8-21-2012

# Using Student Response System (SRS) to reduce off-task behavior of students with behavior problems

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# USING STUDENT RESPONSE SYSTEM (SRS) TO REDUCE OFF-TASK BEHAVIOR OF STUDENTS WITH BEHAVIOR PROBLEMS

by
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A Thesis

Submitted to the
Department of Special Education
College of Liberal Arts and Sciences
In partial fulfillment of the requirement
For the degree of
Master of Arts in Special Education
at
Rowan University
May 5, 2012

Thesis Chair: Joy Xin, Ph.D

## Dedication

***I would like to dedicate this manuscript to my father and mother, Nevis & Hazel Carter, Sr.***

**Acknowledgements**

I would like to express my appreciation to Professor Joy Xin for her guidance and help throughout this research. Also, I would like to express my appreciation for Michelle Wendt for her technical support throughout this research.

## Abstract

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2012
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The purpose of the present study was to examine the effect of clickers on decreasing off-task behavior of students with behavior problems in Language and math classes. A total of five students and one special education teacher in a self-contain classroom participated in the study. A single-subject research design with ABAB phases was used. An online program called “Class Dojo” was used to record student behavior with a chart immediately to show their on-task and off-task behavior. During the baseline, student behavior was recorded in both Language and math classes for 5 days. During the intervention phase, each participating student was provided a remote device called “clickers” linked with the white board to respond to questions by pressing a key on the device. Their answers would appear on the Interactive Whiteboard anonymously. The teacher corrected mistakes based on student responses and gave feedback. The use of the clicker was withdrawn after 5 days of intervention, then given back to students to use again following the same procedures in the previous intervention. The results showed that students’ off-task behavior decreased and on-task behavior increased with the use of clickers. Their academic performance in Language and math improved slightly when using the clickers. A follow up survey showed that students were satisfied with the clickers and preferred the clicker lessons over non-clicker lessons.

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# Chapter 1

## Introduction

There are several names for personal student technology software, such as student response systems (SRS), Personal Response System (PRS), "clickers" or "zappers". The PRS or SRS use keypads, or "clickers," to efficiently record and display students' answers to questions that can be used for concept checks, quizzes, opinion polls, and more (Caldwell, 2007). By pressing a button on a keypad, students anonymously send their responses to a receiver attached to a computer that displays a histogram of student responses. A growing body of literature on the use of SRSs proclaims benefits of greater participation and increased emotional engagement during lectures (e.g. Stowell & Nelson, 2007), and possible benefits to student learning (Morling, McAuliffe, Cohen, & DiLorenzo, 2008; Poirier & Feldman, 2007). For example, students can answer questions designed to assess their understanding either while a lesson is in progress or after it has ended. Teachers can track student responses on-screen. The system's instructor remote can be used from anywhere in the classroom to control a lesson. This allows mobility of the teacher to walk around the classroom and observe student activity.

Teachers are challenged by engaging students in instruction, and using technology to integrate instruction to facilitate student learning. The PRS or SRS has great potential to engage students by offering an opportunity to interact with the instructor with a clicker to respond to questions immediately (Barrett, et al. 2005). Using PRS or SRS may help instructors move from teacher-centered approaches to the learner-focused (Calkins & Light 2008; Prosser & Trigwell 1999), to promote active learning (Light, et al. 2009).

The in-class interaction stimulated by PRS or SRS may transform students' participation from passive note-taking and listening, as a traditional class activity, to student involvement in understanding and comprehending materials in class (Kolikant, et al. 2005).

Traditionally, the dominant delivery system for instruction was lectures, with the classroom being the primary site. Students were in isolation, and the instructional practices stemmed from an unstated, but commonly accepted assumption that all knowing instructors viewed unknown students as receptacles to be filled. The traditional lecture is one of the oldest and predominantly used teaching methods. This format often represents an exercise in one-way communication that places students in a passive role, and that ultimately minimizes the learner's ability to develop higher level of thinking skills such as analysis, evaluation, and synthesis of ideas and concepts (McKeachie, 1999).

Students' level of on task and off task behaviors determines how much learning occurs. Behaviors such as sharing, helping, initiating communications, requesting help from peers, and giving compliments universally are considered socially desired behaviors and commonly referred to as social skills. In general, social skills may be defined as socially acceptable learned behaviors that enable a person to interact with others and ways that elicit positive responses to avoid the negative (Gresham & Elliot, 1990).

Students with behavior problems pose many challenges to educators. These students may have different classifications; for example, Attention-deficit hyperactive disorder (ADHD), Attention Deficit Disorder (ADD), and Emotional Disturbance (ED). ADHD is a neurologically based developmental disorder that is usually expressed in various contexts (American Psychiatric Association, 1987). When compared with their peers, students with ADD or ADHD are engaged in more off-task behavior like day-dreaming, inattention, such as playing with objects, looking out the window; talking to a peer; interrupting class, and distracting others (Abikoff & Gittelman, 1985: Klein & Young, 1979). These students displayed more excessive motoric activity such as fidgeting or leaving their seat; showing self-stimulatory behaviors such as pulling their hair or ear, singing to self, or rocking (Zentall, 1980). These off-task behaviors interrupt the teacher's instruction and disrupt class activities. As a result, off-task behaviors distract the student's attention which in turn, impact his/her learning.

Students with ED typically exhibit both high levels of problem behavior and poor social functioning (Kauffman & Landrum, 2009). Excesses in problem behavior and deficits in social skills place students with ED at a high risk for a host of negative developmental outcomes, including school failure, and poor relationships with peers, which lead into drug and alcohol abuse, involvement with the criminal justice system, unemployment, poor community adjustment, and mental health problems as they grow up to become adults (Bradley et al. 2004; Carson et al. 1995; Carter & Wehby, 2003; Fergusson & Horwood, 1995; Frank et al. 1995; Greenbaum et al. 1996; Walker et al. 2004).

Evidence has linked students' classroom behavior to academic achievement. With respect to social conduct, positive intellectual outcomes have been related to displays of prosocial and empathic behavior (Feshbach & Feshbach, 1987), prosocial interaction with peers (Cobb, 1972; Green, Forehand, Beck, & Vosk, 1980), appropriate classroom conduct (Wentzel, Weinberger, Ford, & Feldman, 1990), and compliance

(Kohn, & Rosman, 1973). Studies have reported significant relations between appropriate social skills and increased academic time-on task or engaged time and academic responding. Thus, there is strong and consistent support for a relation (as evidenced by moderate to high correlations) between academic achievement and social skills functioning (Eisert, Walker, Severson, Black, & Todis, 1987; Elliot, Gresham, Freeman, & McCloskey, 1988).

One way that teachers can monitor the level of engagement is their interaction with students during lesson instruction using the interactive whiteboards (IWB). The term ‘interactive’ is used to describe both the technical interactivity of the board as an interface between the user and the computer, and pedagogical interactivity as a teaching strategy (Smith et al. 2005). The National Literacy Strategy (DfEE 1998b) and National Numeracy Strategy (DfEE 1999) advocate for direct and interactive teaching as one of the factors contributing to success, along with discussion, pace, confidence, and ambition. Teaching is characterized as being interactive when ‘students’ contributions are encouraged, expected, and extended’ (DfEE 1998b, p.8).

Interactive teaching is achieved through a balance of directing and telling; demonstrating; explaining and illustrating; questioning and discussing; exploring and investigating; consolidating and embedding; reflecting and evaluating; and summarizing (DfEE 2002). Burns and Myhill (2004) focused on characterizing ‘interactive lessons’, identifying some important factors and unifying themes in lessons: reciprocal opportunities for dialogues which allow students to develop independent voices in discussion; appropriate guidance and modeling when the teacher orchestrates the language and skills for thinking collectively; environments which are conducive to student participation and increasing the level of student autonomy. There is evidence of the value of deeper interactivity and greater student control in developing concepts and higher-level of thinking skills (Adey & Shayer 1994; Muijs & Reynolds 2001).

The IWB changes the relationship between Information and Communication Technology (ICT) and pedagogy by combing a display large enough for a whole class to see clearly with user interface which is integrated into the display. The students' goals may be task completion, while the task is designed in order to achieve learning outcomes rather than creating physical products or providing services. The teacher's role can be seen as orchestrating the features to ensure that the activity proceeds successfully towards achievement of the planned learning objectives as well as completion of the task itself (Kennewell 2011; John & Sutherland 2005). The idea of orchestration of features represents teachers: planning of lesson structure, student tasks, instruction and resources appropriate to their students' characteristics, and the continual process of response to intervention that teachers pursue during the lesson that is contingent on students' progress. Students also seek resources to achieve their goals (Sutherland et al. 2004).

During effective whole-class teaching, students are engaged in relation to the subject matter to be grasped. The setting can provide potential and structure for actions of assimilating information, accommodating to experiences which conflict with existing ideas, memorizing material and reflecting on activities. Teachers stimulate the cognitive engagement of students by posing questions and requesting contributions in order to minimize the duration of periods where students are behaving passively. Also, teachers set mental tasks which engage and challenge students in a cognitive way. Higher levels of interaction are achieved when teachers encourage students to act with greater autonomy, imposing their own structure on learning situations (Edwards & Mercer 1087; Sutterland et al. 2004). Teachers expect the SRS to facilitate broader participation in class, both by having all students respond to their questions and by engaging them in discussion focused on those questions. SRS is often used by teachers for assessment purposes to find out how well students know the instructional materials, and use data from SRS to adjust their instruction. The use of SRS may serve as a bridge to increase students' participation, encourage students to respond to questions and present their answers. This student response system provides students an opportunity to be engaged in class activity using a remote to control and click (Draper & Brown, 2004).

**Statement of Problems.**

An important goal for teachers is to find approaches to support student learning, and cognitive development in the subject areas. Using interactive whiteboards (IWBs) can help teachers achieve this goal. According to the report by the British Educational Communications and Technology Agency (BECTA) (2003), this electronic whiteboard allows students to write on using different colors of pens that can retrieve, move, circle the image, or erase when needed. This interactive activity with the board promotes learner's interests, sustain concentration, and motivate their learning. As a teacher, facilitating student learning by their active participation is important (Davidson & Pratt, 2003). For example, teachers move from offering purely static visual support where the teacher lectures and dominates the lesson to the use of kinesthetic affordances such as hands-on activities using clickers to enhance student participation. This interactivity can be pupil to pupil as well as pupil to teacher which should make changes in classroom practices from regular teacher dominated instruction to a more student- focused approach.

This changed pedagogy is mostly effectively sustained through effective questioning as well as a wider range of activity in lesson instruction (Jones & Tanner, 2002), and has been identified as teacher awareness and implementation of interactivity with the IWB.

Once the IWB is used, the Student Response System (SRS), or "clickers," can be introduced simultaneously. SRSs may vary in physical appearance and number of buttons. For example, some have ten digits including zero and also include low and high confidence buttons to display student confidence in their answers (Elliot, 2003). Others have as many as 20 inputs for entering numbers, letters A-E, yes-no responses, and for requesting assistance (Ober, 1997). Some SRSs even allow certain graphic calculators to function as clickers (Abrahamson, 1998). The essential feature of a SRS is the immediate, anonymous display of the distribution of a set of student response (Draper et al., 2002), allow students to enter their answers into a remote device, and instantly summarize their answers for both the teacher and the class (Beatty, 2004).

SRSs provide an opportunity for all students in the classroom to interact with a teacher by responding to his/her questions using the remote "clicker." Students are able to contribute their viewpoint, and actively respond to ideas and questions. This teacher and student interaction gives instructors an opportunity to assess student understanding at that moment. Clicker questions can be used to accomplish a variety of pedagogical goals: assess students' understanding, give feedback on learning, initiate a classroom discussion, stimulate student activity, and explore students' responses in order to adjust instruction accordingly. It is found that this clicker system is beneficial to student learning because it can provide immediate feedback. This immediate feedback is an assessment tool for the teacher and students (Beatty, 2004). Reviewing the existing research, there are studies using SRS in colleges to encourage student-teacher interaction. However, little research is found in middle school for teaching students with behavior problems, especially those who are classified as ED, ADD, or ADHD.

**Significance of the Study.**

There are activities that encourage active thinking: *Progression*: go further, check that students understand, and set targets for what they are working on. *Illustration concepts in different ways:* cognitive and conceptual development "show the same thing in different ways"; *the importance of sequencing:* how the teachers structure the materials or ideas that they are presenting is crucial to motivation; *immediate feedback*: more effective with Interactive whiteboard (IWB). Evidence requires potential IWB users to become confident operators of equipment and software. Students' expectations for better learning outcomes compared to other classes will have more positive assessments of clickers' contribution to learning and involvement than students with expectations for lower course performance compared to other classes (Chenoweth et al., 1983; Cathcart & Olson, 1994). Using SRS in class will engage students with behavior problems because clickers enhance the students' emotional experiences in the classroom by promoting a sense of comfort, encouraging participation, and motivating students to answer questions correctly. Clickers can aid in the creation of classroom environments that are emotionally stimulating, and stimulation of good emotional responses is known to increase retention of information (Morris, 2004). This study examines the effects of such SRS to engage students with behavior problems in class participation in order to reduce their off-task behavior. It attempts to add information to evaluate SRS and its impact on student learning.

**Statement of Purposes.**

The purposes of this study are to investigate students' level of engagement by incorporating IWB and SRS into class instruction, 1) to reduce their off-task behaviors; 2) increase on task behaviors, and 3) improve student performance in Reading comprehension and math computations.

<u>Research questions:</u>

1. Will the use of clickers increase the level of on- task behavior of students with behavior problems?
2. Will the use of clickers decrease off -task behavior of students with behavior problems?
3. Will the use of "clickers" promote teacher-student interaction to enhance student performance?

<u>Definition of Terms:</u>

**Student Response System** (SRS) – a "clicker" or electronic keypad to record and display students' answers to questions that can be used for concept checks, quizzes, opinion polls and more; by pressing a button on a keypad, students anonymously send their response to a receiver attached to a computer that displays a histogram of student responses.

**Interactive White board (**IWB) - a large touch-sensitive screen that uses a sensor for detecting user input. It serves as a huge touch screen that provides touch control of computer applications and annotation over standard Microsoft Windows applications. A pen, eraser, or even a person's finger can be used to touch and move images.

**Off task behavior-**any behavior that disrupts the student's academic performance such as constant talking at inappropriate times, making noises, and tapping, singing during instruction, fidgeting with objects, and daydreaming.

**On task behavior-** desired or expected behavior in academic setting such as raising hands to answer questions, helping peers, being respectful to peers and teacher, cooperating with others, and completing all assignments.

# Chapter 2

## Review of the Literature

Engaging students in class is a challenge to teachers. Keeping them on-task during instruction is another challenge. Actively engaging in class discussion and activities demonstrate the level of student understanding and the teacher's effective instruction. Monitoring student on-task behavior, such as paying attention to the lesson, good listening, participating in class discussion, and completing the assignments is the teacher's responsibility to ensure student's engagement in lesson. This is a challenge for teachers when teaching a group of students with behavior problems. Recent technology allows students to be involved in student response systems (SRS), by clicking a button of a remote control to answer questions and present opinions in discussion. SRS provides an opportunity for teachers to promote student engagement in class. This chapter reviews studies on students with behavior problems, and the way to use technology to increase their on-task behavior and engage their class participation.

### Students with behavior problems.

It has been documented that the majority of children and youth identified with Emotional/Behavior Disorder (EBD) have poor behavior outcomes. Half of these students drop out of school, the highest rate among all disability categories (U.S. Department of Education, 2004). Of those who remain in school, only 42% graduated with a diploma and overall have lower grades than any other group of students with disabilities (Wagner et al., 2005). According to Van Acker, (2004), 20% of students with EBD are arrested at least once before they leave school, over half are arrested within a few years of leaving school, and 70% have been arrested among those dropouts.

Aggressive and disruptive behaviors often characterize students with Serious Emotional Disturbance (SED) (Wehby et al., 1993). Aggressive behavior can be in two forms, physical and nonphysical. Physical aggression is displayed by hitting, pushing, kicking, throwing objects, walking around classroom without permission, taking objects or materials that belong to someone else, and refusing to follow classroom rules. Nonphysical aggression is manipulating others' social reputation through spreading rumors, threats of friendship withdrawal, social exclusion, mocking and teasing, and cybering bullying (Crick & Grotpeter, 1995). Students with SED are more likely to receive services in restrictive placements than any other disability groups. Of these students, 30-50% receive special education services in either self-contained classrooms or residential facilities. They are most often removed from mainstream education because of their behavioral excesses (e.g., aggression, hyperactivity) or their behavioral deficits (e.g., lack of social skills, low academic achievement). Thus, an important and necessary component of their educational program is the provision and development of a comprehensive reintegration plan (Council for Children with Behavioral Disorders, 1990a; Kauffmann, 1993b). It has been difficult to determine the most effective method or methods for integrating these students into the mainstream of general education environments (Kazdin, 1985). Barriers exist to prevent the responsible integration of students with SED, including teacher attitudes towards student placement and level of administrative support. Specific factors contributing to teacher attitudes about philosophically or ideologically different perspectives of inclusion, the characteristic behavior problems of students with SED, the teacher's perception of his or her competence to teach these students, lack of knowledge and preparation regarding classroom management strategies, and the students' academic and social needs (Gable, Laycock, Maroney, & Smith, 1991).

Attention Deficit Disorder (ADD) and Attention Deficit Hyperactive Disorder (ADHD) are neurologically based developmental disorders that are usually expressed in various contexts. Schools and classrooms represent a primary setting for the recognition of ADHD and ADD problems because of special demands for attention, learning, and self- control, as well as the ready availability of other students for developmental comparisons. Research about classroom behavior of these students has relied heavily on global teacher reports, especially the Connors (1969) scales, whereas direct observation studies are much rarer (Abikoff, Gittelman-Klien, & Klien, 1977). A meta-analysis ( Platzman et al.,1992), indicated that negative vocalizations, general level of activity, gross motor movements, and inappropriate attention seeking constituted the observation categories that differentiated most frequently between students with ADD and ADHD, and those without. (cf. Abikoff, Gittelman, & Klien, 1980; Abikoff, et al., 1997; Avilia de Encio & Poleino-Lorente, 1991). It is found that high rates of "interference" and "off-task behaviour" distinguished students with and without ADHD. Students with ADHD display frequencies of difficult behaviours in class that clearly distinguish them from their peers.

ADHD is frequently associated with low academic achievement performance, which usually worsens as the behavioral disorder become more severe (Barry, Lyman, &

Klinger, 2002). High percentages of association between ADHD and learning disabilities (LD) are well documented in reading, writing, and mathematics (Dupaul et al., 2004; Faraone, Biederman, Monuteaux, Doyle, & Seidman, 2001; Riccio, Gonzalez, & Hynd, 1994). Around 70% of students with ADHD present some type of learning difficulty, and they are three to seven times more likely than others to receive special education services, be expelled or suspended from school, or repeat a grade. Students with ADHD plus LD usually experience more cognitive problems and more academic difficulties than those with either of the two disorders independently (Miranda, Melia, Marco, Rosello, & Mulas, 2006; Smith & Adams, 2006). What kind of intervention and proactive educational approach can be provided to these students with behavior problems? This question is listed at the top of every educator's agenda.

**Using technology in instruction to engage students.**

Technology has been used in class instruction since the 1980s. Using a computer in class to motivate and engage students has been documented in many studies. From 1994-2002, the percentage of public schools with access to the Internet increased from 35% to 99%. In 2001-2002, 87% of public schools with Internet access reported that professional development on how to integrate the use of the Internet into the curriculum was available to teachers (Kleiner & Lewis, 2003). In recent years, interactive whiteboards (IWB) has been introduced in school to be incorporated in instruction to engage students in class activities. Three approaches have been found for success in interactivity using IWB: Supported didactic approach, interactive approach, and enhanced interactivity approach. The didactic approach was characterized by the teacher's presentation with the IWB but only as a visual support to the lesson without an integral strategy for conceptual development (e.g., one math teacher uses a visual fraction wall to demonstrate equivalence, but did not use any other presentational techniques to interact with students). If the teacher was the focus following traditional approaches with minimal student involvement except in response to teacher's questions, it is not effectively using the IWB.

The interactive approach marks progression from the supported didactic stage because the IWB is used to challenge students to think by using a variety of verbal, visual, and kinesthetic stimuli. The IWB becomes the focal point of student attention while in use, usually to illustrate, develop and test discrete concepts.

Enhanced interactivity approach marked the progression from the previous stage with a focus on using technology as an integral part of most teaching in most lessons, and integrating concept and cognitive development in a way that exploits the interactive capacity of the technology. The IWB was used to prompt discussion, explain processes, develop hypothesis or structures, and then to test students' learning by various applications. It is stated that, teachers who reach this level of competence show considerably enhanced understanding of the learning process, and showed ingenuity in developing materials to meet students' specific learning needs.

IWB is a tool or a medium to increase teacher-student interaction in the learning process. This digital board provides an opportunity for this interactivity to occur; According to Kozma (1994), the pictures and diagrams alongside the text helps to increase recall; if the pictures illustrate information about the main idea of the text, representing new content that is important to the overall message, or when they depict structural relationships mentioned in the text. The effective use of a stable medium and the deliberative and reflective process afforded by that medium would appear to aid the creation of the cognitive keys that help structure the learning process and seem to be inextricably bound to the cognitive pace of the student. The questions posed or suggestions offered by students involved in the social discourse help them and the other students who are listening to construct new concepts and ideas according to their past and current knowledge (Bruner, 1973).

Modifying the displayed content by annotation, skipping back to previous screens, or visiting a relevant internet site known to the teacher, were examples of the IWB being used to enhance these important moments of interpersonal interaction. During those periods within a lesson that were teacher-led, similar threads, where verbal explanations related to and engaged with IWB content were constructed by teachers and each small knowledge fragment encapsulated within the symbol systems was displayed on the board, served as a focal point for the teacher's elaboration and explanation (Nonaka & Takeuchi, 1995).

While using IWB, student response system (SRS) could be applied at the same time. Every student has a remote control to press the key to respond to teacher's questions or comments on class discussions. It is found that SRS offer a potentially helpful teaching tool. It provides an opportunity for all students in the classroom to interact and contribute their viewpoint, encourage students to actively respond to ideas and questions, and give instructors the opportunity to assess student understanding at that moment. Clicker questions can be used to accomplish a variety of pedagogical goals; assess student understanding, give feedback on learning, and initiate a classroom discussion (Horowitz, 1988; Draper et al., 2002). To date, studies involving SRS occur in a large lecture classroom setting involving college students where the instructors seek to transform the learning environment of the large course from impersonal, passive, and anonymous to personal, active, and responsible.

Researchers sought to explore what social and educational infrastructure is needed to support classroom use of student response systems. A study (Roschelle et al., 2004), was conducted to investigate the ways in which student characteristics and course design choices were related to student assessments of the contribution of clicker use to their learning and involvement in the classroom. Around 200 students at a large public university in the Western United States participated in this study. About 40.5% were first-year students, 30.3% were second year, 19 % third year, and 9.8% fourth year. Sixteen percent had enrolled (or were enrolled) in at least one clicker class. The participating students were studying over 80 majors in 10 groups. All courses used the same response system, Hyper-Interactive Teaching Technology (H-ITT). With this system, instructors may ask any question at any time. To use the system, the instructor poses a multiple-choice question and sets the software to receive student answers. Students answer questions by pressing a button (A-E) on their transmitter, which then sends an infrared (IR) signal to one of several wireless receivers mounted on the classroom wall. Receivers are connected in a daisy-chain network to the instructor's computer, where the H-ITT software registers and processes the signals. Student responses are displayed immediately in the form of a histogram. Student answers are saved in a database, which instructors may incorporate directly into their grading.

A survey was delivered to students in the last week of the semester. The first section of the survey requested demographic data, including student major, class standing, and projected course grade relative to other courses had been taken at the university. The remainder of the survey included items investigating students' assumptions about large lecture classes and their perceptions and behaviors related to clickers' contributions to involvement and learning process. Finally, each faculty member completed a short survey to collect additional information about the classroom experience, including the typical number of questions used per day in each class and the incorporation of clicker activities into the grading system.

The measurement included 1) *Student assumptions about large lectures*: seven items were used to assess the expectations and values regarding large lecture courses that students bring to the classroom. These included assumptions about learning processes, preferences regarding the student role, and assumptions about how large lecture classes should be taught. Using a five-point scale, students indicated their agreement with each statement. 2) *Desirable learning processes*: Five items assessed students' perceptions and behaviors related to learning processes (e.g., getting feedback on ideas, preferred to be anonymous in class, preferred to be engaged and involved in large classes). These items contained statements concerning students' perceptions that clickers contributed to learning processes as well as statements concerning students' learning-related behavior with clickers. Students responded to statements using a five-point Likert scale. 3) *Classroom involvement*: Six items focused on students' perceptions and reported behaviors regarding active involvement in the class. These items focused on the degree in which students felt like their role as students was that of an active, engaged participant as well as their perceptions that the classroom culture as a whole was more like a small class. 4) *Student motivation*: Two different items investigated whether or not clickers served as external motivators for attending class. The first asked students about their agreement with the statement ‘for me, earning “clicker” points motivates me to come to class, and the second asked about agreement with the statement “I attended class when I otherwise would not have because of the clickers’.

The results showed five of seven assumptions as significant predictors: beliefs that feedback contributes to learning, preference to be involved and engaged in large classes, beliefs that the traditional lecture style is not the best way to teach large classes, preference for less anonymity in large classes, and desire to avoid straight lecture class if possible. Students who indicated a higher preference for being involved and engaged in the large course were more likely to perceive clickers positively and engage in desirable clicker behaviors. Also, students who placed a greater value on feedback reported more positive assessments of clickers in terms of both learning processes and involvement.

The findings indicated that the degree to which the behaviors required in a ‘clicker classroom’ violate students’ expectations and preferences for how a large lecture class should operate impacts their perceptions and (more importantly) their classroom behavior. The clicker itself does not ensure engaged active students in the classroom, but rather a tool that may facilitate that process, depending in part upon expectations that students bring to the large lecture class. If students want to be involved and engaged, they are more likely to perceive clickers positively in terms of both learning and involvement processes. Students may not respond positively if they do not see the use of clickers as necessary to an instructor’s pedagogical style. This indicates that instructional strategies focused on changing students’ beliefs about large course pedagogy may increase clicker effectiveness, beyond the general use of active learning strategies. For example, instructors may need to work to explicitly frame the clickers in terms of their benefits to the class and to student learning (De Berry's, 1998).

Another study addressed how trait levels of classroom shyness can influence conformity when students answer opinion questions in different ways using student response systems 'clickers' (Stowell & Nelson, 2007). The participants were 128 college students to indicate their opinion on 50 controversial questions by raising their hand or anonymously pressing a button on a keypad ('clicker'). The majority of participants, 110 (86%) were first-year students or sophomores and 84 (66%) were women. The distribution of race or ethnic background was 93 (75%) White, 23 (18%) African American, 7 (4%) Latino/Hispanic, 4 (3%) other, and 1 (1%) Asian American.

The Academic Emotions Questionnaire (AEQ; Pekrun, Goetz, Titz, & Perry, 2002) was used to measure various emotions in academic settings such as a lecture or examination. The AEQ has no designated shyness subscale, but two of the subscale constructs anxiety and shame, overlap significantly with shyness (Harder, Rockart, & Cutler, 1993; Henderson 2002). Researchers chose 14 items from the AEQ that ask about anxiety (e.g., "I get scared that I might say something wrong, so I'd rather not say anything") and shame (e.g., "When I say anything in class I feel like I am making a fool of myself") typically experienced in a regular classroom lecture. Students responded to all AEQ items on a Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Results showed significantly greater variability in the clicker response than the hand-raising. Group size, sex, race, age, and shyness did not interact significantly with the method of responding, suggesting that the difference in variability between clickers and hand-raising methods was comparable across group size, demographic factors, and shyness. Subscales of shame and shyness were highly correlated. The combined shame and anxiety score (shyness) was significantly associated with increase feelings of un-comfortableness when using hand-raising to answer controversial questions, demonstrating a stronger preference for using clickers over hand-raising. Women reported a higher level of shyness than men, indicating a greater preference for using clickers to answer controversial questions.

Using clickers to answer controversial questions reduced conformity in the classroom, revealing a greater diversity of students' opinions. The ability of the SRS to make extreme opinions more visible to others in the classroom might lead to greater or more thoughtful subsequent discussion, but further research is needed to evaluate the effectiveness. Even though some studies attempted to examine the effect of using clickers and how to relate to class participation in college settings, little research was found for middle school students, especially those with behavior problems.

**Using technology in instruction to engage students with behavior problems.**

Computer assisted instruction has been integrated in classes for students with disabilities since the 90s. Studies on the effects of using technology to help those students are numerous; of these, computer assisted collaborative learning was highlighted. In Schulz-Zander's study, the importance of interaction among disabled (D) and nondisabled (ND) students working together on computer-based tasks, was focused. Twenty dyads of D and ND students were observed and videotaped while working together at the computer. The term 'disabled' refers to children assessed and diagnosed as 'children with special needs', according to the principles of the legislation for integration in Cyprus (Ministry of Education and Culture, 1999). Students faced difficulties specific to the area of receptive language and reading comprehension, and their selections was based on their records and most recent assessment reports. The age of students ranged from 7-10 years of age. Thus, pairs of students varied according to the age groups. Computer-based tasks, designed upon teacher input, involved pictured enhanced cloze-text and writing composition activities. Both types of tasks were designed so that students had access to the disabled peers with behavior problems who would feel valued when asked to work on the computer and interested in interacting with peers (Mavrou, Lewis & Douglas, 2007). The accepted type of response (e.g., verbal, pointing, clicking, etc.) was flexible as appropriate for each student's individual needs and capabilities.

For the transcription of video data, an observation schedule was used. Two types of data were collected (events and language), and the two transcripts were synchronized with the video; one for non-verbal interaction (events) and one for verbal interaction (language). A computer-based qualitative analysis tool, Transana (Fassnacht & Woods, 2005), was used for the data analysis. Interaction data was collected and transcribed from videos directly into the software, which is for the main purpose of the audio and video data, accompanied with text (transcripts). Events were coded and characterized in terms of collaboration, non-collaboration and positive/negative socio-emotional behavior. Language was analyzed based on the functional-structural perspectives of discourse analysis. In computer-based activities, input devices and peripherals are the ways students answer and respond to tasks. Non-verbal interaction transcripts for all collections of clips in the study very often reported 'answering' as 'click on answer', which was not always introduced by a verbal answer. In general, answering involves language and in most of the cases, it is a ‘hard’ task for students, especially for those with disabilities. This is usually the reason students ‘do not have the courage’ to participate in the classroom and in group work. In front of the computer, students feel more confident, as pointing at the screen or clicking on a wrong answer is not considered as ‘harmful’ as saying something wrong in front of the classmates.

In this study, students and teachers felt that the computer made a difference to the style of their interactions and type of participation. In informal interviews, D and ND students alike referred to their preference for working together at computers. The use of technology provided and reinforced interaction between the groups and facilitated participation of students with disabilities. The computer supported the transformation of simple computer-user interaction into a more complex experience by prompting students to exchange a dialogue and actively participate in the educational process. Analyzing the role of the computer in mediating interaction and participation provided a better insight of how technology is about engagement and inclusion. Pictures, symbols, words, animations, etc., can be combined in interactive ways to facilitate students’ understanding and engagement. The computer was described as a mediational scaffolding agent of the six areas of interaction identified in this study. As research supports, in collaborative learning the computer maintains interaction and releases language (Shahrimina & Butterworth, 2002). Technology offered different possibilities for interactions and activity engagement, through the multimedia environment, the sensory-motor opportunities of participation, the opportunities of roles allocation and the motivational value of technology per se. Thus, the computer as the third party of the collaborative activity (Wegerif et al, 2003) enhanced the structure of the interaction as well as the possibilities for the students to actively participate in. Children and young people with behavior problems benefit greatly from the experience of being included, and technology has the possibility to reduce isolation and increase self-confidence in the mainstream community (Abbot, Austin, Mulkeen & Metcalfe, 2004).

Another study examined the benefits of adding game elements to standard computerized working memory (WM) training. Researchers examined whether game elements would enhance motivation and training performance of children with ADHD, and whether it would improve training efficacy. There were 52 students, ages 7-12 from a suburban area, who had been referred to three outpatient mental-health clinics, and were on a waiting list for ADHD treatment. Inclusion criteria were: (a) meeting DSM-IV diagnostic criteria for ADHD; (b) aged between 7 and 12 years; (c) clinical score on the Attention Deficit and/or Hyperactivity/Impulsivity subscales of the Disruptive Behavior Disorder Rating Scale; and (d) no use of medication on the days of training. Controls were matched to students with ADHD for age, gender, IQ, comorbid behavior disorders, dyslexia, and experience with computer gaming.

Motivation level was assessed in both an objective and subjective manner: objectively by assessing the amount of time the student used the training and the number of sequences performed during training, and subjectively by asking students questions about the computerized WM task and the WM game. Absence time is the average time (in seconds) that the children spent without using the training was recorded automatically by the computer. If the student did not interact with the mouse within 60 seconds, the time was recorded by the computer until the student interacted again. This resulting time interval is considered the amount of time the student was not using the training. At the end of the third training session, an exit questionnaire was administered to the students consisting of four questions concerning the computer task: (a) How did you like the computer task? (very nice/ nice/ neutral/ boring/ very boring); (b) What did you think of the computer task? (very difficult/ difficult/ neither difficult nor easy/ easy/ very easy); (c) Would you like to have it at home? (never/ almost never/ sometimes/ often/ very often).

A laptop was provided with an optical mouse. Each training session lasted 35 minutes. No toys were allowed in the training room, and views from the windows were blocked. Standard instruction for the training was read to the student, followed by a test session of 5 minutes. The student then started training, while the experimenter was seated behind the student. The pre-training group differences were tested, and training effects were examined. The results showed that two training conditions were not significantly different in terms of demographic variables and baseline characteristics. In the control condition, the length of sequences (i.e., level of difficulty) was automatically adjusted to the student's performance, while in the game condition the sequence length, which ranged between three and six squares, was presented in random order. Significantly more sequences were performed in the game condition than in the control condition. The impact of game elements on the motivation and performance of children with ADHD on a WM task was found. The game condition compared to a control condition without game elements, yielded more impact on the student's WM. Students who trained on the game version of a visuospatial WM task were more strongly motivated to do the training (reduced absence time during the training and a greater number of trials completed), did better during training (fewer incorrect trials), and significantly improved after training on an untrained WM task while no such improvement was observed for the control group. It is not clear from this study which of the various elements of the game contributed to superior training efficacy. Different forms of feedback, animation, and control over when to perform a trial (training at one's own pace), use of levels, and a long-term goal are all elements of the game format. To determine the impact of these elements, future research should systematically vary these elements. It is found that the positive effects of their WM training generalized to non-trained executive functions and even to ADHD-related behaviors as rated by parents suggesting a "spillover" effect. The aim of this study was to keep the student interested and motivated to do the sequences. Even though the game training used in this study needs further development, the results are promising with regard to the use of computer games in the treatment of ADHD. Overall, the study may have wider implications on the future development of new, innovative, and feasible interventions for these students (Holmes et al., 2005).

**Summary.**

SRS and IWB are considered as tools for teachers to promote interactivity with the computer and students to enhance learning. Pedagogy is the key component to the success of the SRS. Effective questioning, lesson preparation, student-centered activities, and instructional pace along with SRS encourage active student participation. Students listen and respond to questions by pressing buttons on their clickers anonymously. This allows the teacher to observe student responses, and check students' level of comprehension. SRS could be both a positive and negative experience for students. It could be positive because it is a self-regulated system, which can increase self-esteem, and help student move at a pace that is comfortable. It could be a negative experience for both teacher and students, if technical problems happened, such as damaged software, dead batteries, and equipment troubles.

It is a teacher's responsibility to meet the needs of all students to the best of their ability using research-based effective strategies. However, it is extremely difficult to teach students with behavior problems. Perhaps with better professional support and development, teachers can incorporate SRS gradually into the classroom and engage these students in class activities, so that they can become active learners. There have been studies of active engagement in instruction of college students using clickers. However, no previous studies systematically and empirically have explored the effects of student engagement in instruction using clickers for middle or high school students with behavior problems. This study attempts to explore this area to involve those students in class participation using SRS in instruction to reduce their inappropriate off-task behaviors.

## Chapter Three

## Method

### Context of the Study

**Setting.**

This study was conducted at an elementary school in southern New Jersey. The school has approximately 630 students ranging from Pre-kindergarten to eighth grade in an urban area. Most parents live in the area and their children attend the same school as they attended. They are very involved in school activities and participate regularly in different events. In many cases, the parents and children have grown accustom to having certain teachers as part of the school fixtures. The school is located near three churches in which many students attend. The school staff and the community collaborate as often as possible on different activities such as tutoring programs, basketball tournaments, family nights, and recreational events, etc.

Students with disabilities are placed in resource rooms, self-contained classrooms, basic skills, and in-class support settings based on individual needs. The class sizes range from 18-21 students. There are three teachers per grade level up until the 6$^{th}$ grade. After that, there are two teachers per grade level for the middle school students, when in-class support is provided.

**Classroom.**

This study was conducted in a 6$^{th}$-8$^{th}$ grade self-contained classroom where students were learning Language Arts in one period and Math in another. The Language class was scheduled for 80 minutes every day for 5 days a week, and the math class was scheduled for 90 minutes every day for 5 days a week. There were five students in the classroom with different learning disabilities and one special education teacher.

**Participants.**

**Students.** Two, seventh graders and three, eighth graders; four males and one female participated in this study. All students were identified as having behavior problems and have their Individual Education Plan (IEP) addressed in behavior improvement, in addition to their Language Arts and math objectives, students followed the eligibility requirements for special education under the directions of the Child Study Team (CTS) (See Table 1).

Table 1. General information of participating students

| Student | Age | Grade | Language test scores | Math test scores | Classification |
|---|---|---|---|---|---|
| A | 13 | $7^{TH}$ | RS=26: SS=52 low ext. KTEA-II test | RS=27: SS=44 low ext. KTEA-II test | MD |
| B | 13 | $7^{TH}$ | 148 (PF) mean: 200 NJASK test | 150 (PF) mean: 200 NJASK test | MD/ADD |
| C | 14 | $8^{TH}$ | RS=42: SS=70 below avg KTEA-II test | RS=41: SS=68 below avg KTEA-II test | ED |
| D | 14 | $8^{TH}$ | 128 (PF) mean: 200 NJASK test | 150 (PF) mean: 200 NJASK test | MD |
| E | 14 | $8^{TH}$ | 152 (PF) mean: 200 NJASK test | 140 (PF) mean: 200 NJASK test | MD |

**MD** = Multiple Disabilities **ED** = Emotional Disturbance **ADD** = Attention Deficit Disorder
**PF** = Partially Proficient: based on the **(NJASK)** New Jersey Assessment of Skills and Knowledge
**KTEA-II**=Kaufman Test of Educational Achievement, Second Edition: **RS** = Raw Score **SS** =Standard Score **low ext. =** lower extreme- well below grade level

Student A is a 13 year old male classified as being Multiple Disabled (MD). He is a $7^{th}$ grader, but his reading is at a first grade level. He has difficulty with reading fluency and phonemic awareness. He can retain and comprehend information if the story is read aloud or on tape. He is motivated to learn new material; however, he displays off-task behavior 50% of the time when the work is challenging. For example, he tries to make others laugh by saying or behaving inappropriately when a class assignment is provided; he is easily distracted and watches to see if others notice his mistake, he draws pictures or doodles during instruction without engaging in the lesson. He becomes very loud and agitated when things are not occurring in his manner.

Student B is a 13 year old male in the 7th grade classified as MD. He functions at the 6th grade level, and follows the 7th grade curriculum with modifications. He reads fluently and comprehends well. This student day dreams a lot, is easily distracted, takes a long time to explain events and complete assignments, stares or touches other students, and has to be redirected frequently. He does not take medication, but seems to stay focus if he sits in front of the teacher. If the teacher leaves him aside, he plays with items, day dreams, or does not focus on instruction. Usually, he can be redirected by a tap on the desk or a verbal prompt. Student C is a 14 year old male in the 8th grade classified as MD. His academic level is 4th grade. He is able to read but with incorrect intonation. Thus, he has to be reminded to pause at commas and at the end of a sentence. This student comprehends material and can verbally tell the sequence of events, but has difficulty in written expression. He likes to call out the answers while the teacher is going over problems with other students. This behavior frustrates other students. Also, he gets out of his seat frequently, distracts others and gets them off track by talking about outside-school events, and touches other's body or personal items. He appears to lack self-control and display impulsive behavior during instruction. He tries to boss other students, argues with the teacher, especially, if he feels he is right.

Student D is a 14 year old male, 8th grader, classified as MD. He functions at a 5th -6th grade level in reading. He is inconsistent with memory skills. Some days he cannot remember what happened the day before, but other days, his memory and retention of concepts are excellent. During bad days, mnemonic devices, charts, graphs, or other devices have to be used to help him recall information. When the teacher is modeling the problems on the board, he correctly gives the answers. However, when he has to work independently, he forgets steps, and becomes frustrated. After redirection and further practice, he can independently perform all steps that day, but the next day, the teacher has to re-teach him the lesson. This student laughs at everything and tries to make his classmates laugh, does not complete assignments, participate in class activities, and day dreams.

Student E is a 14 year old female, 8th grader, classified as Emotional Disturbed (ED). Her reading is at a 3rd-4th grade level. She is able to comprehend what she reads, but has a hard time with expressive written language. The student voices her dislike for math. She states that math is hard for her and the instruction needs to be repeated several times with many examples. While the teacher is going over the math instruction, the student puts her head down on the desk, sings songs, draws pictures, asks to go to the bathroom, or tries to hold a conversation with other classmates. She sometimes becomes argumentative when approached about her off-task behavior.

**Materials.**

**Student Response Systems (SRS)**. This is an individual remote device students used to answer teacher-directed questions via interactive whiteboard (IBW) by pressing a button. Each remote device has an on button; two yellow up and down arrows to move in both directions for a selection. It also has a delete button to erase and re-do the responses; the rest 15 buttons for letters and numbers, and a small screen to show one's answers. The clickers have 4 different kinds of questions programed, such as true and false questions, multiple choices, multiple answered questions, and written response to an opinion or open-ended question. In class, each student is assigned with a number, so that the teacher can identify the student's response.

**Tests**. A textbook test consisted of 10 true and false, multiple choice, and open-ended questions were used after each chapter was taught. Also, a teacher-made test used vocabulary words from the novel students read to formulate test questions. Each test has 10 fill in the blank vocabulary questions, 3 true and false, 5 multiple choices, and 2 open-ended questions. The teacher used vocabulary words from the novel and formulated test questions. The math test on geometric figures was formulated by the teacher to include problems in the math book. The test consisted of 15 fill in the blank and multiple choice questions. Questions were taken from each section of the chapter. Students had to use protractors and identify different types of angles.

**Online 'ClassDojo'.** ClassDojo is an online program to track student behaviors (http://teach.classdojo.com). It has icons with plus and minus points to record behavior occurrences. This program can run on an IWB, a computer connected to a projector, a smartphone, a tablet, or an iPod touch. The teacher created icons in the program. Each icon represented raising hands, completing assignments, engaging in lesson, and class participation. A teacher can select on-task or off-task behavior such as raising hands and participation. For example, a picture shows raising hands with a green background for good behavior, and a picture of raising hands in red for inappropriate behavior such as calling out without permission. In class, the teacher pressed an icon, and the program would record the individual student's behavior. An electronic graph presents the recorded behaviors on a chart. When the appropriate icon was clicked, the program tallies the individual student behavior occurrences, and then presents the results in a pie chart.

**Procedure.**

**SRS.** The teacher prepares the assessment on the IWB, and the students have to answer the questions using their clickers. During class, each student is assigned a number on his/her 'clickers'. The clickers are attached to the teacher's IWB, which allows the teacher to identify all students that are connected. The students' names show up on the screen, and the teacher observes who answered the questions, who need to answer the questions, and the overall effectiveness of the questions. This information helps the teacher differentiate and adjust instruction according to the results of student responses. Students are responsible for their own clickers and work at their own pace. All of their responses are anonymous. This alleviates some stress and pressure from feeling or looking inadequate in front of their peers. A reading novel was used for part of this study. Open-ended questions were presented as part of the assessment onto the IWB, and the students responded by pressing the keys on their clicker to answer the question. While the students answered questions, the teacher clicked at an Icon from a website program called "ClassDojo" to record on task and off task behavior. This SRS system was used for both Language and math class.

**Testing.**

The teacher developed a reading test by the taking information from the class novel and formulated questions. The students had to define vocabulary terms in different ways. For example, they wrote sentences using the vocabulary terms correctly, filling in the blanks, and context clues for the meaning. Also, the students had to answer true and false questions, text-based and inferential questions based on the novel. Students referred to reading novels when answering the text-based questions. All directions and questions were read to the students, and the testing was untimed until they completed. The students used clickers to anonymously record their answers. The same procedures were used in math class. Students completed test questions formulated from the math textbook on geometric figures. Protractors were given to students to measure angles. Also, students had to identify different polygons and to find the missing measures. After all students completed the assessment, the teacher collected the clickers and discussed the reading and math test results.

**Behavior Recording.**

Each student monitors a chart of their on-task and off-task behavior after each class with the teacher to discuss accomplishments and their behaviors in class.

**Research Design.**

A Single subject design with ABAB phases was used. Baseline data was collected to record student behavior in both math and Language classes. The online program ‘ClassDojo’ was used to record on task and off task behavior for all students. Students’ behaviors were recorded for 3 days in Language class without clickers in baseline phase (Phase A). Then, their behaviors were recorded for 5 days in Language class using clickers in the intervention phase (Phase B). The same procedure was followed to record student behavior in math class. After 5 days of intervention, the clickers were taken away in each Language and math class for 5 days, then given back to students to use for another week of 5 days.

**Data Analysis.**

All student behaviors were recorded and presented in a line graph to compare the differences in different phases.

## Chapter 4

## Results

Figures 1-4 present participating students' on-task and off-task behaviors in Language and math classes with and without clickers displayed in the baseline and intervention phases. Figures 5-14 present individual participants' on-task and off-task behaviors in Language and math classes with and without clickers displayed in the baseline and intervention phases. Figures 15 and 16 present the participants' average scores of Language and math assessments during baseline and intervention phases.

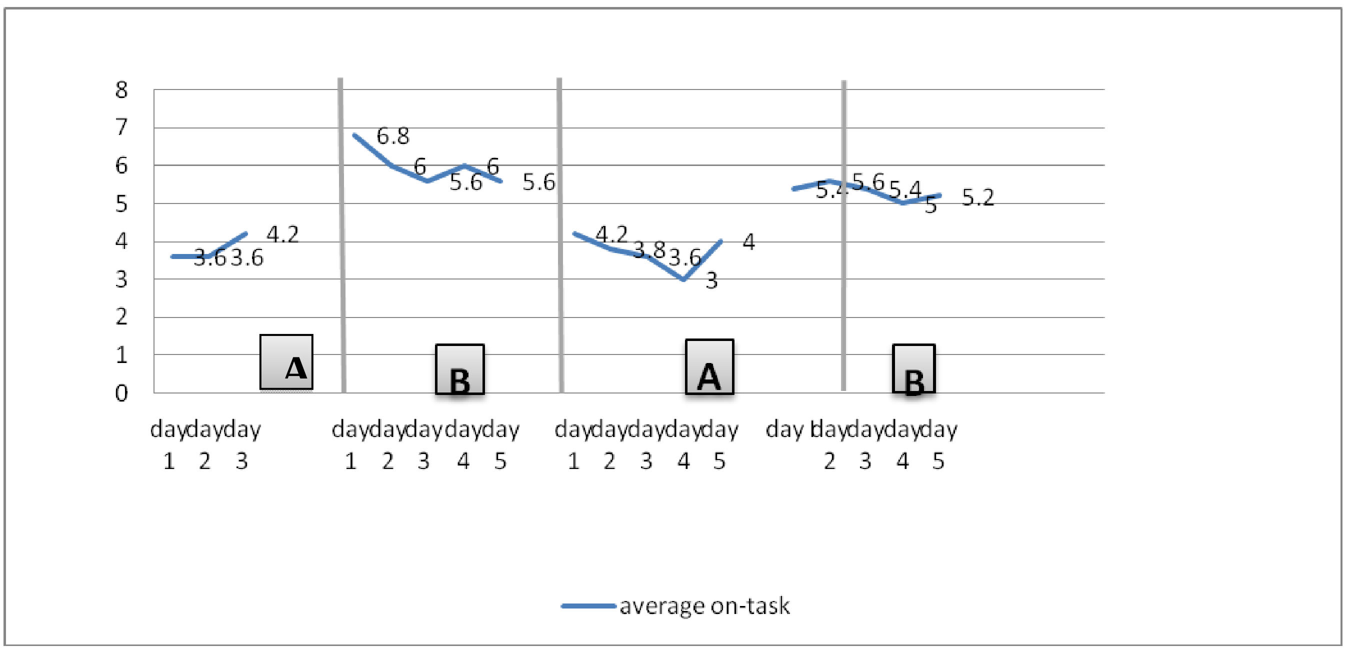


**Figure 1. Students' on task behavior in Language class**

In baseline A, students' on-task behavior average range was 3.6 -4.2 for 3 days without clickers. In intervention B, students' on-task behavior increased to 6.8 when clickers were used to respond to questions for 5 days. The average for each day fluctuated but it was still higher than baseline A.

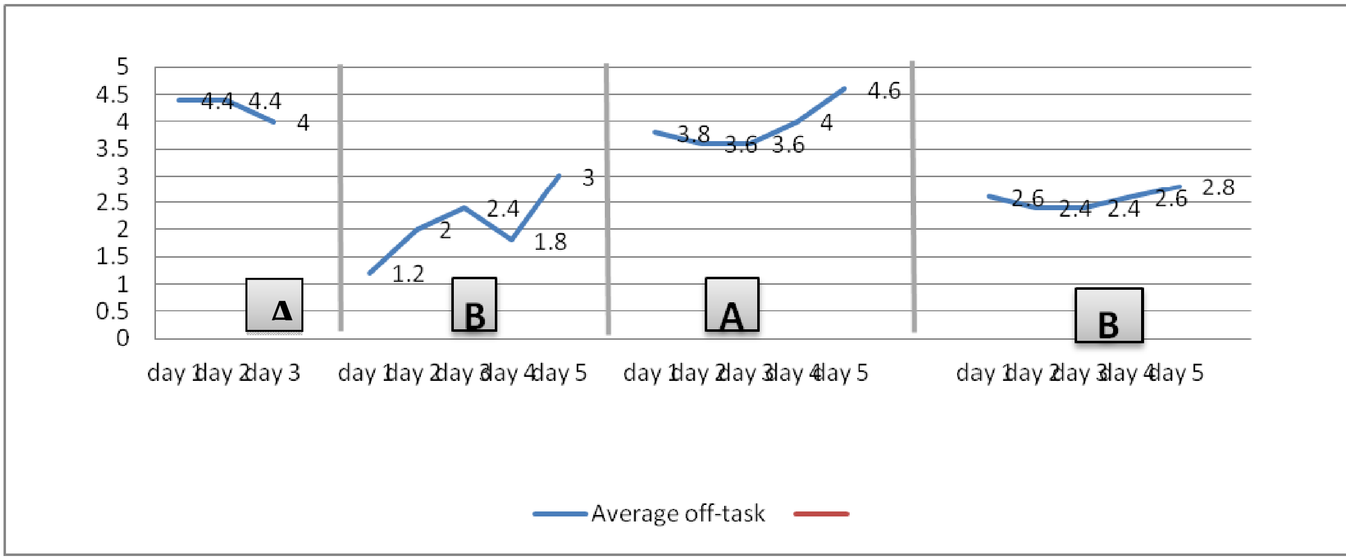


**Figure 2. Students' off-task behavior in Language class**

In baseline A, the average off-task students' behavior for 3 days without clickers ranged from 4.4- 4.0. In intervention B, the average off-task students' behavior for 5 days decreased to 1.2-3 when clickers were used to respond to questions.

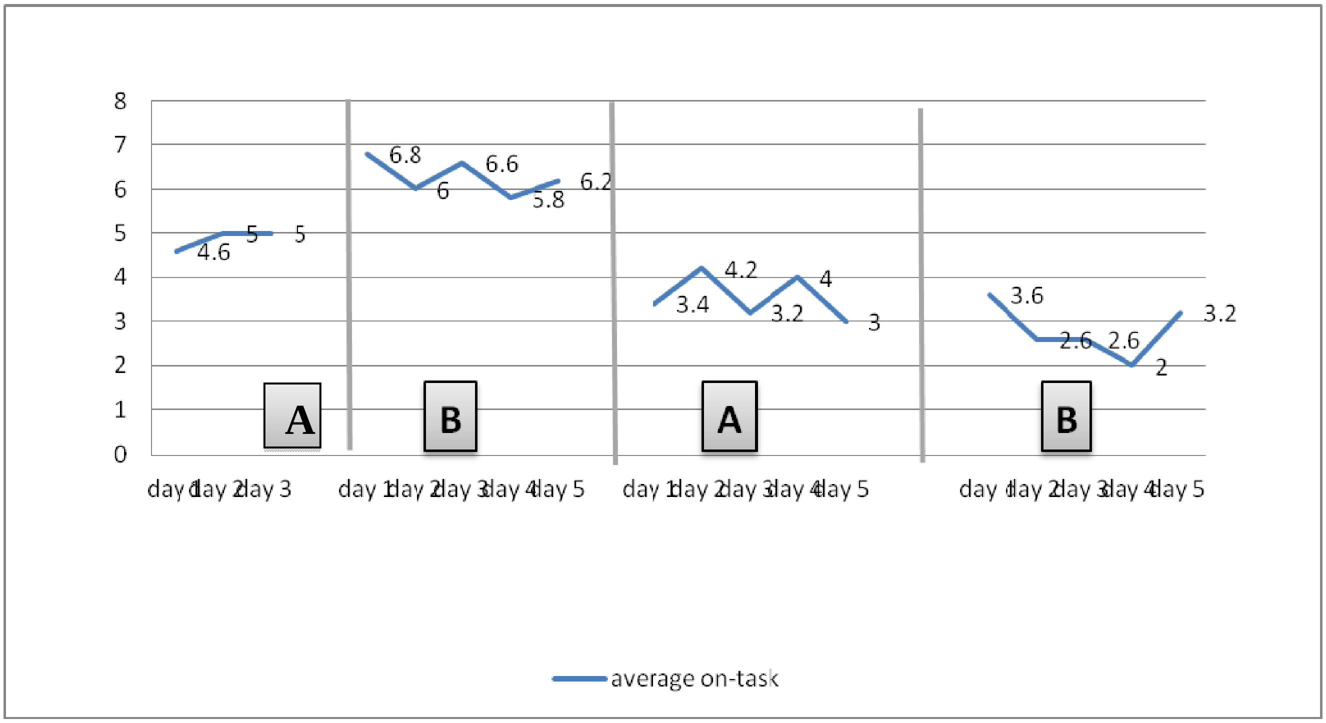


**Figure 3. Student's on-task behavior in math class**

In baseline A, students' on-task behavior average range for math class was 4.6-5 for 3 days without clickers. In intervention B, students' on-task behavior increased to 6.8 when clickers were used to respond to questions for 5 days. The average for each day fluctuated but it was still higher than baseline A.

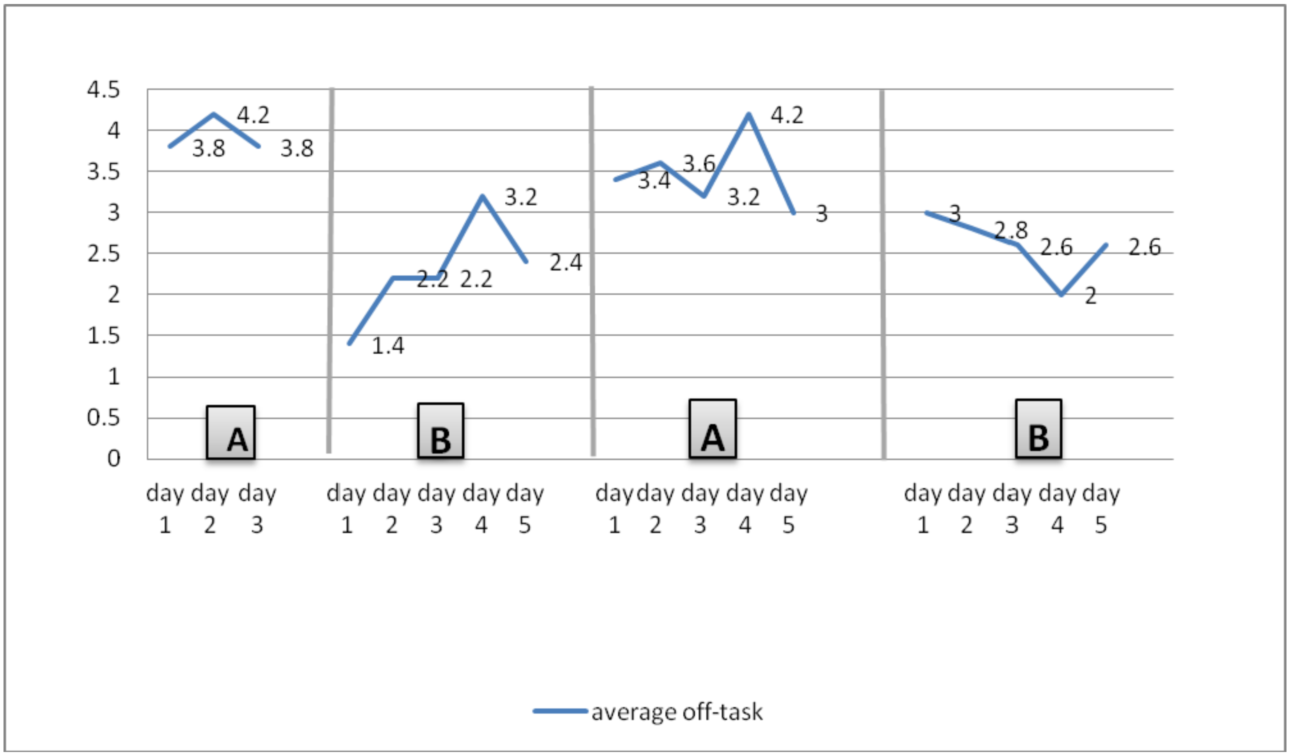


**Figure 4. Students' off-task behavior in math class**

The average range of off-task behavior in math class was 1.4-4.2. Off-task behavior was higher without clickers.

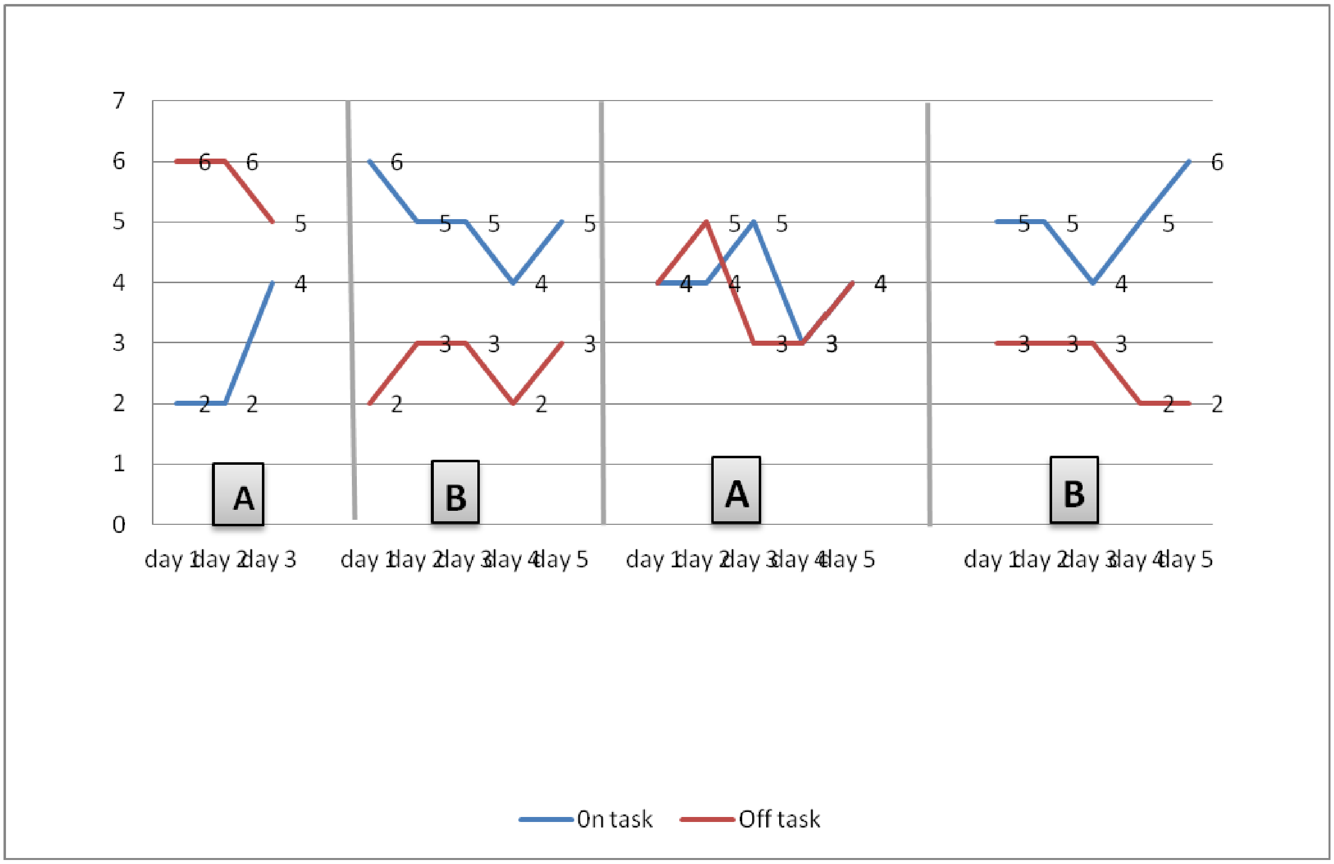


**Figure 5. JW's on-task and off-task behavior in Language class**

JW's on-task behaviors varied during the first baseline and intervention. However during the second baseline the results were identical, but differed again during the intervention phase.

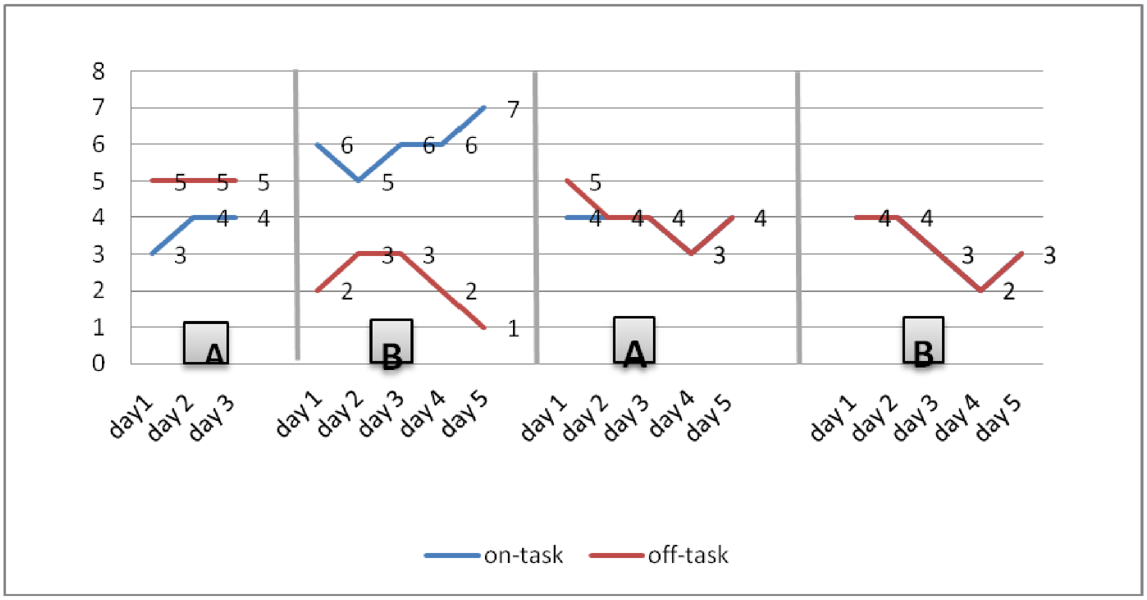


**Figure 6. JW's on-task and off-task behavior in math class**

JW's on-task and off-task behavior were different during the first baseline and intervention, but were very similar or identical during the second baseline and intervention.

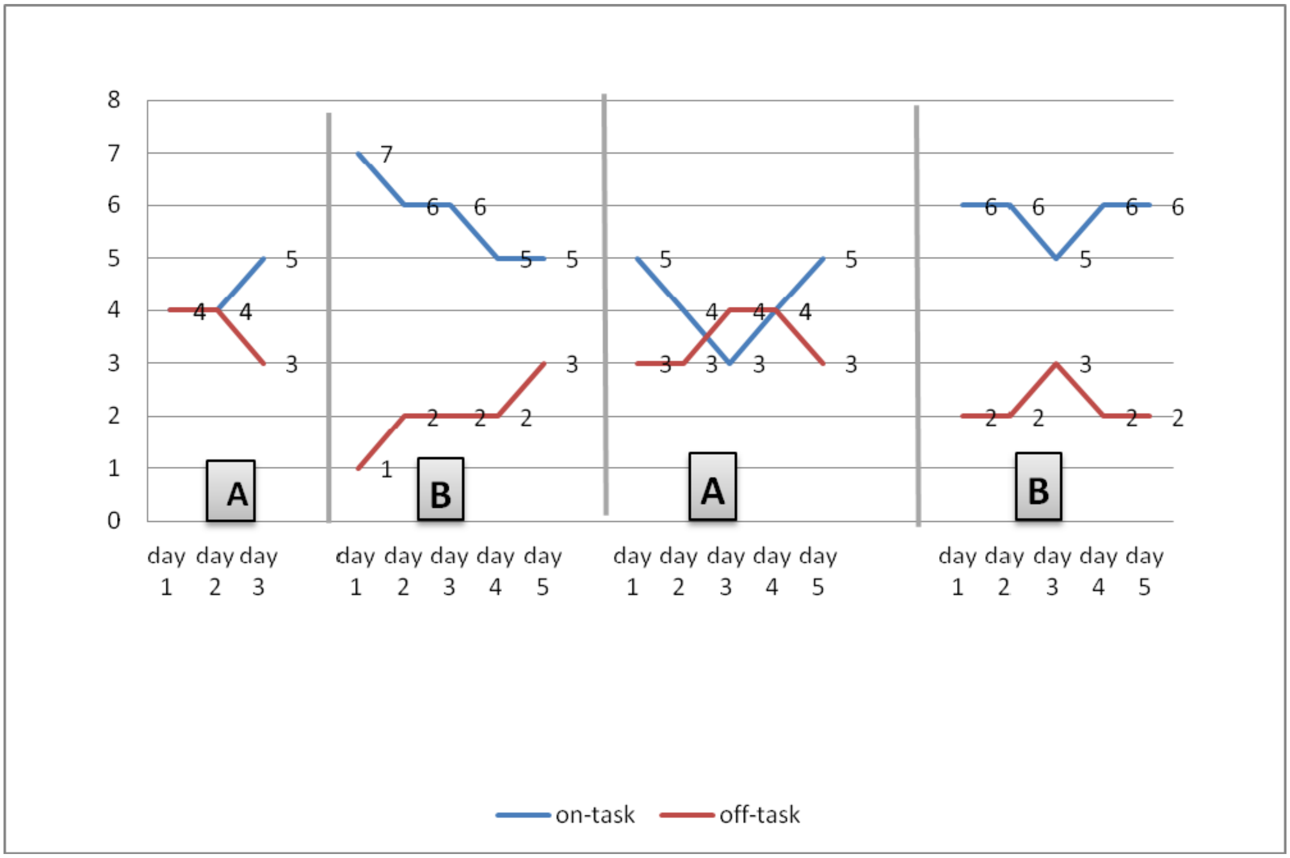


**Figure 7. DC's on-task and off-task behavior in Language class**

DC's on-task and off-task behavior during the first baseline phase was identical for the two days of the study, and then variations of behavior differed on the third day. During the intervention phases, on-task and off-task behavior were significantly different. On-task behavior ranged from 7-5, while the off-task behavior average ranged from 1-3.

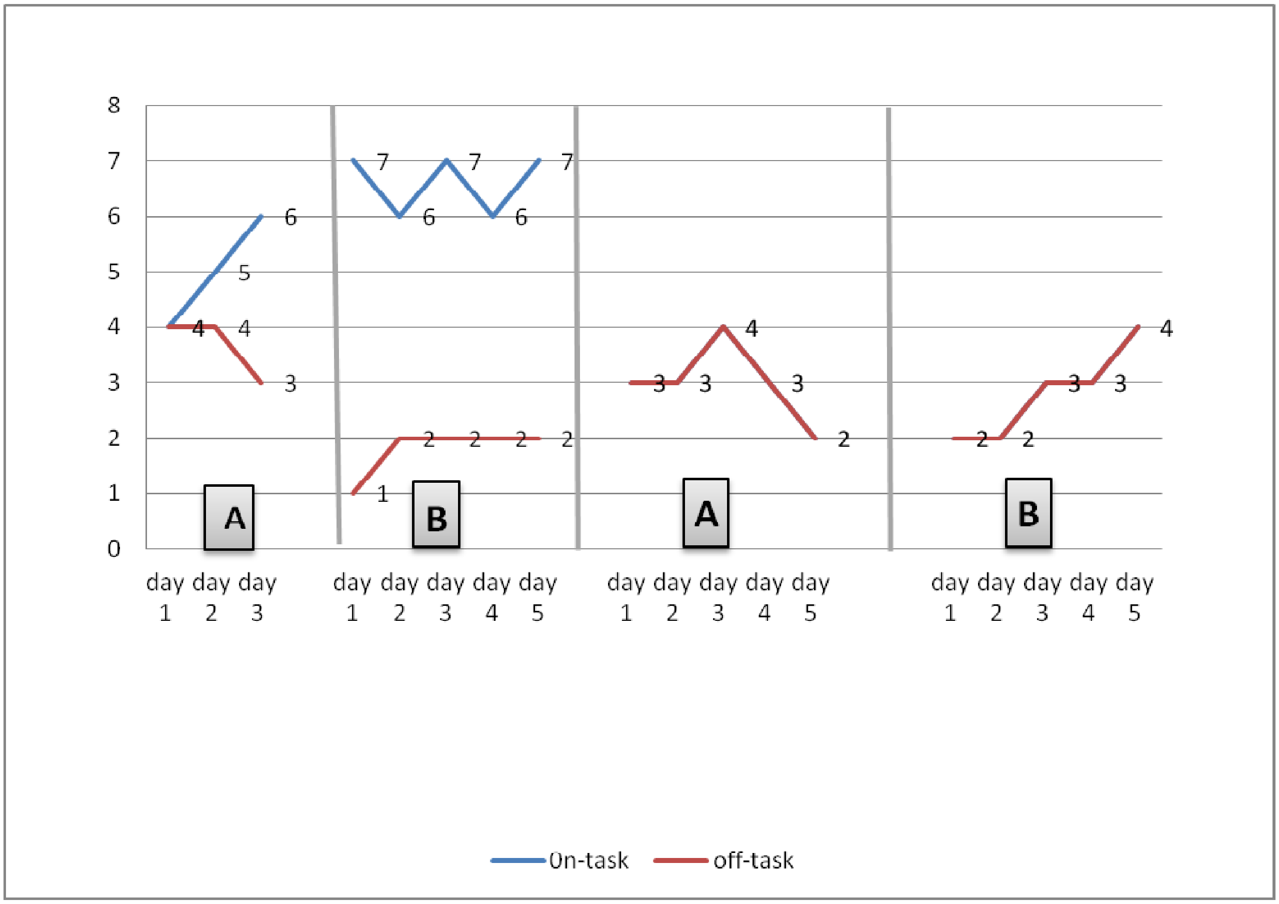


**Figure 8. DC's on-task and off-task behavior in math class**

DC's on- task and off-task behaviors were different during the first baseline and intervention, but the results were identical during the second baseline and intervention.

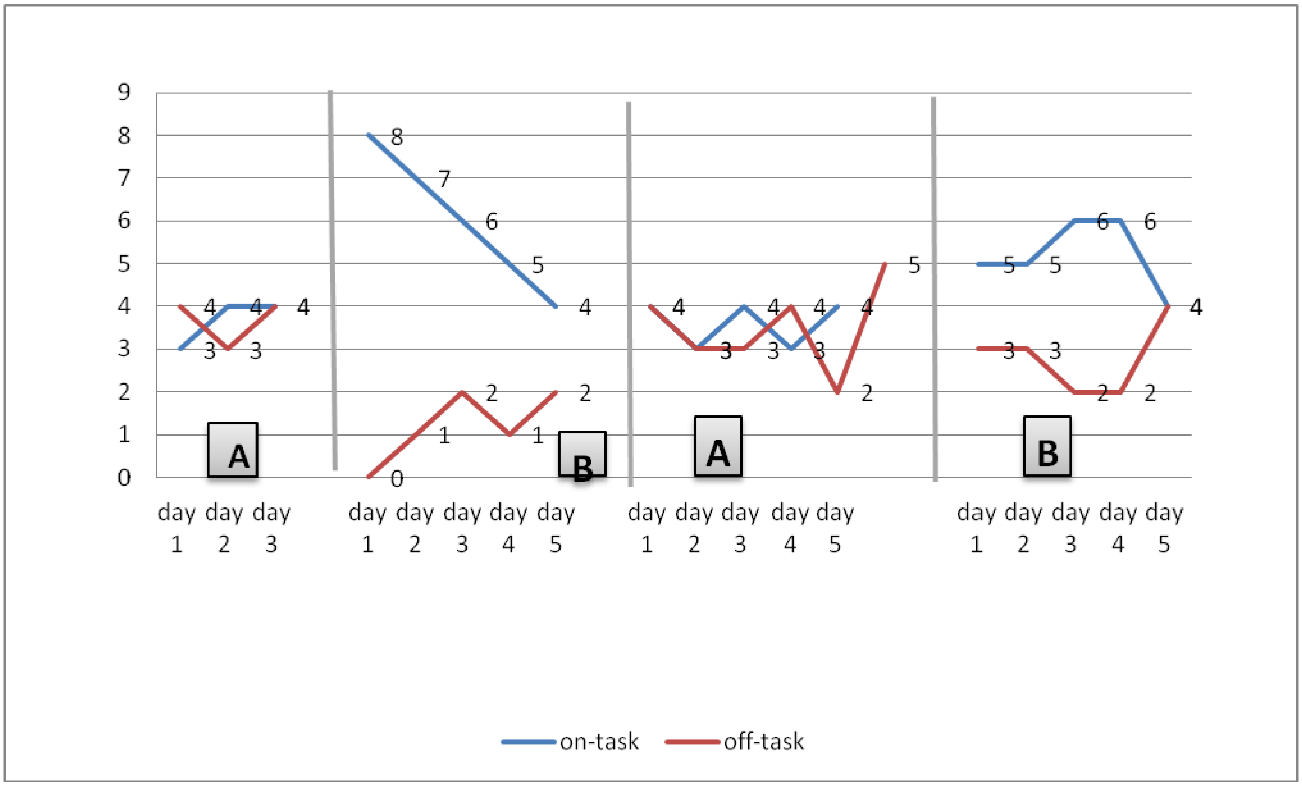


**Figure 9. SH's on-task and off-task behavior in Language class**

SH's on-task and off-task behavior during baseline and intervention ranged from 0-8 showing inconsistencies in behavior.

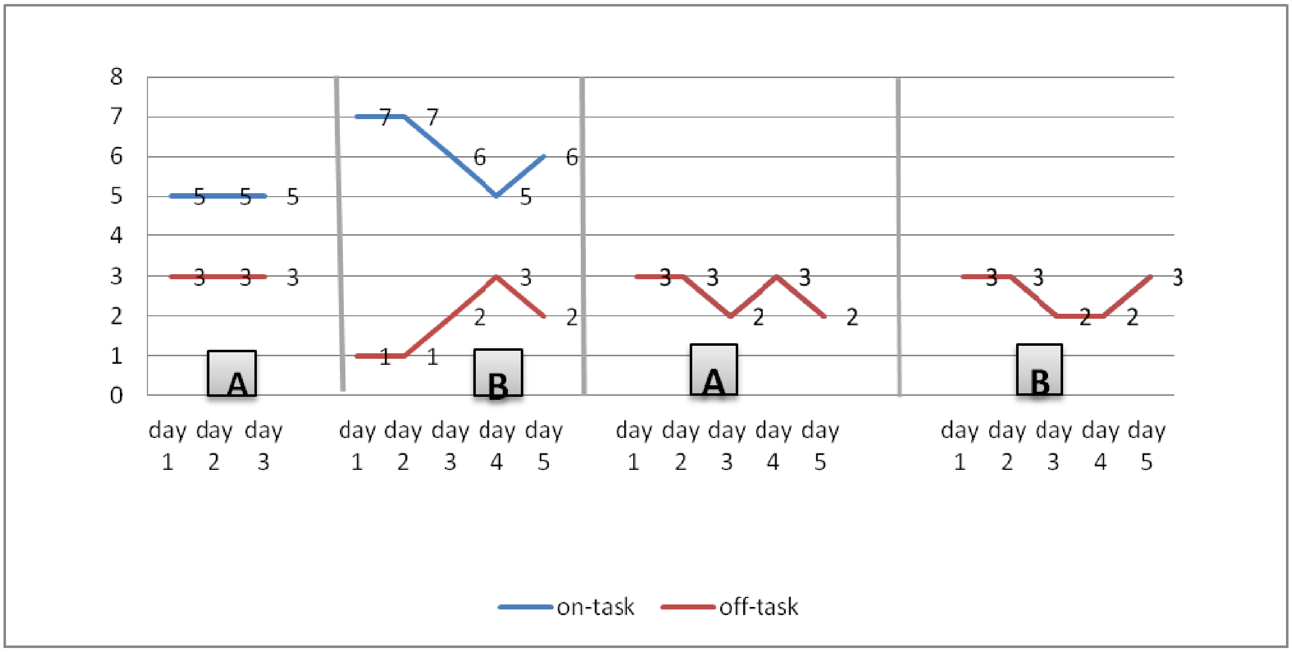


**Figure 10. SH's on-task and off-task behavior in math class**

SH's on-task and off-task behavior in math class were different during the first baseline and intervention phase, but had identical results during the second baseline and intervention phase.

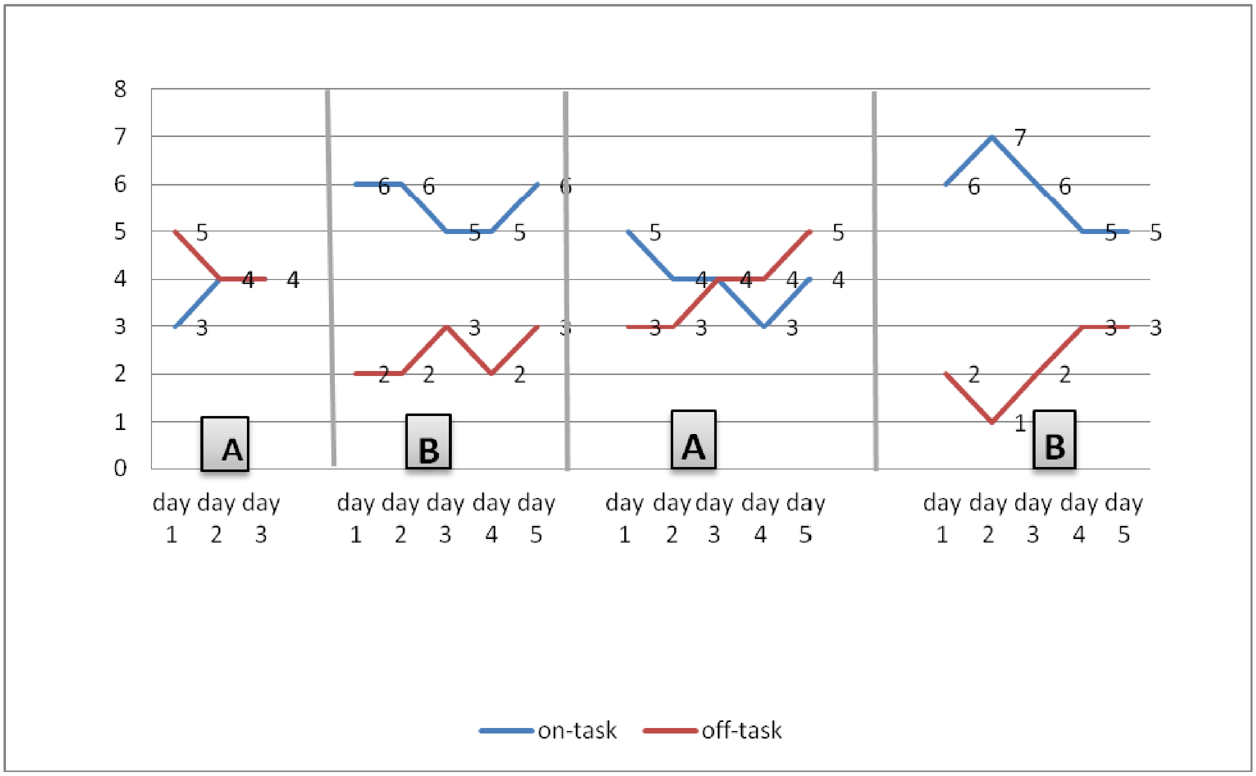


**Figure 11. QF's on-task and off-task behavior in Language class**

QF's on-task and off-task behavior in Language class ranged from1-7 during baseline and intervention strategies.

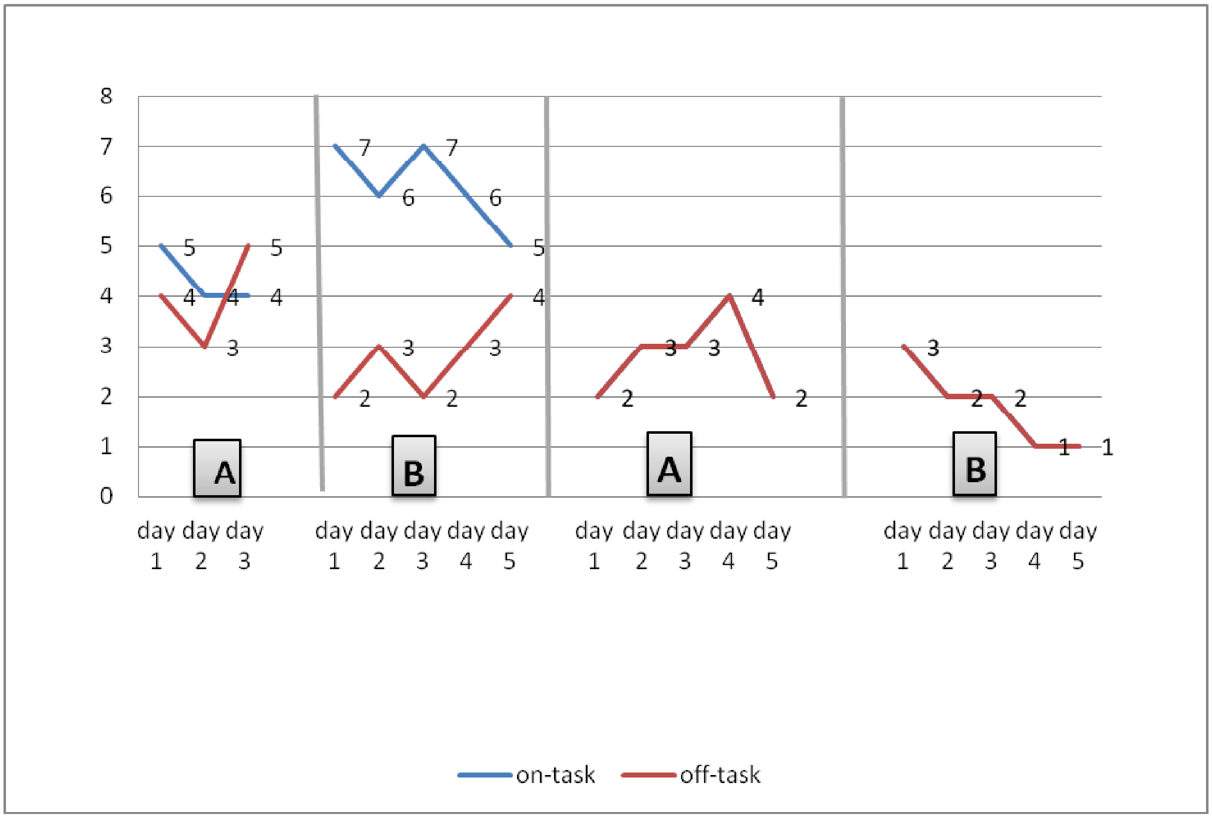


**Figure 12. QF's on-task and off-task behavior in math class**

QF's on-task and off-task behavior in math class ranged from 1-7 during baseline and intervention strategies.

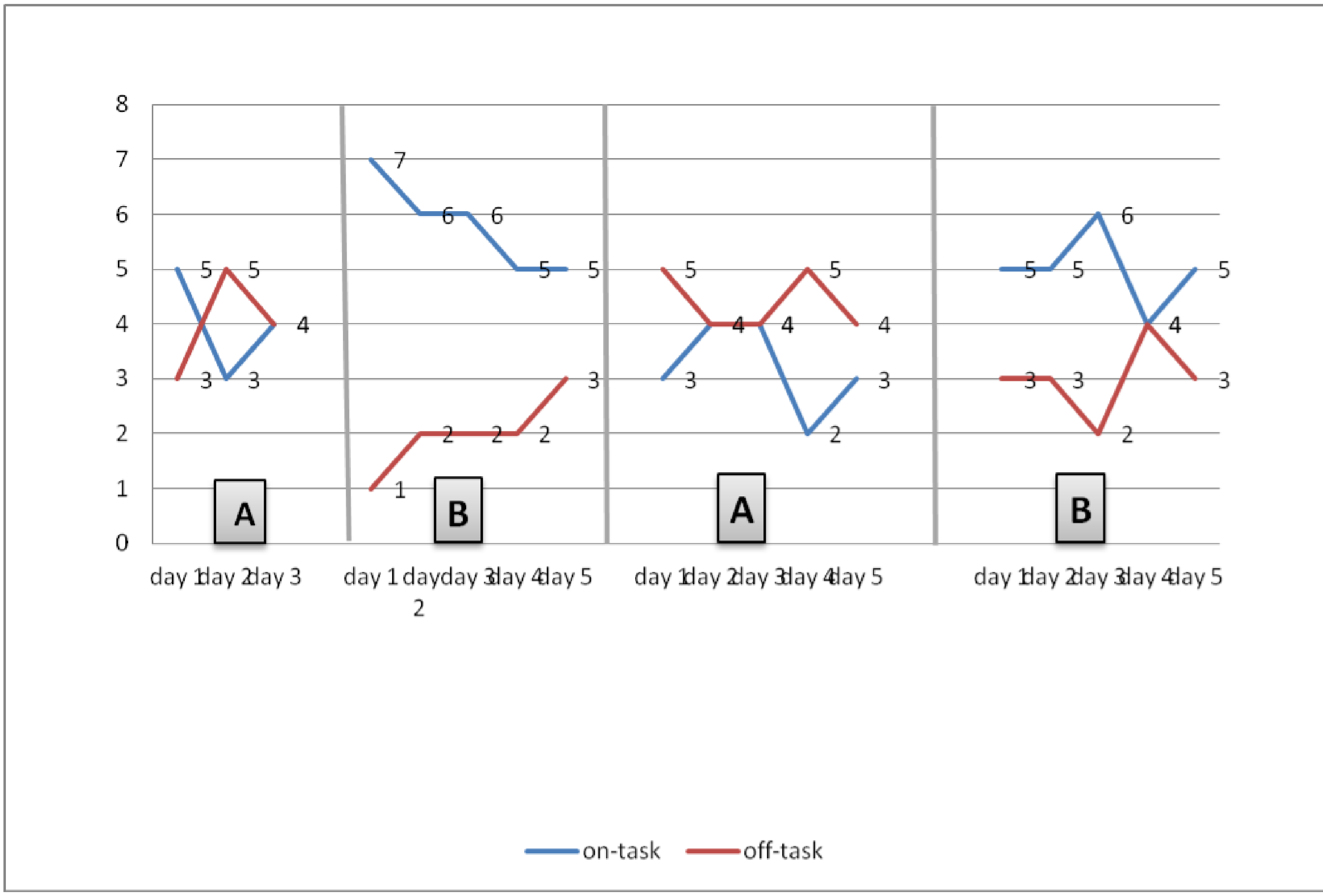


**Figure 13. AJ's on-task and off-task behavior in Language class**

AJ's on-task and off-task behavior in Language class ranged from 1-7 during baseline and intervention strategies.

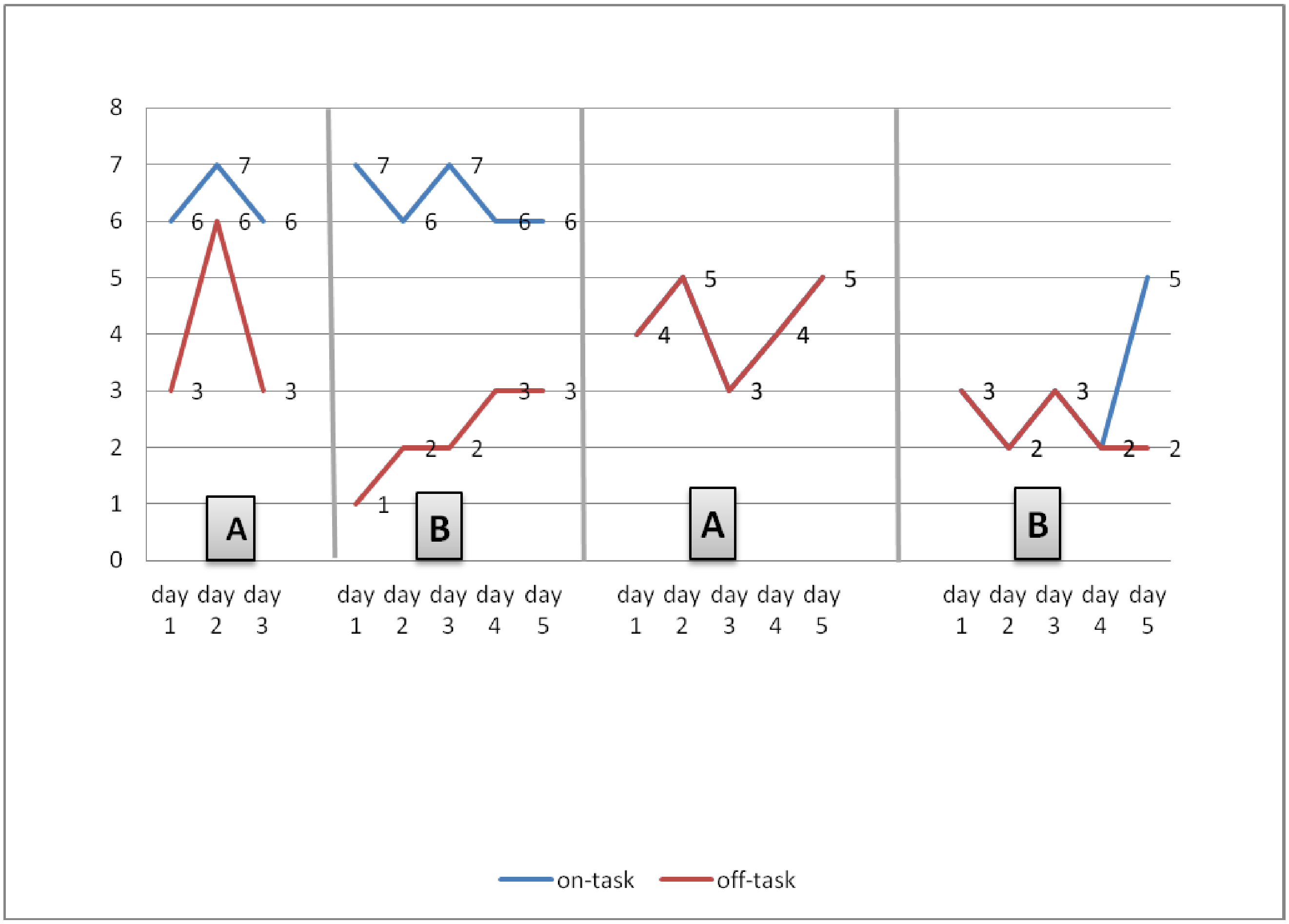


**Figure 14. AJ's on-task and off-task behavior in math class**

AJ's on-task and off-task behavior in math class during the first baseline and intervention varied. However, during the second baseline A on-task and off-task behavior were exactly the same. The behaviors during intervention B were the same in the beginning, but AJ's on-task behavior was significantly higher on the 5th day when answering questions in math class.

| Student names | Baseline A | Intervention B | Baseline A | Intervention B |
|---|---|---|---|---|
| JW | 92% | 96% | 88% | 97% |
| DC | 88% | 90% | 87% | 90% |
| SH | 75% | 80% | 78% | 81% |
| QF | 85% | 90% | 88% | 95% |
| AJ | 80% | 90% | 81% | 93% |

**Figure 15. Student Language assessment averages for each phase of the study**

Figure 15 represents average Language assessment grades for 5 participating students during baseline and intervention phases. There were a total of 18 assessments. The averages were calculated weekly.

| Student names | Baseline A | Intervention B | Baseline A | Intervention B |
|---|---|---|---|---|
| JW | 88% | 93% | 88% | 94% |
| DC | 85% | 86% | 85% | 86% |
| SH | 73% | 76% | 75% | 77% |
| QF | 88% | 90% | 89% | 90% |
| AJ | 78% | 80% | 80% | 81% |

**Figure 16. Student math assessment averages for each phase of the study**

Figure 16 represents average math assessment grades for 5 participating students during baseline and intervention phases. There were a total of 18 assessments. The averages were calculated weekly.

**Social Validity**.

Students were given a survey at the end of the study. The following questions were asked and their responses are included:

1. How did the clickers affect learning? All the students in the study stated that the clickers made learning more exciting. The graphics were fun to look at, and they loved the tools offered on the IWB. The types of questions were not too difficult, and no writing was involved, therefore, spelling issues were not a problem.

2. Did the use of clickers change the attitude toward instruction? The students stated that they liked using the clickers better than just having the teacher stand in front of the class talking all the time. They enjoyed the interaction with the IWB, and said the lessons offered on the IWB were more exciting than the lessons in the book. They enjoyed getting out of their seats using the pen and having access of the internet at their fingertips.
3. What areas of instruction do you think the teacher should include or eliminate? All of the students strongly stated that writing should not be a part of the lesson because it takes too long to complete assignments. They all agreed that more activities involving the internet should be used.
4. How do you think clickers would help other children? The students stated clickers can help students stay in their seats, not call out as much, and helps people who are shy to answer questions without being scared of the responses from others.
5. Do you think having clickers in the classroom decrease behavior problems? All students answered yes to this question. Students stated that clickers helped everyone to stay focused because some students like to do things with their hands. Clickers help students get rid of some nervous energy. They can push buttons and play with the clickers. The clickers are in anonymous mode that releases a lot of pressure. More students participate in class now because if they get a wrong answer, only the teacher knows, so no one feels embarrassed.

## Chapter 5

## Discussion

The purpose of the present study was to examine if the use of clickers decreased the level of off-task behavior of students with behavior problems in Language and math classes. The findings are limited to a small group of students in a self-contained classroom with one special education teacher. Students' participation and engagement levels were assessed. No previous studies systematically or empirically have explored the effects of student engagement in instruction using clickers for middle or high school students with behavior problems. This study attempted to explore this area to involve those students in class participation using SRS to reduce their inappropriate off-task behaviors. The results showed students' on-task behavior increased and off-task behavior decreased with the use of clickers.

A total of 18 assessments were completed in an 80 minute Language class and a 90 minute math class in an 18 day period for 5 students. Eight assessments were given without using clickers and 8 assessments were given using clickers in Language and math classes. There were two baseline and two intervention phases. Phase A or the baseline did not involve the use of clickers for Language and math classes for the first 3 days of this study. Phase B or the intervention involved the use of clickers in both Language and math classes for 5 days. The assessments were compared to determine if the clickers increased or decreased the behavior of students with behavior problems during instruction. This same intervention was retested using Phase A and B again in both Language and math classes for 5 days to determine if clickers impact student's behavior. The data collected for Phase B used clickers in Language and math classes a second time, and recorded more on-task behavior than that without clickers. Differences in student behaviors between clicker and non-clicker use were recorded to determine what kind of behaviors were displayed and the number of times behaviors occurred in an 80 minute Language class and a 90 minute math class period for 5 days. An online program called "Class Dojo" was used to track and recorded student behaviors and presented in a pie chart. All students showed an increase in on-task behavior using clickers. They were staying in seats longer, better participation and engagement, and completion of their assignments.

The first research question was on the effects of clickers in Language and math classes to increase the level of on-task behavior of students with behavior problems. The results indicated that students' on-task behavior increased with the use of clickers. All student responses to the teacher's questions were anonymous, using a clicker students were comfortable to answer the questions without being subjected to criticism from classmates. This makes their active engagement in the lesson; with less talking or distractions from other students. At the same time, students worked at their own pace to press the clicker and get immediate feedback from the teacher. This was very helpful and informative to all students. However, some problems have to be considered in order to increase student participation. For example, if the students received a good grade they cheered while the others might become upset at this "celebration." During class, the students were on-task, but the outbursts following the assessment results and feedback presented challenges for the teacher.

Results of a follow up survey indicated that students preferred the use of clickers. In class, students used the clicker to answer questions with multiple choices, true and false, and yes and no responses. There was little writing involved and the students could use process of elimination to obtain the answer. Misspelling and punctuation mistakes were not an issue, which relieved a lot of frustration and behavior problems. The anonymous nature of the clickers provided a comfort zone. Most students stated they gained more confidence by seeing the right answer, especially for math computation. If students did not see their responses, then they knew they had to re-do the steps to obtain the right answer. Students could only view his/her individual responses on his/her clicker; therefore, no one could tease or comment on the failures or successes of others. This may make students confident about their responses and comfortable in the lesson, with the pace, and with the questions and answers.

The second research question was on the effects of clickers decreasing off-task behavior of students with behavior problems in Language and math classes. The results indicated that the clickers were successful in decreasing off-task behavior. Clickers were a great visual and interactive tool for students to remain engaged in the lessons. Students remained on-task and their off-task behavior decreased as long as there was no writing involved. When students had to answer open-ended questions after a reading assignment, their off-task behavior increased. They complained about the need to write, and were reluctant to restate the questions and write in complete sentences.

Students' off-task behavior decreased using clickers due to short responses and the easy way to push a button to respond to the questions. Because there was no writing involved, they could work at his/her own pace.

Using clickers had its advantages and disadvantages. Some of the advantages of using clickers and an IWB served as a focal point for the teacher's elaboration and explanations. The students could go back and view the screen again and again. They got immediate feedback via a graph at the end of the assessment, and the clickers showed the number of problems that were incorrect. Students could not change their answers after the response was completed, but they could view what kinds of mistakes were made. This was a great teachable moment; and the students had to take responsibility for their own actions. All choices and decisions were made by individual effort, thus, they could not blame others for poor performance. Students realized the amount of time they put in to the lessons affected the outcome of their grades and behavior problems.

Some disadvantages of using clickers involved writing skills. When writing is required to answer open-ended questions, the clickers seem not useful, due to limited characters a clicker can store. Thus, clickers were not helpful for essay writing and long writing responses. The clicker assessment for writing could only be used to show punctuation errors which were intentionally misspelled, and the students had to click on the right response to make corrections. This strategy slightly improved academic skills, but improved behaviors significantly. Students' on-task behaviors improved and frustration level decreased.

The third question was on the use of clickers to promote teacher-student interaction to enhance student performance. The results showed student improvement in academics, because of their increased on-task behavior and engagement in lessons. There appeared to be a higher level of motivation to answer the questions when using the clickers. The students seemed comfortable to answer the questions, and responded in a positive way to the teacher's instruction when using clickers. They did not appear to be intimidated to answer questions and look foolish in front of their peers, especially to the student who frequently called out the answers. Using the clickers allowed for individual pacing and ensured that all students completed assignments in a timely manner. The interactive whiteboard (IWB) allowed the teacher to observe the students who answered the questions and who needed extended time. The response was in an anonymous mode to prevent pressure from other students to speed up the pace. The students preferred the clicker assessments because of the style of questions. The clicker questions were multiple choices, yes or no, or true and false, which required little writing. The non-clicker assessments had multiple choice questions and writing responses. The writing portion of the assessment caused negative student reactions. The students stated their displeasure in writing. This response to the writing portion of the assessment caused most of the off-task behavior. The clicker assessments do not accommodate writing. Perhaps, this is a major reason the students favor using clickers. There was no major difference in the quality of results in students' grades with or without clickers, but the level of on- task and off-task behavior was very different.

In addition, using clickers on the IWB gave the teacher baseline information based on the data. The teacher was able to monitor student performance academically and socially. The students' comfort level or feelings of safety when responding to questions posed via teacher's instructions increased using clickers. The anonymity of clicker responses relieved some student's fears of giving wrong responses in front of their peers. Also, the students were motivated to answer the questions using clickers correctly. At the end of the responses, the students could see what questions they got wrong. This extrinsic reinforcement caused a discussion between the student and teacher. Most students were motivated to improve their grades. The immediate feedback after their responses was a strong indicator of how to pace the instruction, and the types of questions that should or should not be used in the future.

The teacher was pleased with student behavior and motivation to the responses of the questions while using clickers. It appears that clickers have promoted active participation among the entire class. Every student had to respond and answer questions when using the clickers. To ensure that all students were interested or engaged in lessons, the teacher varied the level of difficulty among the questions. Sometimes the teacher did not show the results of their responses to the entire class because this caused frustration and disappointment to other students, especially if they did not do well on the assessment. Non-clicker use presented more frustration and behavior problems because one or two students always answered all the teacher's prompting or questions, while the others were disengaged during teacher-instruction without answering questions.  These students played in their desk or with objects, called out, or got out of seat, which caused off-task behavior to increase.

**Limitations.**

This Study some limitations.  First, the study only had five participants with one special education teacher.  It would be more instructive to compare the participants with their non-disabled classmates in a general education classroom, rather than in a self-contained setting.  Perhaps, the participants in this study could have benefited from peer buddies from their non-disabled classmates to help motivate and stimulate them to behave and respond better to different types of questions.  Second, financial obligations played a huge role in this study.  The special education classes did not have their own IWBs; therefore, the participants had to relocate during the study to get access to the IWB in the beginning of the study. This took participants away from the comfort of their own classroom setting.  During the second half of the study, the participants were back in their self-contain classroom.  Instead of using an IWB, the participants had to use a projector, which was connected to a lap top.  The participants could use the clickers to respond to questions, but they could not use any of the tools offered on the IWB such as the pencil, eraser, etc.  This function could only be controlled by the teacher.  Finally, writing lessons presented many challenges for both the teacher and students while using the clickers.  The clickers can only hold 8 characters at a time similar to a calculator with a small screen to view responses.    One button could be pushed per question.  Therefore, all responses were yes or no, true or false, or multiple choice, which allowed only one press of a button compared to writing an entire sentence.   The clickers used in the study seem not to be designed for writing, which is a major part of the curriculum.

**Implications.**

Elementary schools, middle schools, and high schools are changing constantly because of the advancement of technology in the students' learning environment.  Most classes have at least two computers in the classroom, but that is not enough to equip the students to be prepared for the technology demands in society.  The upper classes have IWBs in the classrooms, personal lap tops for the students, and software equipment to prepare them for success.  However, the special education classes, especially, self-contain classes do not have IWBs in their classrooms.  This is the population that can benefit the most from technology and hands-on activities.  In the study, we can see that students stated their strong pleasure in using the clickers and IWB.   Exposure to all the tools offered on the IWB could be the key to open the door of success for a student.  Administrators should take into consideration the students' preferences in their learning.  If their behaviors decreased with the clickers, then perhaps more money and time needs to be devoted to technology for special education teachers and students.  If the school district cannot provide IWBs for the special education classes, then perhaps include the special education students into the general education classrooms with peer buddies, a classroom aide, or an inclusive instruction to include those needy ones so that all students can be exposed to technology in major subject areas such as Language and math.

**Conclusion and Recommendations.**

Previous researchers have attempted to demonstrate the effectiveness of clickers by showing an increase in students' performances. An evaluation of the students' progress is necessary to determine if the assessment used was successful. One important point in this study was to ensure teacher- student interaction which promoted greater participation and engagement during instruction. Students voiced their strong preference for using clickers to provide their input into their learning. Teachers should take into count students' likes and dislikes to orchestrate positive, interactive, and engaging lessons. If the students are motivated they will participate in the learning activity the teacher instructs. The teacher on the other hand, must prepare for many situations which might occur in the lesson such as technical problems, organizational concerns, pacing of lesson, and different level of questions to ensure that students are on the level, and perhaps challenged, but not to the point of frustration. This study showed that students preferred the use of clickers and their off-task behavior decreased when using clickers. All students were engaged and participated in the lessons. The students looked for the immediate feedback after their responses, and their comments were very informative and helpful to the teacher. The teacher took students suggestions and incorporated them into the next lesson. The students' input made the lessons more engaging; therefore, the lessons were more student-centered which promoting more interaction and participation. Using clickers in the classroom promoted a higher participation in class, decreased off-task behavior such as calling out, walking around, and incomplete assignments.

My research indicates many positive benefits from using clickers. Teachers and students can keep up with the changing technological advancements and learn together. One key factor for success is student input. The teacher must evaluate the students' strengths and weakness, their interests, and academic levels. If the students are motivated, they will be engaged in the lesson, which in return, will decrease off-task behavior. Modifications should be made by differentiating the types of questions used in class. Teachers should practice technology skills before using the clickers to provide a smooth transition once the clicker assessments begin. Thorough explanations of instructions should be given to students with examples for clarification. I would recommend to other teachers to start with easy questions in the beginning to allow students to become familiar with the clickers and IWB. Once the students understand the functions of the clickers and IWB, then the level of difficulty in assessment questions should increase. The teacher should establish a rapport with students to discover how to pace the lesson, and what types of material will be most engaging for the students.

Also, I recommend to other teachers to keep the school's curriculum in mind when using clickers. Writing is a major part of the curriculum and this skill instruction cannot use the clickers. Therefore, the lessons should be planned accordingly. The teacher needs to use the clickers for certain types of questions and have time devoted for writing in class. Teachers should establish a routine with the students. If the students know that two days a week will be devoted to just writing skills, perhaps this will eliminate some behavior problems. Most off-task behaviors occurred when writing was involved. Students did not want to write in complete sentences, use appropriate planning such as outlining or constructing graphic organizers independently before writing a draft. This opposition for writing caused most of the off-task behavior. For future lessons, writing and grammar skills should be included in clicker use. Perhaps this could be done by intentionally misspelling words, leaving out capitals, and punctuation, etc. Students would have to click on the correct response, and perhaps rewrite the response on paper to work on penmanship and other writing skills.

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## Appendix A The Nina, the Pinta, and the Vanishing Treasure Reading Test

**Name____________________________ Date_____________________________**

**Match the vocabulary terms with the correct meaning below:** sleuth, contrary, situation, perp, collaborate, inspiration, detective, curator, accomplish, participate, evidence, exhibit, benefactor

1. This means to show or to display, usually at a museum __________________
2. This means you have to work together or cooperate with someone _________________
3. This word means the same as a detective __________________
4. I am a bad guy, so that means that I am a _________________.
5. I mean the opposite of something; I am __________________ to the law.
6. This word means a circumstance or a problem; we have a ______________ on our hands,
7. This is a divine influence or revelation ________________
8. You need to take part in an activity; you have to _________________, not look around.
9. The _________________ is the person in charge of a museum.
10. You need proof before you can solve a case, so you have to have strong _______________ to help solve the case.
11. This person makes a large gift to an organization he/she is a ____________________
12. A ___________________ is a person that looks for information or clues to solve a case.
13. I have __________________ everything that I started; so I have finished or produced a nice product.

**Circle the correct response below**

14. What were the names of the ships in this story

    a. The Pinta, the Nina, and the ghost ship

    b. The Nina, the Pinta, and the Santa Maria

c. The cruise ship, the voyager, and the treasure ship

15. Who was the famous person in this story that had a holiday and exhibit named in his honor?

    a. Michael Jordan

    b. Christopher Columbus

    c. Officer Flint

16. Why did Columbus call the Native Americans Indians?

    a. They wore feathers and very little clothing

    b. They look different from him

    c. He thought that he was India, so he called them ‘Indians”

17. Who were the two students who helped Alec solve the two cases?

    a. Jane and Gina

    b. Emily and Gina

    c. Gina and Roy

18. Synonyms are words that have the same meanings. What is another word for Homo sapiens?

    a. Trees

    b. Sap

    c. Crazy

19. What are other names for carbonated beverages and dishes from the text?

    a. Sodas and plates

    b. Plates and gas

    c. Sodas and things

20. How did Mrs. Jones' lesson help Alec solve the case?

  a. She told him to read the book

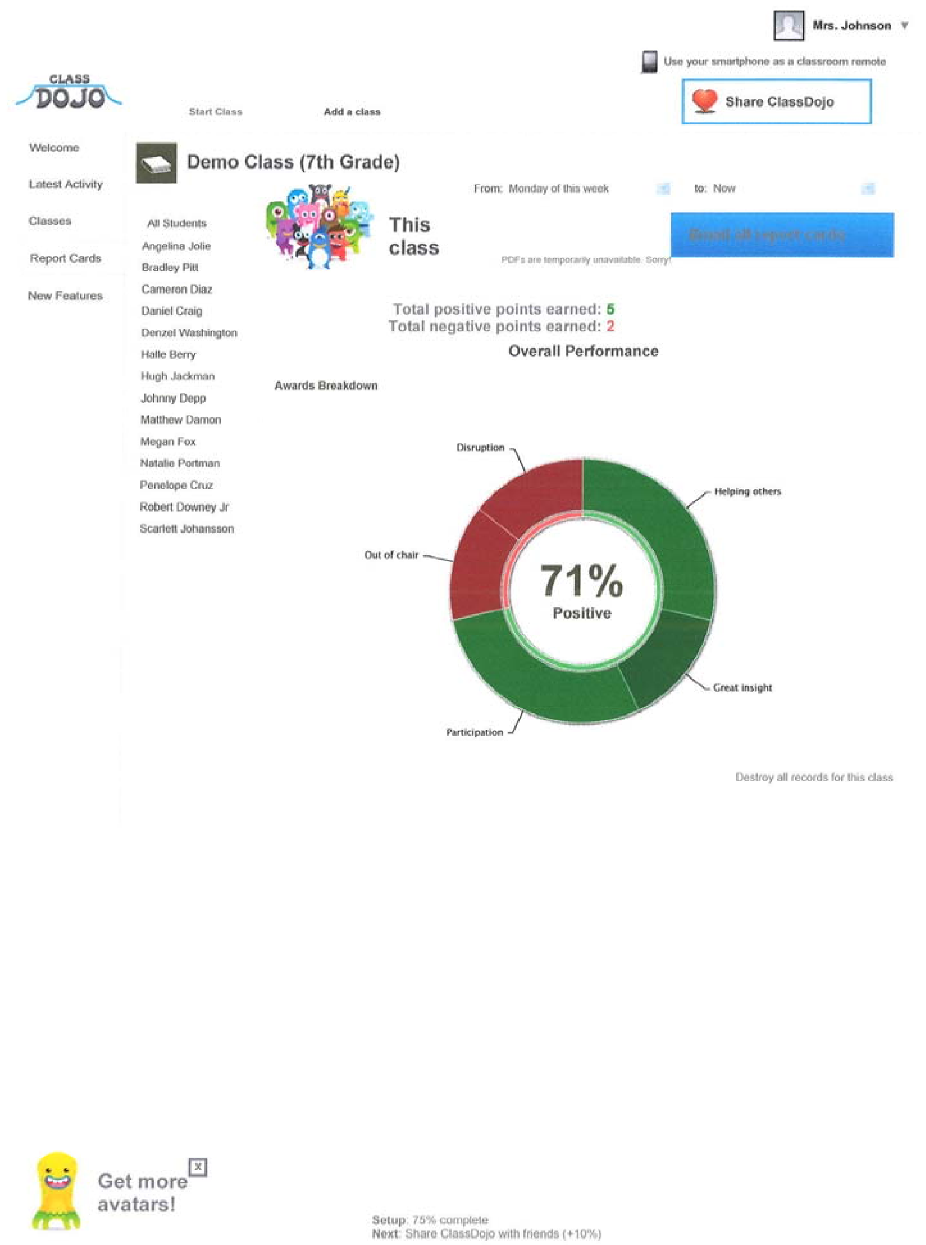
  b. She told him that animals were on the ship, not gold

  c. She told him that he needed to go talk to his father about the clues

**What was your favorite part of the story? Write a paragraph listing events (5 to 6 sentence at least)**

# Appendix B ClassDojo Sample Chart

ClassDojo#!/welcome#!/welcome Page 1 of 1



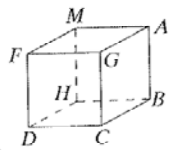

http://teach.classdojo.com/?utm_source=Main+teacher+list&utm_campaign=25f1bb7033-N... 5/9/2012

## Appendix C Geometry Math Test

# Chapter 7 Test

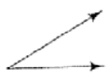
Go Online PHSchool.com For: Online chapter test Web Code: ara-0752

**Use the diagram for Exercises 1–3.**




1. Name all the segments parallel to $\overline{AB}$.
2. Name all the segments intersecting $\overline{FG}$.
3. Name all the segments skew to $\overline{DH}$.

**Use a protractor to measure each angle.**

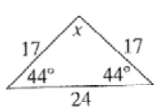
4. 

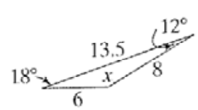
5. 

**Find the measures of the complement and the supplement of each angle.**

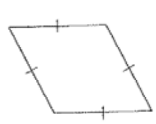
6. $m\angle H = 45°$
7. $m\angle R = 7°$
8. $m\angle K = 89°$
9. $m\angle P = 25°$
10. What is the supplement of a 102° angle?
11. Does a 98° angle have a complement? Explain.
12. Draw a segment. Construct its perpendicular bisector.
13. Draw a segment $\overline{AB}$. Construct a congruent segment $\overline{CD}$.

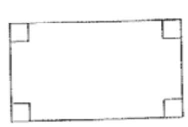
**Find the value of $x$ in each triangle. Classify each triangle by its side lengths and its angle measures.**

14. 


15. 

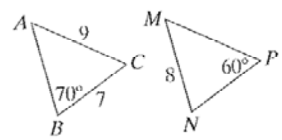

**Identify each polygon.**

16. 

17. 

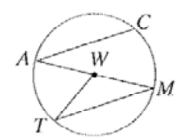
18. What is the name of a polygon with one pair of parallel sides?

**In the diagram below, $\triangle ABC \cong \triangle MNP$. Complete each statement.**




19. $\overline{AC} \cong$ ___
20. $\angle P \cong$ ___
21. ___ $\cong \overline{PN}$
22. $\angle B \cong$ ___
23. ___ $\cong \angle M$
24. $AB =$ ___
25. $m\angle N =$ ___
26. $MP =$ ___

**Name each of the following for circle $W$.**




27. three radii
28. two chords
29. two central angles
30. one diameter
31. three arcs shorter than half the circle
32. **Class Trip** Students earned the following amounts of money to pay the transportation costs of a class trip. Make a circle graph for the data.

| Fundraiser | Money |
|---|---|
| Car wash | $150 |
| Paper drive | $75 |
| Book sale | $225 |
| Food stand | $378 |

33. **Writing in Math** Briefly explain the differences and similarities among a rectangle, a rhombus, and a square.