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Response Cards in the Elementary School Classroom:
Effects on Student and Teacher Behavior

by

Shannon McKallip-Moss

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts in Applied Behavior Analysis
Department of Graduate Studies
College of Graduate Schools
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RESPONSE CARDS IN THE ELEMENTARY SCHOOL CLASSROOM:
EFFECTS ON STUDENT AND TEACHER BEHAVIOR

Shannon McKallip-Moss

ABSTRACT

Previous research has examined the effects of response card use at various grades levels including elementary, middle, high school, and community college. These studies provide convincing evidence that incorporating response cards into group instruction helps improve learning outcomes. However, the majority of these studies focused solely on learning outcomes, typically assessed through the administration of tests and/or quizzes. The present study examined the effects of response cards on learning, and expanded the research by assessing effects on disruptive student behavior and the quantity and quality of interactions between teachers and students. A second grade teacher and two students were exposed to response cards in an alternating treatments design. Results showed increased positive responding from both teachers and students during response card sessions. However, inappropriate student behavior and negative teacher comments also increased during response card classes. This study provides preliminary evidence that active responding strategies can increase the amount of positive interactions between teachers and students.

Chapter One

Introduction

Although primary and secondary students spend an average of six hours at school each day during a typical school week (Karweit, 1998), the amount of time students spend actively engaged in instruction is usually quite less. Fredrick, Dietz, Bryceland, and Hummel (2000) suggest that after such activities as lunch, homeroom, and passing periods, students are left with approximately five hours for academics. Unfortunately, the amount of time allotted for instruction does not necessarily equal the amount of time used for instruction. By the time the students arrive in class, take out their materials, and find their seats, a good deal of instructional time has already passed. For teachers who must deal with disruptions during instruction, the time is further diminished. Yet even within the amount of time actually devoted to teaching, the amount of time spent learning may vary from student to student. Greenwood, Hart, Walker, and Risely (1984) noted that within a one hour reading lesson in a classroom, the amount of actual reading time might be as little as 10 minutes for one student or as much as 55 minutes for another. Clearly, how students spend their academic time is an important variable in effective instruction. Simply increasing the amount of time used for instruction will probably not solve the problem. Focus must also be placed on increasing the amount of learning that occurs during instructional time.

Lack of student engaged time has been researched across many student populations. Stanley and Greenwood (1983) reported that students in a Title I classroom actually spent 11 minutes less each school day engaged in academic tasks than non-disabled peers in general education classrooms. The amount of time students spend engaged in instruction also appears to be lower in inner city schools. For example, Hall, Delquadri, Greenwood, and Thurston (1982) reported that although teachers in six inner city elementary classrooms allocated 75% of the school day for academic instruction, their students spent less than 1% of the day responding to instruction in each of the following ways: reading aloud, answering questions, asking questions and reciting.

The type of instruction provided by the teacher also appears related to student engagement. Brophy (1998) found that lecturing was one of the most commonly used methods of whole class instruction, despite the fact that teacher lecture has been found to be less effective than instructional strategies that require more participation from students. Gardner, Heward and Grossi (1994) suggest that one likely reason for the relative ineffectiveness of the lecture method is that students have few, if any, opportunities to respond during instruction. Lack of opportunities to respond may result in passive attending to a lesson, as opposed to active engagement in learning.

The finding that students spend a large portion of their time passively attending to instruction is particularly troubling given the evidence showing that learning is enhanced when students are actively engaged in classroom instruction. A study by Carta, Greenwood, and Hall (1988) found that while quality and amount of instructional time are important factors, academic engaged time and opportunities for responding were the factors most closely related to achievement. The authors reported that deficits in

academic behavior were independent of the students' level of intelligence or socio-economic status, but were dependent on how instruction was presented. Based on a review of effective classroom strategies, the authors determined that the variable most consistently related to increases in achievement was the extent to which students were actively engaged during instruction.

Sterling, Barbetta, Heward, and Heron (1997) showed that simply attending to instruction did not produce the same amount of learning as when students were required to actively respond to instructional antecedents. In their study, active student responding consisted of having all students chorally responding to teacher posed questions. On-task instruction, on the other hand, consisted of having all students attend visually to teacher presented material. Using an alternating treatments design, the authors were able to determine that passively attending to the teacher was insufficient for learning. This conclusion was based on daily quiz scores, which showed greater acquisition and maintenance of health facts when students were required to actively respond during lessons. Another important finding of this study was that when the teacher required students to actively respond to instruction, performance on skill maintenance tests two weeks after instruction was higher than when students passively attended to instruction. The students who participated in this study also reported that they believed they learned more by actively responding to instruction. This study suggests that students learned, as well as maintained, more content when actively engaged during instruction.

In addition to increasing learning outcomes, increasing active student responding has also been reported to affect inappropriate behaviors. Stainback, Stainback and Froyen (1987) determined that inappropriate behaviors are commonly found when

students are not engaged in academic behavior. The authors' conclusion was based on descriptive data gathered through interviews and informal conversations with classroom teachers and other school personnel. These data suggested that the more time students spend on task, the greater the probability of increased learning. Unfortunately, no experimental evidence was presented to validate their claim.

Given the positive academic and social outcomes of increasing academic engaged time, it is reasonable to conclude that an important goal for education is to develop instructional strategies that are likely to increase student involvement in instruction. A strategy commonly used as an active responding technique is asking students to raise their hands so they may be called upon to answer questions. Teachers frequently use this procedure to gauge the amount of knowledge their students have attained. While this strategy may be useful in determining the knowledge of a single student, hand raising does not allow the teacher to determine skill knowledge among the remainder of the class. Furthermore, this strategy often results in more frequent responses by high achieving students and few or no responses by low achieving students (Maheady, Mallette, Harper, & Sacca, 1991).

One technique that has been proven beneficial in increasing active student responding for all students in the classroom is the use of response cards. A response card is any item that can be held up simultaneously by every student in the class as a means of responding to a question or problem presented by the teacher (Narayan, Heward, Gardner, Courson, & Omness 1990). Response cards also provide the teacher with important visual feedback during classroom instruction. When the student responds to teacher- posed questions, the teacher receives feedback on each student's answer. Based

on these answers teachers can modify and re-teach curriculum or continue to progress through instruction (Gardner, Heward, & Grossi 1994).

Types of response cards include color or pre-printed cards and write-on cards. The pre-printed cards allow students to choose from a selection of answers (e.g., Kellum, Carr, & Dozier, 2001), whereas write-on response cards are usually small dry erase boards, which can accommodate a wider range of questions and responses (e.g., Narayan et al., 1990).

In a study by Narayan et al. (1990), the effects of traditional hand raising on student learning was compared to the use of write-on response cards. The study was conducted in a fourth grade classroom during social studies instruction. Students were given daily quizzes consisting of ten questions. During one condition students were required to raise their hands to answer the teacher's questions. The teacher would then call on one student at a time until the correct answer was given, at which time the teacher moved on to different information or another question. The response card condition required that all students respond by writing their answer on laminated particleboard and displaying it upon teacher request. Using a reversal design, the researchers found that overall, students performed better on same day exams when they used response cards to answer teacher questions. During the hand raising condition, it was estimated that each student responded twice during a twenty-minute lesson. With response cards, students' opportunity to respond increased to an average of thirty responses during each twenty-minute lesson. In addition to improving rate of response and quiz scores, the authors also reported that using response cards required very little preparation before the lesson, were relatively inexpensive to use, and were preferred by students over hand raising.

Gardner et al. (1994) also compared the effects of hand raising and write-on response cards. The authors evaluated the use of response cards in a fifth grade inner-city science class. The study was designed to replicate and extend the earlier findings of Narayan et al. (1990) by determining whether response cards produced positive effects on delayed learning tasks in the same way that immediate recall scores had been improved. The earlier study tested response card instruction with a quiz presented at the completion of the lesson. Gardner et al. tested learning the day following instruction, as well as two weeks after instruction. Using a reversal design, the authors discovered that not only was there an improvement in next day exams, but performance on response card material also was maintained on bi-weekly exams. In addition to increasing exam scores, the authors reported that most of the students preferred response cards to hand raising and thought they were more fun. Students also reported that they felt they learned more when response cards were used.

Cavanaugh, Heward and Donelson (1996) evaluated the effects of response card instruction and passively attending to instruction on the quiz scores of 9th grade science students. Of the 28 participants, eight were identified as having learning disabilities, behavioral disorders, or mental retardation. During the response card procedure, teachers presented key points to the students. However, each key point had a blank in place of the key term or definition. After the key point was displayed by the teacher, the students were asked to write a word on their response card that corresponded with the blank on the presented key point. Students were then cued by the teacher to hold up their responses. The passive review procedure consisted of having the teacher read the key points, and provide examples to the students. Next day test scores by 13 of the 15 general education

students and all of the special education students identified scored higher during the response card procedure. The authors also reported that beginning each session with a test helped focus student attention and established an orderly climate for each day's lesson, thereby allowing students to display a higher level of attentiveness. Effects on teacher behavior were also reported. According to the researchers, the teacher indicated that he initially perceived almost all his lessons to be effective, but after using response cards he was better able to discern how much the students were actually learning.

Kellum et al. (2001) further extended the literature by validating the use of response cards in a community college psychology course. Prior to this study, there had been very little research conducted on the benefits of response card with post secondary students. The authors used review questions with and without response cards to compare the effects on test scores and student participation. During the review questions without response card procedure, the instructor presented review questions and called on individual students to answer. During review questions with response cards, the instructor presented a question and all students were asked to simultaneously respond using response cards. Response cards were 3X5 and were color-coded, red and green. Students were asked to respond to multiple response or true/false questions by holding up the corresponding card. Results showed that students scored higher on end of class exams when response cards were used compared to when review questions were asked. End of semester data indicated that students generally liked using response cards and believed that response card instruction improved their test scores. They also reported that they thought more instructors should include them in their courses.

Given the promising outcomes of the above studies, it seems necessary to further

examine the effect of response card instruction, especially with regard to behaviors yet to be discussed in the literature. The present study seeks to do so by assessing the effects of response card instruction on the more traditional measure of learning (i.e., test and quiz scores), but also by assessing response card effects on inappropriate classroom behavior. It also seeks to provide a more systematic analysis of the effects of response cards on teacher behavior. Specifically, it will seek to examine whether incorporating response cards into classroom instruction enhances the frequency and quality of teacher/student interactions. Given that positive teacher statements have been shown to improve student learning when combined with other behavior management procedures, (Deutchman, Darch, Paine, Radicchi, & Rosellini, 1983), the role of response cards in evoking praise statements is important to examine.

Method

Participants and Setting

One teacher and three students from a Title I elementary school participated in this study. The school's population consisted of predominately minority students in grades kindergarten through fifth grade. The teacher participant was recommended by school staff due to reports of disruptive student behavior and selected based upon her willingness to participate in this study. Mrs. Green was a fifth year, second grade teacher in her early thirties. The study classroom had approximately twenty-five students. Three students were selected with the help of the classroom teacher due to a high frequency of off-task, disruptive behaviors. Student participants class included Bobby, (7-years-old), Jeff, (8-years-old) and Cindy, (8-years-old). Half way through the study, Jeff was transferred to a self-contained classroom. Data were collected on the two remaining students, Bobby and Cindy.

Institutional and School Board Review

Prior to the start of the study, the school district, and the University of South Florida's Institutional Review Board approved all procedures. An outline of the study was given to the participants and consent forms accompanied the study outline. Consent/assent forms were obtained from all participants prior to data collection.

Dependent Variables and Measurement

Data were collected on both teacher and student behavior during 30-minute instructional sessions across consecutive school days. The session consisted of shared reading instruction. Response card and questions only conditions were randomly assigned. During this time the teacher focused on skills including word recognition, spelling, comprehension, increasing vocabulary and word meanings. The instructional session lasted between forty and fifty minutes, with only the first thirty minutes being scored by observers. All instructional sessions were videotaped and data were derived from the videos. Observers used an audio tape that provided cues to observe and record. The sessions were broken down into 15 second intervals to observe, and 5 seconds to record. The primary variable in this study was teacher statements to the students during instruction. Teacher statements were classified as positive, negative or neutral. A positive teacher statement was defined as any verbal interaction directed to the target student, a group of students, or the class that could be considered social praise (e.g., “Oh, that is very good!”), encouragement (e.g., “You are almost there, give it one more try”), or approval (e.g., “You are so smart”). Negative statements were defined as any verbal interactions that expressed disapproval of a student’s or class’ behavior (e.g., “You are acting like kindergartners.”) or to his/her response to a question (e.g., “No way, not even close.”). Negative statements might involve threatening consequences, using sarcasm, or increasing the volume of one’s voice (i.e., yelling). Neutral statements were defined as statements directed to students that did not fit the criteria for positive or negative statements (e.g., a direction or redirection to begin or continue working). Statements

used to convey information about subject matter being taught and content-specific questions directed to individual students or the entire class were not coded.

The student participants' behaviors were coded as active appropriate, passive appropriate, active inappropriate, and passive appropriate. Active appropriate responses were defined as raising one's hand following a teacher prompt, answering a question or making a content relevant statement, or holding up a response card following a teacher direction to do so. Passive appropriate responses were scored if a student visually attended to teacher instruction or lecture, but did not engage in active participation. Active inappropriate responses were scored if the student made a comment that was unrelated to instruction or engaged in any form of making noise (tapping on desk, humming etc.). Active inappropriate also was scored if the student engaged in forms of disruptive behavior that did not make an audible sound (e.g., getting out of seat, touching other students, playing with things in the desk, drawing on response cards, etc.). Any behaviors for which the teacher had to stop instruction to re-direct or reprimand student behavior was scored as active inappropriate. Passive inappropriate behavior was scored if the student if off-task but not actively disrupting class (e.g., sleeping, staring out the window, head down on desk) at any time during instruction.

Quizzes. Quizzes were given periodically throughout the study. Several of the quizzes were given immediately at the completion of the lecture, while approximately three quizzes were administered the day after the instructional session. Students were given a quiz consisting of between five and ten recognition questions (multiple choice) and/or recall questions (requiring one word answers). The quiz content covered only material presented during instruction to ensure that quiz questions reflected instructional

content. The primary investigator and the classroom teacher were responsible for developing quiz questions when appropriate. The majority of the quizzes were taken from the teacher handbook and therefore, already developed. The classroom teacher scored the quizzes using a pre-made answer key. Quiz scores for each student were presented as a percentage correct.

Observer Training

The primary investigator also served as the primary observer. Prior to data collection, the primary investigator reviewed the procedures for collecting partial interval data (Cooper, Heron, & Heward, 1987; Kazdin, 1982). A review of definitions for teacher and student target behaviors also took place. A second reliability observer was then trained by the researcher. The investigator described each dependent variable and provided examples as well as non-examples of teacher statements and student behavior. During this time, the observer was permitted to ask questions pertaining to the definitions of the dependent variables. Following this session, the observer was asked to complete a five question quiz (Appendix C) on interval recording and use of the data sheet. The observer passed the quiz (score = 100%) on the first attempt and the primary investigator continued with the training.

Once the second observer was familiar with operational definition and recording procedures, he was required to practice data collection during examples of a taped instructional session. Observer was required to obtain a 90% or higher agreement with the researcher across three consecutive practice observations in order to begin taking data for the study. The observer scored a 90% on the first attempt. Interobserver

agreement (IOA) was calculated on an interval by interval basis using the following calculation: agreements divided by agreements plus disagreements multiplied by 100%.

Interobserver Agreement

Interobserver agreement (IOA) was calculated on 30% of the observations. IOA for observations of Mrs. Green averaged 92.8% (range, 85.7% to 100%). For Cindy, observations averaged 90% (range, 80% to 100%). IOA observations for Bobby averaged 87% (range, 83% to 100%).

Experimental Conditions

Baseline. During baseline, the teacher was asked to present information in the absence of a particular intervention for increasing student responding. However, a classroom management system designed by the teacher earlier in the school year was maintained across all phases of the study. Mrs. Green had a card chart in which she removed a colored card for inappropriate behaviors. For every card that was taken away from the student name, a pre-determined consequence was implemented (e.g., warning, time out, parent phone call, conference with the principal). During the course of study, Bobby and Cindy were asked to pull their card approximately three times. Following baseline, two treatment conditions were implemented in an alternating treatments design.

Predetermined questions. Prior to each class session, the teacher and researcher identified at least five questions that could be asked to students during instruction. These questions came primarily from the teacher edition reading book. The teacher was asked to pose these questions to the class at appropriate times during the course of instruction and to respond to student answers as she typically would (e.g., by calling on a student that raised his/her hand to answer the question).

Response card instruction. As with the previous condition, five questions were prepared by the teacher and research prior to the instructional session. However, students were required to respond to these questions by writing their answers on small dry erase boards. At the beginning of the first response card instruction session, the teacher introduced students to response card instruction and the guidelines for answering questions. A script was prepared by the primary investigator and given to the teacher before the introduction session (Appendix D). The training script included an explanation of how to use response cards to answer questions, how to simultaneously respond, and the importance of attending to the teacher to determine when to respond. Response cards (i.e., dry erase boards), markers and erasers were distributed to all students at the beginning of each session. After asking each predetermined question, the teacher cued the students to write their answer by stating, “Ready? Write!” The teacher then allowed 10s for the students to write their answers. The student answers included writing one to two words on their cards. Upon completion of the 10s writing time, the teacher cued students to simultaneously respond by saying, “3, 2, 1, Ready? Cards Up!” Students displayed their answers by lifting their response cards above their heads with their answer facing the teacher. After the cue to respond was given, the teacher was asked to scan the cards to discern student responses and provide feedback. If some of the student’s responses were incorrect, the teacher stated the desired answer and asked students if they needed further clarification about the correct answer.

Procedural Integrity

To determine integrity of students’ use of response cards, the observer marked a box on the data collection sheet to indicate whether each student used the response card

after the target question. If the students were not using response cards, the teacher was asked to provide a prompt to do so. Occasionally, the two study students required a prompt from the teacher to begin writing answers on their boards.

Social Validity

Social validity was assessed at the completion of data collection. Teachers and students were asked to provide feedback about response card use on the questionnaire provided (Appendix E). The student measure assessed which teaching method the students liked better and with which method they felt they learned more. The teacher measure was used to assess whether or not she liked response card use, if she thought they were beneficial, and whether she would continue to use them in her classroom.

Chapter Three

Results

Figure 1 shows the results for Mrs. Green. The top panel represents data collected on positive teacher comments made to the students. Mrs. Green averaged 7.2% of intervals (range, 4% to 13%) engaged in positive statements to the students during baseline. During the question only phase, positive statements made to the student increased slightly (M=8.2%; range, 4% to 13%). Further improvements were made regarding increasing positive statements when Mrs. Green implemented the response card condition. Behavior increased to a mean of 16.6% (range, 12.2% to 28%). Although data were somewhat variable, only two data points fell with the range of the “questions only” condition.

The middle panel of Figure 1 displays data reporting the percentage of negative comments made during instructional sessions. Mrs. Green averaged 9.7% of intervals (range; 5.5% to 16%) engaged in negative comments to the students during baseline. The highest percentage of negative comments were reported during the question only phase (M= 14.4%; range, 10% to 20%). A slightly lower average was reported during the response card condition (M=13.1%; range, 22% to 8.8%), although almost all data points fell within the baseline range.

The bottom panel of Figure 1 displays the percentage of questions that were asked during the thirty minute instructional session. During baseline, the percentage of intervals

in which questions were asked during instruction was 12.3% (range, 9% to 16%).

Questions presented during the question only phase resulted in a decrease in mean performance (M=11.37%; range, 9 to 16). Mean performance was slightly higher in the response card condition (M=13.8%; range, 8% to 20%), but almost all data points fell within the range of baseline.

Because active responses were deemed most important for treatment effects, data are presented for only those variables. Data for Cindy are presented in Figure 2. The top panel represents active appropriate behavior during instructional sessions. Cindy was absent on session 12, so no data were collected on that day. During baseline, Cindy averaged 8.6% of intervals (range, 2.2% to 17.7%) of appropriate behavior. In the question only phase, Cindy's behavior decreased slightly to a mean of 8.3% of intervals (range, 3.3% to 13.3%). The highest increase in active appropriate behavior was reported during the response card condition. When response cards were implemented, Cindy's active appropriate behavior increased to 18.2% (range, 12.2% to 28.8%). When compared to baseline, on task appropriate behavior improved during the response card phase by 111.6%.

The bottom panel of Figure 2 represents data of active inappropriate behavior during instructional sessions. Cindy averaged 8.8% of intervals (range, 4.4% to 25.5%) engaged in inappropriate behavior during baseline. During the question only, condition active inappropriate behavior increased slightly to 10% (range, 4.4% to 25%). The highest increase in active inappropriate behavior was observed during the response card condition (M=17.1%; range, 4% to 30%), where an uptrend in behavior was observed.

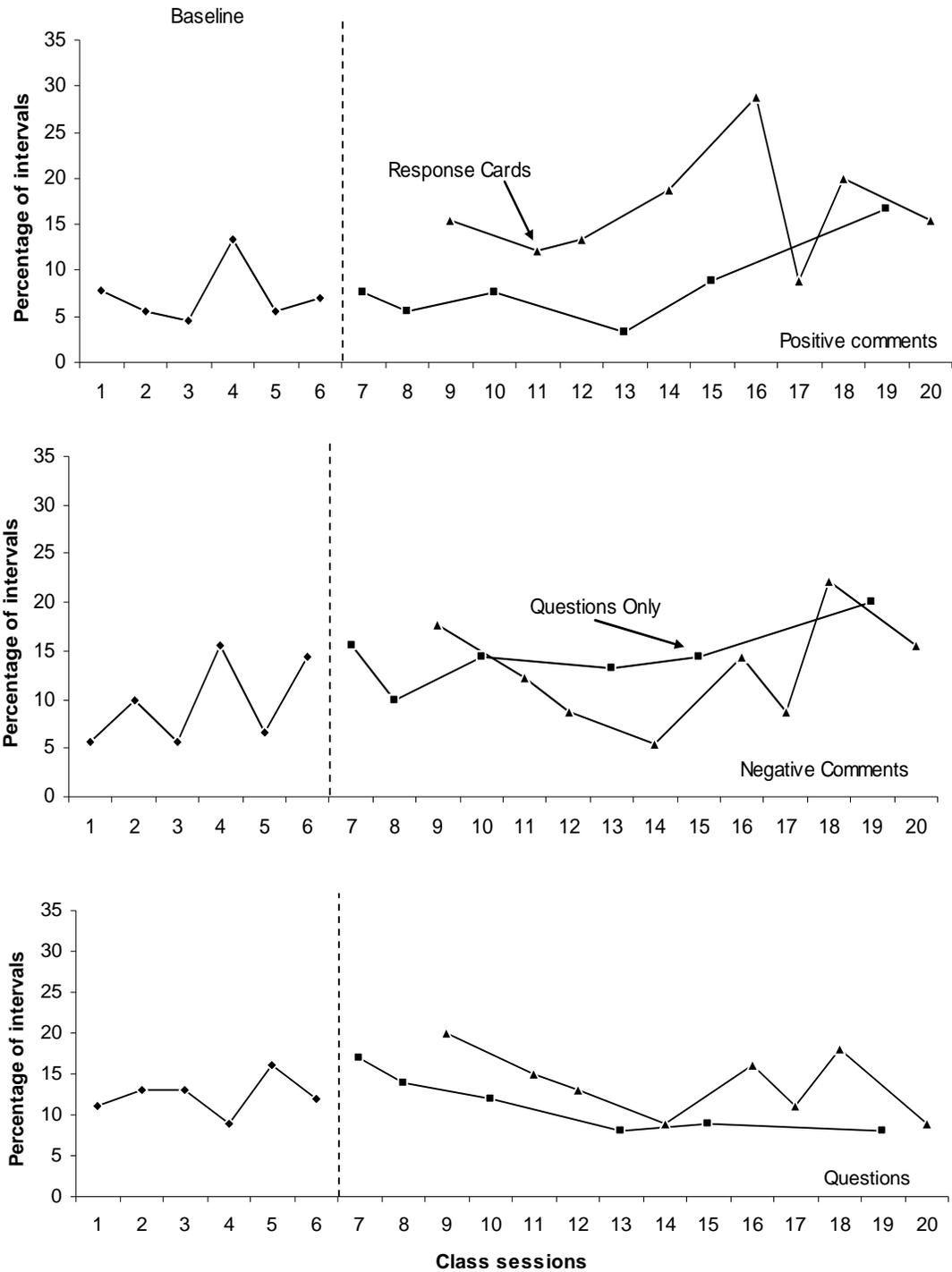


Figure 1. Percentage of intervals of positive (top panel) and negative (middle panel) teacher comments and questions (bottom panel) made across experimental conditions.

Figure 3 displays the data for Bobby. The top panel represents data of active appropriate behavior during the instructional sessions. Bobby averaged 8.1% of intervals (range, 3.3 to 11) engaged in active appropriate behavior during baseline, though data were highly variable. There was a decrease in active appropriate behavior during the question only condition (M=4.4%; range, 4.4% to 6.6%). There was a noticeable increase in active appropriate behavior during the response card condition (M=17.5%; range, 8% to 31.1%). Though data were highly variable, they appear to be uptrending and represent a 116% increase in responding over baseline.

The bottom panel of Figure 3 shows Bobby's active inappropriate behavior across all three phases. During baseline, Bobby averaged 15.4% of intervals (range, 8.8% to 18.8%) engaged in active inappropriate behavior. During question only and response card conditions, there was an increase in active inappropriate behavior. Bobby averaged 31.7% of intervals (range, 13.3% to 47.7%) during the question only condition 32.1 % of intervals (range, 24.4% to 43.3%) in the response card condition, representing a near doubling of inappropriate behavior during treatment conditions.

Table 1 shows the scores on student quizzes across conditions. During baseline, Cindy averaged 46.5% (range, 60% to 33%) on quiz scores. Quiz scores increased slightly during the questions only, condition to 61.5% (range, 43% to 80%). The most noticeable increased was reported during the response card condition. Cindy's test scores when using response cards increased to 100%. The data displaying Bobby's quiz scores also indicate that quiz scores were higher during response card condition. An average of 60% (range, 70% to 50%) was reported during baseline. There was a slight increase

during the questions only condition with a mean score of 69.5% (range, 50% to 80%). During the response card condition, Bobby averaged 100% on quiz scores.

Social Validity

Table 2 displays results of the social validity assessment for Mrs. Green. The teacher reported that if she had her choice, she would rather allow students to use response cards to answer questions. Mrs. Green also reported that the students learned more during class when they use response cards to answer questions. The teacher reported that she did not think there was a difference between response cards or hand-raising when it came to making positive comments.

Tables 3 and 4 show the results of the social validity assessment for Cindy and Bobby. Both students reported that they believed the teacher made more positive comments to the use when they were allowed to use response cards to answer questions. One student reported that they participated more in class when they were asked to raise their hands to answer questions. Both students reported that they learned more in class when they were asked to raise their hands.

Treatment integrity

The following are results of treatment integrity for the teacher's question-asking across conditions. During the questions only and response card conditions the mean score was 100%.

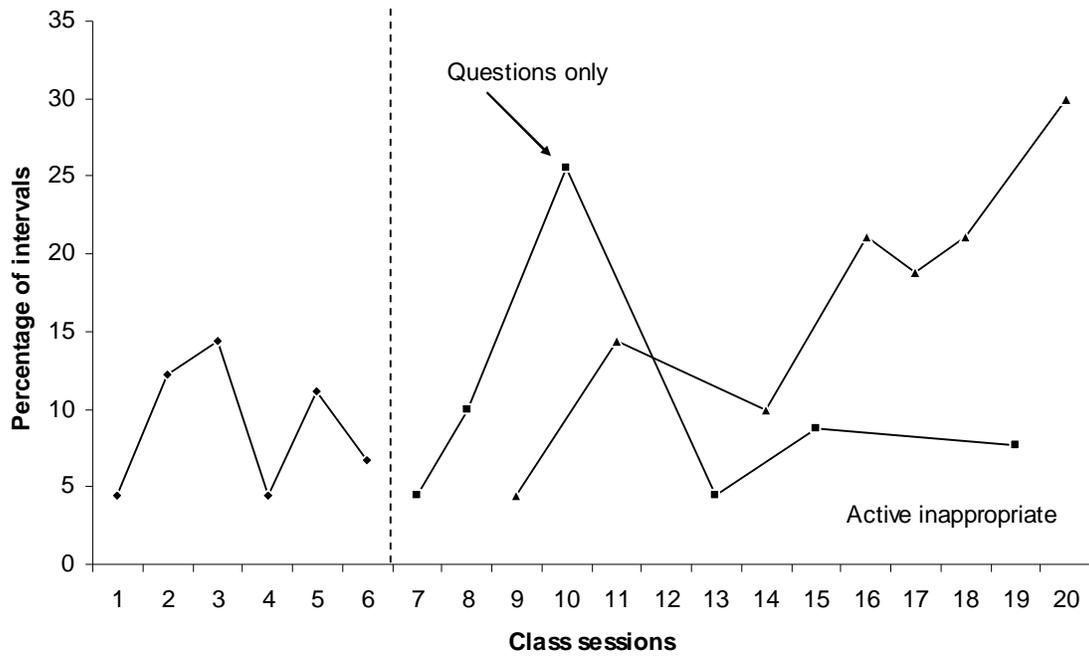
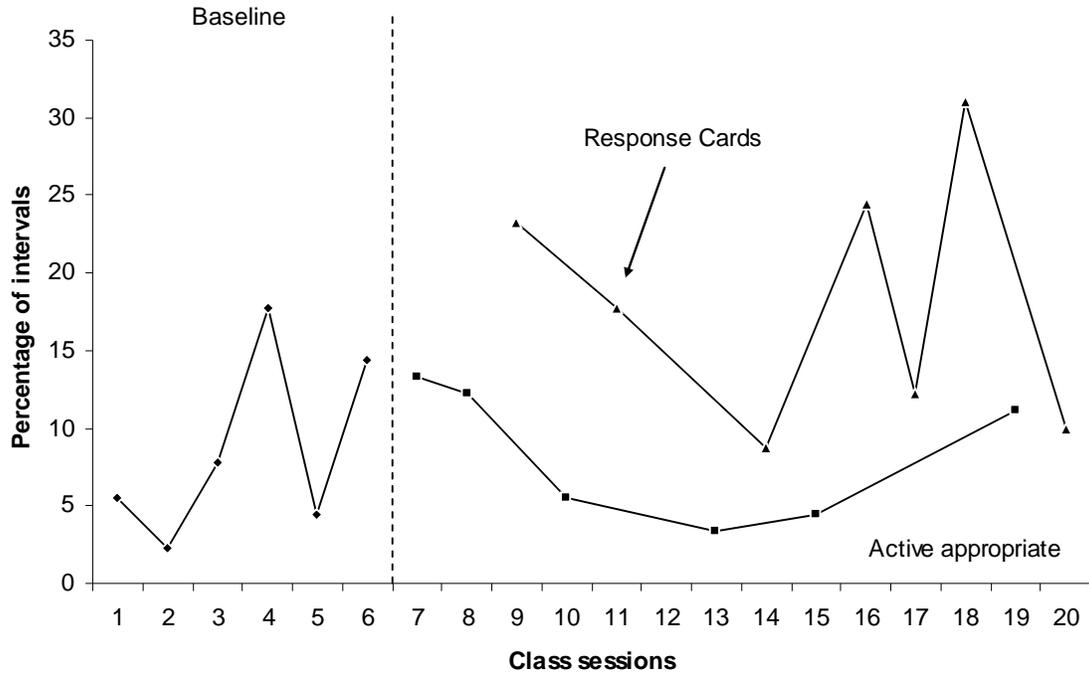


Figure 2. The percentage of intervals in which Cindy engaged in active appropriate (top panel) and inappropriate (bottom panel) behavior across sessions.

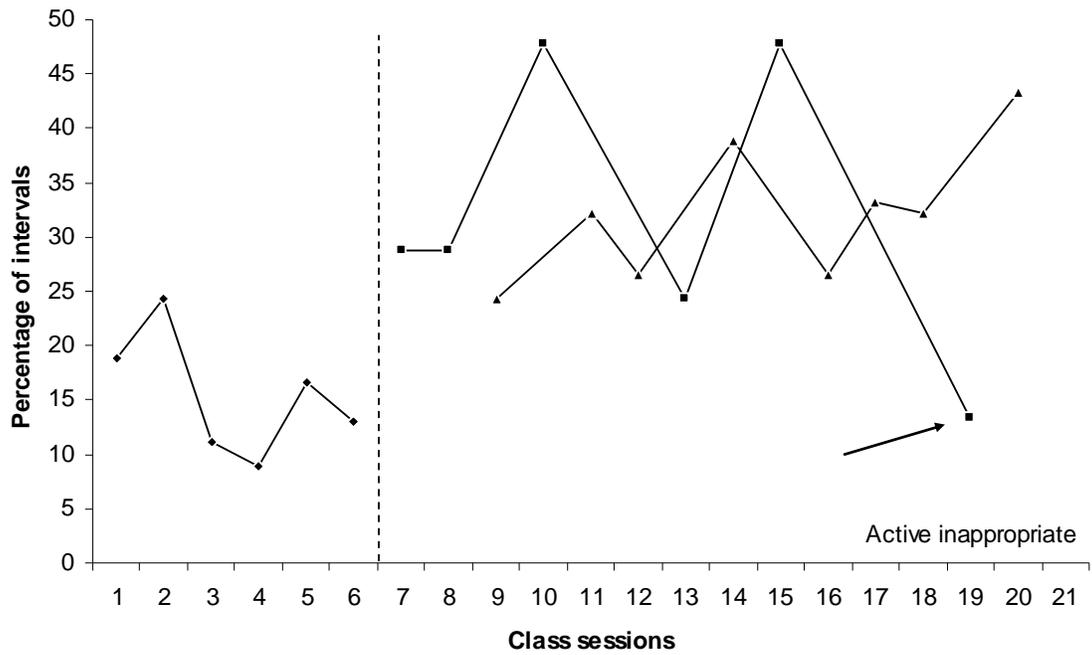
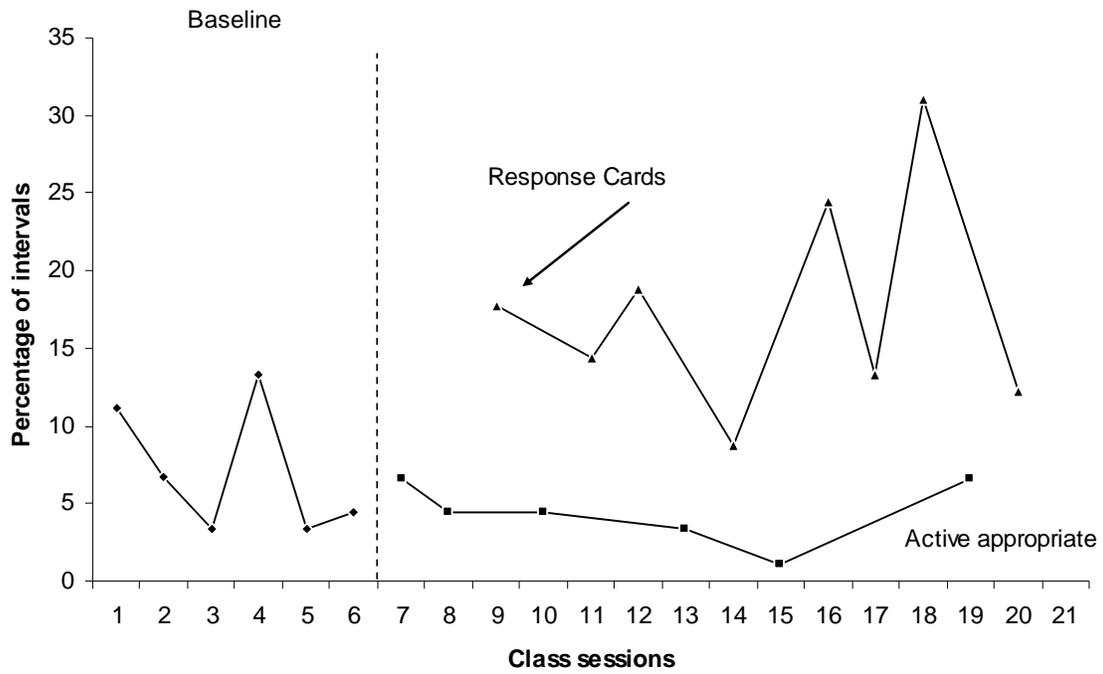


Figure 3. The percentage of intervals in which Bobby engaged in active appropriate (top panel) and inappropriate (bottom panel) behavior across sessions.

Table 1

Mean student quiz scores across conditions

Student	Baseline	Questions Only	Response Card
Cindy	46.5%	61.5%	100%
Bobby	60%	69.5%	100%

Table 2

Social Validity Questionnaire Responses for Mrs. Green

Statement	Response
1. I thought class was more enjoyable when	response cards were used.
2. I think students participated more in class when	response cards were used.
3. I think students learned more in class when	response cards were used.
4. I think I made more positive comments when	No difference b/t conditions
5. I think students were more well behaved when	No difference b/t conditions
6. If I had the choice, I would rather	use response cards.

Table 3

Social Validity Questionnaire Responses for Cindy

Statement	Response
1. I thought was class more enjoyable when	response cards were used
2. I think I participated in class more when	response cards were used
3. I think I learned more in class when	we raised our hand
4. I think my teacher made more positive comments when	response cards were used
5. If I had a choice, I would rather more of my classes	response cards were used

Table 4

Social Validity Questionnaire Responses for Bobby

Statement	Response
1. I thought was class more enjoyable when	response cards were used
2. I think I participated in class more when	we raised our hands
3. I think I learned more in class when	we raised our hands
4. I think my teacher made more positive comments when	response cards were used
5. If I had a choice, I would rather more of my classes	response cards were used

Chapter Four

Discussion

Previous research has reported that incorporating response cards into group instruction improved student learning outcomes by increasing time on task and quiz scores (e.g., Gardner et al., 1994; Kellum et al., 2001; Narayan et al., 1990). The goal of this study was to extend the response card literature by assessing their effects on disruptive student behavior and the quantity and quality of interactions between teachers and students.

The results from this study suggest that response card instruction can increase positive teacher student interactions during instructional sessions. Although data were somewhat variable, Mrs. Green generally made more positive comments when all students were actively engaged in instruction (i.e., when response cards were used). It is worth noting that data on session seventeen (the lowest data point) was taken a few days after the students returned from Christmas break. Mrs. Green had to stop and re-direct students to the classroom rules frequently throughout this session. Responding to instruction was also somewhat inconsistent for both participants on that day, due to the breaks in instructional momentum.

The data indicate that there was no observable difference in the number of negative comments during either condition, but that negative comments in both

experimental conditions increased over baseline averages. Although a slightly lower average (compared to questions only) was reported during the response card condition, almost all points fell within baseline. A potential reason for this finding was the teacher's low tolerance for disruption. For example, students would be verbally re-directed several times or asked to "pull a card" for minor infractions such as tapping a pencil or marker, whispering to a classmate during instruction, or looking for papers in their desk. Toward the end of the study, Mrs. Green was very focused on inappropriate behavior which may have accounted for the negative comments. One reason for this focus is that Mrs. Green stated that she believed the students behaved better when consequences were given for inappropriate behavior, as evidenced by the classroom management system. Another explanation may have been that Mrs. Green's classroom was engaging in a high frequency of inappropriate, off task behaviors, making it difficult to re-direct her attention to on task students.

Another potential reason why negative comments increased during experimental conditions was the increased opportunities for children to make mistakes, especially when response cards were used. During the response card condition, Mrs. Green would stop instruction to point out the students who had responded incorrectly. She would verbally express her disbelief that the students were not "paying attention" and answering questions correctly. Therefore, it appeared that Mrs. Green did not use the feedback to tailor her instruction to increase probability of correct student responding. Instead, she held the students accountable for not comprehending instruction. During the question only condition, incorrect answers were generally followed by a brief comment and then another student was asked to answer the question. When all of the student were

responding (i.e., when response cards were used), this appeared to have affected the frequency and duration of negative comments directed to the students, especially if several students responded incorrectly. These findings suggest that future studies should seek to extend response card training before the start of the study, especially with regard to responding appropriately to student errors. Kellum et. al. (2001), suggested that it is possible that increased student responding enables the instructor to tailor his or her lecture to increase probability of correct students responding. Areas of training should include strategies for adjusting instruction to meet student needs, as well as the benefits of active student responding.

On the social validity questionnaire, Mrs. Green stated that she felt the class was more enjoyable when response cards were used. Mrs. Green also reported that if given a choice, she would rather allow students to use response cards to answer questions. It is interesting to note that Mrs. Green reported that she did not think there was difference in positive comments to the class during either condition. This finding could be due to high frequency of negative comments that were made across both conditions, which made it more difficult for the teacher to discriminate changes in her behavior across conditions. It is interesting to note that during the course of the study, Mrs. Green began using response cards in other subjects including social studies and math.

On the social validity questionnaire given to the students, both participants indicated that they believed class was more enjoyable when response cards were used. They also believed that Mrs. Green made more positive statements during the response card condition. It is interesting to note that both participants stated that they felt they learned more when they raised their hands. A potential reason why the students felt this

way could be that when students raised their hands to answer a question, they were given more personalized attention from the teacher. During the response card condition all students were given a generalized praise statement, especially if the majority of the class responded correctly. Likewise, if the majority of the class responded incorrectly, a negative statement was directed to the class.

This study also sought to evaluate effects of response cards on student behavior. Both participants displayed an increase in active appropriate behavior during the response card condition. This could be accounted for by the increased time on task by actively responding to instruction. Another factor may have been that student participants enjoyed participating in classroom instruction, and were therefore more engaged, when response cards were used.

An interesting finding of the study was that inappropriate behaviors increased during the response card condition for both children. During response card instruction, both participants responded more frequently to teacher questions. However, when the teacher began to lecture during instructional sessions, the children tended to engage in off task behavior consisting of writing and/or drawing on their response cards. Future researchers may seek to address this issue by requiring the teacher to provide reinforcement not only for correct responding, but for correct usage of response cards during the student training use. In the current study, student training session was brief and focused predominantly on ensuring students knew how to appropriately display their responses to the teacher. Extending the training to include information on what to do with the cards and markers when a response is not required may prove beneficial to future researchers. For instance, the students were prompted and trained to place eraser

at the top of the desk after use. They were then told “not to write on response cards until asked to do so”. No directions were given about where to place the marker. Simply providing a location to place the marker after responses have been written down may also be a useful strategy. It should be noted that the response card *procedure* probably did not increase rate of inappropriate behavior; rather the *presence* of response cards increased inappropriate behavior. Future research on using response cards might also evaluate the effects of pre-printed response cards versus write on response cards, especially for younger students who might be more easily distracted by write-on cards.

It also should be noted that during response cards sessions, Mrs. Green asked the majority of the questions in the beginning of the session, whereas the end of the session consisted primarily of lecturing to the students. Although the students were actively engaged during the beginning of the session, as the session continued, the amount of teacher posed questions decreased. Had the teacher been required to space questions across the instructional session, the students may have maintained reductions in inappropriate behavior.

With regard to performance on quizzes, students clearly obtained higher scores during response card sessions, suggesting that they remembered more of the material on days when response cards were used. However, these results should be tempered by the fact that quizzes were relatively infrequent and may not have accurately depicted student learning across time. In addition, no long-term measures of retention of information were conducted.

There were several limitations to this study. The first was that it was difficult to make a case for the effects of response card on improving quiz scores. There were only a

few quizzes given with the majority of them being spaced out several days. Daily quizzes that would guarantee the material covered on the assessment was taught solely by one method or the other (i.e., questions only or response cards) would have strengthened the findings. The second limitation was that the presence of response cards may have artificially increased inappropriate behavior. Specifically, there was no opportunity to engage off task behavior consisting of drawing and writing on dry erase boards during baseline or the questions only condition. Therefore, introducing response cards created an opportunity that had not previously been present. Lastly, content variability was not controlled for. While the content consisted of shared reading skills, there was no control for difficulty of content from session to session.

This study provides preliminary evidence that active responding strategies can increase the amount of positive interactions between teachers and students. Consistent with previous research, it shows that learning outcomes and participation also are improved when response cards are used. While results appear to indicate that using response cards is an effective means to increase appropriate behavior, the data reporting inappropriate behavior is less favorable. Clearly more research is needed to fully evaluate the benefits of response card use on teacher and student behavior.

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Appendices

Appendix A

Informed Consent

Social and Behavioral Sciences
University of South Florida

Information for People Who Take Part in Research Studies

The following information is being presented to help you decide whether or not you want to take part in a minimal risk research study. Please read this carefully. If you do not understand anything, ask the person in charge of the study.

Title of Study: Response Cards in the Elementary School Classroom: Effects on Student and Teacher Behavior

Principal Investigator: Shannon McKallip-Moss

Study Location(s): Oak Park Elementary School

You are being asked to participate because it is important for us to develop effective teaching methods to increase active student responding.

General Information about the Research Study

The purpose of this research study is to enhance student achievement. Active student responding is directly linked to academic achievement. When students are responding to instruction there is an increase in learning opportunities and decrease in problem behaviors. Response cards have been proven to increase student participation. Response cards are made of dry erase boards and will be used to ensure that all students are responding to teacher posed questions.

Plan of Study

Prior to the beginning of the study the investigator will conduct a brief training session on response card use. As well as provide training in investigator will be assisting you plan instruction, i.e. pre-determined questions to ask students. This study will not increase your work- load or lesson planning time. In fact, it may decrease your workload by cutting down the amount of time spent grading papers. Through the course of the study student will continue learning county mandated grade level expectations. During the course of the study will be collecting data during one class period a day. Sessions will be videotaped. Data related to academics and behavior will be collected. Depending on the day you may be asked to stop using response cards to solicit student responses.

Payment for Participation

You will not paid for participating in this study.

Benefits of Being a Part of this Research Study

By taking part in this study you may increase your knowledge of effective teaching methods. The benefits of this study also include identifying methods for increasing the amount of time spent on academics during a class period and decreasing problem behavior in the classroom. The study will benefit you as a teacher because it will increase your knowledge of active student responding techniques.

Risks of Being a Part of this Research Study

There are no known risks to participating in this study.

Confidentiality of Your Records

Your privacy and research records will be kept confidential to the extent of the law. Authorized research personnel, employees of the Department of Health and Human Services, and the USF Institutional Review Board may inspect the records from this research project.

The results of this study may be published. However, the data obtained from you will be combined with data from others in the publication. The published results will not include your name or any other information that would personally identify you in any way. The data will be displayed using code names for all of the participants. The principal investigator will keep data until completion of the study when the data will be destroyed.

Volunteering to Be Part of this Research Study

Your decision to participate in this research study is completely voluntary. You are free to participate in this research study or to withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive, if you stop taking part in the study.

Questions and Contacts

- If you have any questions about this research study, contact Shannon McKallip-Moss (813) 382-2734
- If you have questions about your rights as a person who is taking part in a research study, you may contact the Division of Research Compliance of the University of South Florida at (813) 974-5638.

Consent to Take Part in This Research Study

By signing this form I agree that:

- I have fully read or have had read and explained to me this informed consent form describing this research project.
- I have had the opportunity to question one of the persons in charge of this research and have received satisfactory answers.
- I understand that I am being asked to participate in research. I understand the risks and benefits, and I freely give my consent to participate in the research project outlined in this form, under the conditions indicated in it.

- I have been given a signed copy of this informed consent form, which is mine to keep.

Signature of Participant

Printed Name of Participant

Date

Investigator Statement

I have carefully explained to the subject the nature of the above research study. I hereby certify that to the best of my knowledge the subject signing this consent form understands the nature, demands, risks, and benefits involved in participating in this study.

Signature of Investigator
Or authorized research
investigator designated by
the Principal Investigator

Printed Name of Investigator

Date

Investigator Statement:

I certify that participants have been provided with an informed consent form that has been approved by the University of South Florida’s Institutional Review Board and that explains the nature, demands, risks, and benefits involved in participating in this study. I further certify that a phone number has been provided in the event of additional questions.

Signature of Investigator

Printed Name of Investigator

Date

Appendix C

Appendix B

Parental Permission (Parental Consent)

Social and Behavioral Sciences
University of South Florida

Information for Parents who are being asked to allow their child to take part in a research study

The following information is being presented to help you decide whether or not you want to allow your child to be a part of a research study. Please read this carefully. If you do not understand anything, ask the person in charge of the study or the person obtaining your consent.

Title of research study: Response Cards in the Elementary School Classroom: Effects on Student and Teacher Behavior

Person in charge of study: Shannon McKallip-Moss

Where the study will be done: Oak Park Elementary School

General Information about the Research Study

The purpose of this study is to assess the effects of various types of instructional strategies. During the course of the study we will focus on increasing active student responding through response card use. Response cards make it easier for your child to respond to teacher posed questions.

Your child is being asked to participate in this study so that we may continue to provide students with quality instruction that will promote highest student achievement.

Plan of Study

During the course of the study the students will continue to learn county mandated grade level expectations. During instructional session the teacher will pose various questions that reflect the content that has been reviewed. All students will actively participate during instruction by writing down their answers on a dry erase board or raising their hands.

Payment for Participation

Your child will not be paid for your participating in this study.

Potential Benefits of Taking Part in this Research Study

Benefits to the student participants include increasing amount of engaged time spent on academics.

Risks of Being a Part of this Research Study

Several response card studies have been conducted in the past. There are no known risks to participating in this study.

Confidentiality of Your Child's Records

We will keep the records of this study private by keeping data until the completion of the study and then destroying student data. Only authorized personnel will have access to the student data.

However, certain people may need to see your child's study records. By law, anyone who looks at your child's records must keep them confidential. The only people who will be allowed to see these records are:

- The study staff.
- People who make sure that we are doing the study in the right way. They also make sure that we protect your child's rights and safety:
 - A. USF Institutional Review Board (IRB) and their staff
 - B. Others may include:
 - People at USF who oversee research;
 - Florida Department of Health; and the
 - United States Department of Health and Human Services (DHHS)

The results of this study may be published. However, the data obtained from your child will be combined with data from other children in the publication. The published results will not include your child's name or any other information that would personally identify your child in any way.

The data will be displayed using code names for all of the participants. The principal investigator will keep data until completion of the study.

Volunteering to Take Part in this Research Study

Your decision to allow your child to participate in this research study must be completely voluntary. You are free to allow your child to participate in this research study or to withdraw him/her at any time. If you choose not to allow your child to participate or if you remove your child from the study, there will be no penalty or loss of benefits that you or your child are entitled to receive. Students who choose not to participate in this study will not be penalized.

Questions and Contacts

- If you have any questions about this research study, contact Shannon McKallip-Moss at (813)382-2734.
- If you have questions about your child’s rights as a person taking part in a research study, you may contact the Division of Research Compliance of the University of South Florida at (813) 974-9343.

Consent for Child to Take Part in this Research Study

I freely give my permission to let my child take part in this study. I understand that this is research. I have received a copy of this consent form.

_____ Signature of Parent of child taking part in study	_____ Printed Name of Parent	_____ Date
_____ Signature of person obtaining consent	_____ Printed Name of person obtaining consent	_____ Date
_____ Signature of Witness	_____ Printed Name of Witness	_____ Date

Statement of Person Obtaining Informed Consent:

I certify that participants have been provided with an informed consent form that has been approved by the University of South Florida’s Institutional Review Board and that explains the nature, demands, risks, and benefits involved in participating in this study. I further certify that a phone number has been provided in the event of additional questions.

_____ Signature of person obtaining consent	_____ Printed Name of person obtaining consent	_____ Date
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Appendix C

Observer Quiz on Partial Interval Recording

1. Partial Interval recording is a procedure that allows responses to be recorded if the specified behavior occurs at any time during the interval. True False

2. For this study, observation sessions will be divided into fifteen second intervals. When the fifteen second interval is complete you will be given five seconds to record data. True False

3. You may score a behavior at any time during the interval. True False

4. Regardless of how many times the targeted behavior occurs the observer would score only one occurrence. True False

5. When recording a behavior during an interval the observer will circle the correct code to indicate that the behavior has occurred. True False

6. Please indicate what each code on the data sheet stand for:
 - a. P _____
 - b. NE _____
 - c. N _____
 - d. AA _____
 - e. PA _____
 - f. AI _____
 - g. PI _____

7. Out of the codes above, please CIRCLE the ones that refer to student behavior.

Appendix D

Teacher Response Card Script

Say this: For the next few days, we are going to use response cards during class. Response cards are small dry erase boards that you can write on. I'll give one response card to each of you, along with a marker and eraser. Please don't write on the board until I ask you to do so.

Do this: Hand out boards, markers, and erasers. If necessary, provide reminders not to write.

Say this: Here is how we use response cards. After asking a question, I will say, "Ready? Write!" At this time you will have about five seconds to write your answer. Let's try that. I'm going to ask a question. Remember, wait for me to say, "Ready? Write!" before you begin writing.

Please write the name of your favorite sports team on the board. Don't worry about spelling. When you are done, leave your card on your desk. Here we go. Ready? Write!

Do this: Watch students to make sure they begin writing when you say "Write!" If necessary, provide reminders to wait until the instruction is given or to begin writing when the instruction is given.

Say this: OK, now everyone should have something written on their response card. Now I want you to show me what you wrote, but I want everyone to show me at the same time. When I say "Ready? Cards Up!", I want everyone to hold up their cards so I can see them. Let's try that. "Ready? Cards up!"

Do this: Watch students to make sure everyone holds their card up at the same time. Usually, you'll have a few kids who hold them up too soon or too late. If this is the case, remind the students to wait until you give the cue to hold up their cards. Keep practicing until all kids hold up their cards at the same time.

Say this: This time I'm going to ask you a harder question. Remember, I'll ask the question, then I'll signal that it's time to write by saying "Ready? Write!". I'll give you time to write down your answer, then I'll give you the signal to show me your answer. Remember, don't hold up your card until I say "Ready? Cards up!"

What is the capital of Florida? Don't worry about spelling. Ready? Write!

Appendix D, continued

***Do this:** Give students about 5 seconds to write their answers. If kids aren't writing, prompt them to do so. If kids hold up their cards after writing, remind them to wait for the signal.*

Appendix D, continued

Say this: Ready? Cards up!

***Do this:** Check to make sure all the students raised their cards. If the class did not go a good job of raising cards simultaneously, provide the cue again and have them practice holding up cards at the same time.*

Call on one student to verbally answer the question. Write the correct answer on the board.

Say this: Any questions?

Appendix E

Social Validity Questionnaire for Students

1. I thought class was more enjoyable when
 - a. we were allowed to use response cards to answer questions
 - b. we were asked to raise our hands to answer questions

2. I think I participated in class more when
 - a. we were allowed to use response cards to answer questions
 - b. we were asked to raise our hands to answer questions

3. I think I learned more during classes when
 - a. we were allowed to use response cards to answer questions
 - b. we were asked to raise our hands to answer questions

4. I think my teacher made more positive comments to the class when
 - a. we were allowed to use response cards to answer questions
 - b. we were asked to raise our hands to answer questions

5. If I had a choice, I would rather more of my classes
 - a. allow students to use response cards to answer questions
 - b. ask students to raise our hands to answer questions

Appendix E

Social Validity Questionnaire for Teachers

1. I thought class was more enjoyable when
 - a. students used response cards to answer questions
 - b. students raised their hands to answer questions
 - c. I don't think there was a difference between using response cards and raising hands.

2. I think students participated in class more when
 - a. they used response cards to answer questions
 - b. they raised their hands to answer questions
 - c. I don't think there was a difference between using response cards and raising hands.

3. I think students learned more during classes when
 - a. they used response cards to answer questions
 - b. they raised their hands to answer questions
 - c. I don't think there was a difference between using response cards and raising hands.

4. I think I made more positive comments to the class when
 - a. they used response cards to answer questions
 - b. they raised their hands to answer questions
 - c. I don't think there was a difference between using response cards and raising hands.

5. I think students were more well behaved when
 - a. they used response cards to answer questions
 - b. they raised their hands to answer questions
 - c. I don't think there was a difference between using response cards and raising hands.

6. If I had a choice, I would rather
 - a. allow students to use response cards to answer questions
 - b. ask students to raise our hands to answer questions
 - c. I don't have a preference.