 10, 1994. Mr. Gerard Marcom, the school principal, has been extremely helpful and supportive of this research venture.

I understand that my child’s identity will be confidential throughout the study and during any later publications, recordings, videotaping, or research dealing with this procedure. Additionally, I understand that I may withdraw my consent for my child’s participation at any time. If there are any questions, comments, or concerns, I may contact Mr. Bullara or Dr. Gardner at (614) 292-8148 or at Alum Crest High School (614) 365-5010.

Name of Student __________________________ Date ____________

Signature of the Parent or Guardian __________________________ Date ____________

Ms. Susan Verkest, Teacher __________________________ Date ____________

Gerard Marcom, Principal __________________________ Date ____________

Daniel Thomas Bullara __________________________ Date 4/2/94

Dr. Ralph Gardner, III __________________________ Date 4/2/94
APPENDIX B

STUDENT QUIZ
Chapter 26 - PLANTS AND ANIMALS

26.2&3 - GYMNOSPERMS AND ANGIOSPERMS (part 1) - QUIZ

Name ___________________ Date ___________________

Directions: Fill in the blank with the correct answer. Spelling does not count against you, but please try your best.

(2) 1. Describe one characteristic of fruit and give an example?

________________________

(1) 2. _________ produce seeds in specialized structures call flowers.

(1) 3. Male cones are called _________ _________.

(1) 4. Angiosperm seeds are enclosed within a _________.

(1) 5. The seeds of angiosperms are produced differently from those of _________.

(1) 6. Instead of broad, flat leaves, most _________ have needle-shaped leaves that they keep throughout the year.

(1) 7. Plants that produce _________ are the most advanced in the plant kingdom.

(1) 8. _________ produce seeds in special structures called cones.

(1) 9. Female cones are called _________ cones.

(1) 10. Do Angiosperms include plants, such as roses, lilies, carnations, oak trees, corn plants grasses and berry bushes.

(YES OR NO)

(1) 11. Flowers are the _________ system of the plants.
APPENDIX C

QUIZ KEY
Chapter 26 - PLANTS AND ANIMALS

26.2&1 - GYMNOSPERMS AND ANGIOSPERMS (part 1) - QUIZ

Name __KEY_____________ Date ________________

Directions: Fill in the blank with the correct answer. Spelling does not count against you, but please try your best.

(2)
1. Describe one characteristic of fruit and give an example?
   ______SWEET - APPLE OR DRY ACORN__________

(1)
2. ___ANGIOSPERMS___ produce seeds in specialized structures called flowers.

(1)
3. Male cones are called ___POLLEN___ ___CONES____.

(1)
4. Angiosperm seeds are enclosed within a ___FLOWERS____.

(1)
5. The seeds of angiosperms are produced differently from those of ___GYMNOSPERMS____.

(1)
6. Instead of broad, flat leaves, most ___CONIFERS___ have needle-shaped leaves that they keep throughout the year.

(1)
7. Plants that produce ___SEEDS___ are the most advanced in the plant kingdom.

(1)
8. ___GYMNOSPERMS____ produce seeds in special structures called cones.

(1)
9. Female cones are called ___SEED____ cones.

(1)
10. Do Angiosperms include plants, such as roses, lilies, carnations, oak trees, corn plants grasses and berry bushes.
    YES

(1)
11. Flowers are the ___________ system of the plants.
    Reproductive
APPENDIX D

EXAMPLE OF BI-WEEKLY REVIEW TEST
SCIENCE REVIEW EXAM
LESSONS 23.1-24.3

NAME ______________________

DATE___________

Directions: Fill in the blank with the correct answer.
Spelling does not count against you, but please try your best.

(2) 1. Cell theory states that cells are the basic units of _________ and _________ in all living things.

(1) 2. Where do cells come from?

___________________________

(1) 3. An _________ microscope can magnify the cell 300,000 times or more.

(1) 4. ______ tissue is made up of long cells that are grouped in bundles.

(1) 5. The cells that make up ______ tissue are called neurons.

(1) 6. Muscles you cannot control are called?

___________________________

(1) 7. The nutrients from the food are used for various processes in the ________________.

(1) 8. One of the most important processes related to digestion is?________________________
(2) 9. Nutrients are used for _____, _____, and repair.

(2) 10. _____, growth, and _____ occur in living cells.

(1) 11. Nerve cells use this energy to transmit _____.

(1) 12. Growth, like reproduction, can occur only in living things. (True or False)

(1) 13. In cells, carbon dioxide and excess water are removed as _____.

(1) 14. What was the definition of breathing?

(1) 15. What is another term used for "Latin name"?

(1) 16. All living things are divided into five major categories called? _____.

(2) 17. Name two major categories of the classification system used today. _____

(1) 18. There are _____ kingdoms in the classification system.

(2) 19. We learned that things are ordered according to what?

_____ and _____

(2) 20. Kingdom Monera contains _____ organisms such as bacteria and blue-green bacteria.
(1) 21. The Protozoa are the _______ group of protists.
(1) 22. Give a reason why the body produces new cells
______________________

(1) 23. What regulates the activities in a cell?__________
(2) 24. If a cell were a factory, which part would be the supervisor and
why?_________________________________

(2) 25. ______ ______ is a method of cell division
in which the original cell splits into two cells.

(1) 26. The final stage of mitosis is ____________?
(1) 27. During metaphase, the _______ disappears
completely.

(1) 28. Where does mitosis take
place?______________

(2) 29. Sexual reproduction is the process by which two
gametes ______to produce ______ cell that
develops into a new individual.

(1) 30. Each egg cell or sperm cell contains only half the
number of __________ as the original cell.

(1) 31. ________ _________ begin with meiosis.

(1) 32. The purpose of meiosis is to produce gametes. (True
or False)
APPENDIX E

EXAMPLE OF BI-WEEKLY REVIEW TEST KEY
SCIENCE REVIEW EXAM
LESSONS 23.1-24.3

NAME __________________

DATE________

Directions: Fill in the blank with the correct answer. Spelling does not count against you, but please try your best.

(2) 1. Cell theory states that cells are the basic units of ___STRUCTURE___ and ___FUNCTION___ in all living things.

(1) 2. Where do cells come from? ___OTHER

CELLS___________.

(1) 3. An ___ELECTRON_____ microscope can magnify the cell 300,000 times or more.

(1) 4. ___MUSCLES___ tissue is made up of long cells that are grouped in bundles.

(1) 5. The cells that make up ___NERVOUS___ tissue are called neurons.

(1) 6. Muscles you cannot control are called? ___INVOLUNTARY____

(1) 7. The nutrients from the food are used for various processes in the ___CELL___.

8. One of the most important processes related to digestion is? _ABSORPTION_

9. Nutrients are used for _GROWTH_, _REPRODUCTION_ and repair.

10. _MOVEMENT_, growth, and _REPRODUCTION_ occur in living cells

11. Nerve cells use this energy to transmit _MESSAGES_.

12. Growth, like reproduction, can occur only in living things. TRUE

13. In cells, carbon dioxide and excess water are removed as ' _WASTE PRODUCTS_'.

14. What was the definition of breathing?

   **Breathing is the act of taking in oxygen and releasing carbon dioxide.**

15. What is another term used for "Latin name"? _SCIENTIFIC_NAME_

16. All living things are divided into five major categories called? _KINGDOM_.

17. Name two major categories of the classification system used today. _KINGDOM_, _PHYLUM_, _CLASS_, _ORDER_, _FAMILY_, _GENUS_, _SPECIES_

18. There are _5_ kingdoms in the classification system

19. We learned that things are ordered according to what? _SIMILARITIES AND DIFFERENCES_ / _CLASSIFICATION SYSTEM_
20. Kingdom Monera contains **SIMPLE** _**ONE-CELLED**_ organisms such as bacteria and blue-green bacteria.

21. The Protozoa are the **LARGEST** group of protists.

22. Give a reason why the body produces new cells: **REPAIR, REPLACE, DAMAGED OR WORN OUT CELLS**

23. What regulates the activities in a cell? **THE NUCLEUS**

24. If a cell were a factory, which part would be the supervisor and why? **THE NUCLEUS BECAUSE IT REGULATES THE ACTIVITIES OF THE CELL.**

25. **BINARY ** _**FISSION**_ is a method of cell division in which the original cell splits into two cells.

26. The final stage of mitosis is **TELOPHASE**?

27. During metaphase, the **ENVELOPE** disappears completely.

28. Where does mitosis take place? **BODY CELLS**

29. Sexual reproduction is the process by which two gametes _**FUSE**_ to produce _**ONE**_ cell that develops into a new individual.

30. Each egg cell or sperm cell contains only half the number of **CHROMOSOMES** as the original cell.

31. **HUMAN REPRODUCTION** begin with meiosis.

32. The purpose of meiosis is to produce gametes. **TRUE**
| No | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | E   |
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APPENDIX G

DATA SUMMARY SHEET
Date_________________Lesson number_________________

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<th>Name</th>
<th>Quiz score</th>
<th>Disrup (No.)</th>
<th>Disrup (%)</th>
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start time_________________

finish time_________________

length of session_____________

condition__________________

observers__________________

__________________________
APPENDIX H

DESCRIPTION OF TEACHER'S PROCEDURES
PROCEDURES FOR TEACHER TO FOLLOW DURING LESSONS
USED IN THE STUDY

Teacher Presentation Sequence: Baseline, Intervention, and reversal.
1. Set up and turn on overhead. Set up screen
2. Place first transparency on overhead showing only title and key terms and concepts.
3. Give students their notebooks and pencil or pen. (during intervention, place guided notes in notebooks before giving them to students)
4. Remind students, prior to starting the lesson:
   A. To take notes on the lesson presented on the overhead making sure to include the important information.
5. Ask questions off overhead.
   A. Respond to student initiated answers.
6. Use progressive disclosure technique.
7. Wait for a count of 3 (one one-thousand, two one-thousand, .......) before giving the class more information to take notes on.
8. At end of lesson, have students place notes in notebooks for review and studying during free time and prior to quiz.
Collect
9. At end of day, hand out students' notes and give students 5 to 10 minutes to review notes.
10. Collect notes and give out quiz
11. When students are completed with quiz, collect and place in quiz folder for grading

12. Praise students for effort

To ensure consistency in classroom management, please follow the below guidelines regarding classroom disruption. *(Note: this does not mean to let students do what ever they want, if children are really disruptive, handle using normal classroom management strategies)*

V. Class disruptions

A. Ignore minor disruptive behaviors during group hand-raising instruction such as:
   - standing out of seat, head on desk

   - engaging others during teacher directed instruction by talking to peers, provoking others (laughing at, making faces at, or touching others

   - making sounds with voice, objects or actions (i.e. pounding desk, non specific auditory responses voicing disapproval, tapping on desk w/ fingers or pencil, etc) that are not directed towards a specific other
APPENDIX I

PROCEDURAL RELIABILITY CHECKLIST
CHECKLIST OF PROCEDURES FOR TEACHER TO FOLLOW DURING LESSONS USED IN THE STUDY

For each numbered step below, rate the step with a plus (+) if the teacher demonstrated the behavior and a (-) if the behavior was not demonstrated.

Teacher Presentation Sequence: Baseline, Intervention, and reversal.

1. Set up and turn on overhead. Set up screen
2. Place first transparency on overhead showing only title and key terms and concepts.
3. Give students paper (if they do not have their own) and pencil or pen. (during intervention, give out guided notes)
4. Remind students, prior to starting the lesson:
   A. To take notes on the lesson presented on the overhead making sure to include the important information
5. Ask questions off overhead
   A. Respond to student initiated answers.
6. Use systematic disclosure technique.
7. Wait for a count of 3 (one one-thousand, two one-thousand, .......) before giving the class more information to take notes on.
8. At end of lesson, have students place notes in notebooks for review and studying during free time and prior to quiz. collect
9. At end of day, hand out students' notes and give students 5 to 10 minutes to review notes.

10. Collect notes and give out quiz

11. When students are completed with quiz, collect and place in quiz folder for grading.

12. Praise students for effort

To ensure consistency in classroom management, the teacher should follow the below guidelines regarding classroom disruption. *(Note: this does not mean that the teacher will let students do what ever they want, if children are really disruptive, handle using normal classroom management strategies). If there is an incident of engagement related to classroom disruption, please note the time, child, and a brief description of the event on the table below.

V. Class disruptions

A. Ignore minor disruptive behaviors during group hand-raising instruction such as:
- standing, out of seat, head on desk
- engaging others during teacher directed instruction by talking to peers, provoking others (laughing at, making faces at, or touching others
- making sounds with voice, objects or actions (i.e. Pounding desk, non specific auditory responses voicing disapproval, tapping on desk w/ fingers or pencil, etc)

that are not directed towards a specific other
<table>
<thead>
<tr>
<th>Time</th>
<th>Name</th>
<th>Description of event</th>
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Summary of checklist:

_______ Number of Pluses  _______ Number of Minuses

_______ %

________________________
Date    Lesson    Signature
APPENDIX J

EXAMPLE OF TRANSPARENCIES
Science: Plants are Important

KEY WORDS:

Beets

carrots  radishes
Peaches  tomatoes

cucumbers  starch
other plant products  seeds

asparagus  celery
potatoes  Cacao
peanuts  corn
wheat  Lima beans

other dry beans  cooking

oil  roots
leaves  stems

cabbage  spinach

lettuce  spices
Since this study will rely heavily on the use of the overhead projector all lessons will be scripted on transparencies.

I. Introduction

- Think of what the world would be like if there were no plants. Would you have food? Would you have clothing? Would you have a place to live?
- Of all living things, plants are the most important. In this lesson we will be studying why plants are so important. Also, you will find some ways plants or parts of plants are used.

II. Query

- Who can tell me a plant that is used for food?

- Who can tell me why plants are important to clothing?

Who can tell me how plants are used in buildings?
III. Instruction

- As you know, green plants make their own food. You learned that **carbon dioxide** and **water** are changed into **sugar** in the leaves.

- Usually more sugar is made than a plant can use. The **extra sugar** is changed into **starch** and other plant products. Starch is the stored food in the seeds. It may also be stored in the **roots, stems, and leaves**.

- Examples of **plants** that can be used for food that have **starch** stored--
  - in **seeds**: **peanuts**, corn, **wheat**, Lima beans, and other dry beans
  - in **roots**: beets, carrots, and radishes
  - in **stems**: asparagus, **celery**, and potatoes
  - in **leaves**: **cabbage**, **spinach** and lettuce
  - as **fruits**: Peaches, tomatoes, and cucumbers

Q. Carbon Dioxide is changed into what in the leaves

(sugar)
Q. What makes their own food?

(green plants)

Q. The extra sugar is changed into what in plants?

(starch or other plant products?)

- **Green plants** are used as food by many living things. Many of the foods you eat are parts of green plants. Humans also **eat** many different types of stems, roots, leaves, and seeds.

Q. Give an example of a root that can be eaten as a food?

(beets, carrots, and radishes - all appropriate)

Q. Give an example of a stem that can be eaten as a food?

(asparagus, celery, and potatoes - all appropriate)
Q. Give an example of a leaf that can be eaten as a food?

(cabbage, spinach and lettuce - all appropriate)

Sometimes you may not recognize a food as being part of a plant. Breakfast foods such as oatmeal and corn flakes are made from seeds. Flour is also made from seeds. These foods made from seeds are called grains. Grains are the seeds of certain grasses such as oats and corn. Wheat and rice are other examples of grains. Many different kinds of grains are used as food by people and animals.

Q. Oatmeal, corn flakes, and flour are made from?

(seeds)

Q. Foods made from seeds are called?

(grains)
Q. Are grains an important source of food for animals and people?

(Yes)

Do you drink cocoa, coke-a-cola, or hot chocolate? Cocoa, coke-a-cola, and chocolate are made from the seeds of the \textit{Cacao} (\textit{ke ka'o}) tree.

Q. Cocoa, coke-a-cola, and chocolate are made from the seeds of what tree?

(Cacao)

Coffee is also made from the \textit{seeds} of a certain kind of tree. That is why on the Juan Valdez commercials you see people hauling great big bags of coffee beans on the back of a mule. These beans (seeds) have just been picked off \textit{trees}. The leaves of still other kinds of trees are used to make tea.

Q. Coffee is made from the what of a certain kind of tree?

(seeds)
Seeds, as well as the fruits of some plants, contain oil. Some of those oils are used for cooking. Corn oil and olive oil are such an oil.

Q. Seeds, as well as the fruits of some plants, contain?

(oil)

Q. What are some of these vegetable oils used for?

(cooking)

- Do you use mustard? Mustard is a spice used to flavor foods. Cloves, nutmeg, pepper, and cinnamon are also spices.

Q. Mustard, cloves, nutmeg, pepper, and cinnamon are?

(spices)
APPENDIX K

EXAMPLE OF A SCRIPTED LESSON
Example of lesson using transparencies

Science: Plants are Important

KEY WORDS:
- grains, beets
- carrots, radishes
- Peaches, tomatoes
- cucumbers, starch
- other plant products, seeds
- asparagus, celery
- potatoes, Cacao
- peanuts, corn
- wheat, Lima beans
- other dry beans, cooking
- oil, roots
- leaves, stems
- cabbage, spinach
- lettuce, spices

Since this study will rely heavily on the use of the overhead projector all lessons will be scripted on transparencies.

1. Introduction
- Think of what the world would be like if there were no plants. Would you have food? Would you have clothing? Would you have a place to live?
- Of all living things, plants are the most important. In this lesson we will be studying why plants are so important. Also, you will find some ways plants or parts of plants are used.
II. Query

- Who can tell me a plant that is used for food?
  (Write the responses of five different students on the
  overhead or on the chalkboard).

- Who can tell me why plants are important to clothing?
  (Write the responses of three different students on the
  overhead or on the chalkboard).

- Who can tell me how plants are used in buildings?
  (Write the responses of three different students on the
  overhead or on the chalkboard).

III. Instruction

- As you know, green plants make their own food. You
  learned that carbon dioxide and water are changed into sugar
  in the leaves.

- Usually more sugar is made than a plant can use. The
  extra sugar is changed into starch and other plant
  products. Starch is the stored food in the seeds. It may
  also be stored in the roots, stems, and leaves.

- Examples of plants that can be used for food that
  have starch stored--

  in seeds: peanuts, corn, wheat, Lima beans, and other
  dry beans

  in roots: beets, carrots, and radishes

  in stems: asparagus, celery, and potatoes

  in leaves: cabbage, spinach and lettuce
as **fruits**: Peaches, tomatoes, and cucumbers

Q. Carbon Dioxide is changed into what in the leaves

  *(sugar)*

Q. What makes their own food?

  *(green plants)*

Q. The extra sugar is changed into what in plants?

  *(starch or other plant products?)*

> **Green plants** are used as food by many living things. Many of the foods you eat are parts of green plants. Humans also **eat** many different types of stems, roots, leaves, and seeds.

Q. Give an example of a root that can be eaten as a food?

  *(beets, carrots, and radishes - all appropriate)*

Q. Give an example of a stem that can be eaten as a food?

  *(asparagus, celery, and potatoes - all appropriate)*

Q. Give an example of a leaf that can be eaten as a food?

  *(cabbage, spinach and lettuce - all appropriate)*

Sometimes you may not recognize a food as being part of a plant. Breakfast foods such as **oatmeal** and **corn flakes** are made from **seeds**. **Flour** is also made from seeds. These
Foods made from seeds are called grains. Grains are the 
seeds of certain grasses such as oats and corn. Wheat and 
rice are other examples of grains. Many different kinds of 
grains are used as food by people and animals.

Q. Oatmeal, corn flakes, and flour are made from?
   (seeds)

Q. Foods made from seeds are called?
   (grains)

Q. Are grains an important source of food for animals and 
people?
   (Yes)

Do you drink cocoa, coke-a-cola, or hot chocolate?
Cocoa, coke-a-cola, and chocolate are made from the seeds of 
the Cacao (ke ka'o) tree.

Q. Cocoa, coke-a-cola, and chocolate are made from the 
seeds of what tree?
   (Cacao)

Coffee is also made from the seeds of a certain kind 
of tree. That is why on the Juan Valdez commercials you see 
people hauling great big bags of coffee beans on the back of 
a mule. These beans (seeds) have just been picked off 
trees. The leaves of still other kinds of trees are used to 
make tea.

Q. Coffee is made from the what of a certain kind of tree?
(seeds)

- Seeds, as well as the fruits of some plants, contain oil. Some of those oils are used for cooking. Corn oil and olive oil are such an oil.

Q. Seeds, as well as the fruits of some plants, contain?

(oil)

Q. What are some of these vegetable oils used for?

(cooking)

- Do you use mustard? Mustard is a spice used to flavor foods. Cloves, nutmeg, pepper, and cinnamon are also spices.

Q. Mustard, cloves, nutmeg, pepper, and cinnamon are?

(spices)
APPENDIX L
EXAMPLE OF GUIDED NOTES
Science: Plants are Important

**KEY WORDS:**
garbs beets
carrots radishes
Peaches

cucumbers
other plant products
asparagus
potatoes
peanuts

corn
wheat
other dry beans

cooking
oil
leaves

cabbage
lettuce

I. Introduction
- Of all living things, plants are the most important. In this lesson we will be studying why plants are so important. Also, you will find some ways plants or parts of plants are used.

II. Query
- Name a plant that is used for food?
- Tell why plants are important to clothing?
- How plants are used in buildings?
III. Instruction

- As you know, green plants make their own food. You learned that ____ ____ and ____ are changed into ____ in the leaves.
- Usually more sugar is made than a plant can use. The ____ ____ is changed into ____ and other plant products. Starch is the stored food in the seeds. It may also be stored in the ____, ____ , and ____.

- Examples of ____ that can be used for food that have ____ stored—
  in seeds: ____ , corn, ____ , Lima beans, and other dry beans
  in ____ : beets, carrots, and radishes
  in stems: asparagus, ____ , and potatoes
  in leaves: ____ , ____ and lettuce

as ____ : Peaches, tomatoes, and cucumbers

Q. Carbon Dioxide is changed into what in the leaves

_______

Q. What makes their own food?

_______

Q. The extra sugar is changed into what in plants?

_______

- ____ ____ are used as food by many living things.
  Many of the foods you eat are parts of green plants. Humans also ____ many different types of stems, roots, leaves, and seeds.
Q. Give an example of a root that can be eaten as a food?

Q. Give an example of a stem that can be eaten as a food?

Q. Give an example of a leaf that can be eaten as a food?

Q. Sometimes you may not recognize a food as being part of a plant. Breakfast foods such as _____ and ______ are made from ____. _____ is also made from seeds. These foods made from seeds are called grains. Grains are the seeds of certain grasses such as oats and corn. _____ and ___ are other examples of _____. Many different kinds of grains are used as food by people and animals.

Q. Oatmeal, corn flakes, and flour are made from?

Q. Foods made from seeds are called?

Q. Are grains an important source of food for animals and people?

- Do you drink cocoa, coke-a-cola, or hot chocolate?
Cocoa, coke-a-cola, and chocolate are made from the seeds of the ____ (ke ka‘o) tree.

Q. Cocoa, coke-a-cola, and chocolate are made from the seeds of what tree?
Coffee is also made from the ____ of a certain kind of tree. That is why on the Juan Valdez commercials you see people hauling great big bags of coffee beans on the back of a mule. These beans (seeds) have just been picked off _____. The leaves of still other kinds of trees are used to make tea.

Q. Coffee is made from the what of a certain kind of tree?

__________

_____, as well as the fruits of some plants, contain ____. Some of those oils are used for ______. Corn oil and olive oil are such an oil.

Q. Seeds, as well as the fruits of some plants, contain?

__________

Q. What are some of these vegetable oils used for?

__________

Do you use _____? Mustard is a ____ used to flavor foods. Cloves, nutmeg, pepper, and cinnamon are also spices.

Q. Mustard, cloves, nutmeg, pepper, and cinnamon are?

__________
APPENDIX M

STUDENT INTERVIEW QUESTIONNAIRE
Student interview form

First name of student________________________________________

(read to the student)

"I am going to ask you a few questions regarding you science lessons you learned during the last few months. Your last name will not be written down so people will not know who you are. I will write down what you say to each question and then read it back to you to see if I wrote it down correctly. If I write something down differently than what you mean to say, I will change it and read it again. There are no right or wrong answers to the questions I will ask you, this is not a test. In other words, your answers will not affect your grade in science. Do you have any questions before we begin?"

Question #1

During the last few months, your teacher had you take notes for science using you own note paper and using handout notes with blanks on it. Do you feel that you took better notes with your own notes or with the handout notes?________________________________________

________________________________________

Question #2

On which days do you feel that you did better on the quizzes, on the days you took your own notes or on the days you used the handout notes?

________________________________________

________________________________________

Question #3

Did your own notes or the handout notes helped you to better understand the lesson taught?

________________________________________

________________________________________
Question #4
Which did you prefer to use while learning science, your own notes or the handout notes?
____________________________________

Question #5
Would you like to use handout notes for your other subjects if they were available? ____ If so, which ones?
____________________________________

Question #6
Do you have any comments?
____________________________________.

Question #7
Do you feel that you were more confident to take the quiz on the days you used your own notes or on the days you used the guided notes? ________ Explain
____________________________________

____________________________________

____________________________________

Name of interviewer                      Date
APPENDIX N
TEACHER QUESTIONNAIRE
Teacher interview form
(read to the teacher)
"I am going to ask you a few questions regarding the science lessons you taught during the last few months. I will write down what you say to each question and then read it back to you to see if I wrote it down correctly. If I write something down differently than what you mean to say, I will change it and read it again. There are no right or wrong answers to the questions I will ask you, this is not a test. Do you have any questions before we begin?"

Question #1
During the last few months, you taught science while your students took notes for the lesson taught using their own note paper and using handout notes with blanks on it. Do you feel that your students took better notes with their own notes or with the handout notes?

Question #2
On which days do you feel your students performed better on the quizzes, on the days they took their own notes or on the days they used the handout notes?

Question #3
During which condition do you feel your students behaved better, their own notes condition or the handout notes condition?
Question #4
Which did you prefer to use while teaching science, own notes or the handout notes?

Question #5
Would you like to use handout notes for your other subjects if they were available? ___ If so, which ones? ___

Question #6
Do you have any comments?

Name of interviewer

Date